THE UNIVERSITY OF STRATHCLYDE
DEPARTMENT OF MARKETING

Virtual Globals – Marketspace and the Internationalisation of Small Technology-Based Firms

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Dedication

Meinen Eltern

(To my parents)

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Abstract

This study explores the potential impact of the Internet's marketspace on the internationalisation specifics of small technology-based firms (STBFs) in Northrhine-Westphalia, Germany.

Utilising a multi-method approach, this study identifies several impacts of using the location-insensitive marketspace on the location-sensitive internationalisation process of STBFs in the marketplace. In particular, it was found that attitudinal, resource-related, information-related and network-related aspects of internationalisation were positively influenced. These effects facilitated, sometimes even enabled, the internationalisation of STBFs. STBF's direction of internationalisation was also influenced. Especially the foreign market selection of younger STBFs that used the Internet prior to their internationalisation was increasingly influenced by marketspace-related factors, potentially signalling a marketplace to marketspace shift for younger STBFs.

But despite these impacts this study also shows that the traditional location-sensitive marketplace still matters a lot. It is not substituted by the Internet's marketspace and the emergence of a new internationalisation mode. Also, the marketspace does not constitute a panacea in itself. The findings show that Internet use levels for international business matter rather than the mere adoption of this new technology. These use levels are in turn dependent on a firm's experience with the marketspace, dependent on Internet use at the industry and international business partner level and, more importantly, dependent on the STBFs' product and industry-sensitive business model. In particular, STBFs that can adopt an Internet-centric business model for their international operations profit from the facilitating characteristics of the marketspace.

However, the incremental internationalisation process characterised by expanding international orientations, strengthening resources and capabilities, gains in operational experience and characterised by the gathering of international business information remains. Although earlier and faster than in the past – in parts due to the Internet's marketspace – and although starting at higher levels of initial commitment – due to pre-inception resources accumulated by STBFs' founders – internationalisation in the marketspace-age still follows an incremental path.

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List of Abbreviations

ADT	Arbeitsgemeinschaft Deutscher Technologie- und Gründerzentren [Association of German Technology and Start-Up Centres]
BMWi	Bundesministerium für Wirtschaft [German Ministry for Economics]
CT	Communication Technology
DTI	Department of Trade and Industry
ed.	edited, editor/s
e.g.	exempli gratia (for example)
etc.	et cetera (and so on)
excl.	excluding/ exclusive
FDI	Foreign Direct Investment
ftp	file transfer protocol
http	hypertext transfer protocol
HW	hardware
IB	international business
ICT	Information and Communication Technology
i.e.	id est (that is to say)
incl.	including/ inclusive
IS	Information System
IT	Information Technology
MNE	Multinational Enterprise
NPD	new product development
OECD	Organisation for Economic Co-operation and Development
p.a.	per annum
PLC	product life cycle
sic	written in this way intentionally
SME	Small to Medium Sized Enterprise
STBF	Small Technology Based Firm
SW	software
TCP/IP	Transmission Control Protocol/ Internet Protocol
UIM	Uppsala Internationalisation Model
UNCTAD	United Nations Conference on Trade and Development
URL	Uniform Resource Locator
vs.	versus
v.v.	vice versa
www	world-wide-web

List of Symbols

Σ	sum
α	alpha (for Cronbach's alpha)
φ	phi (phi coefficient in 2x2 crosstables)
χ	chi (in the chi square statistics)

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Chapter 1: Introduction

Firms are consumers, producers, managers and distributors of information (Egelhoff, 1991; Casson, 1996). Furthermore, information use is an essential element of an organisation's activities in order to reduce uncertainty and equivocality about its external environment and its internal operations (Daft and Lengel, 1986). Consequently, it is not surprising that at the core of internationalisation process theory is lack of knowledge and subsequently uncertainty about markets abroad due to a lack of location-sensitive foreign market information (Johanson and Vahlne, 1977, 1990). The internationalisation process is in essence seen as a costly experiential learning process of information and knowledge accumulation that gradually reduces uncertainties about markets abroad.

Recent developments in location-insensitive information and communication technology (ICT) infrastructures, most importantly the Internet's marketspace, could therefore significantly alter firms' internationalisation by impacting this core process.

Ease of information gathering and communication is no longer a function of geographical proximity as originally suggested by Vernon (1966). Producers are no longer only aware of local innovations and markets. Due to the emerging global marketspace of the Internet, the "global scanner" (Vernon, 1979) is not necessarily confined to large multinational firms only. This is because the location specificity of knowledge (von Hayek, 1945) becomes more and more location independent on the Internet's marketspace. Small firms are also increasingly in a position to disseminate and scan for needed information on a global scale if they utilise this marketspace. A previously unavailable option that might not only impact their internationalisation process but it might also challenge traditional marketplace-based theories of the internationalisation process of firms.

Furthermore, history suggests that new technological innovations such as the Internet may exert as profound an influence on organisations as today's established technologies did when they were commercially introduced for the first time. The seminal historical business research by Chandler (1977) lucidly demonstrated that other technological innovations like the railroad, the telegraph, the development of continuous process machinery and mass manufacturing techniques enabled the emergence of large, centralised firms, the prototype of today's ubiquitous modern industrial, multidivisional organisation. The Internet's marketspace might have similar impacts on the organisation of economic activity.

This thesis will attempt to empirically investigate the validity of this argument in the context of small technology-based firms' (STBFs) internationalisation.

In doing so, this chapter introduces the present research context (section 1.1). Subsequently, it will present the general research goal of the study and its research aims (section 1.2). Working definitions of key terms used throughout the thesis will be given and the expected value of the research findings will be stated (sections 1.3 and 1.4). Finally, the structure of the thesis, including a brief overview of the key content of its chapters, will be outlined.

1.1 Research Context

As the proportion of small firms in the developed economies continues to increase (Brynjolfsson et al, 1994; Liu and Yang, 2000), the well-being of small firms is of increasing interest throughout Europe as Governmental research policies indicate (see for example: ENSR, 1997). It is based on the belief in their ability to generate employment and produce technological innovations (Rothwell, 1984; Aldrich and Auster, 1986; Acs and Audretsch, 1988; Vossen, 1998).

In particular, small firms' role as a source of innovation, especially during early stages of emerging technologies (Abernathy and Utterback, 1978; Rothwell, 1984), led to governmental support programmes for STBFs (Jones-Evans and Westhead, 1996; Baranowski and Raetz, 1998; Storey and Tether, 1998).

Although this view has been challenged recently based on inconclusive findings (see for example: Licht and Nerlinger, 1998; Tether, 1998, 2000), it is reasonable to conclude that, overall, STBFs play an important complementary role to large firms (Abernathy and Utterback, 1978; Rothwell, 1984; Laamanen and Autio, 1996). Furthermore, STBFs constitute an important qualitative stimulus for technological change and innovation throughout the economy (Bollinger et al, 1983; Licht and Nerlinger, 1998; YliRenko and Autio, 1998; Cooper, 2000; Tether, 2000), an important indirect impact beyond STBFs' direct employment and innovation impacts.

However, from their inception STBFs usually face a variety of organisational liabilities due to their age, size and technological-base. Overcoming these liabilities is vital for their survival. Due to the forces of globalisation, particularly in technology-intensive

industries (Archibugi and Michie, 1995), overcoming these liabilities often implies the early need for a STBF to internationalise, facing the additional liabilities of foreignness (Zaheer, 1995).

Succeeding in this contradictory imperative of early internationalisation needs despite facing organisational liabilities that severely limit this very process is therefore important for STBFs and their managers; usually the owner manager – the technical entrepreneur – or a team of founders (Cooper, 2000).

Recent developments in location-insensitive and less costly ICT infrastructures, most importantly the Internet's marketspace, could therefore significantly facilitate pursuing this contradictory imperative.

However, serious empirical studies on the organisational impacts of the Internet's marketspace, especially with an international business focus, are still in an embryonic state (Hamill, 1997; Samiee, 1998a, 1998b). Despite Quelch and Klein's (1996) pioneering article four years ago and despite theoretical claims of the Internet's marketspace revolutionising the internationalisation process of firms (Quelch and Klein, 1996; Ellsworth and Ellsworth, 1995, 1997; Hamill, 1997), there has been little attempt to empirically examine the specific role of the Internet's marketspace in the internationalisation of STBFs or small firms in general.

1.2 Research Aims

Following the introductory remarks above, it is the general research goal of this study to explore empirically the use of the Internet's marketspace in STBFs in order to assess whether Internet use can impact – and if so how – the internationalisation of STBFs.

It is the general thesis of this study that effective, high level organisational use of the Internet can support the internationalisation process by reducing information and resource related internationalisation barriers and thereby potentially impacting behavioural dimensions of the internationalisation of STBFs.

In addressing this, the following five research aims are to be investigated. These will be further developed and specified after the literature review.

1. To examine the current level of Internet use for international business and its determinants among STBFs.

2. To examine the internationalisation characteristics of STBFs, their manifestations and determinants.

3. To explore the role of the technical entrepreneur or venture team both in the internationalisation process of STBFs and in relation to the level of Internet use for international business.

4. To explore and assess the impact of Internet use levels for international business on the internationalisation characteristics of STBFs.

Since organisational use of the Internet's marketspace can also manifest itself externally in the form of a corporate website, research aim 5 is added extending the impact analysis of research aim 4.

5. To assess the levels of website implementation among website adopters and to explore potential internationalisation impacts.

1.3 Definitions

While more detailed definitions of key terms and their rationale will be provided in the following chapters, it is considered useful to provide working definitions here of the key terms used throughout this thesis.

Small Technology-Based Firm (STBF)

A STBF for the purpose of this thesis exhibits the following characteristics:

- fewer than 100 employees
- an independent status
- a high level of R&D intensity
- development of marketable, technology-based products

The Internet and the Marketspace

The Internet is the largest connected set of computer networks in the world. The two core characteristics that set the Internet apart from other technological innovations are

that it is global – it is universally accessible and globally interconnected – and it is digital. Due to its digital nature, the Internet can be simultaneously regarded as a global data and information source, a global communication infrastructure and a distribution channel of digitised products.

In order to distinguish the global, location-insensitive, virtual communication space (Culnan and Markus, 1987) that the Internet superimposes on the location-sensitive, non-mediated marketplace, Rayport and Sviokla (1994) have introduced the term "marketspace". Both terms, Internet and marketspace, are used interchangeably in this thesis.

Internationalisation

Internationalisation is both a process by which firms increase their *awareness* of the direct and indirect influences of international transactions on their future (Beamish, 1990) and a process of *adapting* exchange transaction modalities to international markets (Andersen, 1997).

1.4 Value of the Research

The findings of this research are of value to various audiences.

The value for the academic community mainly lies in an increased understanding of the currently limited knowledge about the marketspace and its impact on the internationalisation of firms. In particular, analysing this impact by focussing on the internationalisation specifics of STBFs addresses the scant attention in the literature on STBFs' internationalisation (Lindqvist, 1991; Fontes and Coombs, 1997; Berry, 1998; Preece et al, 1998). The findings of this study should therefore also contribute to a better understanding of the specifics of STBFs' internationalisation.

The value for policy makers stems from a better understanding of the marketspace's role in the internationalisation of firms. This should help them to formulate and implement more effective policies to optimise its potentially supportive use and to minimise potential barriers to effective use.

An understanding of the potential value of the Internet's marketspace for international business operations and, more importantly, how it can be realised is of value for practitioners. Particularly taking into consideration that up to now, most information

regarding the Internet's marketspace potential for small firms is mostly descriptive and purely anecdotal.

1.5 Structure of the Thesis

In addressing the above outlined research context and the research aims, the literature review part of this thesis (chapters 2-4) will be structured as follows.

Chapter 2 will review the literature on small firms in general and on STBFs in particular. Chapter 3 reviews the literature on the internationalisation of STBFs. The theoretical implications of the Internet's marketspace on small firms' internationalisation and the few empirical studies that have addressed some of these implications will be reviewed in chapter 4. Chapter 5 concludes and synthesises the literature review part of the thesis, develops the applied research framework for the empirical investigation and further specifies the research aims. Chapters 6-9 prepare, present and synthesise the empirical part of this thesis.

An overview of the structure of this thesis is presented schematically in figure 1.1 at the end of this introductory chapter. The key content of each chapter is briefly presented below.

Chapter 1

The introduction (chapter 1) has provided an overview of the topic of this thesis, its context and its structure. The general research goal of this thesis and its research aims have been stated and first working definitions of key terms have been provided. Furthermore, the value of this research for the academic community, policy makers and practitioners has been addressed.

Chapter 2

Chapter 2 will examine small firm characteristics in general and STBFs characteristics in particular. Besides more precisely defining a STBF and a review of the key organisational characteristics of small firms and STBFs, this chapter will include a review of the key decision-maker in STBFs: the technical entrepreneur or the team of founding technical entrepreneurs. It will be the goal of this chapter to highlight key dimensions and variables of STBFs, at both the firm and the owner-manager level.

Chapter 3

Chapter 3 will review the internationalisation of the firm after defining more precisely what is meant by the term internationalisation. An overview of the forces and impacts of globalisation will be given and theoretical developments in international trade and investment will be discussed. Critically reviewing and expanding theories and models of the internationalisation process of firms will form the focus of this chapter. The key characteristics of STBFs, as discussed in the previous chapter, and the few empirical studies that do exist will also be reviewed.

Chapter 4

Besides more precisely defining the Internet and the marketspace, chapter 4 will review ICT theories and empirical studies relating to the use of the Internet's marketspace in small firms. It will be the goal of this chapter to identify potential linkages between using the Internet's marketspace and the internationalisation process of the firm. Drawing upon the findings of the previous chapter (chapter 3), chapter 4 will therefore present an impact framework that will be further refined in chapter 5 and empirically assessed in subsequent chapters.

Chapter 5

Chapter 5 will integrate the key findings of the previous three chapters in order to present a research framework that will guide the subsequent empirical investigation. Based on this framework and the literature synthesis, chapter 5 will also further develop and specify the five research aims of this thesis. Presenting a set of specific research objectives for each research aim will do this.

Chapter 6

In chapter 6, a discussion of the applied research design will be undertaken. This chapter will contain a review of research methodologies and instruments and a justification of the chosen methodology. Furthermore, this chapter will present the findings of the exploratory research stage of this thesis, since these findings influenced the applied research methodology and its implementation. Besides presenting this implementation process, chapter 6 will also include a section on the operationalisation of the various measures used during the empirical investigation. Used interview guides and survey questionnaires will be presented and discussed, too.

Chapter 7

Chapter 7 will present the findings of the first two empirical research stages that addressed the research aims of this thesis: the survey of STBFs and the observational analysis of STBFs' websites. Besides discussing the findings, this chapter will also highlight potential findings-based implications for the post-survey interviews, clarifying and further exploring results that emerged from the survey data analysis.

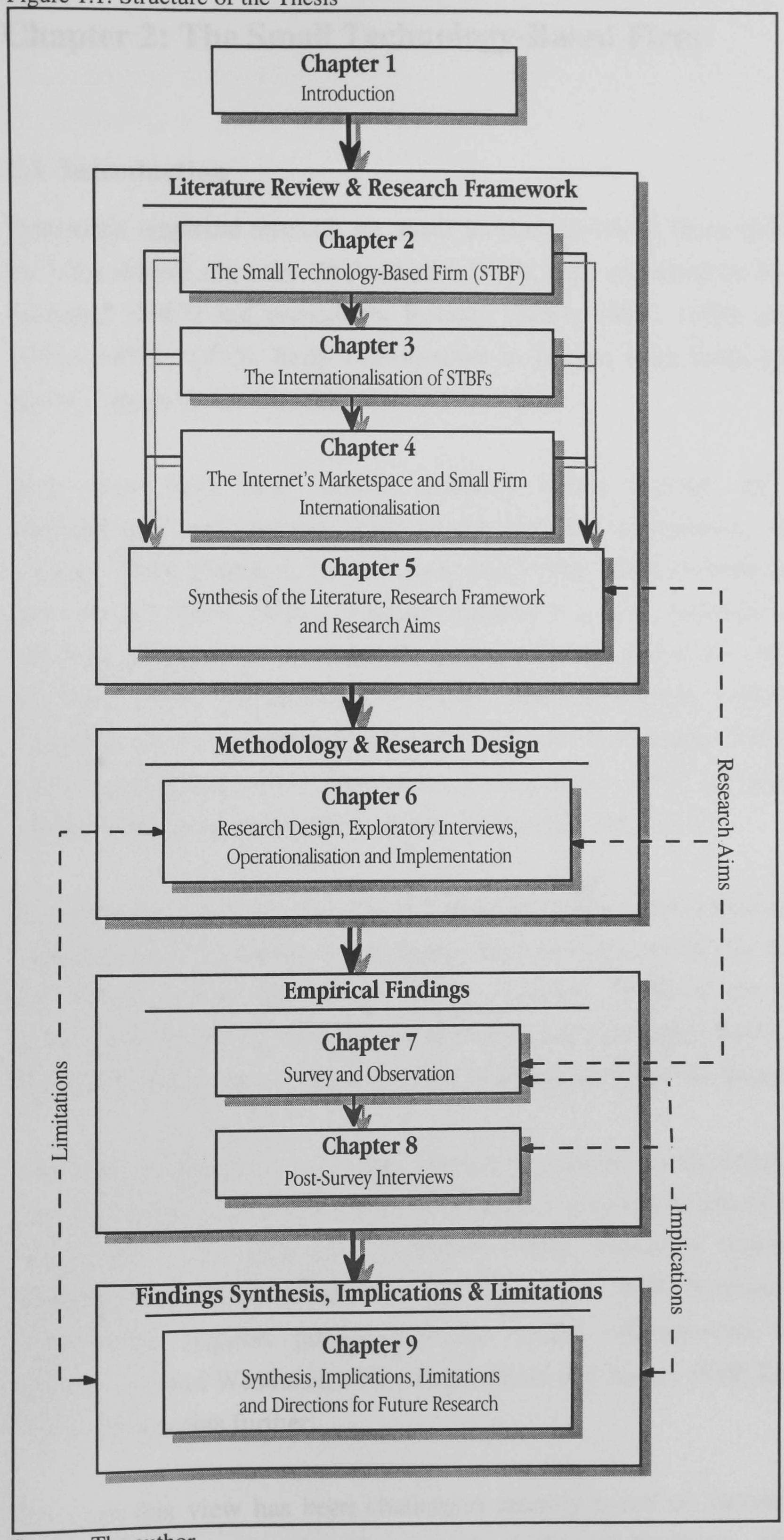
Chapter 8

Chapter 8 will develop the post-survey interview guide and presents the selection procedure of cases for the interviews. The specifics of this will be mostly determined by the outcome of the survey data analysis presented in the previous chapter. It will be the goal of this chapter to further clarify, validate and explore in a qualitative manner the quantitative findings of the survey analysis. This additional research phase is needed due to the rather exploratory nature of this study, which gives rise to the expectation that both unexpected significant, as well as unexpected insignificant findings will be discovered during the quantitative stages. The post-survey interviews will therefore explore these in order to clarify the potential cause or causes. This goal mainly relates to clarifying spurious correlations or relationships by uncovering explanatory third variables not covered or considered in the two quantitative research stages previously discussed.

Chapter 9

Chapter 9, the final chapter of this thesis, will present the key empirical findings of this study and will synthesise these to develop a model of marketspace-influenced internationalisation. Chapter 9 will also discuss the implications of this study's findings for research and theory, policy makers and practitioners. A discussion of its limitations and directions for future research will conclude this chapter, and this thesis.

Figure 1.1: Structure of the Thesis



Source: The author.

Chapter 2: The Small Technology-Based Firm

2.1 Introduction

Systematic empirical research on small technology-based firms (STBFs) emerged in the USA at least since the 1960s (Autio, 1997), with contributions by Schrage (1965), Susbauer (1967) and particularly Roberts (1964, 1968, 1969) and Cooper (1970, 1971a, 1971b, 1973). Early contributions in Europe were made by Watkins (1973) and in Canada by Litvak and Maule (1973, 1976).

Ever since these early studies, research mainly focused on the motivational characteristics and character traits of the founding entrepreneur (see for example: Schrage, 1965; Susbauer, 1967; Wainer and Rubin, 1969; Roberts and Wainer, 1971; Jones-Evans, 1995, 1996a), typically referred to as the "technical entrepreneur", the founding process (see for example: Cooper, 1971a; Arthur D. Little, 1977; Hansen and Bird, 1997), the financing of STBFs (see for example: Arthur D. Little, 1977; Hunsdiek, 1985), growth and success factors (see for example: Arthur D. Little, 1977; Cooper and Bruno, 1977; Hunsdiek, 1985; Oakey, 1995) and on the environment where STBFs emerge (see for example: Arthur D. Little, 1977).

Especially the later focus developed further into research interested in spatial issues and regional cluster formations along famous high-tech regions like the Route 128 (Roberts and Wainer, 1968) and Silicon Valley (Cooper, 1970) in the USA, as well as government supported foundations of science and innovation parks (see for example: Sternberg, 1990; Dierdonck et al, 1991; Staudt et al, 1994; Westhead, 1997).

This massive research interest into STBFs was driven by the belief in their ability to generate employment and produce technological innovations (Rothwell, 1984; Aldrich and Auster, 1986; Acs and Audretsch, 1988), especially during early stages of emerging technologies (Abernathy and Utterback, 1978; Rothwell, 1984). Various governmental support programmes for STBFs (Baranowski and Groß, 1994; Jones-Evans and Westhead, 1996; Baranowski and Raetz, 1998; Licht and Nerlinger, 1998) support this further.

Although this view has been challenged recently based on inconclusive findings or findings to the contrary (see for example: Licht and Nerlinger, 1998; Tether, 1998,

2000), it is reasonably to conclude that, overall, STBFs play an important complementary role to large firms (Abernathy and Utterback, 1978; Rothwell, 1984; Laamanen and Autio, 1996) and that STBFs constitute an important qualitative stimuli for technological change and innovation throughout the economy (Bollinger et al, 1983; Licht and Nerlinger, 1998; YliRenko and Autio, 1998; Cooper, 2000; Tether, 2000), an important indirect stimuli, beyond STBFs' direct employment and innovation impact.

Despite this immense interest in STBFs, literature examining the internationalisation of STBFs has so far received only scant attention in the literature (Lindqvist, 1991; Fontes and Coombs, 1997; Berry, 1998; Preece et al, 1998). This is surprising, because due to the forces of globalisation (see chapter 3) – particularly in technology-intensive industries (Archibugi and Michie, 1995) – the early internationalisation of STBFs has becomes more and more a competitive imperative than a competitive option (for more details see chapter 3).

Following the contingency view of the internationalisation of the firm as for example proposed by Reid (1983) – which views the internationalisation process of firms as contingent upon internal and external forces of a firm – understanding the internationalisation of a STBFs means understanding its internal, as well as its external characteristics.

Following this view it becomes obvious that an in-depth discussion and review of the key characteristics of this thesis' population is essential. Essential in order to understand and assess their internationalisation and it is essential in order to control for key determinants in the internationalisation process of STBFs. This should allow to evaluating the role and impact of the Internet's marketspace on their internationalisation process: the ultimate aim of this thesis.

The goal of this chapter is threefold.

The first goal is to define the population of STBFs as a basis for the empirical investigation.

The second goal is to understand the specifics of the population in order to facilitate the author's empirical investigation by isolating key characteristics of STBFs that need to be considered during the empirical stages of this thesis.

The third, last and indirect goal of this chapter is to demonstrate – together with the other two literature review chapters (chapter 3 and 4) – the fruitfulness to investigate the Internet's impact on the internationalisation of the firm within the specific population of STBFs, as opposed to an across sector, across firm sizes approach.

In order to address these goals, the chapter will be organised as follows.

Section 2.2 addresses the first goal and defines the term "small technology-based firm", by first defining the term "small firm" (section 2.2.1) and secondly defining the term "small technology-based firm" (section 2.2.2). Since one of the key dimensions that will emerge is "research intensiveness", section 2.2.3 will specify this organisational dimension in more detail.

Sections 2.3 to 2.5 address the second goal by reviewing key organisational (section 2.3 and section 2.5) and key environmental (section 2.4) characteristics of STBFs.

Section 2.6 concludes this chapter by summarising the key findings of each of the previous sections. This summary will subsequently be used in the literature synthesis in chapter 5 in order to develop the specific research objectives for the empirical investigation.

2.2 Definitions of Key Terms

This section defines the two key terms: "small firm" and "small technology-based firm". The definition of a small firm that follows below will form the basis for defining a STBF in the subsequent sub-section.

2.2.1 The Term: "Small Firm"

In reviewing the literature on small firms in general, the literature on STBFs, the literature on the internationalisation of small firms and the literature on ICT/ Internet use in small firms in particular, it becomes apparent that no universally accepted definition of what constitutes a small firm exists. Definitions vary by author, by research context and by the country origin of the study. Nevertheless, in order to ensure consistency, comparability and to allow for demarcation, it is necessary and important to state how a small firm is defined in this study.

The various attempts to define a small firm mainly differ in the number of criteria applied, the level of discrimination used and the interval size of each applied criteria, as well as in the quantitative or qualitative nature of the criteria applied.

The quantitative measures usually employed, either individually or combined, are the financial output measure turnover (see for example: Brooksbank, 1991) and, most frequently, the input measure number of employees (see for example: Small Business Administration [SBA], 1988; Institut der deutschen Wirtschaft [IW], 1990; Brooksbank, 1991; European Network for SME Research [ENSR], 1997; Bank of England [BoE], 1997; OECD, 1997).

While the range of each of these two criteria vary by countries and organisations (see table 2.1 and 2.2), even within a country definitions are not consistent and vary a lot. Reid (1982) for example cites a study in the US that found 75 different US definitions of what constitutes a small firm on a variety of measures.

Table 2.1: A Selection of Employment-Based Intervals Used to Categorise Firms

	micro	very small	small	medium	large
OECD ('97)	1–4	5–19	20–99	100-500	>500
EU (Mulhern, '95)	1–9	–	10–99	100–499	>500
ENSR, '97	1–9	10–49	50–250	>250	
UK (BoE, '97)	1–9	–	10–99	100–499	>500
Germany (IW, '90)	–	1–19	20–99	100–199/ 200–499	500–999/ >1,000
US (SBA, '88)	–	<20	20–99	100-499	>500

Source: The author, derived from the literature.

However, with regards to the input criteria number of employees, a general cut-off point seems to emerge, setting the maximum limit at less than 100 employees to define a small firm (see table 2.1).

As this thesis focuses on "truly" small firms and not SMEs, medium-sized firms are excluded. The reasoning for this approach – as this chapter will show – is that medium-sized firms are more likely to exhibit organisational characteristics that are different compared to small firms due to their size and age differences. These differences would necessitate a modified empirical investigation to be able to control for these differences, raising issues like firm-level investigations versus venture-level investigations (Cavusgil and Zou, 1994; Zou and Stan, 1998), the problem of the key

informant in organisational research (Phillips, 1981; Tomaskovic-Devey et al, 1994) and recall issues with regards to events that took place in the more distant past. Hence – following Buckley's (1989) notion that small firm definitions are not wrong or right, but more or less useful – focusing on "truly" small firms reduces the potential impact of these factors, as well as reducing the need to increase questionnaire items that could potentially reduce response rates.

Thus, the "common" upper limit of less than 100 employees (see table 2.1) will be applied, which is in line with various empirical investigations in this field (see for example: Culpan, 1989; Lindell and Karagozoglu, 1997; Keeble et al, 1998) and well above the observed median (10-20 employees) and mean size (over 50 employees) of STBFs in general according to a review by Autio (1997). As recommended (OECD, 1994) employee numbers will be based on full-time equivalent figures, in order to account for the common use of part-time employees in STBFs (see for example: Pfirrmann, 1999).

However, the employee size in small firms can vary significantly across sectors, which is reflected in some definitions differentiating small firm definitions by sector (see for example: Wilson Committee (1978) as cited by Buckley, 1989; Japan's definition of small firms as cited by Fujita, 1995a; OECD, 1997). As this study focuses on STBFs, the "across sector effect" is negligible, because within the specific industry sector of STBFs, the average employee size does not vary significantly across sub-sectors (Autio, 1997). Thus, the employee limit will be applied as an absolute limit to the whole population.

With regards to the financial output criteria based on a firm's annual turnover, the applied maximum levels vary more compared to the employment criteria (see table 2.2). Part of the problem with regard to these criteria is again sector sensitivity. It can for example be assumed that small firms operating in capital intensive industries that are highly international can achieve much higher turnover figures compared to small organisations in the primary sector (see for example: Wilson Committee (1978) as cited by Buckley, 1989; Japan's definition of small firms as cited by Fujita, 1995a; OECD, 1997). Thus, besides for governmental usage determining eligible firms for support programmes or tax incentives, a small firm definition purely based on turnover maximums across sectors is of limited value.

Table 2.2: A Selection of Turnover Categories Used to Define a Small Firm

	turnover
Brouthers et al (1996)	$1m – $1bn
Culpan (1989)	< $ 5.0m
Rabino (1980)	< $10.0m
Calof (1993)	< $50.0m
UK 1981 Company Act	< £ 1.4m
Brooksbank (1991)	< £ 2.5m
European Investment Bank	< £50.0m

Source: The author, derived from the stated literature and Berry (1993).

But even when used within specific industry sectors, applying the turnover criteria alone can lead to other problems. One empirical investigation (Kirpalani and Macintosh, 1980) for example used a maximum of annual sales of $30 million as the only delimiting variable. This led to an inclusion of a wide range of firms from a structural, employee size perspective. In this particular case it ranged from 17 to 1,000 employees. Following the interval sizes as stated in table 2.1 this range included very small, as well as large firms, making their findings hardly representative of what is usually considered to be a small firm. In addition, setting an upper turnover limit or using any other financial indicator as a cut-off point (for example annual profits) might conceal interesting information about highly successful (in monetary terms) small firms. Therefore, no excluding turnover dimension or any other similar financial output dimension that gives an indication of the operational, monetary success (or failure) of a small firm is included in this thesis' definition. A procedure which is in line with other empirical investigations in the field (see for example: Jones, 1998; Keeble et al, 1998).

Both quantitative measures discussed so far lack important structural, qualitative variables (see below). A reliance on purely quantitative measures has thus been criticised and it was suggested to add qualitative criteria to enhance the definition of a small firm (Brooksbank, 1991).

The qualitative variables used to define small firms usually refer to ownership and management aspects (Corsten, 1987), as well as market aspects (Bolton Committee, 1971) and organisational structures (Wittlage, 1987).

A much-cited report carried out by the Bolton Committee in 1971, founded by the UK government to examine the small firm sector of the UK, used a combination of

qualitative criteria. A small firm according to this report was viewed as exhibiting the following characteristics (as cited in Buckley, 1989):

1. market share:	a small firm's share of the market is relatively small, so that its activities cannot influence market prices or national quantities of goods sold to any significant degree
2. independence:	the owner manager has independent control of the business; small firms that are a subsidiary of a larger firm are thereby excluded
3. management style:	the owner manager actively manages the firm in a personalised way with little delegation of authority

Such purely qualitative definitions can be criticised on several grounds. Stanworth and Curran (1976) for example noted that the concept of market share in the Bolton's Committee definition is not clear. Small firms specialising in serving specific market niches could for instance have significant market shares. Furthermore, it can be stated that the assumed independence of the owner manager is seldom observable (Berry, 1993). Reliance on external funding, for example in the form of venture capital, is quite common among STBFs (Storey and Tether, 1998), thereby reducing the degree of complete independence of the owner manager. Additionally and more importantly, the lack of information available on ownership and management styles in firms, contributes a significant methodological drawback (Stanworth and Curran, 1976). Incorporating measures to assess these characteristics in the present study, although it is unlikely that respondents would reveal them, would lead to an increase in questionnaire items potentially reducing response rates and adding little relevant value to the objectives of this study. The same holds for organisational structures as a defining variable in this definition.

However, a significant distinction between small firms in relation to their independence exists with regards to their affiliation to other, particularly larger companies. Subsidiaries of larger domestic or international firms need to be excluded (see also the Bolton Report definition above), as they normally do not exhibit the classical characteristics of small, independent firms due to differences in access to resources supplied by the parent company. Excluding subsidiaries in small firm research is regarded as a common research practice (see for example: Arthur D. Little, 1977; Bamberger, 1989; Bell et al, 1998a).

It becomes evident from the above discussion that either purely quantitative or purely qualitative criteria in isolation are not satisfactory to capture the main characteristics of a small firm. A combination of both measures is needed in order to delineate the small firm and its activities from larger economic organisations.

Hence, the following definition of a small firm is proposed, which will be applied in the empirical investigation of this thesis.

A small firm meets the following criteria:

- *organisational size*: a small firm is defined as having less than 100 full-time employees
- *independent status:* subsidiaries of other organisations regardless of their size are excluded

2.2.2 The Term: "Small Technology-Based Firm" (STBF)

Although plenty of research on technology-based firms from different academic disciplines and with different foci has emerged ever since the first contributions in the 1960s (see the introduction to this chapter), it is surprising to find no standard definition based on their organisational characteristics. Different terms like:

- "small technology-based firm" (see for example: Forrest, 1990; Sternberg, 1990),
- "new technology-based firms" (see for example: Bollinger et al 1983),
- "new, technology-based firms" (see for example: Autio, 1997),
- "high technology small firm" (see for example: Oakey, 1991),
- "small high-tech firms" (see for example: Lang, 1996),
- "early-stage technology-based firms" (see for example: Preece et al, 1998) or
- "young technology-based firms" (see for example: Klofsten, 1997)

are usually all used to refer to the organisational population of relatively young and relatively small firms with a technological base at their core.

However, as each of these terms – taken literally – address different salient organisational dimensions like age (new, technology-based firms; young

technology-based firms), size (STBFs) or the "quality" of the technological base (small high-tech firms; new technology-based firms), the definition of a STBFs for the purpose of this study will have to address, define and incorporate these three dimensions.

Size

The size dimension of the STBF has been addressed in the previous section and will therefore not be discussed further. STBFs as defined in this thesis, exhibit all the variables as stated in the definition of a small firm, in addition to the characteristics to be discussed below.

Age

As noted in the above section, various authors stress the organisational age of the studied population of technology-based firms. However, strictly speaking a new technology-based firms is different to a new, technology-based firm, with the latter referring to a young firm and the former referring to the "newness" of the technological base of the firm.

Although organisational research has noted the close relationship between the age and the size of an organisation early on (Starbuck, 1965) – that is large firms tend to be older than small ones or, to put it another way, organisational smallness is often coupled with organisational newness (Aldrich and Auster, 1986) – relying on age alone as a defining dimension can be misleading.

For example, Arthur D. Little (1977) in their landmark study of new technology-based firms in the UK and Germany have used a definition of their population by only relying on their age; besides a technological-base as a defining parameter. This definition led to including a broad variety of firms from a size perspective, ranging from 25 to over 1,000 employees. It can be inferred from the sheer differences in size that key organisational structures will vary a lot, influencing the organisational operations of these firms. Without controlling for these dimensions, any finding on organisational outcomes like the internationalisation of a firm and its organisational performance would be misleading.

Since the age and size of an organisation often intertwines as stated above, one might not consider the age dimension as a limiting and defining element, given the limiting size dimension as set in the previous section. However, following Starbuck's (1965)

distinction between organisational growth, that is an increase in size, and organisational development, that is change in an organisation's age, both dimensions need to be considered, particularly since the importance of the technical entrepreneur (see section 2.5) tends to diminish as the firm develops (Klofsten, 1997).

In order to control for the potential neglect of additional key determinants in the internationalisation process of STBFs that might increasingly emerge as the firm ages (for example issues of succession and top management change), it is argued here that an investigation into the internationalisation of new and young STBFs is different to an investigation into the internationalisation of established or old STBFs. Each in need of different sets of salient variables to be investigated in the course of the empirical inquiry and in need of a slightly different research design. Thus, following the definition of STBFs by Lindqvist (1991), an upper age limit of not more than 25 years will be applied. Although any upper age limit is questionable – when is a firm young and when is it old? – Lindqvist's age limit is well above the age maximum of most studies (see table 2.3), thus keeping the range wide enough to allow for comparisons with other empirical findings and for an analysis of the potential effects of age. In addition, in an organisation of maximum 25 years of age the likelihood is still high to find and identify the original founder or a member of the founding team, knowledgeable about the complete history of the firm since its inception. This reduces the recall problem noted earlier.

Table 2.3: A Selection of STBFs' Age Maximum in Empirical Investigations

	age range in sample	**used as a criteria**	**age stated**
Lindqvist (1991)	≤ 25 years	yes	explicitly
Meyer and Roberts (1986)	≤ 18 years	no	implicitly
Cooper and Bruno (1977)	≤ 16 years	no	implicitly
Tyebjee (1994)	≤ 15 years	no	implicitly
Preece et al (1998)	≤ 15 years	no	explicitly
Fontes and Coombs (1997)	≤ 15 years	yes	explicitly
Lamont (1972)	≤ 11 years	no	explicitly

Source: The author, derived from the literature.

"Quality" of the Technological Base

Besides the size and the age as a key defining variable for STBFs, their technological base is another key variable (Jones-Evans, 1996a).

Technology specificities or technology characteristics usually relate to the level of technology, or to the difference of what has been popularly called "high-tech" versus "low-tech" or "no-tech".

Throughout the STBFs literature, it is inevitable to notice a more or less explicit high technology focus (see for example explicit high-technology foci in studies by Cooper and Bruno, 1977; Smith and Fleck, 1987; Oakey, 1991, 1993, 1995; Berry, 1993; Lang, 1996; Tether and Storey, 1998). However, although the term high-technology is frequently used in the literature, no strict definition of the term exists and a lot of confusion exists about the term and its operationalisation, mainly due to its multi-dimensional nature (Felsenstein and Bar-El, 1989).

Additionally, as technology becomes more and more a fundamental strategic resource in firms (Granstrand, 1998) and as technology is increasingly playing an important role in all aspects of small firm competitiveness (OECD, 1993), in a way more and more firms are becoming technology-based firms (Granstrand, 1998), making distinctions increasingly difficult.

Nevertheless, three sources of technology in an organisation can be identified (Capon and Glazer, 1987), facilitating the definition:

– *product technology*	technology embodied in a product,
– *process technology*	technology involved in the process of product creation,
– *management technology*	technology associated with selling the product, as well as administering and managing the overall business

Following this classification of technology, a STBF is an organisation that emphasises and utilises in-house research and development (R&D) and the exploitation of technical knowledge that manifests itself in the creation and selling of marketable product and/or process technology. Yet this does not imply solely in-house R&D, but it includes external R&D like contract R&D and co-operative R&D with other firms, both typical for STBFs (see for example: Roberts, 1990; Forrest, 1990; Lang, 1996).

Also, this does not imply that the STBF has to manufacture its technology-based products internally. The actual production can and often will be outsourced due to the

usual lack of capital for investing in expensive production machinery in the first years after inception. Lindqvist (1991) for example found that 53% of "small" STBFs (less than 20 employees) sub-contracted their production, with only 17% of "small" STBFs producing completely in house. In contrast, STBFs with more than 50 employees were more likely to have complete in-house production (40%), with only 12% of firms still completely sub-contracting their production.

Since "... small firms operating in high-tech industries often compete in ways that are fundamentally different from their low-tech industry counterparts." (Covin et al, 1990) and in order to reflect the high-technology focus that is pertinent in the STBF literature, STBFs are therefore defined as research intensive. A definition which follows the notion of other authors in the field (see for example: Bollinger et al, 1983; Storey and Tether, 1998), which implicitly includes the characteristic intrinsic uncertainty of technology development (Bender, 1986; Teece, 1996) and which avoids the controversial discussion of what constitutes high-technology and what does not constitute high-technology and its related problem of time. As noted by Butchart (1987), today's high-tech might already be tomorrow's low-tech.

In line with Cooper (1971b) and more recently Hoffman et al (1998), pure service firms will be excluded due to their unique nature, particularly in the internationalisation context (Buckley et al, 1992; Chadee and Mattsson, 1998) of this thesis. However, it is acknowledged that the selling and marketing of technology-based products usually involves services to some degree, which will be controlled for in the empirical investigation.

In contrast to Cooper's early definition of a STBF (Cooper, 1971b), software (SW) firms – often viewed as service firms (see for example: Brouthers et al, 1996) – are not excluded, since they can produce a tangible product. SW products' storage is tangible, that is the computer chip, the CD-ROM or the computer disc embodying the programmers' code. Moreover, including SW firms is particularly interesting in the context of this thesis, since SW products are currently among the few products that are 100% digitisable. A potentially important factor with regards to using the Internet as a global distribution channel (see chapter 4). Pure SW service firms like SW consultancies are however excluded.

In summary, taking the definition of a small firm developed above into consideration and combining it with the specifics of technology-based firms, a STBFs exhibits the following characteristics:

– *organisational size*:	a STBF is defined as employing less than 100 full-time employees (full-time equivalent)
– *independent status:*	subsidiaries of other organisation regardless of their size and location are excluded
– *organisational age*:	a STBF is less than 26 years of age
– *R&D intensive:*	a STBF is research intensive and conducts in-house R&D, as well as external R&D and co-operative R&D
– *product/ process technology:*	a STBF develops and sells marketable, technology-based products and/or process technology

Pure service firms, pure retailers or distributors of technology-based products and non-profit organisations are obviously excluded by this definition.

2.2.3 Defining Research Intensiveness

The definition of a STBF given above defined it as research intensive. This section specifies this definition, in order to allow surveying the population in a systematic manner. While the organisational parameters size, age, independence and the marketing of self-developed products can be easily operationalised and assessed (see chapter 6), research intensiveness is not as clear-cut an organisational dimension and viewed quite differently in the literature.

Research intensiveness, as well as the related and often interchangeably used terms high-tech and innovativeness are viewed differently in the literature. These different approaches can be identified and categorised into internal approaches and/ or external approaches. The internal approaches usually distinguish between input and output factors at the firm level and/or at the industry level (see for example Butchart, 1987; OECD, 1994). The typical input factors used are R&D expenditure as a percentage of production, sales or industry value added (Felsenstein and Bar-El, 1989; OECD, 1994), with R&D expenditure as a percentage of sales being the most common operationalisation (Butchart, 1987; Symeonidis, 1996).

The second typical input factor used is based on human capital input, operationalised in terms of the number or percentage of scientists, engineers or other personnel working in the R&D function of a firm (Bender, 1986; Butchart, 1987; Felsenstein and Bar-El, 1989; Symeonidis, 1996). The typical output factor of the internal approach is the number or percentage of patented innovations (Arthur D. Little, 1977; OECD, 1994; Symeonidis, 1996).

External approaches on the other hand usually take a more qualitative approach at the supra-firm level. Regarding operating at the boundaries of current knowledge (Bleicher, 1983; Bender, 1986) and an unforeseeable, volatile and unplannable marketplace (Arthur D. Little, 1977; Bleicher, 1983; Bender, 1986; Meer and Calori, 1989) as characteristic factors of research-intensive firms in technology intensive industries.

For the purpose of this thesis, the qualitative factors at the supra-firm level of the external approach are less applicable due to potential operationalisation problems for the survey stage of this study and particularly due to this thesis' firm-level focus. Thus, the operationalisation of research intensiveness follows the internal approach at the firm level. Input and output factors are suggested within this approach. However, the typical output factor number or percentage of patents has been criticised (Symeonidis, 1996; Arundel and Kabla, 1998; Lanjouw et al, 1998), due to differences in the propensity to patent an innovation across industries, product and process innovations, and firms. Since R&D intensity and patent propensity was found to be relatively unrelated (Arundel and Kabla, 1998) and since it was also shown that the propensity to patent increases with firm size (Arundel and Kabla, 1998; Mogee, 2000) – STBFs are thus less likely to patent their innovations compared to larger technology-intensive firms – it was decided not to use this indicator and rely on input factors instead. But because actual expenditure on R&D in the case of STBFs can be inadequate for measuring technical intensiveness – STBFs do not have significant sales in their early years and their R&D expenditure is heavily influenced by their resource poverty (Eisenhardt and Schoonhoven, 1990) – it was decided to use both input measures: the most common "R&D expenditure as a percentage of sales" and the less sales sensitive measure "percentage of employees working in the R&D function of the firm". This measure was also deemed appropriate because of the often informal nature of R&D in small firms (OECD, 1994; Symeonidis, 1996; Roper, 1999). A factor that is better captured by the second indicator. Suggested distinctions across products within firms (Grupp, 1995) were not followed, since the majority STBFs are unlikely

to be multi-product firms, due their liabilities (see below). Thus, an aggregate measure at the firm level is considered suitable.

In order to finalise the operationalisation of research intensiveness, one additional aspect needs to be discussed. The cut-off point for both measures.

Similar to what measures to use, no clear cut-off points for each measure exist and any chosen cut-off point is regarded as somewhat arbitrary (Butchart, 1987). Particularly problematic is that the suggested cut-off points, for example for the R&D sales intensity measure, are all at the industry rather than at the needed firm level. Grupp and Münt (1998) and Licht and Nerlinger (1998) suggest for example to use +3.5% above the industrial average as "high-tech" and +8.5% above the industrial average as "leading edge". Also, no clear guidelines do exist regarding the relationship of the two adopted measures. Are firms only research intensive when they rank high on both measures? Or is it sufficient if they rank high on only one of the two measures? Due to the absence of clear guidelines for both measures at the firm level, it was decided not to use any clear cut-off points ex ante. Therefore, the respondents' mean R&D intensity on both measures will be compared ex post to the high-tech firms cluster mean values as identified by Felsenstein and Bar-El (1989) – one of the few studies that not only conceptualised the assessment of research intensity at the firm level but it also assessed and validated it empirically – and other studies that investigated STBFs. This comparison will allow assessing the samples' research intensiveness compliance.

After defining STBFs and research intensiveness, the following sections will review key characteristics and influential factors of STBFs in order to address the second and the third goal of this chapter.

2.3 The Liabilities of STBFs

While a review of all the organisational variables of STBFs, its sources and effects would be clearly beyond the scope and focus of this thesis, this section focuses upon four characteristic dimensions and its impacts on STBFs: their age, their size, their technological environment and the characteristics of their key decision-maker, the technical entrepreneur.

As was noted in section 2.2, due to the correlation between the age and the size of a firm, STBFs are not only smaller, but on average also younger than larger,

technology-based firms. This poses the question whether differences on those two dimensions result in additional differences compared to larger technology-based firms or whether STBFs are "just" younger clones of larger organisations on a small scale.

Due to their characteristic dimensions, organisational researchers have referred to liabilities of age and size to characterise small and young firms (Aldrich and Auster, 1986). Each of the two dimensions and its implications will be briefly discussed below. However, it should be noted that these two dimensions are not completely unrelated, since smallness if often coupled with newness (Aldrich and Auster, 1986).

2.3.1 Liabilities of Age: STBFs and the Liabilities of Newness

Liabilities of age refer to liabilities of newness and liabilities of ageing (Aldrich and Auster, 1986), with the former referring to new and young organisations and the later referring to older organisations. Due to the focus of this thesis on small and relatively young technology-based firms, liabilities of ageing will not be discussed and the following paragraphs will focus on the liabilities of newness.

Stinchcombe (1965) coined the term "liabilities of newness" in his seminal article "Social Structure and Organizations", referring to a general rule of a higher proportion of new organisations failing compared to more established organisations. This observation has been empirically validated in various studies (Aldrich and Auster, 1986; Hannan, 1998; Nucci, 1999), although industrial, strategic and environmental contingencies play a significant role with regards to organisational failure rates (Romanelli, 1989; Henderson, 1999).

In addition, empirical findings by Brüderl and Schüssler (1990) and Kale and Arditi (1998) have also shown that the liability of newness does not follow a monotonic decline in mortality rates, but that an initial period of low risk, that is a low organisational mortality, is observable. Brüderl and Schüssler (1990) argue that this initial period of low risk relates to the founder's "will to survive", as well as to the initial stock of resources at a firm's inception. Ceteris paribus, the higher the initial resource endowment of a firm the longer this period will be, which the authors have referred to as the "liability of adolescence". Thus, the initial resource endowment of a firm is important in understanding its subsequent national and international operations. This notion was further supported by an empirical investigation that has found a system of positive returns with regards to the firm's initial founding state. It was shown that the effects of the founding team and its resources grows over time,

increasing the gap between large, small firms and small, small firms (Eisenhardt and Schoonhoven, 1990).

Stinchcombe (1965) gives the following reasoning that make up and effect the degree of this liability. With regards to internal factors, the author states that the founding of a new organisation involves the creation of roles that are new for the newly hired organisational members. This process of role definition involves defining their mutual relationships and defining organisational rules. This process is time consuming and therefore costly, but necessary in order to establish routines and generate organisational experience, thereby stabilising the organisation as a going concern. This formation process is further rendered more difficult by the fact that "[n]ew organizations must rely heavily on social relations among strangers." (Stinchcombe, 1965), with trust and loyalty among the organisational members being at the stage of developing rather than already existing.

In addition to these internal forces, the liability of newness also effects the interaction with a firm's environment. This external aspect of the liability of newness was shown to be more critical to survival than the internal aspect of the liability of newness (Singh et al, 1986). Stinchcombe (1965) notes that "[o]ne of the main resources of old organizations is a set of stable ties to those who use organizational services." This observation, which is an early precursor of today's discussions regarding the importance of a firm's network relationships, underlines the importance for new organisations to not only create trust internally, but also externally through developing relationships with important actors in its environment like suppliers, business partners and customers. Therefore it is not surprising to find that establishing a positive corporate image is viewed by managers as one of the most important competencies for small firms in general (Gabele and Moraw, 1994). In the case of establishing external links with established organisations, a recent investigation by Stuart et al (1999) has actually shown that new ventures can benefit from such links, as it endows them with organisational legitimacy due to an implicit "status transfer" from these more established organisations. Thereby reducing their liabilities of newness.

Besides the sociological aspects of the external aspect of the liability of newness, other authors (see for example: Meer and Calori, 1989: Garnsey and Wilkinson, 1994; Hoffman et al, 1998; Storey and Tether, 1998) have also noted the importance of external links for STBFs. These links are also important in order to overcome the liabilities of smallness, STBFs' second characteristic.

2.3.2 Liabilities of Size: STBFs and the Liability of Smallness

Besides the above mentioned importance of external linkages due to STBFs newness, external links are also important due to the internal "resource poverty" that is so characteristic of small firms in general (Welsh and White, 1981).

Establishing ties with larger, resource richer organisation helps to overcome, or at least reduce, this poverty as these ties can buffer small firms from environmental uncertainty (Aldrich and Auster, 1986; Golden and Dollinger, 1993) and supply them with external expertise and information (Baum et al, 2000). Due to the typical intrinsic uncertainty of technology development (Bender, 1986; Teece, 1996) and the rising costs of R&D (Granstrand, 1998), this observation is even more pronounced in the case of STBFs. Therefore it comes as no surprise that relationships to larger firms are quite common in technology-intensive industry sectors (see for example: Smith and Fleck, 1987; OECD, 1993; UNCTAD, 1993; Fujita, 1995b; Licht and Nerlinger, 1998; Pfirrmann, 1999).

However, it should be noted that the opportunities to overcome or reduce the liabilities of newness and smallness offered by establishing ties with other organisation, have to be judged against the potential pitfalls of such links (De Meyer, 1999). Particularly too high a dependence on a small number of partners or even only one partner can be counterproductive (Pavia, 1990; Miles et al, 1999). Besides the danger of the dominant partner switching to other firms, loss of core assets, skills and technology are other potential traps, as was demonstrated forcefully in a case study by Garnsey and Wilkinson (1994).

2.4 Liabilities of Innovativeness: STBFs and the Initial NPD Process

All small firms face the discussed liabilities of age and size. But STBFs face yet another liability that is less pronounced in the case of non-technological small firms. This liability, which might be termed "the liability of innovativeness", relates to the initial new product development (NPD) process, that is the time-span of the first product development until its launch in the marketplace. Of course, this liability also relates to subsequent NPD processes reflecting the already noted typical intrinsic uncertainty of technology development, but taking the set age limit of a STBF into consideration it can be assumed that the initial NPD process is on average the most crucial.

In contrast to for example pure service firms or distributors who can start their "output operations" right away, STBFs seldom start their operations with a marketable product, usually it still has to be developed. In one of the earliest investigations, Susbauer (1967) for example reported an initial NPD of on average two years. The implications of the earliness of the initial NPD are obvious. A speedy market launch helps a new STBF to gain early cash-flow, gain market share, visibility and legitimacy, thereby increasing the likelihood of survival and decreasing the liabilities of newness (Schoonhoven et al, 1990).

But a paradox becomes apparent. On the one hand, in order to be competitive a STBF would be better off developing an innovative, unique product, thereby potentially increasing the initial NPD time and endangering the venture's survival. On the other hand, a less innovative product potentially reduces the initial NPD time-span, but weakens a firm's competitive position from its start. Research has found support for a relationship between innovativeness of a product and waiting time (Schoonhoven et al, 1990). A study by Keeley and Roure (1990) found an optimum time of about 10 months for initial NPDs. Shorter NPD times, the authors went on to argue, are apparently associated with less innovative product features, while longer NPD times can increase the odds of market shifts, closing "windows of opportunity".

However, besides being a potential indication of the degree of innovativeness embodied in the product, the time difference between a STBF's date of inception and its initial product launch, can also be an indicator of inefficient management within the STBF. Keely and Roure (1990) found for example only a weak relationship between product superiority and development time. Therefore, caution is needed in interpreting this time difference. Furthermore, as noted by Oakey (1995), initial NPD lead times are sub-sector specific. For example, Smith and Fleck (1988) report that in biotechnology firms, the relatively long and heavy financial expenditures needed to develop a product is a key determinant in the strategies of such firms.

The differences in capital requirements become obvious when one considers the investments needed to develop cutting edge products in the biotechnology sector compared to the software sector. While producing cutting edge SW products needs not much more than a well-equipped PC and good programming skills, biotechnology-based firms need to invest much more in expensive analytical machinery.

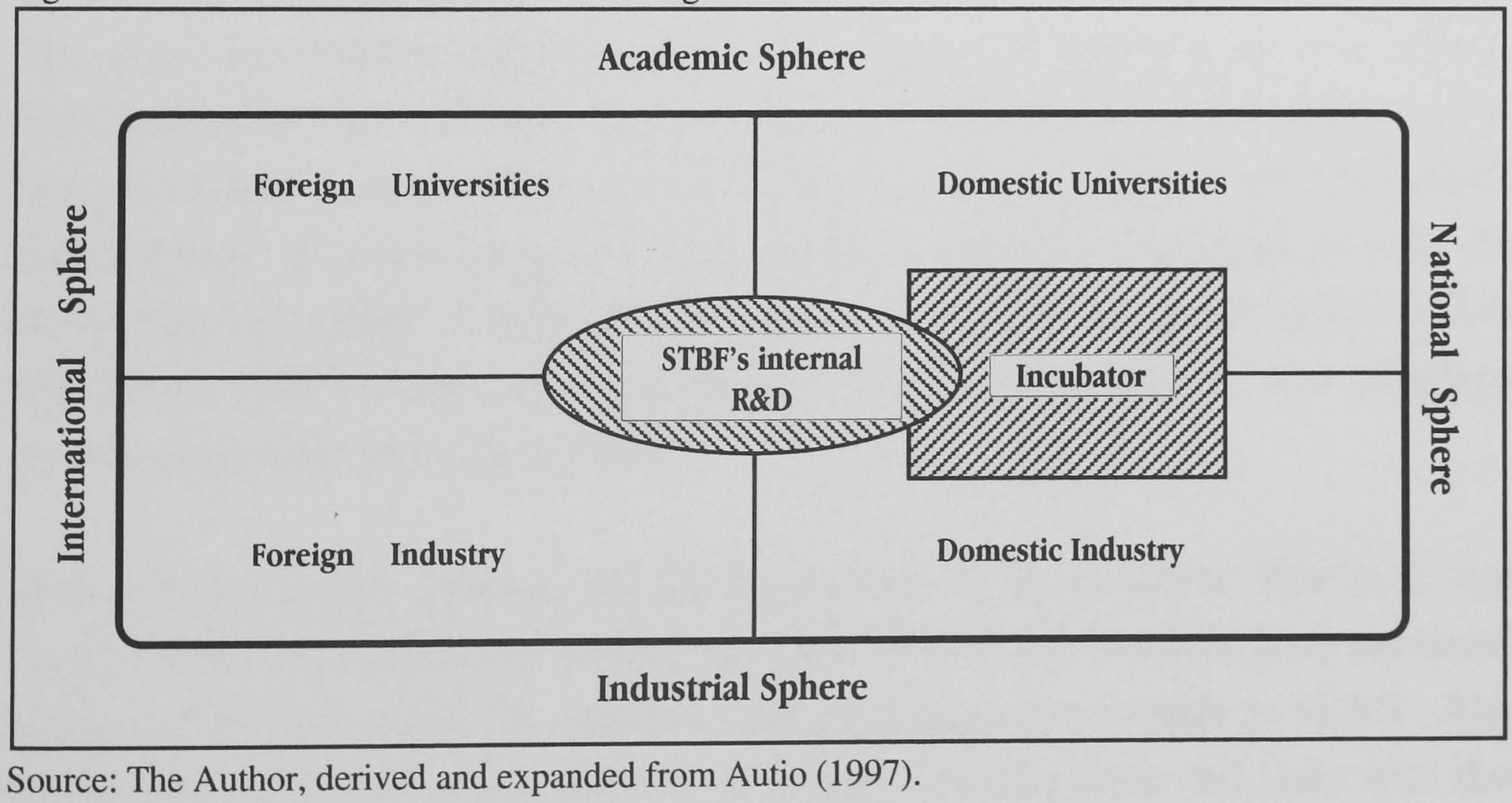
In sum it can be concluded that it is important to take the initial NPD into account in order to correctly assess the time-related dimensions of the internationalisation of STBFs (see also chapter 3).

2.5 The Technological Environment of STBFs

Besides the influential organisational dimensions of age and size, a STBF is also strongly influenced by the technological environment it is embedded in (Autio, 1997).

The technological environment can be defined as networks of interacting agents involved in the development, diffusion and utilisation of technology. Networks that are not necessarily confined to the domains of any particular industry or economy and that are not solely driven by market forces (Autio, 1997; he termed it a technological system). While such systems are very complex and a STBF is connected to it in various forms of technology transfer mechanisms (Autio, 1997), for the purpose of this review the main input channels and output channels of technology in such systems are of importance (see figure 2.1).

Figure 2.1: Dimensions of STBFs' Technological Environment



Source: The Author, derived and expanded from Autio (1997).

2.5.1 The Incubator and the Pre-State of STBFs

It was noted early on in STBF research that the pre-inception phase, the "pre-state", of the STBF is very influential. Cooper (1973) in his review on technical entrepreneurship for example synthesised that STBFs tend to exploit technology or

markets similar to the firm the technical entrepreneur worked for before founding his own business. This organisation is referred to as the incubator, whereas the incubator is only the organisation the technical entrepreneur worked for before he founded his venture, although he might have worked for more firms (Cooper, 1971b). The term organisation was used here deliberately, because the incubator can be an academic organisation (for example a university or a non-commercial research laboratory) or an industrial organisation (see figure 2.1).

The importance of the incubator is apparent throughout the literature ever since the first studies, which also relates to the observation made above that STBFs tend to engage in close external relationships to overcome their liabilities of size and age.

Cooper (1971a, 1971b, 1973, 1986) notes that the location and nature of the business of the STBF is strongly influenced by its incubator. Similarly, Eisenhardt and Forbes (1984), comparing technical entrepreneurship in the USA, UK, Japan and India, also noted the existence of an incubator as a key influential factor. Feeser and Willard (1990) even found that STBFs in which the technical entrepreneur develops and markets technologies similar to the incubator achieved higher levels of growth.

But not only do STBF exploit technology or markets similar to that of the incubator, they might also transfer technology from the incubator to their new venture. Besides first observations by Roberts (1968), Lamont (1972) and Litvak and Maule (1976) later also found a considerable amount of transfer of technology from the technical entrepreneurs' previous employer. Such transfers included technological skills and knowledge "embodied" in human resources. In a Canadian sample of STBFs, Litvak and Maule (1973) found for example that 20% of their sample also employed personnel recruited from the incubator.

Oakey (1995) further substantiated the importance of the incubator firm in a more recent study. He found in his sample that over 50% of the founders have previously worked in the same sector. In electronics the percentage was as high as 81.8%. Also, his findings show that nearly 50% of his sample (43.8%) have still links with their previous employer, 61.4% of these links being of a formal (business) nature and either research related (11.3%), as a customer (30.2%) or as a supplier (11.3%). Hence, not only does the incubator influence the nature of the technology and the business a STBF operates in, but the incubator can also play an important role in the post-inception

operations of a STBF, from both a technology input, as well as technology output perspective.

Nevertheless, it should be noted that it is likely that the influence of the incubator diminishes over time, as the STBF grows and develops and as other and/or additional input factors and output markets emerge. However, taking the set age limit of STBFs in the definition into consideration, the incubator, pre-state influence is supposed to be disproportionately higher compared to more mature technology-based firms.

2.5.2 Output Specialisation and Market Niches

STBFs usually market and sell their products and services to other industrial firms (Smith and Fleck, 1987). Their typical product/ market strategy is to operate in less crowded market niches addressed by a core technology (Meyer and Roberts, 1986) and highly specialised products (Smith and Fleck, 1987; Hoffman et al, 1998). A focus strategy which often correlates with positive economic performance (see for example: Meyer and Roberts, 1986; Feeser and Willard, 1990; Schitag Ernst & Young, 1998). In Oakey's (1995) study for example, 74.5% of respondents stated to operate in a single industry. Oakey also found that 50% of his sample dispatched over 50% of their output to a single customer in their first year of formation. Although product customisation was not reported, it can be assumed that the typical strategy of customer specialisation of STBFs (Autio, 1997) often goes hand-in-hand with product customisation, since organisational flexibility and adaptability, due to a lower degree of organisational task specialisation, is a key advantage of small firms (Starbuck, 1965; MacMillan, 1975; Abernathy and Utterback, 1978; Aldrich and Auster, 1986; Fiegenbaum and Karnani, 1991; Chen and Hambrinck, 1995).

This typical niche market approach is an important aspect of STBFs. A particularly important determinant for their international orientation and internationalisation process that will be further discussed in chapter 3.

Besides the liabilities of STBFs and their influential technological environment, the characteristics of the STBF's key decision-maker, the technical entrepreneur, is another key determinant due to small firms' high degree of centralisation in general. The degree of centralisation, which represents an organisational dimension measuring the concentration and locus of power and control in an organisation (Dandridge, 1979), is characteristic for small firms in a way that was most forcefully articulated by MacMillan (1975), stating that: "[i]n small businesses the owner *is* the business."

Adapted to STBFs it implies that the technical entrepreneur of the STBF is the business. Hence, in order to understand STBFs, it is essential to understand the technical entrepreneur.

The next section will review the main variables relating to the technical entrepreneur as a specific type of owner-manager in small firms.

2.6 The STBFs Owner Manager: The Technical Entrepreneur

In line with MacMillan's (1975) notion, research on STBFs noted early on that the primary asset and key person in a STBF is its technical entrepreneur (Roberts, 1968; Cooper, 1973; Cooper and Bruno, 1977). Not only are his motives and goals, his skills and capabilities of importance, but also his personal contacts based on his previous experience are important and often the initial source of customers (Smith and Fleck, 1987).

Technical entrepreneurship refers to the foundation of a technology-based firm (Schrage, 1965; Cooper, 1973). Hence the technical entrepreneur is the founder or co-founder of a technology-based firm. However, as noted by Roberts (1968), technical entrepreneurship can also be related to internal technical entrepreneurship within a large organisation, nowadays termed "intrapreneurship" (Jones-Evans, 2000). In this thesis, technical entrepreneurship refers only to the former definition. Also, in the literature a distinction is sometimes made between managers and entrepreneurs (see for example: Carland et al, 1984). For the purpose of this thesis, the manager who owns and/or (co-)founded a STBF is called the technical entrepreneur, regardless of an actual entrepreneurial orientation.

The technical entrepreneur has been analysed from different perspectives. Watkins (1973) categorised these approaches into an analysis of genetic factors, factors relating to his family, as well as his educational background and factors relating to his previous career experiences. To this categorisation, the psychological levels needs to be added, since several researchers have looked at the motivational and aspirational forces driving technical entrepreneurs (see for example: Schrage, 1965; Wainer and Rubin, 1969; Roberts and Wainer, 1971; Litvak and Maule, 1973; Litvak and Maule, 1976). However, the psychological characteristics and/or the family background that might influence his motivations will not be discussed or considered further. It is the outcome of these variables that is relevant to this study, not their psychological roots.

Following this categorisation, the next section will discuss studies relating to the background of technical entrepreneurs.

2.6.1 The Pre-State of the Technical Entrepreneur: Pre-Inception Experience

Following the arguments made earlier with regards to the importance of the incubator, the background of the technical entrepreneur tends to be either in industrial or academic research, a standard observation since Schrage's (1965) first observation. However, it should be noted that a more recent empirical investigation by Jones-Evans (1995) has broadened this simple binary typology to include additional types of technical entrepreneurs without a research and science background (the user and opportunist technical entrepreneur). Still, since it is usually difficult for an entrepreneur to promote and market a new technology on which his venture is based if he or she has not a very good knowledge of the technological potential and features of it (Oakey, 1995), at least a high level of education is usually a key characteristic of the technical entrepreneur (Roberts and Wainer, 1971; Litvak and Maule, 1976; Kets de Vries, 1977; Bollinger et al, 1983; Hoffman et al, 1998; Storey and Tether, 1998; Cooper, 2000). This is an observation that has to be seen in contrast to the "average" entrepreneur, who is not so well educated (Stanworth and Curran, 1976). Usually this education is obtained in the incubator as discussed above.

The gained experience of the technical entrepreneur prior to founding the STBF shapes his post-inception expertise and skills. Previous research showed for example that the technical entrepreneur with an academic incubator background is less likely to have been exposed to managerial skills and that he is less business oriented (Samsom and Gurdon, 1990). In contrast, the technical entrepreneur with an industrial incubator background tends to exhibit a stronger business orientation with a higher level of management experience (Knight, 1988).

Several empirical research projects have focused on the previous experience of the technical entrepreneur. But while the previous experience of an owner-manager can impact the firm in several ways, most studies analysed its impact on venture performance (Jo and Lee, 1996).

One of the earliest studies is probably Lamont's (1972) matched-pairs study. Lamont (1972) compared a matched sample of 24 technology-based firms located in a science

park. 12 firms were first generation spin-offs founded by technical entrepreneurs without previous entrepreneurial experience, while the remaining 12 firm were second generation spin-offs founded by technical entrepreneurs with previous experience in the foundation and management of a STBF. His investigation clearly showed a positive effect between the technical entrepreneurs' experience and the performance of the STBF, with the second-generation spin-offs experiencing greater rates of sales growth and an earlier achievement of profitability.

Yet, the conclusion that previous experience in general is positive is misleading. Though Lamont's (1972) study showed early on that technical entrepreneurs can learn from experience and that is leads to higher performing STBFs, empirical findings are mixed (Starr et al, 1993; Reuber and Fischer, 1994, 1999; Jo and Lee, 1996; Jones Evans, 1996b).

Starr et al (1993) argue that the mixed findings are in parts due to methodological problems. An "average" entrepreneurial experience, which is assumed by most modern multi-variate analysis methods, does not exist and due to its multi-faceted nature, it can be measured along various dimensions (see table 2.4) and this variety in measures can lead to mixed findings (Reuber and Fischer, 1994, 1999). Differences in the level of the analysis (Reuber and Fischer, 1999), for example an analysis of the founder versus an analysis of the whole management team, further complicate comparisons.

Table 2.4: Examples of Measures of Entrepreneurial Experience

• number of previous ventures
• the role played in these ventures
• start-up experience
• managerial experience
• experience in a specific functional area/ line of business
• high growth experience
• experience in the same industry
• prior venture performance (for example successful/ not successful)
• prior joint experience of founders
• years in earlier business

Source: The author, derived from Keeley and Roure, 1990; Starr et al, 1993; Jo and Lee, 1996; Reuber and Fischer, 1999.

Schoonhoven et al (1990) for example found that experience in the same industry had a positive effect on performance, as well as previous experience in a start-up. This finding is shared by other investigations, observing that related experience is

supportive (Cooper and Bruno, 1977; Jo and Lee, 1996; Jones-Evans, 1996b). On the other hand, Keeley and Roure (1990) and Van de Ven et al (1984) only found an insignificant relationship between industry experience and performance.

Taking the above discussed views and findings into consideration, it becomes apparent that the previous experience of the owner-manager has mixed effects. These effects can be positive, as well as negative, depending on what dimensions of experience are measured. In a case study-based investigation into high-tech entrepreneurs, Starr and Bygrave (as reported in Starr et al, 1993) found support for this notion and concluded that previous successful entrepreneurial experience can be an asset, as well as a liability (see table 2.5).

Table 2.5: Assets and Liabilities of Entrepreneurial Experience

Assets	**Liabilities**
• expertise	• biases and blinders
• relationships	• strong ties
• reputation	• success syndrome
➠ reduced liability of newness, smallness and adolescence	➠ increases liabilities of staleness, sameness, priciness and costliness

Source: The author, derived from Starr et al, 1993.

Furthermore, each venture is unique due to different contextual elements (Starr et al, 1993; Reuber and Fischer, 1994) and it is probably less the quantity of experience but the quality of experience that is of importance (Starr et al, 1993).

A study by Reuber and Fischer (1994) incorporated the qualitative aspect of experience. With a reference to learning theory, they theoretically argue that it is not the experience per se, but the expertise gained through experience, which differs from individual to individual. It is this expertise that potentially influences the performance of a firm. Their empirical findings supported this notion: expertise was more strongly correlated with performance than experience.

However, as argued by the vary same author in one of their later works (Reuber and Fischer, 1999), even the value of pre-state expertise can be limited or even negative in non-stable environments. In such dynamic environments some (even all) of the pre-state expertise of a technical entrepreneur may become obsolete and therefore of little value for post-inception stages of the STBF.

It thus becomes clear that although the pre-state experience and expertise of the technical entrepreneur is an important aspect that needs to be considered in the empirical investigation, its assessment in a statistical sense is not so straightforward. This aspect will be further addressed in chapter 6.

Also, chapter 3 will expand on this observation by relating the importance of the technical entrepreneur's background to the internationalisation of the STBF, namely his international experience and expertise.

2.6.2 Founding Teams

Assessing the role of the accumulated experience and the organisational goals of a STBF in their internationalisation by focusing the research inquiry only on one technical entrepreneur within the STBF neglects the common phenomenon of founding teams among STBFs (Cooper, 1973; Cooper, 2000), a phenomenon which is less typical for small firms in general (Cooper and Bruno, 1977).

Several observations ever since Cooper's (1973) early observations support this (see for example: Litvak and Maule, 1976; Cooper and Bruno, 1977; Bollinger et al, 1983; Cooper, 1986; Berry, 1993; Oakey, 1995). The high likelihood of team ventures of course raises the question in how far individual goals and experiences of founding members translate into collective goals and experience and how this impacts the operations of the STBF.

Although research into founding teams is still a relatively unresearched area (Cooper, 1986; Müller-Böling, 1993), Cooper and Bruno (1977) found early on that team ventures were more successful than STBFs founded by a single person. Subsequently supported in a study by Feeser and Willard (1990). However, other studies did not support the notion of venture teams being more successful (Eisenhardt and Schoonhoven, 1990). Oakey (1995) even found smaller venture teams to perform better.

But following the belief that it is not the quantity of the founding members but their quality, a more consistent picture surfaces. Both Smith and Fleck (1987) and Weinzimmer (1997) for example found that the functional heterogeneity of the top management team in a small firm was positively correlated with small firm growth and success. This seems to support Lamont's (1972) early observation that a balance of business skills within the STBF has positive effects. Schoonhoven et al (1990) and

Eisenhardt and Schoonhoven (1990) also detected a positive effect if joint work experience exists among founding members. A finding which gives support to Stinchcombe's (1965) notion of the internal liabilities of newness due to the social interactions among strangers. Joint work experience of the founders can be expected to lower this liability.

Thus, it seems that it is more the diversity and complementarity of experience and skills within the venture team than size per se that is likely to positively influence the firm's operations. Similar to the discussion regarding the pre-state experience and expertise of the technical entrepreneur, the existence of a team venture can therefore be an important aspect that needs to be controlled in the empirical investigation.

2.6.3 The "Transition" and the Growth of the STBF

The last key aspect of the technical entrepreneur relates to the growth of the STBF.

Although STBFs are not necessarily aggressive growth seekers, often driven by hedonistic rather than purely economic motives and goals (Smith and Fleck, 1987; Lindqvist, 1991; Oakey, 1993; Jones-Evans, 1996a), it is important for STBFs to overcome their liabilities after inception by accumulating a self-sustaining level of resources. Organisational growth after inception is the means to that end. This is the case even if the technical entrepreneur is not willing to grow further once he has achieved to grow his business up to his personal threshold level (Gimeno et al, 1997).

Against this background, a key and central issue for the technical entrepreneur in STBFs is their transition from a scientist to a businessman (Schrage, 1965).

This managerial transition – also termed the corporate or strategic transformation of STBFs (Roberts, 1991; Berry, 1996) – is regarded as a significant determinant for the success of technology-based firms as they develop and grow (Shanklin and Ryans, 1984; Roberts, 1991; Berry, 1996). Due to the technical entrepreneur's classical background (see above), STBFs tend to often exhibit a technology-driven, inside-outside perspective, rather than a market-oriented, outside-inside perspective in their early years after formation (see for example: Roberts, 1990). But as the STBF develops, as its technological core matures and competition in its market niche tends to increase, such a perspective becomes less and less a guarantee for success and corporate survival.

This transition, from a technology-driven scientist to a market-oriented manager, is thus often a problematic and characteristic phase in STBFs. This is especially so with regards to the internationalisation of their venture, since it can be assumed that a technical entrepreneur without a national market orientation is hardly likely to adopt a market orientation in his international operations, thereby decreasing his likely success in international business.

The Growth of STBFs: Emerging versus Deterministic

The managerial transition of the technical entrepreneur as the STBF develops and grows directly links to two different schools of thought regarding the development of STBFs.

The first school of thought views the development of a STBF as rather deterministic, following a sequence of developmental stages (see for example: Galbraith, 1982). This view includes the discussed view of a characteristics strategic transformation of STBFs. It also includes the argument of a typical "hardening process" of STBFs. According to this view, a STBF typically starts with providing R&D services (soft) to other firms before developing and ultimately marketing its own (hard) technology-based products. Investigations by for example Lamont (1972), Van de Ven (1984) and Roberts (1990) found support for this "hardening process".

However, others argue that such typical developmental stages do not hold. Gartner (1985) and Katz (1993) for example view the founding and development process as rather stochastic and emerging from a complex interplay of various environmental, firm-level and management-level factors. Empirical findings by Hansen and Bird (1997) and by Pfirrman (1999) support this view, although it should be noted that the former study also found support for the stage model of STBF development.

Conclusive and unequivocal support for the transition and stages view of STBFs' development is therefore not necessarily evident in the literature. However, similar to the previous discussions on key characteristics of STBFs, the potential existence of a transition needs to be controlled for in the empirical investigation.

2.7 Summary

This chapter has reviewed the literature in relation to the characteristics of STBFs. It has addressed the two direct goals of defining the population of STBFs and isolating

key aspects of STBFs, important for the empirical investigation of this thesis. Furthermore, it has addressed the indirect goal of demonstrating the fruitfulness of conducting a sector specific investigation of the Internet's impact on the internationalisation of STBFs. A goal shared by all the literature review chapters that will be further discussed in chapter 5.

It was shown that, although no universally accepted definition of what constitutes a STBF exists, key characterising dimensions of STBFs are its age, its size, its research-intensiveness, its technological environment and its high degree of centralisation.

Due to its age, size and research-intensiveness, STBFs face various interrelated liabilities. While sharing the liabilities of newness and smallness with all other young and small firms, STBFs also face the additional liability of innovativeness. A liability that is less pronounced or even non-existent in non-STBFs. Particularly the sub-sector specific, initial NPD process emerged as an important factor in the formative years of STBFs. This factor might influence the subsequent growth and internationalisation process of STBFs and which therefore needs to be considered in the subsequent chapters of this thesis.

In order to overcome or reduce these liabilities, it has become apparent that developing external links and collaborating with other economic actors, especially with larger, resource-richer organisations, is of special importance in the technology-intensive industry sectors STBFs are operating in. The importance of these external links is further amplified by the typical focus and niche market orientation of STBFs. By addressing these market niches with highly specialised and often customised products, close links to its customers and partners are essential to successfully compete with larger competitors.

However, it has also been demonstrated that the extent of these liabilities is strongly influenced by the technical entrepreneur or the founding team of technical entrepreneurs, their background and expertise. Their accumulated pre-inception resources and the subsequent initial resource endowment of the STBF (liabilities of adolescence) emerged as a potentially influential dimension for STBFs.

An influential factor with regards to this internal expertise is the incubator.

The literature review could lucidly demonstrate the incubators' influence, pre- and post inception of the STBF. Not only does the incubator constitute an important source of experience and expertise for the technical entrepreneur, but the incubator is also an important source of various forms of technology transfers. Furthermore, STBFs tend to operate in markets similar to the markets of the incubator, with similar technologies and products. Often, the incubator even becomes an important output factor, either as a customer or as a research partner.

Moreover, it has also been reported that in order to overcome their liabilities after inception, organisational growth is crucial. Against this background, a key and central issue is the reported transition of the technical entrepreneur from a scientist to a businessman. This managerial transition was regarded as a significant determinant for the success of technology-based firms by various authors. Particularly because STBFs often tend to exhibit a technology-driven, inside-outside perspective, rather than a market-oriented, outside-inside perspective in their early years after formation. An orientation that becomes less and less a guarantee for success and corporate survival as the STBF develops.

Nevertheless, it has also been shown that although the above factors need to be controlled for, their assessment is far from straightforward. In parts it has even been argued that their very existence in a deterministic sense – in case of the transition – might be questionable. This has important implications for the actual empirical investigation that will be developed and discussed in chapter 6.

In sum it can however be concluded the technical entrepreneur or the team of technical entrepreneurs and their pre-state experience are key in order to understand and examine the operations of STBFs.

The following chapter will proceed to discuss and review theories and models of the internationalisation of the firm. The first part of the chapter will review the generic models and theories of the internationalisation of the firm, with the second part reviewing the specifics of the internationalisation of STBFs.

Chapter 3: The Internationalisation of STBFs

3.1 Introduction

The previous chapter has reviewed the literature on STBFs. It has isolated key variables relating to STBFs' internal and external characteristics. Therefore, chapter 2 has prepared the ground for this chapter, since an understanding of the internationalisation of a firm means understanding its internal characteristics, as well as its external, environmental forces (Reid, 1983; Boter and Holmqvist, 1996).

Chapter 2 has shown that STBFs face various liabilities after inception. On an international dimension, additional liabilities, the liabilities of foreignness (Zaheer, 1995), await the internationalising STBFs.

In the first main part of this chapter (section 3.4), the general theories and models of the internationalisation of the firm will be reviewed, relating to these liabilities.

But the theories and models of internationalisation have to be seen in relation to the recent developments of international trade and FDI on a global scale. Developments that have significantly impacted upon some of the assumptions and predictions since the first models of internationalisation were proposed more than two decades ago. The term "globalisation" of the world economy is usually used to name this development. Globalisation, its drivers and its outcome and impact on small firms will thus be discussed, prior to the discussion of the internationalisation theories (section 3.3).

In the second main part of this chapter (section 3.5), the generic internationalisation theories and models will re related to the specifics of the STBF, as discussed in the previous chapter. It will become apparent that regardless of the liabilities that STBFs face, internationalisation becomes more and more a competitive necessity rather than a competitive option due to the above average increase in the globalisation of technology intensive industry sectors. This leaves the STBFs with a difficult to solve dilemma of balancing their liabilities against this contradictory imperative.

Before proceeding to review models and theories of international business, section 3.2 will elaborate upon the working definition of what is meant by the term "internationalisation", as stated in the introduction.

The goals of this chapter are reflected in this structure.

The first goal is to define the term internationalisation. The second goal is to review theories and models of the internationalisation of the firm, focusing on process models and the internal key forces and barriers in the internationalisation process. Factors most likely to be impacted by the Internet (see also chapter 4). This review will facilitate the empirical study by isolating key variables that need to be investigated. The third goal is to review the few studies dealing with the internationalisation of STBFs enabling to assess the Internet theoretical value as a support tool within this specific population of small firms. The fourth and last goal of this chapter is to demonstrate the fruitfulness of STBFs as a population to investigate the Internet's impact on the internationalisation of the firm (see also the other literature review chapters).

3.2 Definitions of Key Terms: The Term "Internationalisation"

Johanson and Vahlne (1977) in their seminal theoretical contribution on the internationalisation of firms have defined the term "internationalisation" as "... a process in which the firms gradually increase their international involvement."

Similarly, though focusing on a firm's product offering abroad, Luostarinen (1994) views internationalisation as "... a step-by-step process of international business development whereby a firm becomes increasingly committed to and involved in international business operations through specific products in selected markets."

Cavusgil (1980, 1982) in a similar notion, though more focused, regards internationalisation as "... the process by which firms increase their involvement in international marketing activities.", emphasising the marketing aspect of international operations.

This overall notion of a developmental process is shared by Strandskov (1986), who notes that "... the natural mode of internationalizational behaviour is development", as well as shared by Buckley and Ghauri (1993), who note that "[i]nternationalization means changing state and thus implies dynamic change." and that "[t]he growth of the firm is the background to internationalisation ...". Thus, following Starbuck's (1965) distinction between organisational growth and organisational development (see chapter 2), both dimensions form the background of this process. However, organisational growth is of course not a necessary condition for internationalisation. Motives other

than classical market seeking, like resource seeking, efficiency seeking (Dunning, 1988, 2000), risk avoidance (Robock and Simmonds, 1983), strategic asset seeking (Dunning, 2000) or client following (Erramilli and Rao, 1990), can also determine the internationalisation of firms.

Hedlund and Kverneland (1985) in their review of the definition of internationalisation stress the foreign market entry as a manifestation of international involvement and commitment, stating that "[t]he internationalization of the firm ... has been regarded as a process in which the firm gradually increases its international involvement and chooses more firmly committing entry strategies." As opposed to the above, this definition explicitly states changes in the organisational structure of the firm. Such a focus on observable organisational outcomes was recently argued to be superior, because it increases the robustness of the concept of internationalisation (Andersen, 1997).

Reviewing the concept of internationalisation, Welch and Luostarinen (1988) refer to internationalisation as "... the process of increasing involvement in international operations.", thereby conceptualising internationalisation in broader terms than the previous two authors. While their definition is congruent with Johanson and Vahlne's (1977) original definition, their interpretations of internationalisation goes beyond that of Johanson and Vahlne. They stress the inclusions of inward-internationalisation, that is for instance the international sourcing of organisational input factors like product components, not explicitly thought of in Johanson and Vahlne (1977) original work. Particularly their later elaboration on the inward-outward link of internationalisation (Welch and Luostarinen, 1993) demonstrated that internationalisation has to be conceptualised in a more holistic way, potentially influencing all functional areas in an organisation, not just the outward-bound sales/ marketing function and the market entry choice as expressed in the above definitions.

Beamish (1990), while also stressing the importance of an inward and outward element in internationalisation, adds a cognitive perspective to the definition. He sees internationalisation as "... the process by which firms both increase their awareness of the direct and indirect influence of international transactions on their future, and establish and conduct transactions with other countries." A view which can be traced back to the related view of Perlmutter (Perlmutter, 1969), stressing an attitudinal development within internationally operating firms.

All these definitions, while stressing different aspects of internationalisation, assume, following Johanson and Vahlne's (1977) original definition, that internationalisation is a gradual, developmental process of international involvement and commitment. It is best understood as an evolutionary process (Young, 1990).

However, Beamish's (1990) definition needs to be explored further, as it is unique in two ways. First, it adds a cognitive dimension to the process and second, it does not stress an incremental involvement as a core characteristic of internationalisation. This general notion of regarding internationalisation as an uni-directional process of increased involvement and commitment has been explicitly criticised (Calof and Beamish, 1995).

Calof and Beamish (1995) argue that the internationalisation of a firm does not necessarily imply increased levels of involvement and commitment only. Internationalisation should also be understood to include de-investments, that is a temporary decrease in the level of international involvement of a firm. Thus, they defined internationalisation as "the process of adapting firms' operations (strategy, structure, resource, etc.) to international environments." (Calof and Beamish, 1995). A view shared by Andersen (1997), who defines internationalisation more specifically as the process of adapting exchange transaction modalities to international markets (see also Lam and White, 1999).

From the above discussion it becomes evident that various related definitions of the term "internationalisation" have been suggested and used in the literature. In summarising the core elements as discussed above, internationalisation can be summarised and defined as follows:

Internationalisation is:

- a gradual, dynamic process by which firms both
- develop their awareness of the direct and indirect influence of international transactions on its future and
- adapt their involvement and commitment to international input and output markets, as well as to international competition
- by adjusting their portfolio of international exchange transaction modalities
- as the firm ages and, although not necessarily, grows.

This broad conception of internationalisation includes not only classical outward-bound modes of international operations, but also inward-bound and co-operative activities. In short, the totality of all cross-border activities of a firm (see also Dunning, 1993). In addition to these external dimensions, this definition includes organisational awareness as an internal dimension. Furthermore, it does not stress the necessity of organisational growth, as well as a constant increase in commitment and involvement. A view which follows Bell's et al (1998a) notion that "... at any given point in time, firms will be in a 'state' of internationalisation (which will be subject to both backward and forward momentum) ...".

While the term "internationalisation" can be applied at the country, industry and firm level (Luostarinen, 1994), the term internationalisation for the purpose of this thesis will be used only at the firm level, while the term "globalisation" (see next section) is applied at the industry and country level.

3.3 The Globalisation of the World Economy

The term "globalisation" is usually used to describe the macro-economic, cross-national process of "... the ongoing integration of the world economy" (WTO, 1996). A "... process whereby producers and investors increasingly behave as if the world economy consisted of a single market and production area with regional and national subsectors, rather than of a set of national economies linked by trade and investment flows." (UNCTAD, 1996)

Various initiating and reinforcing forces that make up this process have been stated in the literature. One of the fundamental enabling factors that set the globalisation wheel (again) into motion were the end of the cold war (Luostarinen, 1994) that led to market and investment liberation (Levitt, 1983; Luostarinen, 1994; UNCTAD, 1996; WTO, 1996) and the formation of free trade regions (Luostarinen, 1994; UNCTAD, 1996) and open market economies (Luostarinen, 1994). This trend towards liberalisation was based on the international trade theory's postulate of free trade offering economic benefits to the participating nations (see also the brief sub-section on international trade theory below). The success of the capitalist model in the West, also led to a shift from closed, centrally controlled communist systems, to market driven economies, most notably the former USSR, which further enabled global integration. Liberalisation of national industries and the privatisation of national firms added to this process (UNCTAD, 1996; Fraser and Oppenheim, 1997).

The process of global integration is facilitated by technological advancements, most importantly the advancements in communication, information and transportation technology (Levitt, 1983; Luostarinen, 1994; Knight and Cavusgil, 1996; UNCTAD, 1996; Fraser and Oppenheim, 1997).

The combination of these factors led to observable outcomes like shrinking differences between national markets (Levitt, 1983). Per capita income convergence and consumer life-style convergence creating global mass and niche markets and a rise in international educational programs are additional outcomes and reinforcing trends of globalisation (UNCTAD, 1997). Particularly the increasing autonomy, scale and integration of the world financial markets is seen as a key outcome and reinforcing accelerator of this process (Martin and Schumann, 1996).

Additional developments further reinforced the trend towards globalisation, particularly increasing R&D costs (Granstrand, 1998) paired with shrinking product life cycles (Backhaus, 1997) and accelerated technology diffusion (Backhaus, 1997), increased the necessity for firms to exploit their investments on a global, or at least international scale. A trend that is especially pronounced for technology-intensive firms (see introduction and section 3.5 on the internationalisation of STBFs).

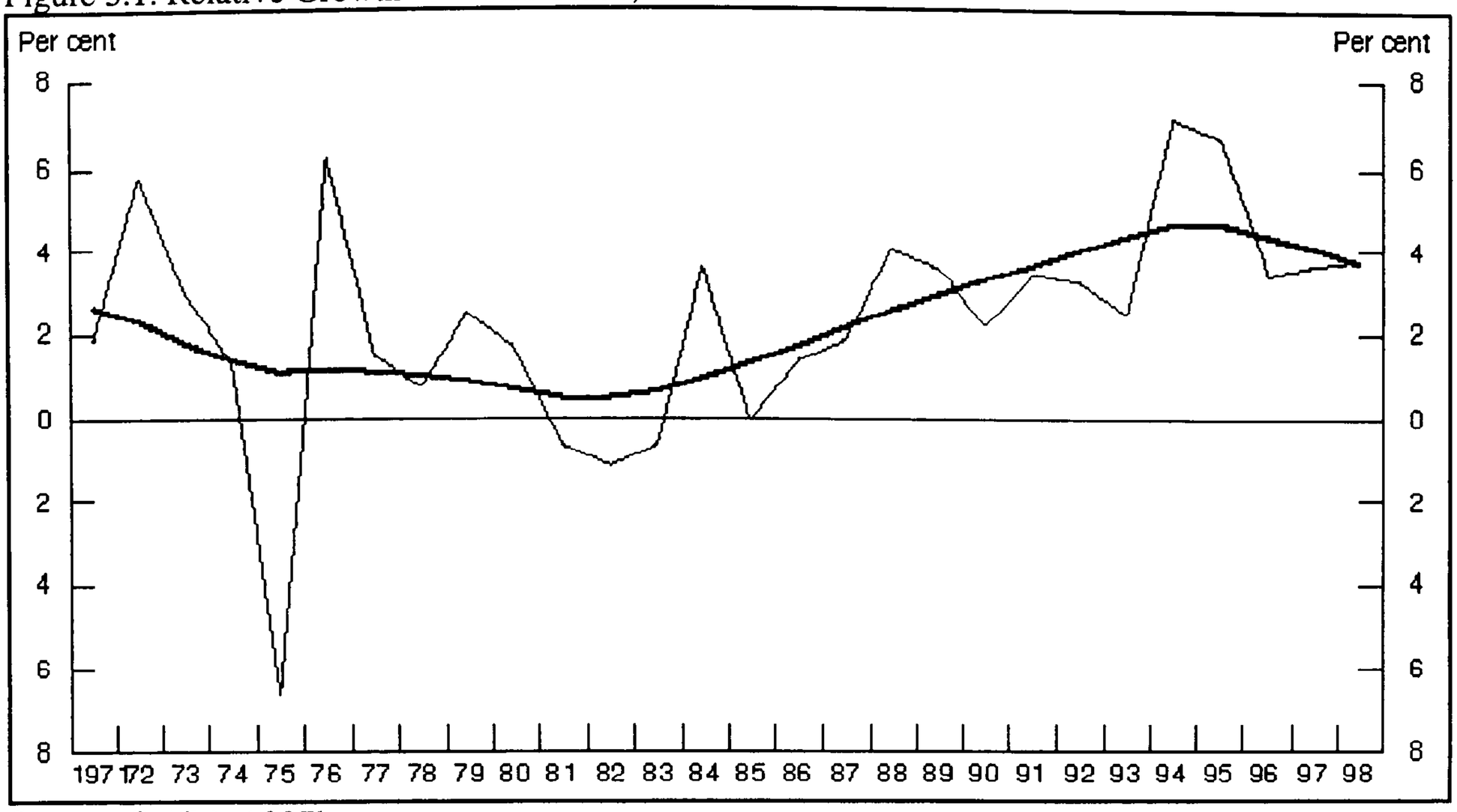
These political and technological factors that have enabled (political factors) and facilitated (technological factors) globalisation have affected the nature and quantity of international trade.

3.3.1 Developments in International Trade and FDI

With regards to exports, the value of merchandising (excluding services) exports increased from $575 billion in 1973 to $6,576 billion in 1995 (WTO, 1996: UNCTAD, 1999), which compares to a mere $113 billion in export trade in 1960 (Scammell, 1983).

As figure 3.1 shows, there has been a constant growth in world trade, with increasing growth rates since the early 1980's and a slight decrease in growth rates since the mid-90s. Over the 28 years period, only the years 1975, 1981, 1982 and 1983 showed a decline in world trade. Overall, global trade has grown 16-fold since the 1950s, by far outstripping the growth in GDP (Economist, 1998a).

Figure 3.1: Relative Growth in World Trade, 1971-1998



Source: OECD, 1997b.

Besides the overall growth in international trade, another key characteristic relates to the international developments in foreign direct investments (FDI); whereas FDI is usually defined as an acquisition of an asset in a foreign country (host country) made by an investor in another country (home country) with the intention to manage this asset. Particularly the last aspect of the definition, managing the asset, sets FDI apart from portfolio investments in foreign stocks, bonds, derivatives and other financial instruments. (WTO, 1996)

As table 3.1 shows, foreign direct investment (FDI) and portfolio investment has increased substantially over the last decades. The annual global flow of FDI, excluding portfolio investments, is estimated to have increased from around $60bn in 1985 to around $315bn in 1993 (UNCTAD, 1995), to a new record level of $644bn in 1998 (UNCTAD, 1999; also see table 3.2 below). The vast majority of FDI and non-FDI trade takes place among the developed countries of the triad (for example 92% of FDI outflows and 72% of inflows; UNCTAD, 1999). The globalisation process is therefore better described, at least currently, as a "triadisation" process rather than a truly global process.

Table 3.1:Gross Inward and Outward FDI plus Portfolio Investment in % of GDP

	1970 to 74	1975 to 79	1980 to 84	1985 to 89	1990 to 95
Belgium-Luxembourg	–	3.4	5.1	14.3	41.5*
Denmark	–	0.6	0.9	3.5	7.2
Germany	1.2	1.3	1.7	5.2	6.3
Japan	–	0.6	2.6	5.9	3.7
Netherlands	7.3	4.7	6.0	10.9	11.1
Sweden	1.0	1.2	1.7	5.0	7.0
UK	3.6	4.0	5.4	14.4	11.9
USA	1.0	1.5	1.4	2.9	3.3

* This strong increase in FDI is mainly due to portfolio investments for tax purposes (Trabold, 1997).
Source: IMF, World Economic Outlook, May 1997, Washington, D.C.

The impact of FDI becomes even more eye-catching if one considers that at present international sales of foreign affiliates outweighs exports as the dominant mode of servicing foreign markets and that the growth of global sales of foreign affiliates exceeds that of exports of goods and non-factor services (see table 3.2). Foreign affiliates now export one third of all world exports and account for 7% of global GDP (UNCTAD, 1998) and the FDI stock to global GDP now accounts for 21% (UNCTAD, 1998).

Table 3.2: Selected Indicators of FDI, 1986-1998

	Value at current prices (in billion dollars)			Annual Growth Rate (in %)				
	1996	1997	1998	1986-1990	1991-1995	1996	1997	1998
FDI inflows	359	464	644	24.3	19.6	9.1	29.4	38.7
FDI outflows	380	475	649	27.3	15.9	5.9	25.1	36.6
FDI inward stock	3,086	3,437	4,088	17.9	9.6	10.6	11.4	19.0
FDI outward stock	3,145	3,423	4,117	21.3	10.5	10.7	8.9	20.3
Cross-border M&As	163	236	411	21.0	30.2	15.5	45.2	73.9
Sales of Foreign Affiliates	9,372	9,728	11,427	16.6	10.7	11.7	3.8	17.5
Gross Product of Foreign Affiliates	2,026	2,286	2,677	16.8	7.3	6.7	12.8	17.1
Total Assets of Foreign Affiliates	11,246	12,211	14,620	18.5	13.8	8.8	8.6	19.7
Exports of Goods and Non-factor Services	6,523	6,710	6,576	15.0	9.3	5.7	2.9	-2.0

Source: The author, adopted from UNCTAD (1999).

These developments in FDI clearly indicate the increasing internationalisation of the national production systems and the deepening of the overall interdependence of the world, or, to be more precise, the industrialised economies. A level, far beyond the levels achievable by international trade alone.

After highlighting the key forces of globalisation and the development in international trade and FDI, the following section will discuss its impact on small firms and small firm's role in a globalising world economy.

3.3.2 Globalisation and the Role of Small Firms

Very little research exists that has examined the effects of globalisation on small businesses and overall very little is known about how small firms participate in the globalising economy (Acs and Preston, 1997).

Traditionally, the literature (see for example: Buckley, 1989) attributes only a minor role to small firms in international business due to their liabilities that were discussed in chapter 2 and the additional liabilities of foreignness (Zaheer, 1995) stated in the introduction and to be discussed further below. ENSR (1993) reports for example that while 50% of all jobs in the EC are found within the SME sector, less than 10% are engaged in exporting. International research by the Stratos Group supports this further. The vast majority of SMEs (81%) regarded their markets as purely domestic (Stratos Group, 1994).

While this observation seems logical, taking the various liabilities of small firms into consideration (see chapter 2), other authors' findings stand in direct contrast to the above observations.

Rennie (1993) for example, reporting the results of a study in Australia by McKinsey&Company (1993), found that 20% of new international trade growth in Australia can be attributed to so called "born global" SMEs, with a further 60% attributable to domestic-based SMEs' exports. This is in line with a recent OECD (1997a) study, estimating that 25-35% of world direct exports are made by SMEs signalling an overall increase in the role SMEs play in the globalising economy.

The notion that SMEs are increasingly stronger embedded in international business is further supported by a more recent ESNR report (ENSR, 1997). This report has shown that slightly over 30% of very small firms (1-9) and 50% of small firms (10-49) have experienced an increase in international business contacts in the last 5 years. Although the increase is higher among larger small firms, this increase is however notable as this survey included all forms of and sizes of SMEs, the vast majority being very small firms with on average 2 employees.

But most of these studies relate to exporting only and not to other means of internationalisation. This is mainly because exporting was for long regarded as the most common form of international business among small firms (Miesenbock, 1988). Researchers have only recently started to view small firm internationalisation in

broader terms, beyond mere exporting (Coviello and McAuley, 1999). However, some evidence exists that FDI also plays an increasingly important role for SMEs, albeit on a much smaller scale compared to larger firms.

Few studies have investigated the role of SMEs in FDI, mainly because FDI by SMEs is considered to be a relatively recent phenomenon (Fujita, 1995a). A study by Fujita (1995a) for example showed that more than 50% of new FDI by Japanese MNEs were accounted for by SMEs (less than 500 employees) in the late 1980s. In addition, SMEs constitute 28% of all US parent companies in 1988, up from 24% in 1982, and 6% of the number of affiliates, up from 5%. His findings show that not only do SMEs increase their international trade exposure, but they also tend to increase their international investment exposure in the form of FDI (see also UNCTAD, 1993). However, it should be noted that SMEs engaged in FDI are on average rather large SMEs than small SMEs (UNCTAD, 1993; Fujita, 1995b), thus unlikely to fall in this thesis' definition of a small firm. Furthermore, according to estimates by the OECD (1997a), FDI among SMEs applies only to approximately 10% of the population of SMEs. Thus, although FDI involvement might have increased in recent years, it is still not a common mode for SMEs. Likewise, licensing, franchising or other contractual arrangements with foreign firm are estimated to account for only 10-15% of international involvement by SMEs (OECD, 1997a).

Overall, the above stated studies indicate that small firms' role in international business has on average increased. This development can be attributed to the above stated forces of globalisation, which seem to facilitate the internationalisation of small firms.

First, the reduction of trade barriers and increasing market liberalisation make it on average easier for small firms to address and enter foreign markets. Second, the reduction in communication, travel and transportation costs make foreign markets economically more attractive to address, thereby reducing the resource-related liabilities of small firms discussed in chapter 2. Third, as the "stock" of internationally experienced human resources increases, it should be easier for small firms to employ such crucial human resources for their international operations. Fourth, the emergence of global markets should reduce "psychic distance" (for the concept of "psychic distance" see below in section 3.4.3.1) as a barrier to start operations with and in foreign countries.

On the other hand, globalisation can also render the internationalisation process of small firms more difficult. Not only is it harder for small firms to compete nationally or internationally as the world-wide competition increases, but the increase in international linkages and the increase in the integration of value-added activities on the industry-level (Makhija et al, 1997), make it also harder for SMEs – particularly new ones facing the liabilities of newness (see chapter 2) – to participate in these well-established international business networks (see also the "late starter" as discussed by Johanson and Mattson, 1988).

This duality of globalisation, both potentially facilitating and aggravating the internationalisation of firms, is not explicitly considered in the theories and models to be discussed in the next section. This is due to their assumptions grounded in the realities of the world economy of over two decades ago. Which side of the globalisation coin plays a more important role for small firms and what salient firm and industry level factors exist remain currently unexplored and theoretically unaddressed. However, it is important to remember the discussed forces of globalisation throughout the literature review in section 3.4 as a background to critically assess and evaluate the validity of the assumptions and postulations of theories related to the internationalisation of the firm.

3.4 Theories of the Internationalisation of the Firm

Research relating to international activity from an economical and managerial perspective can be categorised according to its level of analysis. While international trade theory focuses on the country-level, analysing why countries trade in general, international business theory, as well as internationalisation theory, focuses on the enterprise level, analysing why and how firms pursue international operations.

3.4.1 International Trade Theory

International trade theory is concerned with trade taking place on an aggregated level between different countries. As this paper concentrates on the firm level, international trade theory will not be discussed in depth. However, since the theories of international business on the firm level emerged from the early observations of trade economists, it is fruitful to review some of their core ideas.

International trade theory has been the domain for researchers for a very long time. It focuses on factors at the country-level explaining why countries trade and what goods

are traded. Classical (Smithonian) and neo-classical (Ricardian) trade theories suggest differences, what has been later termed differences in factor endowments (Ohlin, 1933; Heckscher, 1950), on an aggregated, country-level causing imperfections. These imperfections lead to country-specific advantages, which subsequently explain trade patterns with other nations. Whereas classical trade theory postulated the need for absolute advantages, neo-classical trade theories could demonstrate later that even international trade for a country with no absolute advantage would be advantageous if a country enjoys comparative advantages in productivity. An observation that was later attributed to differences in needed factor combinations and underlying cost and price differences of these factors (Ohlin, 1933; Heckscher, 1950).

The simplifying assumptions of these trade theories (for example perfect competition) have been revised by modern trade theories (see for example Krugman, 1990) by taking structural market imperfections like non-perfect competition due to economies of scale, differentiated products and increasing returns as determining factors of international trade between countries into consideration. According to new trade theory trade can take place due to these factors, even if the economies have identical tastes, technology and factor endowments (Krugman, 1990).

Besides refinements by modern trade theories, another refinement of traditional trade theory needs to be mentioned, because it added a dynamic perspective to the static, equilibrium-oriented traditional trade theories. Its originator, Vernon, related the idea of a product life cycle for goods to patterns in international trade and production (Vernon, 1966). He suggests that firms usually innovate and develop new products according to the needs of their home market. As firms begin to serve their home market, firms will subsequently also begin to export their new products in order to capitalise on potential first mover advantages. In the second stage, as importing markets familiarise themselves with the new product, foreign production starts. Subsequently, as these foreign firms gain from economies of scale and scope, foreign production starts to become competitive in other export markets in the third stage of this model. Finally, foreign producers will have accumulated enough benefits from economies of scale and scope to compete in the innovators home country and import competition – the characteristic of the fourth and final stage – starts to occur.

Although early empirical support for some goods exists (see for example Wells, 1968, 1969), due to the forces of globalisation that were discussed above such sequential product launches become less and less common and global product launches become

increasingly common. A development that was foreseen by Vernon (Vernon, 1979). Nevertheless, he argues that for small firms the model of the international product life cycle remains valid. However, as will be reported in sections 3.4.5 and 3.5, this view becomes increasingly challenged as well.

Due to their focus of enquiry on the level of countries, operational, managerial and process issues at the firm level are not considered. The following sections will discuss theories associated with the internationalisation at the firm level.

The literature on the internationalisation of the firm can be characterised as dichotomous (Miesenbock, 1988). One strand focuses on the multinational enterprise (MNE) and the other focuses on the internationalisation of small firms. International business theory focuses on the former and internationalisation theory focuses on the latter. Each will be reviewed and discussed in the two sections that follows, starting with international business theory and focusing on internationalisation theory.

3.4.2 International Business Theory

The core idea of the international trade economists, the idea of imperfections, were utilised by international business researchers to explain international activities at the firm level by projecting these imperfection into the firm. This helped to explain the emergence and existence of MNEs; as opposed to firms only trading with each other by means of importing and exporting.

In 1960 (published in 1976), Hymer's market imperfections theory in essence postulated that firm-specific advantages like technology and management skills are the core source enabling firms to successfully operate abroad by offsetting cost and information advantages enjoyed by indigenous firms.

Hymer's monumental idea was then further refined and developed by Buckley and Casson (1976) to become the internalisation theory.

Buckley and Casson conceptualised the MNE as a firm that responds to pre-product or intermediate-product market imperfections by internalising these markets (like components, semi-processed goods, knowledge, skills and technology) across national boundaries (via FDI). According to transaction cost theory (Coase, 1937; Williamson, 1996), internalisation means that a firm makes use of its organisational

hierarchy to co-ordinate a specific business transaction as opposed to buying it on the market.

Other theories of international business that followed (see for example Magee, 1976; Rugman, 1980) all built directly or indirectly upon this notion of imperfections and the need to internalise imperfect markets.

From 1977 onwards, Dunning combined the related strands of international business theory with his "eclectic paradigm" of international production explaining foreign direct investment of MNEs (Dunning, 1977, 1988, 1995, 2000). A framework that is regarded as the most widely accepted framework in international business research (Johanson and Vahlne, 1990).

According to Dunning, the extent, characteristics and pattern of a firm's international production is determined by a combination of three factors:

1. Ownership-specific advantages enjoyed by the firm
   (for example the capability to organise assets efficiently [dynamic ownership advantages] and/ or access to unique resources [static ownership advantages])
2. Location advantages a foreign market offers
   (for example access to needed resources, markets or superior infrastructure)
3. Internalisation advantages
   (for example transaction cost savings achieved by internalising operations, as opposed to relying on external market transfer mechanisms)

Dunning's framework focuses on international production choices of MNEs and intra-firm trade of intermediate goods. It is therefore concerned with a (potentially) later stage in the internationalisation process of the firm, which is less applicable in the context of small and young firms. It is more concerned with the question of why MNEs exist and in what form than their evolution of becoming a MNE. Or, referring to Vahlne and Nordström's (1993) definition of internationalisation as "[t]he process, or evolution, through which multinational firms have reached their present international position ...", international business theory is more concerned with the outcome of internationalisation than the actual process. Hence, it is static in nature, focusing less on the internationalisation process as such (Johanson and Vahlne, 1990). Although Dunning (1993) later extended his framework to add dynamic aspects (most recently see Dunning, 2000), his framework nevertheless focuses on the existence of sufficient

and necessary factors that explain the pattern of market internalisation by MNEs. The underlying forces of the internationalisation process, the development from a local to a multinational firm, are not explicitly considered.

Additionally, the "eclectic paradigm" assumes rational decision-making based on perfect knowledge by the decision-maker (Johanson and Vahlne, 1990). While the lack of behavioural-related variables, acknowledged by Dunning (1988) as a limitation of his framework, might be less relevant to international experienced MNEs, clearly in the case of small as well as young firms, such an assumption is less acceptable, due to their potentially lower levels of international experience.

Hence, taking the above raised points into consideration, it can be concluded that international business theory is not applicable to explain the internal internationalisation processes of small firms. Yet it should be acknowledged that Dunning's paradigm despite its limited applicability to the internationalisation process of small firms, proved to be successful in explaining the outcome of the internationalisation process (entry mode and location) of small firms (see for example Brouthers et al, 1996).

3.4.3 Internationalisation Theory

In contrast to international business theories, internationalisation theories address explicitly the timely fashion of the process of internationalisation of a firm.

Models of internationalisation usually address two areas. On the one hand the internationalisation process and its underlying forces and on the other hand the organisational manifestations of this process.

Past reviews (see for example Strandskov, 1986; Welch and Luostarinen, 1988; Rao and Naidu, 1992; Andersen, 1993; Leonidou and Katsikeas, 1996) have generally distinguished between the Uppsala model of internationalisation and export developmental models or innovation related models according to Andersen's (1993) review.

Hence, the subsequent discussion will focus on these models as they represent the most widely cited, applied and reviewed models. Other models usually differ only slightly in number and description of stages, hence exhibiting semantic differences as opposed to real differences (Andersen, 1993). Furthermore, they are based on the

same conceptual grounds as can be seen in Leonidou and Katsikeas's (1996) review, hence not adding much value to the discussion below.

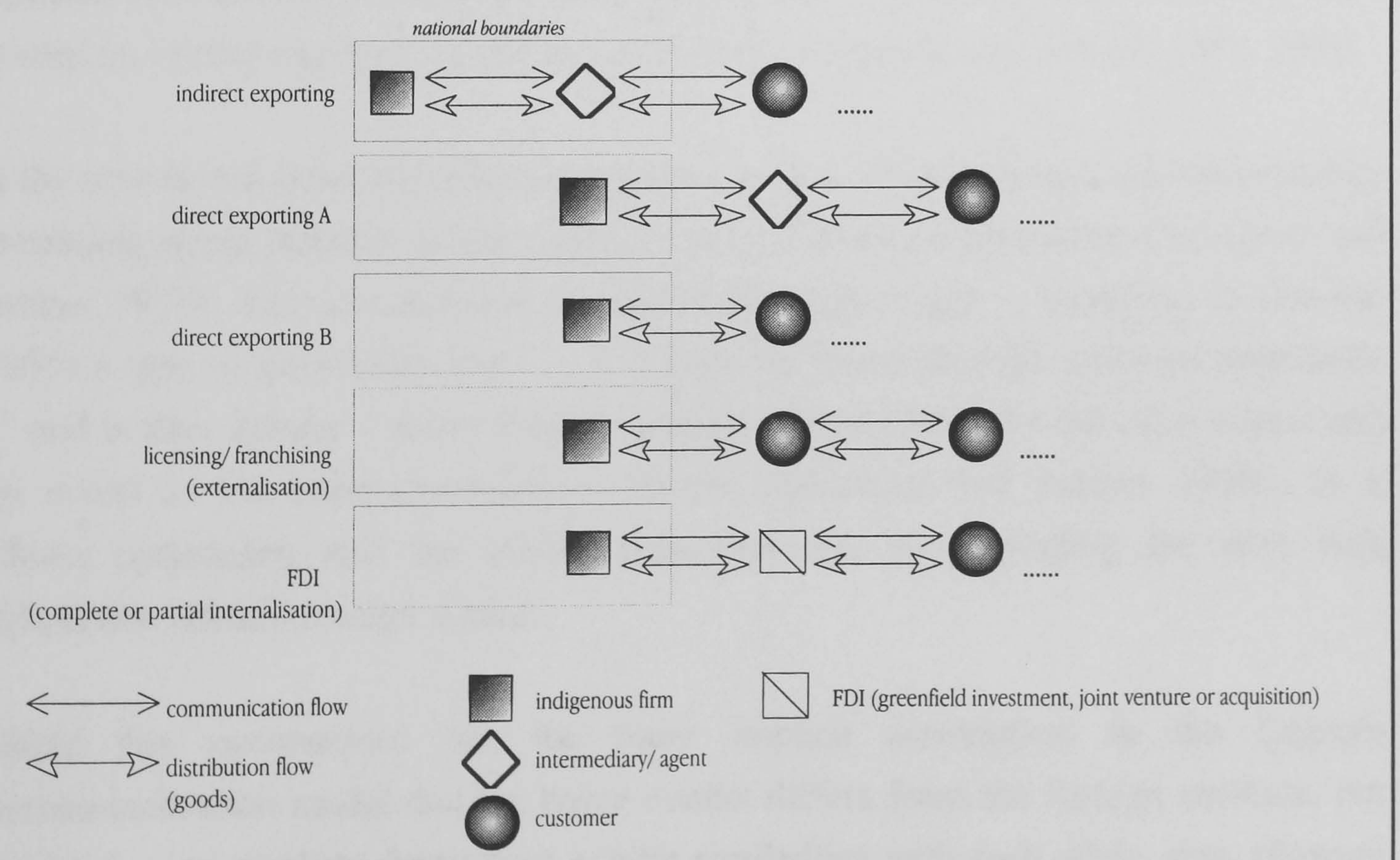
The following were identified as the most widely cited, applied and reviewed models (see also table 3.3):

1. The Uppsala Internationalisation Model (Johanson and Vahlne, 1977, 1990)
2. The Export Developmental/ Innovation Related Models
   – Bilkey and Tesar's (1977) model
   – Cavusgil's (1980, 1982) model
   – Czinkota's (1982) model
3. The Pre-Export Model by Wiedersheim-Paul et al (1978) and Olson and Wiedersheim-Paul (1978)

Two additional and related pre-export models are included as they focus solely on pre-exporting stages. Incorporating these models in the review should result in a broader understanding of the internationalisation process.

The internationalisation models discussed below, all focus on the outward-bound element of internationalisation (see figure 3.2).

Figure 3.2: Generic Modes of Outward-Bound International Operations



Source: The author, derived from the literature.

3.4.3.1 The Uppsala Internationalisation Model

The Uppsala Model of internationalisation is mainly based on the early empirical findings of Johanson and Wiedersheim-Paul (1975) and a theoretical elaboration by Johanson and Vahlne (1977). It has been extended later by the same authors (Johanson and Vahlne, 1990).

The following sub-sections will review and discuss the assumptions of the model, the suggested process of internationalisation and the organisational manifestations of the process.

Assumptions

Mainly based on four case studies (Johanson and Wiedersheim-Paul, 1975) and grounded in early economical contribution by Beckermann (1956) and Linder (1961), this model assumes that a firm first develops in its domestic market and then gradually develops its operations abroad (Johanson and Wiedersheim-Paul, 1975), "as [a] consequence of a process of incremental adjustments to changing conditions of the firm and its environment" (Johanson and Vahlne, 1977).

The model has its theoretical base in Cyert and March's (1963) and Aharoni's (1966) behavioural theory of the firm and in Penrose's (1959) theory of the growth of the firm. It is based on the assumption that the firm strives to increase profits, which is regarded to be the equivalent to growth. Furthermore, it is assumed that the firm seeks to keep its overall exposure to risk at a low level. (Johanson and Vahlne, 1977, 1990)

At the core of the internationalisation process is lack of knowledge and subsequently uncertainty about markets abroad, due to lack of market information (Johanson and Vahlne, 1977). The accumulation of experiential knowledge – according to Penrose (1959) a type of knowledge that "... can only be learnt through personal experience ..." and is thus unique – about foreign markets is assumed to be the main source and key driver in the internationalisation process (Johanson and Vahlne, 1990), as it reduces uncertainty and the related perceived risk by providing the firm with information about a foreign market.

Behind this assumptions lies the more implicit assumption in the Uppsala internationalisation model that the home market differs from the foreign markets, but that the foreign markets themselves exhibit similarities with each other, thus allowing

for the sequential exploitation of economies of scope accumulated via experiential knowledge (Casson, 1993).

This behavioural assumption of the firm as a learning organisation, characterised by bounded-rationality and limited knowledge (Björkman and Forsgren, 1997), stands in direct contrast to the rational decision-making assumptions of the theories of international business discussed previously.

Manifestations

The firm's gradual development of operations abroad is postulated to manifest itself in four market entry stages (see table 3.3, first column) that the authors have termed the "establishment chain". Another, less known model by one of the authors (Forsgren and Johanson, 1975; as cited by Petersen and Pedersen, 1997) postulates five stages, distinguishing two different stages of production abroad (see table 3.3, second column), as opposed to only one stage of foreign production. The postulated stages represent increasing resource commitments to and increasing control over a firm's operations abroad (Johanson and Wiedersheim-Paul, 1975).

Furthermore, the firm's establishment chains in different countries are supposed to correlate with the concept of "psychic distance", that is "the firm starts exporting to neighbouring countries or countries that are comparatively well-known and similar" (Johanson and Wiedersheim-Paul, 1975) according to various factors like political systems, culture, language and education. Psychic distance is supposed to correlate with geographic distance, though exceptions like the British Commonwealth and the dynamic nature of the concept (psychic distance changes over time) are acknowledged (Johanson and Wiedersheim-Paul, 1975).

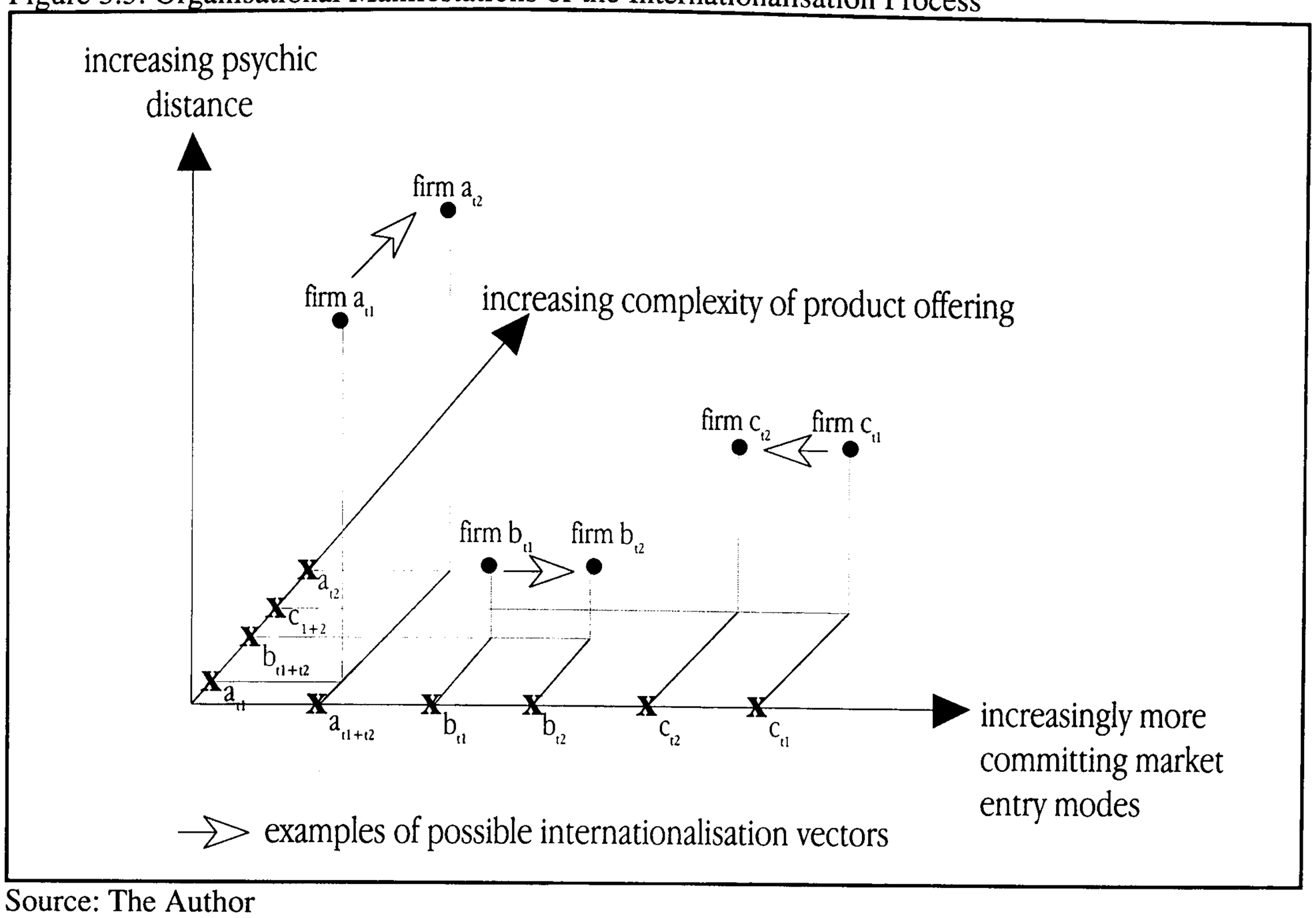
Table 3.3: Stage Models of Internationalisation

Johanson & Wiedersheim-Paul (1975)	Forsgren & Johanson (1975)	Bilkey & Tesar (1977)	Wiedersheim-Paul et al (1978)	Cavusgil (1980, 1982)	Czinkota (1982)	Rugman (1980)
		no interest in exporting	no interest in exporting	pre-involvement	uninterested firm	
		passive exploration of exporting	passive non-exporter	reactive involvement	partially interested firm	
		active exploration of exporting	active non-exporter		exploring firm	
no regular export activities	sporadic export	experimental exporting		limited experimental involvement	experimental exporter	exporting
					disappointed exporter	
					temporarily declining exporter	
export via independent agent	export via foreign intermediary	experienced exporter		active involvement	experienced small exporter	
		additional exporting to psychic distant countries		committed involvement	experienced large exporter	
sales subsidiary	sales subsidiary					FDI
production abroad	assembly production					
	full production abroad					
						Licensing

Source: The author, derived from the literature

The establishment chain and the psychic distance construct represent the two dimensions, or directions according to Johanson and Vahlne (1977), along which the organisational internationalisation process of increased commitment of a firm manifests itself over time. This two-dimensional model was later (Luostarinen, 1980) extended to include a third dimension (as indicated in the three directions of internationalisation in figure 3.3). A dimension that represents increases in the complexity of the product offerings in a foreign country; for example from simple assembling operations to complete production of product families with after sales services.

Figure 3.3: Organisational Manifestations of the Internationalisation Process



Source: The Author

Its originators have suggested five exceptions to the postulated organisational manifestations of the model.

Johanson and Wiedersheim-Paul (1975) suggest two exceptions. First, they suggest possible exceptions to a firm's depth of its establishment chain in small markets. They assume that very small markets may not economically justify a production subsidiary. Serving very small markets via an intermediary or only via a sales subsidiary might be more feasible instead. Second, they suggest exceptions in the form of stage jumps (for example from stage 1, no regular export activities, directly to stage 4, production abroad) made by firms with extensive experience from other foreign markets. It is assumed that extensive international experience of a firm can be transferred to other foreign markets, potentially reducing the perceived uncertainty and thereby the perceived need for an incremental, step-wise increase in market commitment along the postulated stages.

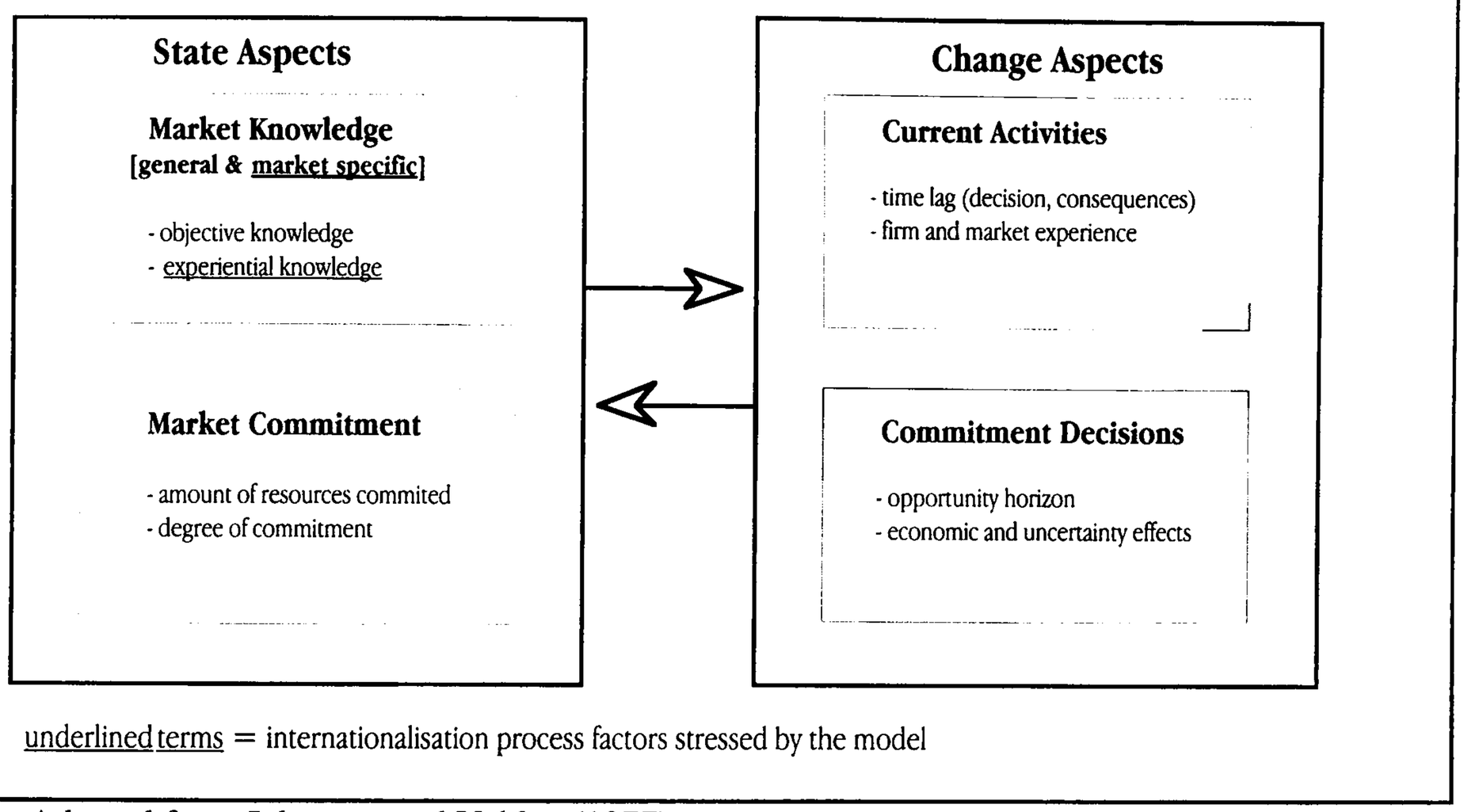
In their review of the model, Johanson and Vahlne (1990) suggested three additional, though related exceptions. First, big firms with large surplus resources are expected to make larger internationalisation steps as opposed to the small step-wise commitments suggested by the model. Second, when market conditions can be considered stable and homogenous, relevant market knowledge can be gained in different ways to

experience. Interestingly, Johanson and Vahlne (1990) do not state how. Third, if a firm has gained considerable experience from similar markets it may be possible to generalise this experience to the specific market in question.

The Process

The underlying basic mechanism of the internationalisation process, operationalised by the two constructs establishment chain and psychic distance (Johanson and Vahlne, 1990), distinguishes between a state and a change aspect (see figure 3.4).

Figure 3.4: The Uppsala Process Model of Internationalisation



Source: Adapted from Johanson and Vahlne (1977).

The state aspect represents the current knowledge and commitment of the firm and the change aspect represents the factors affecting and potentially altering the current state of the firm. Both aspects of the model interact with each other as indicated by the two arrows.

The firm's current state of internationalisation is characterised by the firm's amount and degree of resource commitment to foreign markets, as well as by its objective and experiential knowledge about foreign markets and operations, both at a general and a market-specific level of knowledge. The current state of the firm interacts in causal cycles with the firm's commitment decisions and its current activities, the change aspects of the model (Johanson and Vahlne, 1977, 1990).

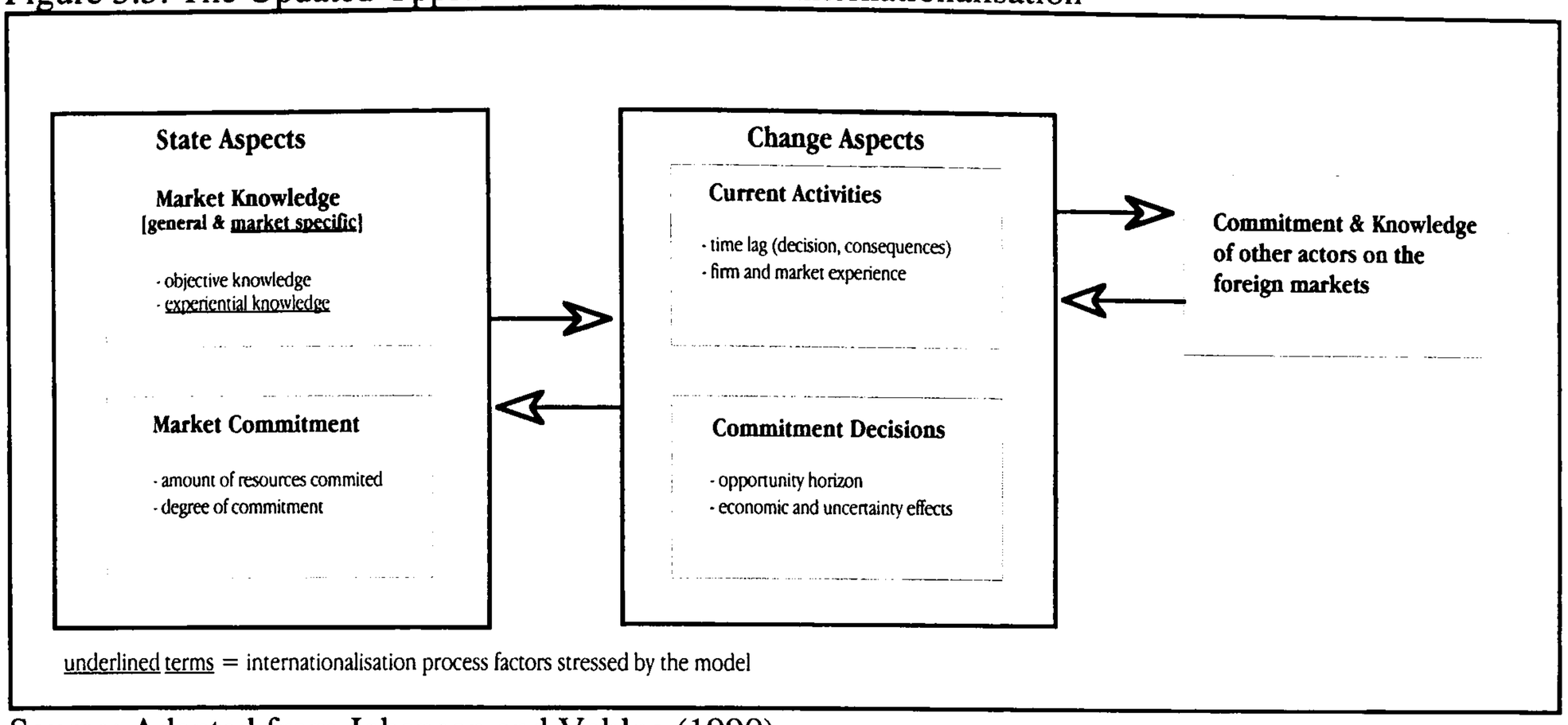
The change aspects include the current activities of the firm and its commitment decisions concerning foreign markets. The current activities of the firm – its prime source of experience – is characterised by a time lag between decisions taken, actions implemented and their consequences for the organisation. The model suggests that the higher this time lag is, the higher the commitment of the firm. In order to highlight this, one might think about the following example. Capital investment in a manufacturing plant abroad is high and the time lag before reaching the break-even point is considerably large. This "lock-in" represents a much bigger commitment, to occur at a later stage according to the postulations of the establishment chain, compared to a less committing singular export transaction, the first stage in the establishment chain. The second sub-dimension of the change aspect of the model, the commitment decisions, are influenced by the firm's opportunity horizon, as well as economic and uncertainty effects. The opportunity horizon of a firm represents the "bounded decision space" of a firm. It is assumed that decisions regarding international market opportunities are dependent on and formed by a firm's experience. Hence, means of addressing market opportunities are searched for and will be related to the environment the firm is interacting with, to the degree of its existing market commitment and influenced by economic aspects and uncertainty.

The model implies that this interaction process will lead to an incremental commitment to markets abroad that will subsequently manifest themselves in the organisational forms of market entry, as well as in incremental changes in the psychic distance of countries served as discussed in the previous section.

The Updated Process and the Importance of Networks

In 1990, Johanson and Vahlne theoretically updated their original process model (see figure 3.5). They extended their model by incorporating findings in the area of industrial marketing, reporting about the important influence of a firm's network – that is the totality of its external relationships (Easton, 1992) – on its operations in general and on its internationalisation process in particular (see for example Johanson and Mattson, 1988; and more recently: Blankenburg and Johanson, 1992; Welch and Welch, 1996). In a way, this extension can be seen as a specification of the nature of the opportunity horizon in the change aspects of the original model.

Figure 3.5: The Updated Uppsala Process Model of Internationalisation



Source: Adapted from Johanson and Vahlne (1990).

Analysed this way, the internationalisation emphasis is on a firm's external relationships and its impact on the firm, rather than purely focusing on internal aspects. This approach follows the notion that "no business is an island" (Håkansson and Snehota, 1990) and it views interactions with other firms as providing a firm with the capabilities to perform its activities (Ford et al, 1986). Thus, its external network becomes a crucial resource and a valuable asset in its own right and in addition to its internal resources and assets (see also the importance of external links for small firms to reduce their liabilities of newness and smallness as discussed in chapter 2). It should however also be noted that a firm's network can also constitute a constraint on its operations (Gulati et al, 2000).

Several studies could demonstrate the important influence of networks on a firm's internationalisation process (see for example Johanson and Vahlne, 1992; Björkman and Eklund, 1996; Coviello and Munro, 1997; McGaughey et al, 1997; Chetty and Blankenburg Holm, 2000). For small firms these influential networks are often not only of a pure business nature, but international social networks are also of importance (Holmlund and Kock, 1998). But it should be noted that a study by Vatne (1995) failed to find support the importance of external relationships in small firms' internationalisation success. However, following the insights of a study by Uzzi (1997), Vatne's findings could be explained by differences in a firm's network embeddedness and its willingness to expand its range of contacts. If a firm's embeddedness exceeds a certain threshold level, network effects become observable. Firms below that level, like maybe the sampled firms in Vatne's study, might not exhibit network effects in their internationalisation. Likewise, firms with a very high degree of network embeddedness might experience negative effects on their

internationalisation due to isolation from information outside their strong network ties. In addition, following Johanson and Mattson (1988), the degree of globalisation of the industry sector the firm is operating in is also of importance. If the industry sector is highly local and domestic, its impact on the internationalisation of the firm can be expected to be rather low. Another source of error might of course also relate to the operationalisation of network effects. Due to its complex nature as noted above, it is difficult to operationalise and capture a firm's network in its completeness. Overall however, it thus seems more appropriate to look at a firm's internationalisation at both an internal and externally driven process, with different weights attached to both aspects, contingent upon the network embeddedness of the firm and the "locality" of its industry sector.

3.4.3.2 Export Developmental Models

The foundation of the export developmental or innovation related models are identical to the Uppsala model. Their basis is also the firm's lack of knowledge and uncertainty about foreign markets (Andersen, 1993). Therefore, they do not add to the theoretical foundation of the internationalisation theory.

Similar to the Uppsala model, all models postulate a gradual increased involvement and commitment to foreign operation based upon experience and learning (Strandskov, 1986), although – as the name suggests – focusing on exporting and its various sub-stages only. Thus neglecting other forms of international business that the Uppsala model incorporates.

Besides their numbers in stages (see table 3.3), the models differ with respect to their stages classification criteria and their assumption about the origin of the initial attention evoking force regarding exporting.

While Cavusgil (1980, 1982) bases his models on increasing export involvement (Strandskov, 1986) and on a push mechanism, that is an external change agent pushing the firm into exporting activities (Andersen, 1993), Czinkota (1982) bases his model on increasing export experience (Strandskov, 1986) and on a pull mechanism, that is an internal change agent pulling the firm into exporting activities (Andersen, 1993).

Although not discussed and considered by most reviews (see for example Andersen, 1993; Leonidou and Katsikeas, 1996) but Rao and Naidu's (1992), Czinkota's model

is unique in that it includes two stages (highlighted in italic in table 3.3) reflecting a decline in exporting level. A continuous decline for firms in stage 5, and a temporary decline for firms in stage 6, caused by disappointing results in exporting (Czinkota, 1982). Although Czinkota does not specify these situations and later drops these two stages in his analysis due to too low a number of firms in that category, it is interesting to note that the very fact that Czinkota identified at least some firms falling into that category supports the definition of internationalisation stated in the beginning of this section, a definition which assumes a non-permanent forward movement in involvement in international operations, acknowledging "de-involvement", either temporary or permanent.

On the other hand, Bilkey and Tesar's (1977) model is based upon increased export dependence on psychologically more distant countries (Leonidou and Katsikeas, 1996) and a mixture of stage classification criteria (Strandskov, 1986). Like Cavusgil's models it is based on a push mechanism (Andersen, 1993). In contrast to the other export developmental models, Bilkey and Tesar (1977) explicitly state the possibility of a stage jump. They argue that stage three (active exploration of export feasibility) can be skipped if the firm obtains unsolicited export orders. However, although their stage model is widely cited in the literature, they themselves only empirically tested stages 3 to 5!

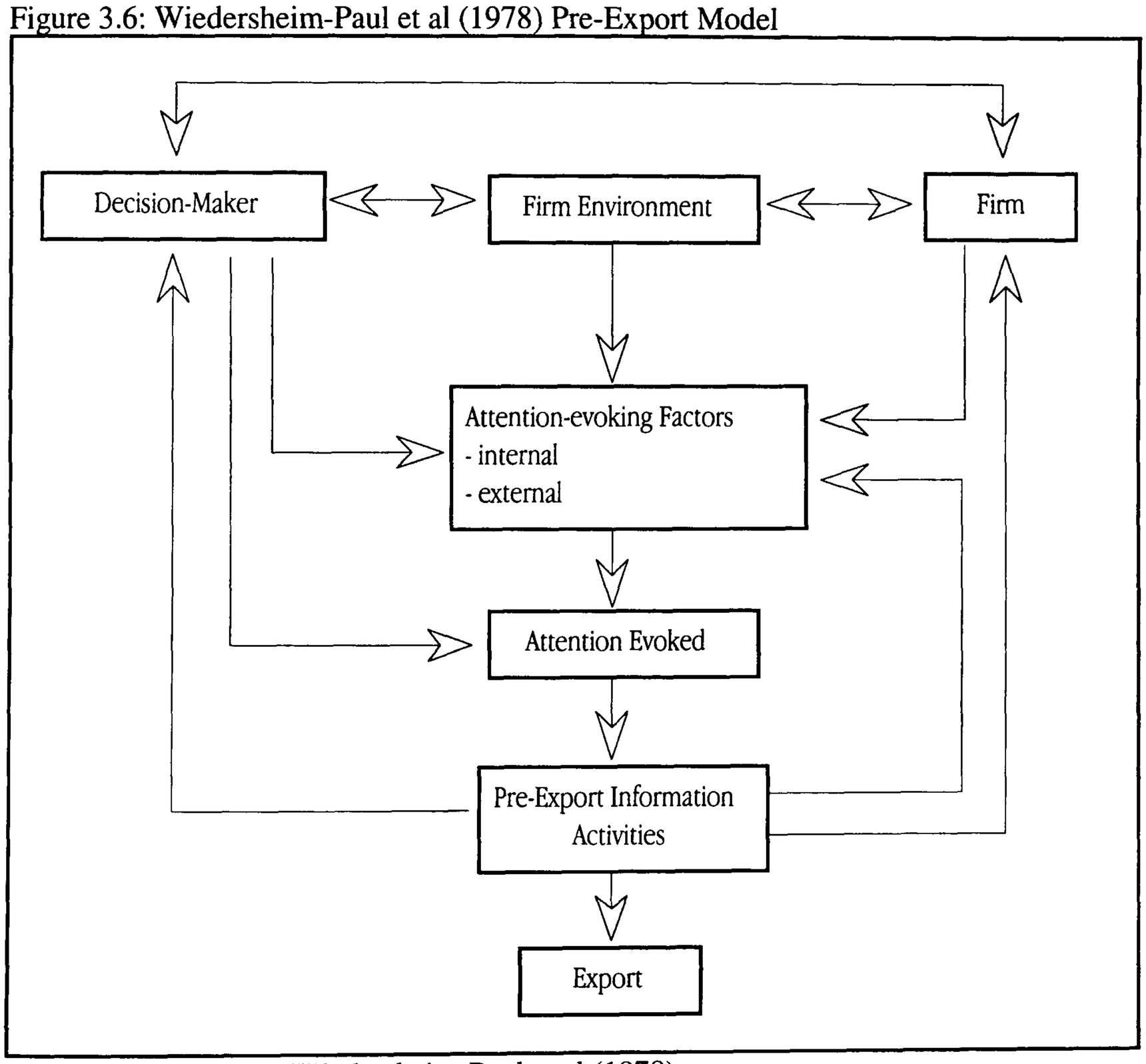
Despite the fact that the export developmental models do not add to the theoretical foundations of the theory of the internationalisation of the firm, they add and highlight the importance of an internal or external initiating force. Often this force is external like an unsolicited inquiry (Bilkey and Tesar, 1977; Graham, 1999). An aspect that is less explicit in the Uppsala internationalisation model. Furthermore, especially in Czinkota's model, de-internationalisation, that is a temporary or permanent decline in international operations, is not only conceptualised, but also empirically supported. However, the assumption of a unidirectional and linear increase in international operations remains the major conceptual thrust of these models.

3.4.3.3 Pre-Export Models

In contrast to the above discussed models, the two similar models by Wiedersheim-Paul's et al (1978) and Olson and Wiedersheim-Paul (1978) focus on pre-export activities (see figure 3.6 and figure 3.7). Like the Uppsala model and the export developmental models, these models are also based on the assumption that all firms are non-exporters after their inception, serving only a local market. Furthermore,

the pre-export models assume one single decision-maker in the firm, usually the founder of the firm. Thus, they implicitly stress that the firm in their early internationalisation is rather small and exhibits a high degree of centralisation (see chapter 2). The single decision-maker is regarded as comparatively more important and influential than the firm as a whole. Mixed findings regarding the importance of firm size (see for example: Aaby and Slater, 1989; Culpan, 1989; Bonaccorsi, 1992; Calof, 1994; Ahokangas, 1998; Zou and Stan, 1998) as a resource indicator for the internationalisation of the firm probably support this notion. Firm level factors might be less powerful predictors than owner-manager level factors. Such a focus is less evident in the previous models.

Figure 3.6: Wiedersheim-Paul et al (1978) Pre-Export Model

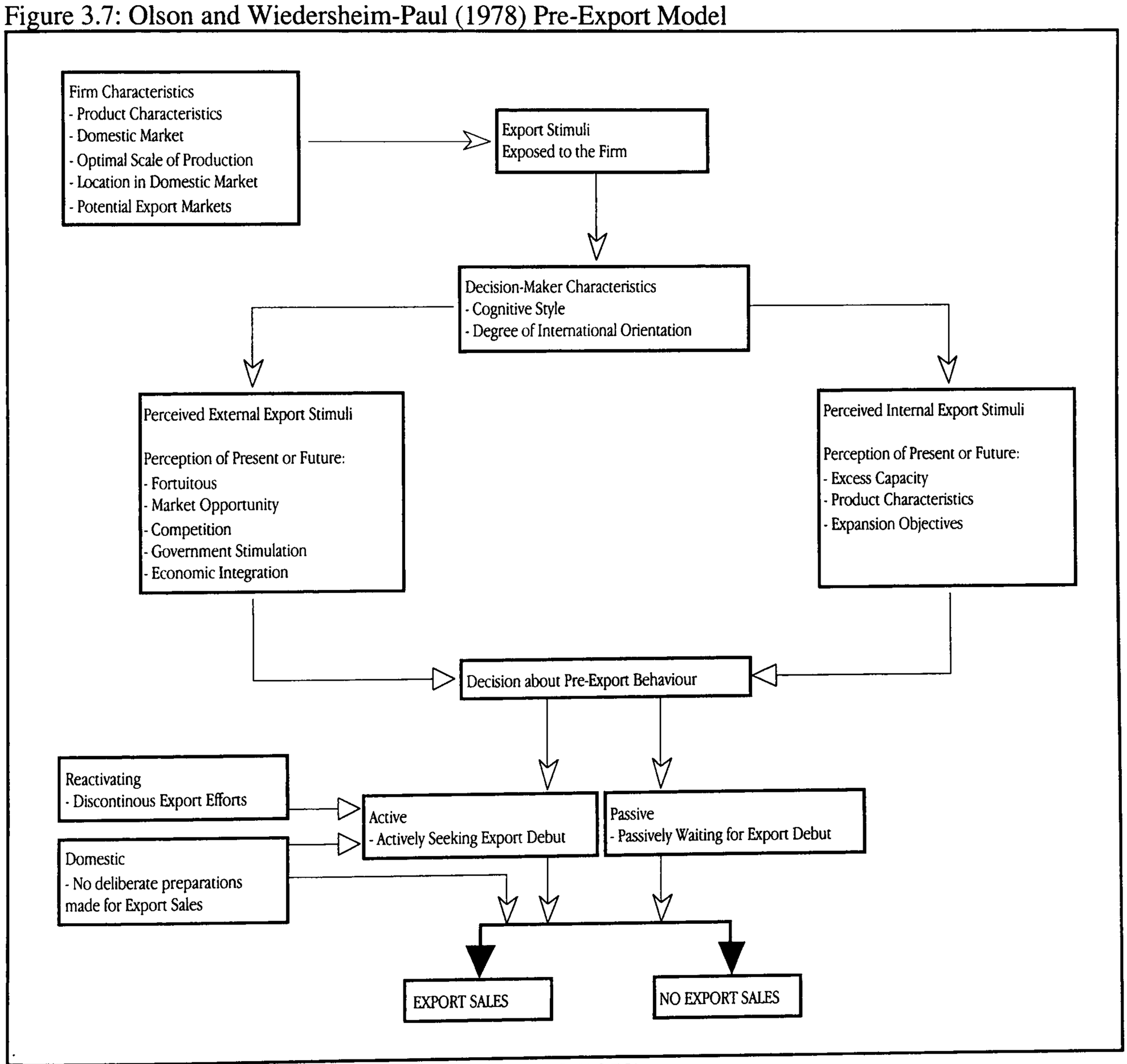


Source: Adapted from Wiedersheim-Paul et al (1978).

The authors of the pre-export models assume that this key decision-maker is exposed to internal and external attention-evoking factors regarding exporting. The model thereby incorporates both push and pull factors, as opposed to the discussed export developmental models with their focus on either push or pull factors.

The decision-maker's international outlook, his perception of uncertainty and his individual uncertainty tolerance paired with his past history and experience are seen as the key determinants regarding his perception of exporting activities. The firm, particularly its goals, products and history and the firm's external environment mediate this perception. Again, similar to the Uppsala internationalisation model, lack of knowledge and hence uncertainty about foreign markets is seen as the principal pre-internationalisation status of a firm. These factors, depending on the decision-maker, can then lead to an increased willingness to initiate exporting, with increasing information gathering about foreign markets and information transmission activities being crucial to the pre-exporting stages.

Figure 3.7: Olson and Wiedersheim-Paul (1978) Pre-Export Model



Source: Adapted from Olson and Wiedersheim-Paul (1978).

Based on these variables, three firm stages are distinguished: domestic non-exporters who have no interest in exporting, passive non-exporters who might start exporting in

the case of an unsolicited order from abroad and active non-exporters, actively undertaking efforts to initiate exporting (see table 3.3 column 4).

In contrast to the previous models, the two related pre-export models – besides stressing the importance of the key decision-maker as opposed to the firm as a whole, thereby individualising the internationalisation process of the firm – also highlight the "pre-state" of the firm. This pre-state, that is the past history and experience of the key decision-maker, which was shown to be influential for small firms in general (see chapter 2), which subsequently influences his international outlook and his perception of uncertainty, is not explicitly considered in the other models. Empirical support with regards to international experience (see for example Bloodgood et al, 1996; Morgan, 1997b; Reuber and Fischer, 1997; Zou and Stan, 1998) validates this aspect.

3.4.4 Barriers to Internationalisation – The Liabilities of Foreignness

Although the body of literature dealing with barriers to internationalisation does not constitute a theory of the internationalisation of the firm in its own right, a review of internationalisation barriers was included in this section for two reasons. First, the process oriented internationalisation theories, mainly the Uppsala internationalisation model, stress lack of knowledge as a key barrier in the internationalisation process. However, as this section will show, other barriers are also identified in the literature. Second, as will be argued later (see chapter 4 and especially chapter 5), the Internet can potentially impact both, the internationalisation process and internationalisation barriers. Therefore, both aspects need to be considered.

The classical models of internationalisation as discussed above, usually regard exporting, either indirect or direct (see figure 3.3), as the first step in a firm's involvement in international transactions. Therefore, the following sections will summarise the key empirical findings of the exporting literature regarding inhibitors to exporting as a first step in internationalisation. This summary will build the basis for one of the discussion on how the Internet and its related services might effect some of these factors (see chapter 4). Moreover, this summary will also be used as an element in the critique of the theories of the internationalisation of the firm that follows in the next section.

It is acknowledged that firms do not necessarily start their international operation with exporting. However, the inhibiting factors are assumed to be similar, as any form of international operation – especially if perceived as new by the firm – involves similar

barriers, albeit the degree of each barrier will vary. For example information needs, financial skills and organisational resources for FDI are usually higher compared to indirect exporting.

As the literature on exporting is extensive, it is the intention of the author to focus on key articles and previous reviews. The goal is to capture the emerging key barriers rather than compiling an extensive and exhaustive literature review, including barrier rankings and degrees of barrier interrelatedness. A recent review by Leonidou (1995a) has actually shown that this is hardly possible due to a lack of comparability between studies.

Furthermore, this brief review will focus on the inhibiting factors only. It is assumed that key facilitators or key success factors like management's competence and commitment to international markets (Aaby and Slater, 1988; Chetty and Hamilton, 1992; Zou and Stan, 1998) and the importance of systematic planning and international market research (Zou and Stan, 1998) represent the opposite to these inhibitors. For example if lack of knowledge about foreign markets is an inhibiting factor, knowledge about foreign markets will obviously be a facilitating factor.

Table 3.4: Inhibitors to International Business (Mostly Exporting) in Small Firms

Internal Inhibitors	
attitudinal:	– **no interest** (for example Miesenbock, 1988) – **ethnocentric/ domestic orientation** (for example Dichtl et al, 1990; Leonidou and Katsikeas, 1996; Morgan, 1997a)
organisational:	– **lack of contacts** (for example Kau and Tan, 1989) – **lack of capacity** (for example Miesenbock, 1988; Leonidou, 1995b; Morgan, 1997a) – **lack of capital** (for example Bilkey, 1978; Miesenbock, 1988; Weaver and Pack, 1990; Leonidou, 1995b; Morgan, 1997a) – **lack of information** (for example Miesenbock, 1988; Weaver and Pack, 1990; Leonidou, 1995b; Leonidou and Katsikeas, 1996) – **lack of knowledge** (for example Bilkey, 1978; Miesenbock, 1988; Leonidou and Katsikeas, 1996; Morgan, 1997a; Schitag Ernst & Young, 1998) – **lack of qualified human resources** (for example Miesenbock, 1988; Morgan, 1997a) – **language barriers** (for example Miesenbock, 1988; Weaver and Pack, 1990; Leonidou, 1995b; Schitag Ernst & Young, 1998)
administrative:	– **export documentation/ "red tape"** (for example Rabino, 1980; Miesenbock, 1988; Leonidou, 1995b; Morgan, 1997a; Schitag Ernst & Young, 1998) – **communication** (for example Rabino, 1980; Leonidou, 1995b) – **logistics&transportation** (for example Weaver and Pack, 1990; Barker and Kaynak, 1992; Leonidou, 1995b; Morgan, 1997a)
product/ services:	– **product not marketable abroad** (for example Kau and Tan, 1989; Morgan, 1997a) – **different standards and specifications** (for example: Leonidou, 1995b)
External Inhibitors	
markets:	– **no perceived demand abroad** (for example Miesenbock, 1988) – **cultural issues** (for example Weaver and Pak, 1990; Leonidou, 1995b; Morgan, 1997a; Schitag Ernst & Young, 1998)
competition:	– **strong international competition** (for example Leonidou, 1995a, 1995b)
trade barriers:	– for example Bilkey, 1978; Rabino, 1980; Miesenbock, 1988; Weaver and Pack, 1990; Barker and Kaynak, 1992; Leonidou, 1995b; Morgan, 1997a; Schitag Ernst & Young, 1998
financial:	– **late(r) payments/ cash-flow issues** (for example Leonidou, 1995a; Morgan, 1997a; Schitag Ernst & Young, 1998) – **exchange rate risk** (for example Morgan, 1997a)

Source: The author, derived from the literature.

In reviewing the literature, one can in general distinguish between two broad categories (see table 3.4): internal inhibitors and external inhibitors (Leonidou, 1995a; Morgan, 1997a) that make up the liabilities of foreignness (Zaheer, 1993).

Besides attitudinal inhibitors, organisational and administrative inhibitors form the core of the internal inhibitor category. Lack of organisational resources that are needed to start or expand international operations clearly emerge as key barriers, together with administrative barriers to actually conduct international operations. Particularly the lack of or existence of limited information regarding foreign markets (for example locating and obtaining a foreign agent) is often stated as the greatest inhibiting effect on export behaviour. Leonidou (1995a) even regards this as the number one internationalisation barrier. Additionally, the firm's products and services can constitute another hurdle, if the products are in need of expensive adaptation due to for example different technical specifications or customer preferences.

The main external inhibitors are trade, market, competition and finance related. Trade barriers, as the name implies, obviously constitute a barrier in its own right, whereas market related barriers are manifold, including no perceived demand and cultural differences. Strong competition in international markets is another perceived barrier that is strongly related to perceived market barriers. Financial factors like late payments and exchange rate risk are additional inhibitors for firms to start or expand their international engagement.

It should be noted that the perception and degree of these barriers differ among firms that are already involved in international business operations and firms that are not yet engaged in international business (Leonidou, 1995b; Morgan, 1997a). Naturally, the perception of barriers by firms that did not internationalise tend to be more of a purely perceptual nature, while internationalised firms' perception is more of an experiential and operational nature (Leonidou, 1995b; Morgan, 1997a). Also, differences regarding the size of the firm, the age of the firm, the industry sector of the firm and the home country of the firm do exist (Leonidou, 1995b).

The Barrier Lack of Information and the Small Firm

Besides external barriers and the internal barriers related to a lack of resources to initiate or support internal operations, lack of information and subsequently a lack of knowledge and contacts emerged as another key category of internationalisation inhibitors. This observation is in line with the importance of knowledge stressed in the

Uppsala process model. Since the Internet can be viewed as a global information pool (see chapter 4), potentially providing information about international markets, it is important to briefly review the specifics of information gathering in small firms, in order to better evaluate the Internet's theoretical impact prior to the investigation.

Although firms are often conceptualised as information processors (Galbraith, 1973; Stinchcombe, 1990; Egelhoff, 1991; Casson, 1996), little research has yet addressed the specific role of information in SMEs in general (Lybaert, 1998) or in the internationalisation of firms in specific (Benito and Welch, 1994; Buckley, 1996; Leonidou, 1997; Liesch and Knight, 1999). Let alone in the even more specific case of STBFs. This is despite its assumed key role in the internationalisation process according to the Uppsala model. This gap was only recently addressed more specifically by Souchon and her colleague (Diamantopolous and Souchon, 1999; Souchon and Diamantopolous, 1999), focusing on export acquisition modes, forms of export information use and its impact on export performance.

However, it emerges that in contrast to larger firms, small firms tend to use more informal (Reid, 1984; Benito et al, 1993; Julien, 1995; Welch, 1996; Pineda et al, 1998; Nijssen et al, 1999) and personal (Specht, 1987; Smeltzer et al, 1988; Julien, 1995; Walters, 1996; Pineda et al, 1998; Nijssen et al, 1999) information sources. Although differences with regards to the perceived importance of an information – the more important a decision, the more information sources, particularly external sources, are used – are acknowledged (Pineda et al, 1998), small firms tend to focus on easily available, accessible and inexpensive sources of information (Walters, 1996; Leonidou, 1997). Expensive face-to-face meetings, particularly in international business operations, are used only infrequently (Walters, 1996) due to the liabilities of small firms (see chapter 2), thus questioning the importance of purely market specific, experiential knowledge as postulated in the Uppsala model.

3.4.5 Critique: Towards an Expanded Internationalisation Model

Section 3.4 discussed and reviewed the main theories of the internationalisation of the firm. It has become apparent that international business theory is mainly concerned with the outcome of this process, mainly in the form of MNEs. Only internationalisation theory explicitly addresses the internationalisation process, its nature and influential variables, with the Uppsala internationalisation model as its key theoretical base. The following two sections will summarise and criticise the model.

The first sub-section focuses on its assumptions and postulated process, the second sub-section focuses on its postulated manifestations.

3.4.5.1 Assumptions and the Internationalisation Process

As discussed above, the Uppsala model of internationalisation proposes that a firm will gradually increase its international involvement and commitment, as its market specific knowledge about foreign markets increases, its network of business contacts expands and its perceived risk decreases through experiential learning gained via its current business activities. It is based on the assumption that a firm, at inception, operates solely in its domestic market and has limited or no knowledge about foreign markets.

Besides methodological weaknesses due to its "timelessness" (Andersen, 1993), at later stages of the internationalisation process, when the firm has become experienced and highly internationalised, the model's assumption decreases its ability to explain the internationalisation process (Vahlne and Nordström, 1993). The strength of this model therefore mainly lies in the early stages of internationalisation.

Furthermore, it implicitly assumes market seeking (Petersen and Pedersen, 1997), as opposed to other motivational factors for internationalisation (see section 3.2), as the sole motivational factor for a firm to engage in international operations. Due to its behavioural focus, aspects of strategic decision-making are not explicitly incorporated (Melin, 1992; Welch and Welch, 1996), although it is generally argued that different strategic motivations need to be considered in order to understand international business operations (Buckley and Casson, 1998).

Empirical studies have shown that strategic planning can be another source for information (see for example Millington and Bayliss, 1990), besides information based on experiential knowledge as stressed in this model. This focus on the importance of market specific knowledge, as opposed to its general accumulated knowledge, is also criticised by other authors (Clark et al, 1997; Hadjikhani, 1997). They found for example that the firm's general knowledge about conducting international business operations is an important source to learn and gain experience, in addition to market specific knowledge. A study by Eriksson et al (1997) could also demonstrate the importance of general international business experience. Although specific to the particular firm, this general experience affected the firm's experiential international business knowledge. Similarly, Bell et al (1998a) also found that industry experience emerged as more important than specific country experience.

Due to the forces of globalisation that were discussed above, converging markets might thus increase the importance of general international experience, as opposed to market specific experience across dissimilar markets, giving rise to economies of scope (see also Casson, 1993). The relative importance of market specific versus general industry knowledge might thus be a function of a firm's industry position on a global to multi-domestic industry scale.

3.4.5.2 Learning, Knowledge and Commitment in the Internationalisation Process

Additionally, though the model stresses experiential learning as the key factor in the internationalisation process, the actual process and the sources of organisational learning remain vaguely described. The current activities being the main source for experiential learning that the model states. How organisational learning actually takes place, what the critical components of organisational learning are, whether organisations actually differ in their learning capacity and why and how they conserve and retrieve experience are questions that are not addressed. The only statement by the authors regarding market knowledge, defined as information about international markets and operations (Johanson and Vahlne, 1977), is that it is "... somehow stored and reasonably retrievable..." (Johanson and Vahlne, 1990). Although Johanson and Vahlne (1990) incorporated in their updated model the possibility of learning from the experience of others via established network relationships, distinctions of external learning mechanisms and how they might subsequently affect the internationalisation process are not considered. A related weakness of the model with regards to its focus on organisational learning is the absence of a distinction between experience and expertise. Although organisational learning theory acknowledges direct experience as the most powerful source for learning, it also acknowledges that people have different "learning horizons" (Senge, 1990), due to differences in cognitive processing capacities. While two decision-makers in a business might have the same amount of international business experience in terms of year working in that field, their expertise might differ significantly due to different learning abilities. An empirical study by Reuber and Fischer (1994) could demonstrate the importance of such a distinction (see also chapter 2). It thus comes as no surprise that Buckley and Casson (1998) argue that the actual learning process and its influences have to become much more operational in order to assess the model's validity.

Also, the exact nature of the assumed relationship between market knowledge and market commitment is not clearly addressed. The model only assumes a positive directional relationship, that is, the higher the knowledge, the higher the commitment. Although this simplistic assumption might be logically appealing, an empirical study in the service industry – thereby also showing the model's potential sector sensitivity towards manufacturing industries – could actually demonstrate the existence of a U-shaped relationship between knowledge and commitment (Erramilli, 1990). Benito and Welch (1994) argue that such a curvilinear relationship might be explained by the fact that as the decision-maker in the firm learns more about an international market, his initial risk perception might change. It could actually increase and lead to lower commitment levels. An argument that could also be grounded in the transaction cost framework (Williamson, 1996). It postulates that transaction costs cannot be completely anticipated ex ante. Hence, the less experienced the decision-maker, the higher the potential gap between anticipated costs and actual costs.

Furthermore, Hadjikhani (1997) noted that the important concept of commitment in the model has been conceived too narrowly, focusing on its tangible element. He distinguishes between tangible (for example economic and institutional forms of commitment) and intangible commitments like the reputation of the firm in a foreign country. The author then goes on to demonstrate, in a historical study spanning 30-years, that the international behaviour of the observed firms was more connected to their intangible, less overt commitment than to their tangible commitment.

3.4.5.3 Resources and the Internationalisation Process

Although grounded in Penrose's theory of the growth of the firm (Penrose, 1959) with its focus on a firm's resources and excess capacity resource related factors like the development of the resource-base of a firm and its subsequent transformation into organisational capabilities (Madhok, 1997) is not explicitly addressed (Andersen, 1997). The model focuses on experience that transforms into knowledge as the key resource in the internationalisation process. However, the reviewed internationalisation barriers clearly showed the importance of resource related factors other than information and knowledge. If a firm does not have the resources to support its internationalisation although it is knowledgeable about international markets, internationalisation will either not take place at all, or it will lead to low(er) levels of performance. Empirical studies demonstrating threshold effects in international business performance (Geringer et al, 1989; Riahi-Belkaoui, 1998) support this. But even more strongly so, Petersen and Pedersen (1998) could show that the

resource-base of a firm showed a stronger association with internationalisation than knowledge accumulation. Thereby supporting the importance, as well as complementary role of organisational resources other than knowledge.

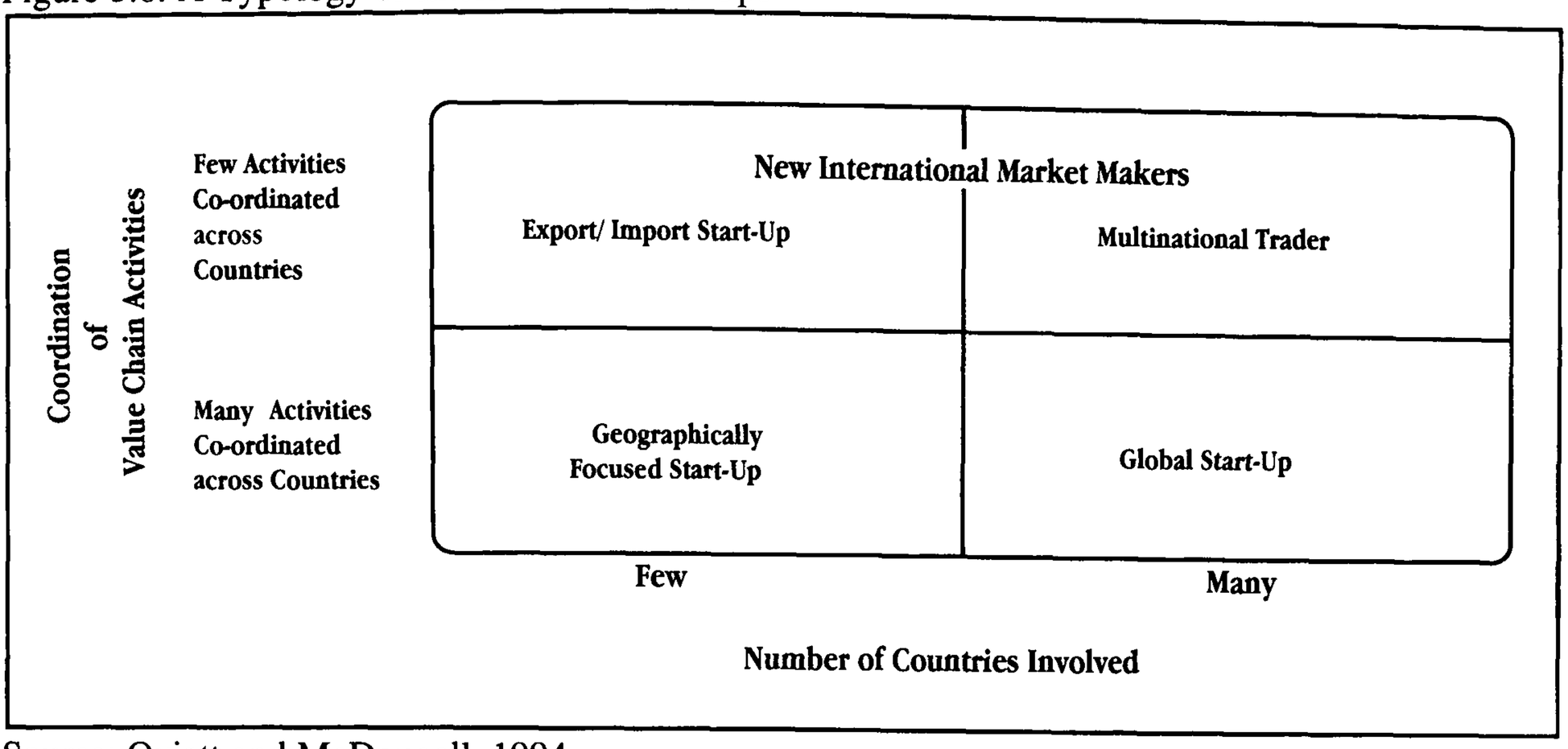
3.4.5.4 Psychic Distance and the Internationalisation Process

Besides the postulated stages in market entry form which will be discussed below, the model's concept of psychic distance has also been in the focus of critique (see for example: Benito and Gripstud, 1992; O'Grady and Lane, 1996; Stöttinger and Schlegelmilch, 1998). While it can also be assumed that due to the forces of economic globalisation psychic distance matters less, it was also noted that a major problem with the empirical studies testing this concept was their tendency towards aggregated levels of analysis (O'Farrell et al, 1995; Petersen and Pedersen, 1997). An aggregated level of analysis treats each firm in a country similar, thereby neglecting potential individual differences in the perception of psychic distance on the level of the decision-maker. A research design on the cognitive level of decision-makers might be more appropriate to testing the validity of the psychic distance construct (O'Farrell et al, 1995; Evans et al, 2000). A study by Nordström (1991) utilising such a conceptualisation could actually show that psychic distance still mattered in the direction of firms' internationalisation.

3.4.5.5 International Start-Ups: A Further Challenge to the Uppsala Model?

Recent empirical findings of what has been termed "infant multinationals" (Lindqvist, 1991), "born globals" (Rennie, 1993; Knight and Cavusgil, 1996) or "international new ventures" (Oviatt and McDougall, 1994) have seemingly challenged the classical view of internationalisation as a gradual process as discussed above, since some of these firms operate internationally, beyond solely exporting, from their inception (see figure 3.8).

Figure 3.8: A Typology of International Start-Ups



Source: Oviatt and McDougall, 1994.

Besides their potential challenge to the traditional theories and models of internationalisation, these observations are particularly important for the context of this thesis, as it is argued that born globals are often STBFs (Knight and Cavusgil, 1996).

Although widely regarded as a new phenomenon, "instant internationals" have in actual fact existed for quite some time (Oviatt and McDougall, 1994; Knight and Cavusgil, 1996). Nevertheless, due to the forces of globalisation that were discussed above, this phenomenon might nowadays become much more common and feasible for a firm as it would have been decades ago under the assumptions of the traditional internationalisation theories.

The very existence of these "instant internationals" might at first sight question the foundations of incremental internationalisation models. However, as will be argued in the next paragraphs, incremental internationalisation models are still valid, because a falsification of its postulated surface manifestations is not necessarily the same as a falsification of the reasoning behind its suggested process forces (Madsen and Servais, 1997). Some of its assumptions just have to be re-adjusted. The line of arguments that is presented below relates to similar arguments made by Madsen and Servais (1997).

In 1977, Johanson and Vahlne noted regarding gaining experience that "... experience is not for sale ... [it] has to be acquired through a long learning process in connection with current [business] activities [of a firm]." This statement neglects possible pre-state aspects of a firm that were discussed in chapter 2 in relation to the background and

experience of the technical entrepreneur and in this chapter in the discussion of the pre-export model.

These discussions showed that the previous experience of a firm's founder or team of founders constitutes an important characteristic for understanding young firms' activities. Yet, pre-state aspects are usually not explicitly integrated into internationalisation models. Hence, by moving the time frame of analysis before the actual inception of a firm, one might actually solve the myth about "instant internationals". Findings of the only empirical study known to the author with a time frame of analysis covering the complete organisational life-cycle of a firm, as well as its pre-founding aspects (McGaughey et al, 1997), clearly emphasised the importance of pre-state aspects. A more recent study by Chetty and Blankenburg Holm (2000) found further support for the importance of a firm's pre-state in understanding and explaining its (post-inception) internationalisation. Thus, the characteristics and personal resources of the founding entrepreneur (or team) prior to inception has an additional important impact on a firm's post-inception internationalisation behaviour.

Besides these pre-state aspects of the firm and its management, one might look at the phenomenon of "born globals" also from a slightly different perspective. It might simply be that, due to the forces of globalisation, the initial level and subsequent speed of internationalisation of an international start-up starts only at a higher base-level compared to the initial base-levels that were possible in a less open and integrated world. Therefore, an incremental increase of international commitment can and most probably will still exists, albeit at a higher initial level. A study by Preece et al (1998) supports this view. While their sample of STBFs was rich in instant internationalisers, potentially supporting the "born global" argument, these firms "globalised" only once they have developed and accumulated a sufficiently strong internal resource-base.

3.4.5.6 Manifestations of Internationalisation: Stage Models

All the discussed models are stage models, or at least they include on (UIM). These models postulate externally heterogeneous and internally homogeneous stages that a firm has to sequentially go through in its international development, albeit some models acknowledge possible exceptions to this linear development.

Ever since these models were first proposed, various empirical studies (see for example: Turnbull, 1987; Millington and Bayliss, 1990; Sullivan and Bauerschmidt, 1990; Bell, 1995; Calof and Beamish, 1995; Björkman and Eklund, 1996; Buckley

and Chapman, 1997) have shown the reduction of steps or a sheer absence of steps in the internationalisation process. Thereby questioning their underlying assumption of linearity in the internationalisation process. Although some of these empirical falsifications were criticised due to their failure to take the underlying assumptions of market seeking into consideration (Petersen and Pedersen, 1997) – the authors could for example demonstrate that different internationalisation motives lead to different pattern of organisational commitment and organisational manifestations – it should be remembered that any stage model represents an idealised, normative theoretical framework of sequencing stages reflecting a continuos much more complex process that takes place in real life.

The few empirical studies that analyse the internationalisation process of a firm on a longitudinal basis (see for example Buckley and Chapman, 1997; Clark et al, 1997; McGaughey et al, 1997), could demonstrate that the sequence of stages are heavily influenced by internal and external factors that are unique to a firm and are therefore hard to incorporate into deterministic and generic internationalisation models like the ones discussed above.

Interval problems (Andersen, 1993), unaddressed specifics regarding mode shifts (Benito et al, 1999), intra-stage and inter-stage problems and the velocity of time a firm needs to pass from one stage to the other (Leonidou and Katsikeas, 1996), are all not addressed and probably cannot be addressed as the process of internationalisation is rather idiosyncratic to each firm, as stated above. This follows Bilkey's (1978) early observation of a "S-O-R type behaviour", where S is the internationalisation stimulus, R the response to that stimulus and O the organisation. The response thus depends on the organisation and its decision-makers and not on the stimulus per se (see the pre-export model), and due to the non-homogeneity of organisations the response is likely to differ.

In addition, the postulated internationalisation stages can exhibit increased commitment levels within themselves (Benito and Welch, 1994). The sales subsidiary stage in the original model for example can include various levels of increased commitment: ranging from simple sales administration to more complex sales management. Similar "sub-stages" may apply in the production abroad stage, as shown in Forsgren and Johanson's (1975) model.

Another problem with these deterministic stage models is their failure to reflect possible mixed modes in one country (Benito and Welch, 1994), that is more than one type of market entry in one single country. Recent empirical investigations could show the existence of mixed modes (Clark et al, 1997) or simultaneous entries (Holmlund and Kock, 1998) and their influential impact on the internationalisation process.

Besides Czinkota's (1982) original 8-stage model, all stage models assume a unilinear movement. That is "backward involvement" in the form of a retrenchment in international operations from a higher commitment mode like FDI to a lower commitment mode like exporting are not considered. Empirical evidence for such backward pattern (Clark et al, 1997) clearly indicates the need for internationalisation models to incorporate this phenomenon. However, managerial issues regarding de-internationalisation are currently not well understood (Buckley, 1996).

Nevertheless, the stage models are a useful way of classifying groups of firms, for instance in governmental export assistance programs targeting a particular segment of firms regarding their involvement in international business. Thereby moving from a process view to a categorisational view. Furthermore, as forcefully highlighted by Czinkota (1982), the amount of information required to classify a firm by exporting stage is lower and therefore less costly compared to other classifications like managerial attitudes. Besides that, rigid evolutionary typologies can now considered to be outdated (Buckley, 1996).

3.4.5.7 From Deterministic Stages to Contingent Internationalisation Paths

This notion has led research to focus more on "middle range approaches" or contingency approaches as proposed for example by Reid (1983). Focusing more on the company and its specific skills, experience and knowledge (Welch and Luostarinen, 1988), as well as market factors specific to the firm (Reid, 1983). This approach acknowledges that a firm's path to internationalisation is contingent on its internal and external peculiarities. Especially the focus on the internal resources of a firm to explain its internationalisation pattern – drawing upon the resource-based view of the firm (Penrose, 1959; Wernerfeld, 1984) – has recently received increased research attention (Bell et al, 1998b). An approach that is less deterministic than previous research due to resource heterogeneity across firms.

Such an approach makes pre-determined sequential stages meaningless and rather looks at a continuum on a variety of dimensions (see for example Welch and Luostarinen, 1988; Jones, 1999; see also figure 3.3). Following the definition of the term "internationalisation" of this thesis, internationalisation thus becomes a constantly changing state of an organisation rather than a specific stage. Rather than focusing on its organisational manifestations, evolutionary aspects like the earliness and speed of internationalisation become additional dimensions and the focus shifts more towards identifying and isolating key influential forces and variables that lead to organisational manifestations rather then deterministically, postulating stages and their sequences.

In summary it can be concluded that Miesenbock's decade old observation that "... a conclusive theory of small business internationalisation is far from being available." (Miesenbock, 1988), still holds and that "... the concept of internationalization has yet to be clearly developed as a research object." (Welch and Luostarinen, 1988). A comprehensive, integrative and dynamic theory of internationalisation relevant to the new environmental realities of an increasingly globalised world is still lacking (Dunning, 1993; Coviello and McAuley, 1999).

Such a new concept or theory will most probably still be incremental, but with less of a focus on experiential, market specific knowledge and more of a focus on objective, general industry knowledge and on other organisational resources and capabilities than the experience-knowledge relationship. Including inward internationalisation and de-internationalisation, pre-state aspects and a focus on the decision-maker(s) rather than a pure focus on the firm level, at least in the early stages of a firm's internationalisation (see figure 3.9).

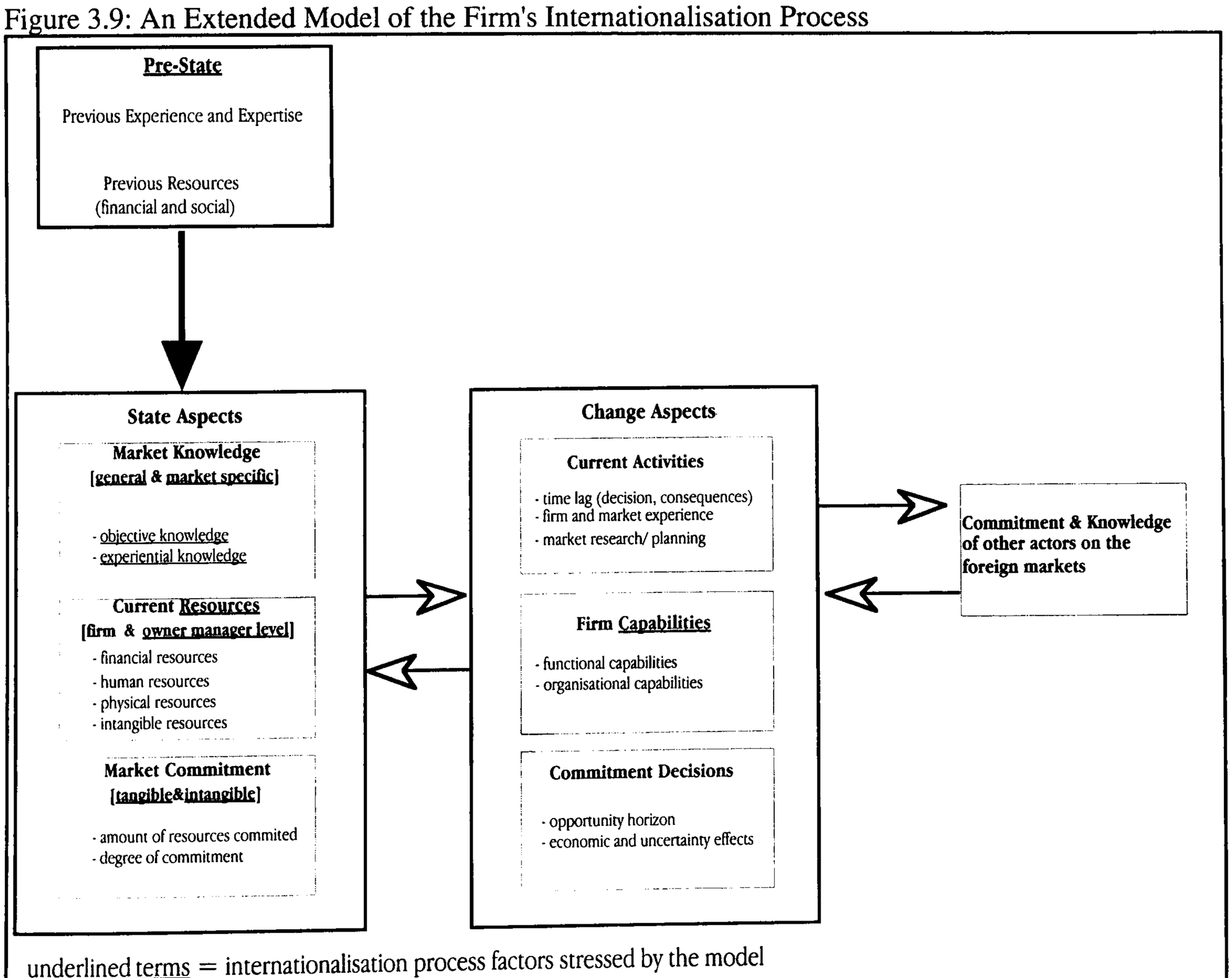
Yet another important factor that needs to be taken into consideration is the relationship between a firm's national and international operations. All the above stated models view the internationalisation process of a firm as relatively isolated from their development of domestic operations. While such a "multi-activity model" was mentioned early in the literature (Bilkey, 1978), so far "single activity models" (Bilkey, 1978) prevailed, assuming that a firm develops its international operations by growing without a need to contract other activities and comparatively isolated from them. The discussed forces of globalisation render such a distinction obsolete.

Furthermore, it will be important to delineate the concept of internationalisation. If one follows the broad definition of the concept given in the beginning of this chapter, one

might naturally ask: "When does internationalisation of a firm exactly start and when, if at all, does it end?" This is particularly important in relation to the applicability of theories in international business. As shown, international business theory's main explanatory strength lies in later stages of the internationalisation process of firms. Hence, the research challenge would be to understand until what point in the corporate life cycle of a firm internationalisation theories are more applicable and at what point international business theory will become more appropriate for explaining international operations. Moreover, it can be assumed that it is more the resources and capabilities of the firm and the accumulated experience and expertise of the key decision maker(s), in the case of STBFs the technical entrepreneur, than its size per se that will determine a potential switch to more rationalistic approaches.

Figure 3.9 summarises the discussed new elements of the internationalisation process forces.

Figure 3.9: An Extended Model of the Firm's Internationalisation Process



The distinction between resources and capabilities draws upon the works of Penrose (1959), Grant (1991) and Amit and Shoemaker (1993). The resource and capability categorisation used draws upon the classifications used by Mahoney and Pandian (1992) and Amit and Shoemaker (1993).
Source: The author.

3.5 The Internationalisation of STBFs

The important role of technology and technical change in international trade was noted early on (Posner, 1961; see also Vernon's international product life cycle as discussed in section 3.4.2). This trend is accentuated by the general globalisation of the economic environment (see section 3.3) and particularly the above average increasing internationalisation of technology-based competition and markets (Archibugi and Michie, 1995; Guerri and Milana, 1995). A trend further pronounced by increasing R&D costs (Granstrand, 1998) paired with shrinking product life cycles (Backhaus, 1997) and accelerated technology diffusion (Backhaus, 1997).

It thus comes as no surprise that technology-based firms, regardless of size, often recognise their internationalisation and international business as a key success factor (see for example Kleinschmidt and Ross, 1984; Reid, 1986; Meer and Calori, 1989; Litvak, 1990; Oakley, 1996; Coviello and Munro, 1997; Davies and Brush, 1997; Lindell and Karagozoglu, 1997) and that they align their product offerings more and more to international market realities (see for example Cooper and Kleinschmidt, 1985; Smith and Fleck, 1987; Kleinschmidt and Cooper, 1988; Feeser and Willard, 1990; Karagozoglu and Lindell, 1998). Early internationalisation (Lindqvist, 1991; McKinsey, 1993; Rennie, 1993; Fujita, 1995a; Oakey, 1995; Knight and Cavusgil, 1996; OECD, 1997a; Keeble et al, 1998; Burgel and Murray, 2000), impressive export sales (Arthur D. Little, 1977; Bollinger et al, 1983; Meer and Calori, 1989; McKinsey, 1993; Oakey, 1995; Burgel and Murray, 2000) and the existence of a relatively large number of small MNEs in the high-tech sector (Fujita, 1995b) support that further.

However, despite the immense interest in STBFs in general (see chapter 2), the internationalisation specifics of STBFs, as opposed to technology-intensive MNEs or medium-sized firms, have so far received only a scant attention in the literature (Lindqvist, 1991; Fontes and Coombs, 1997; Berry, 1998; Preece et al, 1998). Moreover, it is argued that due to the above outlined forces, an increased understanding of the internationalisation of STBFs should be high on the research agenda of future research (Licht and Nerlinger, 1998).

3.5.1 The Contradictory Imperative

Following the introductory remarks above, the need to internationalise early on for STBFs becomes more often a necessity rather than an option. However, as noted in chapter 2, STBFs face various liabilities, especially in their early years. Liabilities that

are further pronounced on an international scale due to the reviewed internationalisation barriers that constitute the additional liabilities of foreignness (Zaheer, 1995).

Hence, a contradictory imperative becomes apparent. On the one hand STBFs are faced with an increasing need to adapt their operations to international realities in order to succeed, on the other hand STBFs are faced with liabilities that restrict implementing such an orientation.

Besides the liabilities of age, size and foreignness, the additional liability of innovativeness (see chapter 2) can also plays an important role in this international context.

Although it is often stated that STBFs tend to internationalise early, sometimes even start to operate internationally at inception (see above), other authors argue differently. Ayal and Raban (1990) for example argue that small high-tech firms in large countries like the US, the UK, Japan or Germany, develop products for their home market and only after they have accumulated experience do they launch international activities. They reason that the selection and development process in high-tech is risky enough in itself, additional risk encountered by operating in international markets would potentially raise the risk level to an unacceptable level. Similarly, Licht and Nerlinger (1998) report of findings stating that older STBFs are more often engaged in international operations than young STBFs. These seemingly contradictory observations, early or instant internationalisation of STBFs on the one hand and later internationalisation on the other, might al least in parts relate to the liability of innovativeness discussed in chapter 2.

After inception, neglecting influential pre-states, STBFs first need to develop a technology-based competitive advantage before they can go international and exploit its product and process technology. While STBFs rarely do so in isolation (see chapter 2), it seems that this phase tends to be of a more local or regional than an international nature (see for example Posner, 1961; Vernon, 1966; Almeida and Kogut, 1997; Ahokangas, 1998, Porter, 1998). A study by Shane et al (1993) showed that innovative start-ups tend to start exporting later than less innovative ventures, but they are more likely to do so. Similarly, Tyebjee (1994) showed that if one accounts for the time difference between the year of inception and the year of the first product launch, an assessment of the internationalisation of STBFs becomes more meaningful. He found that long development times and short PLCs place a greater pressure on entering

foreign markets early and he found an opposite effect regarding the extent of export involvement. However, it is acknowledged that the exact relationship between innovativeness and the earliness of internationalisation remains relatively unexplored (Oesterle, 1997).

Thus, resource related issues, that is the resource poverty on the one hand and the technological expertise (technology development versus technology production and exploitation; see Archibugi and Michie, 1995) on the other, tend to outweigh the traditional outward internationalisation imperative in the early years of a STBF.

Besides the above discussed issues related to the contradictory imperative and the international liabilities of STBF's innovativeness, following the structure of chapter 2, the next two sections will review additional aspect of the internationalisation of STBF and the few studies addressing these. First the role of the technological environment of STBFs will be discussed and secondly the role of the technical entrepreneur.

3.5.2 The Technological Environment and STBFs' Internationalisation

As noted in chapter 2, the incubator/ pre-state often plays an influential role in STBFs. However, as also noted in chapter 2, most studies focus on the technology transfers that occur between the incubator and the newly established STBF. The potential transfer of more general management and marketing skills in relation to the internationalisation of the STBF is usually not explored. Nevertheless, some evidence in the internationalisation context exists.

Keeble et al (1998) for example showed that university links played an especially important role among highly international STBFs. Similarly, Bell et al (1998a) also observed that previous contacts played an important role in the internationalisation of STBFs, although it should be noted that the authors did not explicitly refer to incubator contacts. The previous contacts could also have been of a private nature. Berry (1998) explicitly addressed the role of the incubator in the internationalisation of STBFs. Similarly to the more general observations noted throughout this chapter that gained international experience is supportive to small firms internationalisation, her findings clearly demonstrated an incubator effect. International marketing experience previously gained in an incubator organisation showed a positive effect, defined as the extent of internationalisation, on the subsequent internationalisation of STBFs. Further incubator support was found by Crick and Jones (2000). Contacts based on industry

experience, including experience from previous employment, was an important initiating force in the internationalisation of some of their observed STBFs.

Besides the above indications of the incubator's pre-state influence on the internationalisation of STBFs, the international output dimensions of the technological environment the STBFs is embedded in (see chapter 2, figure 2.1), is another key characteristic.

As noted in chapter 2, STBFs often follow a market niche strategy. This strategic orientation is also reflected in the internationalisation strategies followed by STBFs. Similarly to small firms general focus on few markets (Calof, 1993), STBFs often exhibit concentrated product offerings (Kleinschmidt and Ross, 1984; Boter and Holmquist, 1996) in their international operations. This can be seen as an extension of their typical national operations (see chapter 2). A rather focused, albeit highly intensive, internationalisation that only subsequently, after supportive resources have been accumulated, leads to a more diversified internationalisation (Preece et al, 1998).

As indicated in the introduction to this section, this very niche market orientation also explains STBFs comparatively strong international orientation. As stated by Meer and Calori (1989):

"*Even though most companies have narrowly defined their technologies and products, their strategies are always based upon a world-wide definition of the market, as success depends upon a company's international presence. Serving international markets increases a company's potential to earn back the investments in R&D and to raise barriers against outsiders and imitators.*"

Due to this niche market orientation, home markets are often not big enough in order to achieve a critical mass of output to recover the high R&D costs. Thus, foreign markets are often regarded as more important than the home market (Kleinschmidt and Ross, 1984; Lindell and Karagozuglu, 1997), even if the home market is as big as the US market (Rabino, 1980; Lindell and Karagozuglu, 1997). Furthermore, this niche market approach also amplifies the information related internationalisation barriers like lack of international contacts, because finding suitable partners is more difficult in niche markets addressed with specialised products.

The Direction of Internationalisation of STBFs

Due to STBFs' technology intensity, the overall direction of their internationalisation is comparatively predetermined. As implicitly noted in the globalisation discussion above, the globalisation of technology – at least research intensive – is not a truly global phenomenon but a transregional phenomenon across the developed nations, mainly the triad (Kleinschmidt and Ross, 1984; Fujita, 1995a; Guerri and Milana, 1995; Patel, 1995). A direction in the international operations of STBFs that is easily explained by the needed infrastructure of technology-intensive products, the need of an advanced customer base and, in relation to Magee's "appropriability problem" (Magee, 1977), the need of an effective legal system enforcing property rights and copyright related issues (for recent explicit empirical support see Mansfield, 2000).

Besides the influence of the incubator/ pre-state and the niche market orientation on the internationalisation of STBFs, the national technological environment of STBFs also influences their internationalisation modes and motives.

Chapter 2 showed that STBFs, due to their discussed liabilities, often establish and develop external links, collaborating with other economic actors in order to overcome their internal liabilities. This complex web of external linkages is also a characteristic dimension in the internationalisation process of STBFs. Supporting the network theory of the internationalisation of the firm (see above), STBFs' internationalisation is often influenced by their web of external contacts, in addition to the influence of the incubator (Bell, 1995; Coviello and Munro, 1997; Bell et al, 1998a; Crick and Jones, 2000). But besides the implicit traditional outward focus, the relatively unexplored inward related networks are also an important element in the internationalisation of STBF. Not only do STBFs often import and buy-in technology and components (Smith and Fleck, 1987; Oakey, 1995; Korhonen et al, 1996), but technology sourcing (inward internationalisation) is often the starting point in the internationalisation of STBFs (Korhonen et al, 1996; Fontes and Coombs, 1997; Jones, 1999). Thus, following Fontes and Coombs (1997), if the national technological environment of the STBFs does not offer the specific technological expertise needed, STBFs often "look" international from a resource-seeking, technology sourcing perspective.

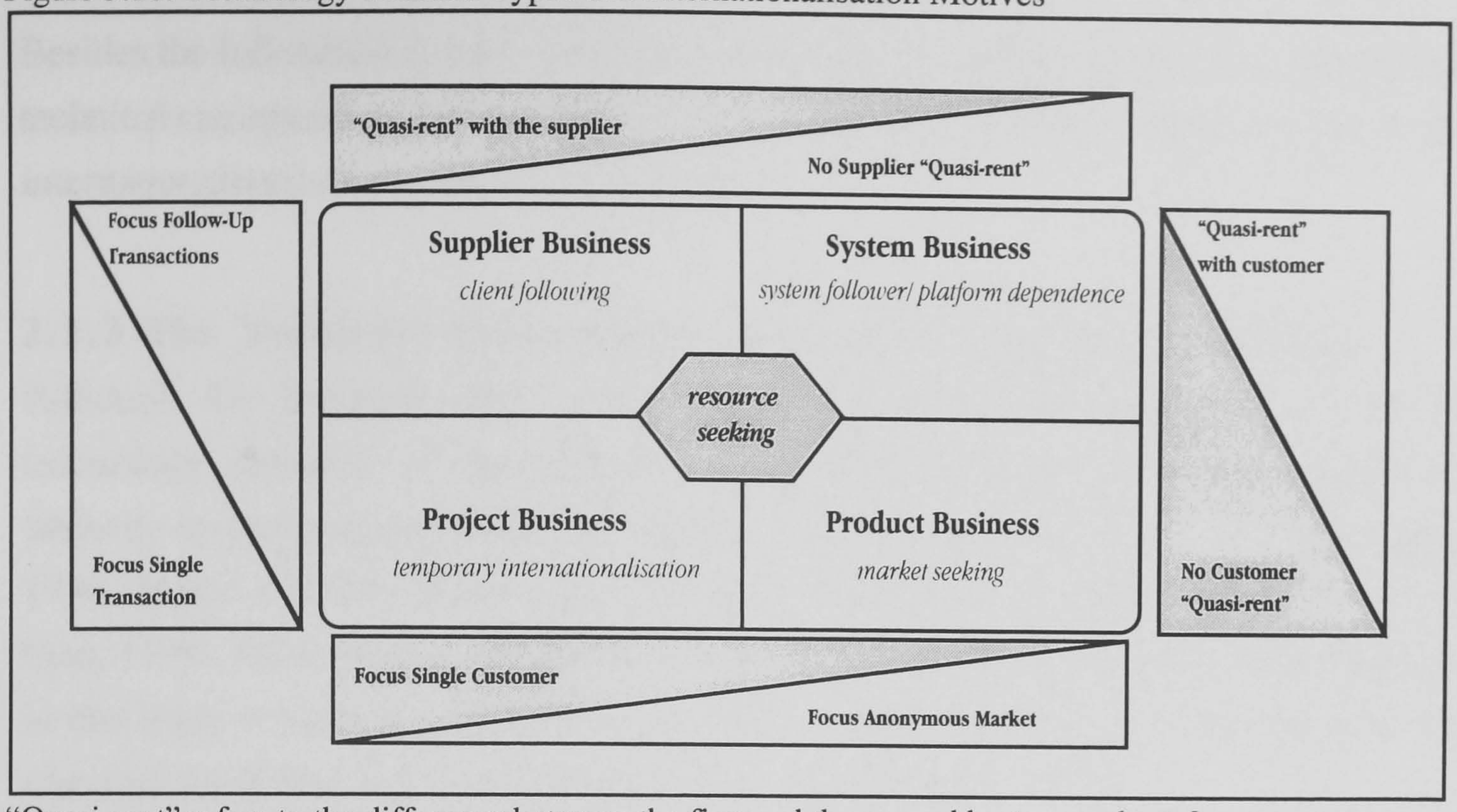
The Internationalisation Motives of STBFs

It thus emerges that internationalisation motives of STBFs tend to be more complex than the simple and unidimensional assumption of pure market seeking in the Uppsala

internationalisation model. But besides market seeking and resource seeking motives, additional motives can be found in the literature.

Reflecting the collaborative mode of national operations (see chapter 2), STBFs often tend to internationalise in co-operation with other firms (Forrest, 1990; Fujita, 1995b; Stearns, 1996; Keeble et al, 1998) – Acs et al (1997) termed this "proxy internationalisation" – in order to overcome their liabilities. This close co-operation is also reflected in the observed internationalisation motives of STBFs. Bell (1995) and Bell et al (1998a) for example found that the internationalisation motive client following – so typical in the service industry (Erramilli and Rao, 1990) – was not untypical among their sample of STBFs. The not unusual need for close co-operation with their customers (see chapter 2), which entails soft factors like pre and post sale services, are a possible explanation for this internationalisation motive similarity with service firms. Observations by other authors reporting of differences in STBFs' internationalisation based upon technology specifics like self-contained products versus technology components (Fontes and Coombs, 1997; Burgel and Murray, 2000), the temporary internationalisation of STBFs operating in the project business (Sharma and Johanson, 1987) or the observed platform dependency of STBFs operating in the systems business (Roberts and Senturia, 1996) support further the importance of the technology specifics, as opposed to mere market specifics, on the internationalisation of STBFs (see figure 3.10). These factors are not explicitly considered in the theories discussed in section 3.4.

Figure 3.10: Technology Transfer Types and Internationalisation Motives



"Quasi-rent" refers to the difference between the first and the second best use value of a resource or product. It reflects the amount a firm might appropriate from non-generic, idiosyncratic resources or products, it is equal to the yield of tied capital (Backhaus, 1997).
Source: The author, derived and expanded from Backhaus (1997).

International Technology Licensing

Another aspect in the internationalisation of STBFs relates to the generic internationalisation mode externalisation (see figure 3.3). In the specific case of STBFs technology licensing. Whereas the term technology licensing refers to the contractual transfer of product or process technology for a fee from one company (licenser) to another (licensee) authorising its use for a certain agreed purpose, but not transferring the right of ownership (Backhaus, 1997).

Although originally regarded as an unprofitable route in international business (because profits from licensing are usually lower due to higher transaction costs), a lack of control and a potential loss of technology (Caves et al, 1983; see also Rugman's (1980) stage model based on internalisation theory in table 3.3), more recently authors have argued that due to recent developments in technology generation and exploitation that were stated above, licensing becomes a much more important option (Kotabe et al, 1996), especially for STBFs (Carstairs and Welch, 1982). The likelihood for licensing is particularly high if the cost of learning about international markets through market specific experience is very high (Buckley and Casson, 1998). Nevertheless, licensing as an internationalisation option is still a very uncommon internationalisation mode for small firms in general (OECD, 1997a) and STBFs in particular (Lindqvist, 1991; Burgel and Murray, 2000), with the obvious exception of software firms who very rarely sell their actual software code.

Besides the influential impact of the technology and the technological environment, the technical entrepreneur or venture team of the STBF plays another important role in the internationalisation process.

3.5.3 The Technical Entrepreneur and STBFs' Internationalisation

Although the literature often suggests that technological characteristics like the technology intensity or the newness of technology relates to export propensity, intensity or performance (Aaby and Slater, 1988; Vatne, 1995; Boter and Holmquist, 1996; Molero, 1998), others only found mixed support (Leonidou, 1998; Zou and Stan, 1998). Observations which lead to the argument that it is not the technology per se that leads to internationalisation and export performance, but how the firm uses and manages its technology (Reid, 1986; Chetty and Hamilton, 1992).

However, besides the general importance of the owner manager in the internationalisation of the firm (Aaby and Slater, 1988; Miesenbock, 1988; Chetty and Hamilton, 1992; Bloodgood et al, 1996; Morgan, 1997b; Reuber and Fischer, 1997; Zou and Stan, 1998; Burgel and Murray, 2000) and his international experience and commitment, little is known about the specifics of the technical entrepreneur in the internationalisation of the firm.

The technical entrepreneur's embeddedness in a more and more globalising technological environment seems to initiate and facilitate the strong international orientation that was noted in the introduction to this section, although not common to all STBFs (Preece et al, 1998). As Bell et al (1998a) write, "... even when individuals have no ... [international] experience, their general understanding of industries they operated in often created international awareness. This was most evident among decision-makers of high-tech firms operating in global industries ....". In such an international environment classical internationalisation barriers like psychic distance or experiential knowledge seem to matter less and general industry knowledge becomes more important (see also section 3.4).

This might also explain why technical entrepreneurs often tend to take on the additional risk exposure by competing across national borders early on, a finding which stands in direct contrast to the assumption of the risk adverse firm in internationalisation theory. The technical entrepreneur's perception of being international among others (Johanson and Mattson, 1988) might reduce his risk perception. Burgel and Murray (2000)

propose another factor. They argue that the technical entrepreneur's typical exposure to high-tech induced uncertainty prepares him for the risk and uncertainty that awaits him in international business. Technical entrepreneurs might thus be less risk adverse in their internationalisation than other owner managers.

Another important aspect in the internationalisation of STBFs relates to the technical entrepreneur's transition from a scientist to a manager (see chapter 2), until recently a completely unexplored area.

However, a study by Berry (1998) gives some first indirect indications. Her study showed that STBFs with a high R&D intensity internationalised earlier, but the STBFs that perceived their R&D as highly important internationalised at a later stage of their organisational development. She synthesised this finding as an indication that initially STBFs' technical entrepreneurs place a priority on the internal creation of a core technology before they develop an international marketing orientation and internationalisation will only subsequently take place.

3.6 Summary

This chapter has defined the term internationalisation, it has reviewed models and theories in relation to the internationalisation of the firm and it has reviewed the few existing studies investigating the internationalisation specifics of STBFs.

It has been demonstrated that although a general process theory of the internationalisation of the firm, reflecting the challenging new realities of the globalised world economy, is lacking, the internationalisation of the firm is mainly influenced by two internal factors: information related barriers and resource-related barriers. Moreover, it has been shown that each factor is influenced by pre-state aspects of the firm, the key decision-maker and a firm's industry and network position in that industry.

In relation to the internationalisation specifics of STBFs, albeit the limited amount of empirical studies, it has become apparent that the above average globalisation within technology intensive industries leaves STBFs with a dilemma that they carefully need to balance. On the one hand, the internationalisation of STBFs has emerged as a competitive necessity rather than a competitive option. On the other hand, due to STBF internal liabilities, which are amplified by the liabilities of foreignness and the

international liabilities of innovativeness, STBFs do not have the resources to adapt to this global challenge early on. However, the evidence has shown that STBFs tend to internationalise rapidly once they developed a marketable product, preferably using less resource-intensive, indirect and co-operative modes to overcome their liabilities.

Also, the internationalisation of STBFs is fairly complex, without singular starting points, sequences or motives. Networks, incubator/ pre-state effects, international managerial marketing experience, the market orientation of the technical entrepreneur, technological rather than mere market motives, industry knowledge rather than experiential knowledge , client following and temporary internationalisation are among the key dimensions that have been uncovered.

In sum it can be concluded that internationalisation is important for STBFs. They often need to internationalise early on but face various liabilities to do so. Liabilities in addition to their liabilities discussed in chapter 2. These barriers are mainly information and resource related.

The emergence of a truly global, non-resource intensive, information and communication network – the Internet's marketspace – can potentially impact these liabilities. The next chapter will address this by defining the Internet, its technology and uses and relating it to the internationalisation barriers of small firms.

Chapter 4: The Internet's Marketspace and Small Firm Internationalisation

4.1 Introduction

A lot has been written about the Internet and its presumably revolutionary impact on individuals, organisations and nations, even about its impact on the global economy. The magical theme "Internet" seems to constantly appear in the media, everyday, also creating new, Internet focused media, for example new journals like Internet Research: Electronic Networking Applications and Policy.

Supported by successful Internet-centred companies like Amazon Books (Kotha, 1998), authors postulate the emergence of "digital entrepreneurs" (Rosenbaum and Cronin, 1993), "born globals" (Butler et al, 1997) and location-insensitive "virtual communities" (Hagel and Armstrong, 1997). One author even postulates the ultimate death of distance (Cairncross, 1997), so key in the internationalisation theories discussed in the previous chapter. Only few contributions offer less euphoric, more realistic views (see for example OECD, 1998).

But although the academic press is currently also witnessing an explosion in conferences, papers, articles and books dealing with the phenomenon Internet – for the first 9 month of 1998 the indexing service BIDS (ISI) for example retrieves 524 academic contributions alone that deal with the Internet phenomenon – and although more and more firms regard the Internet as a competitive necessity (Bennett, 1997; Poon and Swatman, 1997, 1998; Nath et al, 1998), serious empirical studies, especially with an international business focus, are still in an embryonic state (Hamill, 1997a; Samiee, 1998a, 1998b).

After reviewing key theories and empirical findings regarding the internationalisation of the firm and STBFs (chapter 3), as well as the key organisational characteristics of STBFs (chapter 2), the goal of this chapter is to critically review and assess the Internet's potential impact on the internationalisation process of small firms.

In order to accomplish this goal, the chapter will be organised as follows.

Before proceeding to review the literature, the next section (section 4.2) will elaborate upon the working definitions of the term "Internet" given in the introduction. This section will describe the Internet's technological base and its key communication

services (section 4.2.1). Furthermore, it will define the three related key organisational uses of the Internet: "information pull", "information push" and "interaction" (section 4.2.2).

In order to assess the use potential of the Internet for organisations, section 4.3 will review the Internet's development over time, focusing on its content and user growth, its user demographics and its commercial potential (electronic commerce).

After defining the Internet, its services and its characteristics and after reviewing its past development and future projections, section 4.4 will relate the Internet's potential to the internationalisation process of firms that was reviewed in the previous chapter. Focusing on the reviewed barriers of internationalisation and the various liabilities faced by STBFs (see chapter 2), this section will identify potential areas of influence and impact by drawing on related bodies of literature, namely communication research, Information and Communication Technology (ICT) research and the emerging body of Internet research.

The next section, section 4.5, will then move on to review the few empirical studies that explicitly focus on the Internet and the internationalisation of the firm.

Section 4.6 concludes this chapter by summarising the key findings, which will be subsequently used in chapter 5 to further specify the general research aims stated in chapter 1 by developing specific research objectives for each research aim. These will be operationalised in chapter 6 and then empirically assessed in chapter 7 and chapter 8.

The findings of this chapter are instrumental to the synthesis chapters of this thesis that follows as they represent the cornerstone of the research dimensions that will be developed and related to the specifics of the internationalisation of STBFs.

4.2 Definitions

It is useful to provide a clear definition of what is meant by the term "Internet" due to the Internet's great diversity of communication systems and applications, thereby clarifying the unit of analysis that will be applied throughout this thesis. The definition will include an overview of the Internet's main technologies and services and its characteristics.

It will become apparent that the Internet's services offer various potential uses for organisations. The author has grouped these into three use dimensions, entitled "information pull", "information push" and "interaction". Since various other terms are used in the literature and since no generally accepted terminology has yet emerged, section 4.2.2 will define these terms and relate them to similar terms used by other authors.

4.2.1 The Internet, Its Technology and Its Services

The Internet, the word simply meaning a "network of networks" (Hamill, 1997a), is a global, computer-mediated information resource and communication infrastructure (Morris and Ogan, 1996; December, 1996; Leiner et al, 1997). Communication, that is the exchange of information, being its core value (Thomas, 1996) and main use (Cronin et al, 1994). At present, the Internet is the largest computer-mediated network in the world (Feit, 1996).

On the technological level, the Internet is an "inter-network" of connected computer networks using an open, standard technical protocol known as TCP/IP (Transmission Control Protocol/ Internet Protocol) (Thomas, 1996; December, 1996). TCP/IP represents a suite of consistent technical protocols (Feit, 1996) governing the exchange, that is the sending and receiving, of digital, computer-readable data across computers connected to the Internet (December, 1996). TCP governs the accurate, in sequence and complete transmission of the to be transferred data, which is broken up into small data packages (Feit, 1996; December, 1996; Booz, Allen and Hamilton, 1997). IP governs the routing of the sender's TCP data packages to its final destination (Feit, 1996). TCP/IP is platform independent (Feit, 1996), which means that any computer with network capabilities, regardless of its hardware configuration and operating system, can access the Internet and its services. In addition, the TCP/IP protocol suite is media independent (Feit, 1996), which means that different data and media types can be communicated over its network, ranging from text to audio to video data.

The TCP/IP governed technological infrastructure of the Internet offers a variety of different communication services. The main services of the Internet are (Feit, 1996; Thomas, 1996):

- Telnet
- File Transfer Protocol (ftp)

- Electronic mail (e-mail)
- Usenet – Newsgroups
- Gopher
- World Wide Web (www)

Telnet

The Telnet service, which means remote login, enables users to access and control another, remote computer on the Internet (Thomas, 1996). It allows a user for example to remotely access his office computer from abroad in order to read his e-mails. The Telnet terminal emulation service was the first TCP/IP application and it underlies client/ server interactions for the services FTP, e-mail and WWW (Feit, 1996) that are discussed below. Telnet communication is connection-oriented communication, because its use necessitates a sustained exchange of streams of data (Feit, 1996). Today, pure Telnet applications play an increasingly minor role.

File Transfer Protocol (FTP)

FTP, the third most used Internet service (Teo and Tan, 1998), refers to an Internet service that allows a user to copy a computer file from one computer to another (information pull), view the file directory of a remote computer, as well as allow a user to rename and delete files (Feit, 1996). This communication service necessitates the receiver to seek out and access a specific computer that stores the computer file of interest (Morris and Ogan, 1996). A complementary service to FTP is *archie*, a service that searches FTP archives for desired content, accessible by both telnet and e-mail (Thomas, 1996).

E-mail

E-mail, which is currently the main use of the Internet among firms (Abell and Lim, 1996; Abell and Black, 1997; Feher and Towell, 1997; Poon and Strom, 1997; Poon and Swatman, 1997; DTI, 1998; Haynes et al, 1998; Teo and Tan, 1998) and end-users (GVU, 1998), is an asynchronous communication service (Morris and Ogan, 1996) that allows a sender to send text messages, with or without "enclosures" (like text documents, programs, pictures, sound or video), to a pre-specified single receiver or to pre-specified multiple receivers (Thomas, 1996). In contrast to FTP or Telnet, the Internet's e-mail service represents connectionless communication (Feit, 1996), because e-mail messages are exchanged without the sender and receiver being connected to each other synchronously.

Usenet – Newsgroups

The Usenet is a communication service similar to a bulletin board service (Feit, 1996). It is composed of thousands of groups, so-called newsgroups, of similar interest (Thomas, 1996). A message that is posted to a newsgroup is nearly instantly readable to all subscribers or participants of the newsgroup. All messages, including messages relating to a same topic, called threads (Thomas, 1996), are stored in the newsgroup and are retrievable ex-post. Thus, the Usenet service is an asynchronous, connectionless communication service (Feit, 1996; Morris and Ogan, 1996).

Listservs

An important hybrid service, a combination between newsgroups and e-mail, are listservs, also called mailing lists (Feit, 1996). Whereas messages posted to a newsgroup have to be accessed by visiting the specific newsgroup, messages posted to a listserv will be automatically distributed to all listserv subscribers by e-mail (Morris and Ogan, 1996). While newsgroups do not necessitate a participant to subscribe to its service, listserv participants need to subscribe in order to receive its messages.

Gopher

Gopher is a software tool connecting a variety of computers and information archives (Thomas, 1996). Gopher visualises its content in text-based, hierarchical directory menus, with menu items that can lead the user to a variety of data or other services like telnet or ftp (Feit, 1996). Similarly to ftp, this asynchronous communication service necessitates the receiver to seek out and access a specific computer that stores the computer file of interest (Morris and Ogan, 1996). A complementary service to gopher is *veronica*, a service that searches gopher archives for the desired content, accessible through a gopher server, just like the service itself (Thomas, 1996). Another complementary service is *WAIS* (Wide Area Information Service), which, similar to veronica, facilitates the search for content in gopher space by indexing its gopher content and offering search functionality (Feit, 1996). Today, similar to the Telnet service, Gopher applications play an increasingly minor role due to their hierarchical structure and their textual basis.

The World Wide Web (www)

The world wide web (www), or the web, is the newest and fastest growing service on the Internet (Thomas, 1996), which in 1995 has surpassed ftp to become the biggest service on the Internet as measured by the amount of transferred data (see appendix 4.1). Besides e-mail, the www is the most popular service among user (GVU, 1998;

Teo and Tan, 1998). The web offers a versatile entry point to the Internet, by allowing the display and access to many kinds of digital data. It is thus often referred to as a hypermedia environment (Hoffman and Novak, 1996a). The web presents its content on websites, consisting of various web pages using a concept called *hypertext*. Similarly to FTP, this mainly asynchronous communication service necessitates the receiver to seek out and access a specific website that stores the information of interest (Morris and Ogan, 1996). In contrast to the hierarchical structure of gopher or FTP, hypertext allows information to be stored and retrieved in a non-hierarchical structure, by creating links between them regardless of their location and content (Feit, 1996; Thomas, 1996).

An important software (SW) tool for the use of the web is the graphical browser, like Netscape's Communicator and Microsoft's Explorer. Browsers are versatile programs that allow a user to access, display and use the above discussed services (Feit, 1996). Due to this "all-in-one"-integration, users do not necessarily have to be aware of the services and protocols they use when accessing and using Internet services.

Other Services

The Internet includes other services like IRC (Internet Relay Chat) or Internet videoconferencing and Internet telephony (Hoffman and Novak, 1996a; Morris and Ogan, 1996; Hamill, 1997a). Although these services are not as frequently used as the above services, it is important to mention them, since these services are manifestations of the Internet's ability for synchronous communication. Synchronous communication refers to a medium's ability to provide interaction occurring in real time (Culnan and Markus, 1987; Hoffman and Novak, 1996a).

Recent developments in software technology have further blurred the distinction between the above mentioned services and their main characteristics, particularly the characteristics of the www. With the use of in-line browser plug-ins like Real's "RealPlayer" it is now for example possible to view news videos over websites. Thereby extending the originally asynchronous nature of the world wide web to incorporate communication synchronicity.

Derivative Use of Internet Service among Organisations

The above outlined Internet services and its technical capabilities share the common feature of open, global communication and information exchange among all the users connected to its TCP/IP-based network. However, the Internet's technical capabilities

can also be utilised by organisations for their internal communication and their external communication with strategic business partners. Such organisational communication often includes communication of sensitive information, information not to be made accessible to the public. This organisational need for secure and closed internal and external communication is addressed by what has been termed *intranets* and *extranets* or virtual private networks (Economist, 1999).

Intranets are closed, internal TCP/IP-based computer networks that can carry all of the above mentioned Internet services (Quelch and Klein, 1996; Booz, Allen and Hamilton, 1997). Its key characteristic is that access to an intranet is restricted to pre-defined users of an organisation, usually its employees.

Extranets are an extension of intranets, operating outside the domain of a firm by connecting suppliers, business partners, distributors and/or customers to the same pool of internal corporate information (Bullock et al, 1997). In contrast to intranets, extranets cross organisational boundaries, while sharing the intranet's feature of restricting access only to pre-defined users.

Table 4.1: Overview – The Internet and Its Main Services

Service	***Main Use***	***Main Characteristics***
Electronic mail (e-mail)	Communication (interaction)	Asynchronous, one-to-one, one-to-many
File Transfer Protocol (ftp)	Data transfer protocol for information pull	Synchronous
Telnet	Remote terminal emulation, information pull and push	Synchronous
Usenet – Newsgroups	Information pull and push	Asynchronous, one-to-many
Listservs	Information pull and push	Asynchronous, one-to-many
Gopher	Data access and transfer for information pull and push	Asynchronous
World Wide Web (www)	Information push (home page), Information pull (browsing)	Asynchronous and Synchronous
IRC	Communication (interaction)	Synchronous, one-to-one, one-to-many
Internet-Telephony	Communication (interaction)	Synchronous, one-to-one, one-to-many
Videoconferencing	Communication (interaction)	Synchronous, one-to-one, one-to-many

Source: The author, derived from the literature.

This brief overview of key Internet-related services and its main characteristics (see table 4.1 for an overview) shows that the Internet consists of a set of communication services, each exhibiting different, as well as overlapping sets of characteristics.

In summary, following the key elements of December's (1996) definition, the Internet is defined here as:

- computer-mediated communication (interaction), including
- information dissemination (information push) and
- information retrieval (information pull) that
- involves data (bits) exchanges taking place on the
- global collection of computer networks using
- the TCP/IP protocol suite for data transfer.

The information content can involve a broad range of data types (text, graphics, images, sound, video) and various forms of open and closed (in the case of intranets and extranets) information processes (one-to-one, one-to-many; asynchronous, synchronous; information push, information pull, interaction) are possible.

Strictly speaking, this definition excludes other large, often proprietary networks employing other communication protocols like American Online, Compuserve or T-Online. However, these services have created *gateways* to the Internet, so that for example e-mail messages can be sent and received to Internet accounts and users of these services have also access to the web (December, 1996). The overall collection of these networks is referred to as the *Matrix* (Quarterman, 1990). Organisations using non-TCP/IP-based services to access among other things the Internet will be included in this definition.

In order to distinguish the global, location-insensitive, virtual communication space (Culnan and Markus, 1987) that the Internet superimposes on the location-sensitive, non-mediated marketplace, Rayport and Sviokla (1994) have introduced the term "marketspace" (see section 4.4.1). Both terms, Internet and marketspace, are used interchangeably in this thesis.

4.2.2 Uses of the Internet: "Information Pull", "Information Push" and "Interaction"

The previous section defined the Internet as a global communication and information infrastructure. It can thus be used by organisations to process information (distribute information and retrieve information) and it can be used to interact with others (for example business partners and stakeholders). To express this, the previous section used the Internet service independent terms "information pull", "information push" and "interaction" (see table 4.1). Since these terms are related and different terms are used in the literature, it is necessary to define what is meant by these terms in more detail.

In order to distinguish between the possibility of using the Internet as a global pool of information that can be retrieved by organisations in order to enhance their knowledge about an area of interest and the possibility of using the Internet as a global marketing medium, the two terms "information pull" and "information push" are introduced.

Information Pull

Information pull refers to organisational activities related to synchronously or asynchronously pulling information from the Internet, by either reading messages on newsgroups or listservs (mailing lists), retrieving information from databases on telnet, gopher or www or by "browsing" through web pages and its content. Information pull can be active or passive, with searching the www by for example using search engines like AltaVista referring to the former and subscribing to mailing lists referring to the latter. Subscribing to mailing lists is a passive, non-specific information pull activity, because the subscriber does not know exactly what specific kind of information he or she receives prior to his or her subscription.

The information pull aspect of organisational Internet use encompasses other terms used in the Internet literature, like "scanning" (Barker, 1994), "competitive intelligence" (Cronin et al, 1994), "customer and market research" (Auger and Gallaugher, 1997), "information search and retrieval" (Ellsworth and Ellsworth, 1995), "market intelligence" (Hamill, 1997a), "information gathering" (Soh et al, 1997) or "information collection" (Samiee, 1998b).

Information Push

On the other hand, information push refers to organisational activities related to pushing information into the Internet, by either sending non-personalised messages to newsgroups or listservs (mailing lists) or by setting-up a corporate website, pushing

its content into the Internet. Like information pull, information push can be passive or active. Active information push refers to organisations actively marketing its information push activities. Active information push activities in the case of a corporate website include for example creating virtual links from other websites by registering the website with search engines (see for example: Kierzkowski et al, 1996; Hamill, 1997a; Kiani, 1998; for more details see chapter 6, section 6.3.9). In contrast, passive information push refers to organisations setting up a website without any promotions.

The nature of the information push activities, either passive or active, are important, because the communication space (Culnan and Markus, 1987) of the Internet is mainly an information pull medium, where individuals or organisations seek information (information pull) rather than individuals or organisations pushing information to a selected audience (Angelides, 1997; Watson et al, 1998; Boyle and Alwitt, 1999). The commercial failure of push-technology based Internet products (Economist, 1998b) strongly proves this point. Thus, active information push activities are more likely to be effective, leading to customer contacts (the interaction aspect of Internet use) than mere passive information push activities.

The information push aspect of organisational Internet use encompasses other terms used in the Internet literature, like "information dissemination" (Auger and Gallaugher, 1997), "publicity, marketing and advertising" (Cockburn and Wilson, 1996), "marketing and sales promotion" (Ellsworth and Ellsworth, 1995; Hamill, 1997a), "marketing and advertising" (Soh et al, 1997) or "information delivery and on-line distribution" (Samiee, 1998b).

Interaction

Interaction is the Internet's third potential use for organisations. The main difference between information push/pull and interaction is that interaction involves non-anonymous, asynchronous or synchronous personal exchange of information between known communication parties. Both information pull and information push is at least partially anonymous. In contrast to the interactive, two way characteristics of the Internet from a technological perspective – which sees interactivity between users and the "communication space" (Culnan and Markus, 1987) of the Internet – interaction as understood here means "communication space"-mediated personal interaction between known users or parties.

When an organisation pushes corporate information to the communication space of the Internet, it does not know ex ante who might actually retrieve and read its content. The same applies for posting non-personalised messages to newsgroups or mailing lists, because the sender does not know in advance who will read his message and who will not. In addition, the sender does not know the identity of all the receivers, unless he is the initiator and owner of the mailing list requiring subscribers to reveal their identity during the subscription process. Newsgroups however always remain partially anonymous. The same applies in the case of information pull. Although users accessing a web page or Internet-based databases leave "digital fingerprints" (Drèze and Zufryden, 1997) and websites can send so called "cookies" to users accessing a web page (see table 4.2), users pulling information from the Internet can remain anonymous if they wish to.

Table 4.2: A Definition of "Cookies"

A cookie is defined as: • a packet of information, • sent by a web server • to a www-browser and then • sent back by the browser each time it accesses that site again. A cookie can contain any type of information that the web server chooses. Cookies can for example be used to identify a registered user without the need of the users to re-register each time he accesses the web page.

Source: The author, derived from the on-line dictionary Wombat (http://wombat.doc.ic.ac.uk).

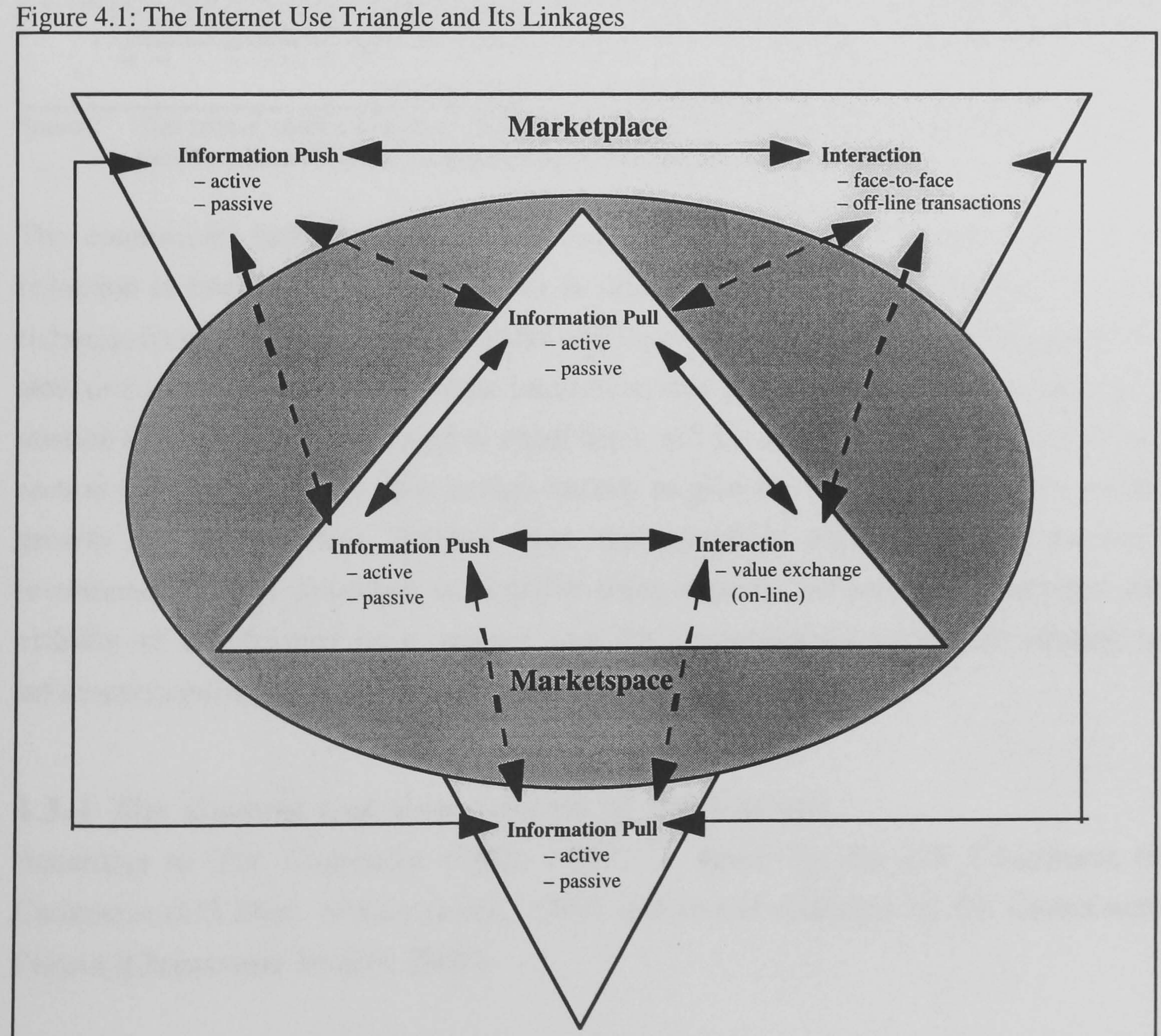
Netscape's Communicator for example offers the option of cookie warnings, giving the user the option to refuse cookies. Anonymiser software (Hagel and Singer, 1999) even masks the identity of the user further by filtering the digital fingerprints that are send to an accessed website. Therefore, both cookies and digital fingerprints cannot necessarily identify the actual user identity. In contrast, interaction as defined here involves the one-to-one or one-to-many exchange of information between pre-specified and known parties. For example sending e-mails to an individual or to a group of individuals or sending an individualised message to a known newsgroup participant. The key of the interaction use sub-dimension is a value exchange between the participating parties (Abela and Sacconaghi, 1997).

So defined, the term interaction includes commercial on-line monetary transactions (direct on-line ordering and selling; see section 4.3.3 on e-commerce) and the establishment of permanent (communication) links between and within organisation in the form of extranets and intranets.

The interaction aspect of organisational Internet use encompasses other, often more narrowly understood terms used in the Internet literature, like "networking" (Barker, 1994), "interfirm collaboration" (Ellsworth and Ellsworth, 1995), "direct on-line selling" (Cockburn and Wilson, 1996), "collaboration" (Cockburn and Wilson, 1996), "network communication" and "relationship marketing" (Hamill, 1997a), "electronic transactions" (Soh et al, 1997), "customer service and support" (Soh et al, 1997) or "transactions" (Samiee, 1998b).

All three uses are interrelated (see figure 4.1), with information pull activities potentially being influenced by and leading to information push activities and interaction activities and vice versa. Also, the three uses relate to similarly interrelated activities taking place in the non-mediated marketplace, because a complete reliance on the Internet is unthinkable (Rayport and Sviokla, 1994).

Figure 4.1: The Internet Use Triangle and Its Linkages

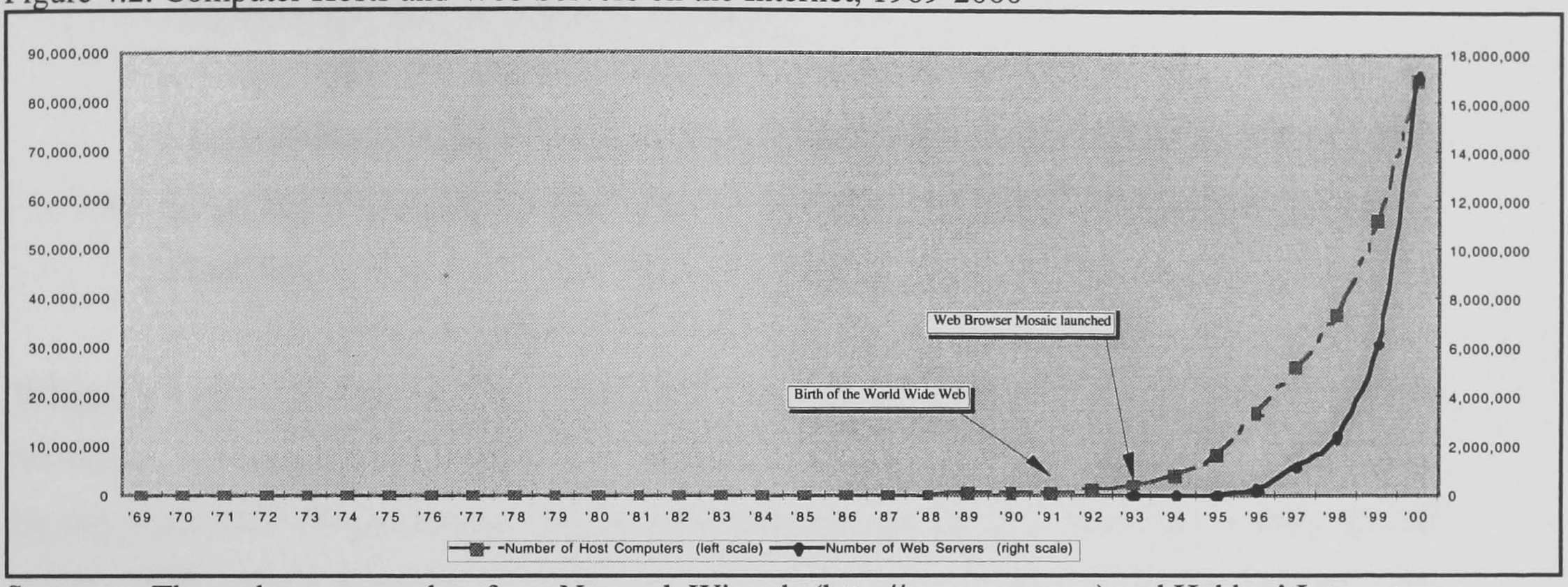


Source: The author.

4.3 The Internet in Time: Development, Demographics and E-Commerce

Despite its early roots in the 1960's (see appendix 4.1), the Internet in a commercial sense is still a relatively new phenomenon. It "exploded" only recently, mainly after the release of the world wide web (www) in 1991 and the release of the browser software Mosaic in 1993 (see figure 4.2), enabling users to take advantage of the technical features of the www that were described in section 4.2.1.

Figure 4.2: Computer Hosts and Web Servers on the Internet, 1969-2000



Source: The author; source data from Network Wizards (http://www.nw.com) and Hobbes' Internet timeline (http://info.isoc.org/guest/zakon/Internet/History/HIT.html).

The commercial and economic attractiveness of the Internet is mainly due to its reduction in interaction costs compared to other means of communication, its media richness, its explosive growth in content and users on a global scale and because of its attractive user demographics. While interaction cost reductions and media richness in relation to the internationalisation of small firms will be discussed in section 4.4.2 and section 4.4.3 respectively, this section intends to give the reader an overview of the growth of the Internet, Internet user demographics and electronic commerce (e-commerce). It is important to consider these aspects, because they determine the viability of the Internet as a support tool for organisational operations relating to information push, information pull and interaction.

4.3.1 The Content and User Growth of the Internet

According to The Economist (1995, 1997), a report by the US Department of Commerce (US Dept. of Commerce, 1998) and recent estimates by the Censorware Project (Censorware Project, 2000):

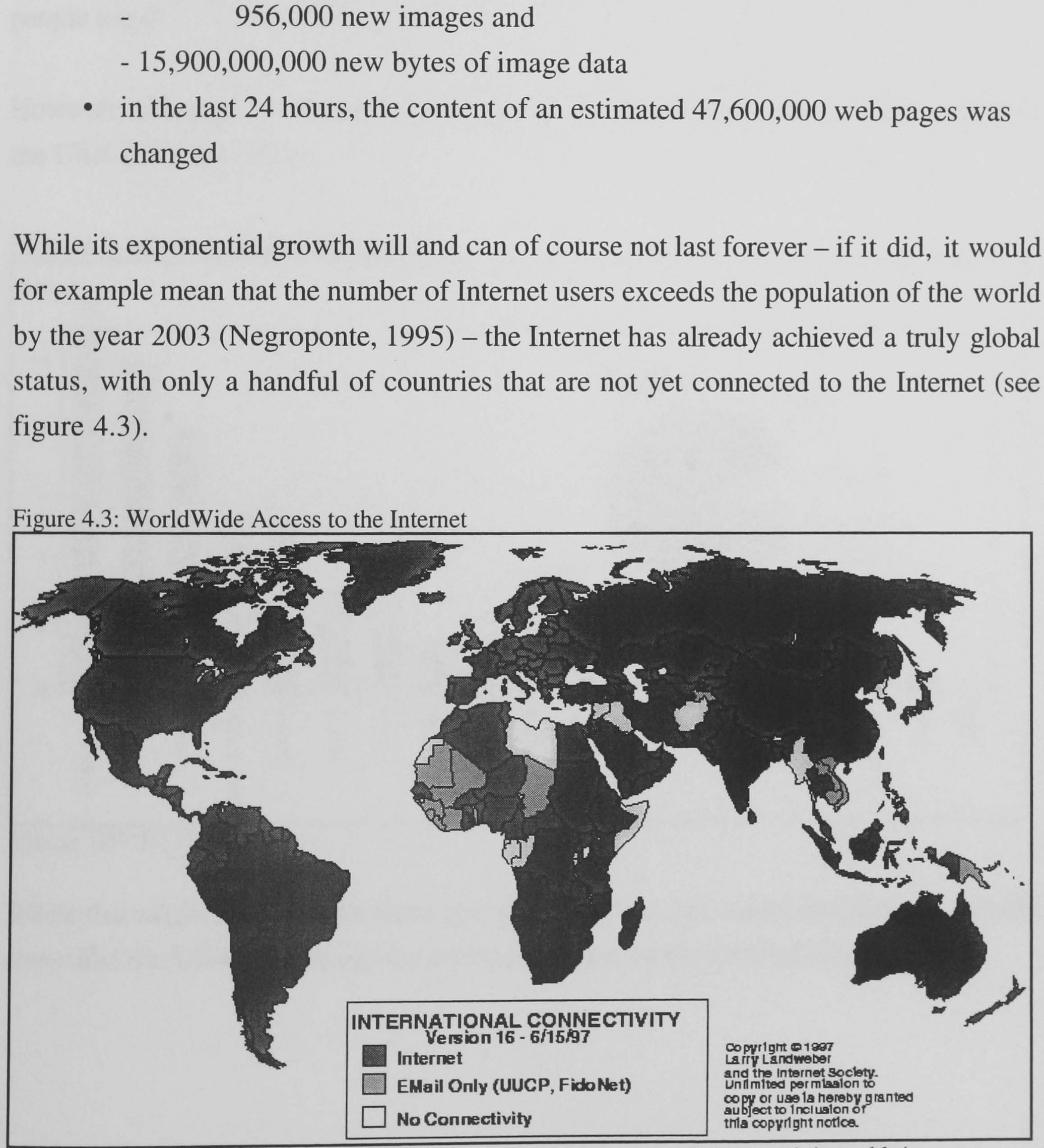
- in 1999 there were an estimated 800,000,000 web pages on the web with an

estimated 15,000,000,000,000 (15 trillion) bytes of textual information

- fewer than 40 million people around the world were connected to the Internet during 1996. By the end of 1997, more than 100 million people were using the Internet. As of 1999 this number is achieved by users in the US and Canada alone
- traffic on the Internet has been doubling every 100 days
- in the last 24 hours, the web has added:
  - 4,250,000 new web pages,
  - 79,700,000,000 new bytes of text,
  - 956,000 new images and
  - 15,900,000,000 new bytes of image data
- in the last 24 hours, the content of an estimated 47,600,000 web pages was changed

While its exponential growth will and can of course not last forever – if it did, it would for example mean that the number of Internet users exceeds the population of the world by the year 2003 (Negroponte, 1995) – the Internet has already achieved a truly global status, with only a handful of countries that are not yet connected to the Internet (see figure 4.3).

Figure 4.3: WorldWide Access to the Internet



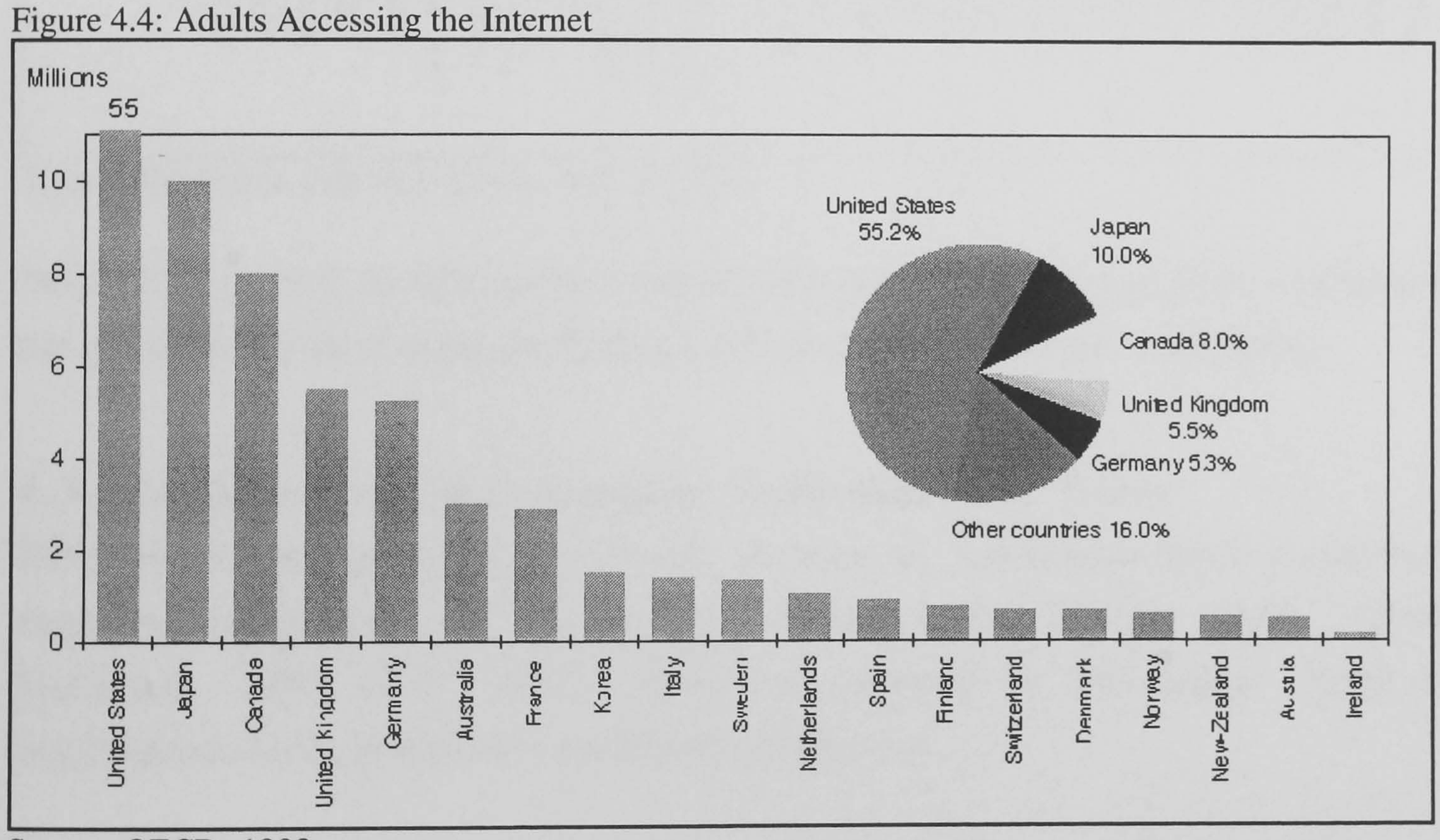
Source: The Internet Society (1997), downloaded from ftp.cs.wisc.edu/connectivity_table/.

At the user level, it is currently estimated that by the end of the year 2005 over 765m individuals and organisations will be connected to the Internet (Cisco, 2000). In 1999, estimates suggest that already 250m users were connected to the Internet (OECD, 2000).

This tremendous user population on the Internet has led to a critical mass of users and content on a global scale. A critical mass is important due to the Internet's reciprocal nature as an interactive medium (Markus, 1987) and its sensitivity to network consumption externalities (Katz and Shapiro, 1985), that is, its value increases as more people use it.

However, although the Internet is truly global, the majority of users are still located in the USA (see figure 4.4).

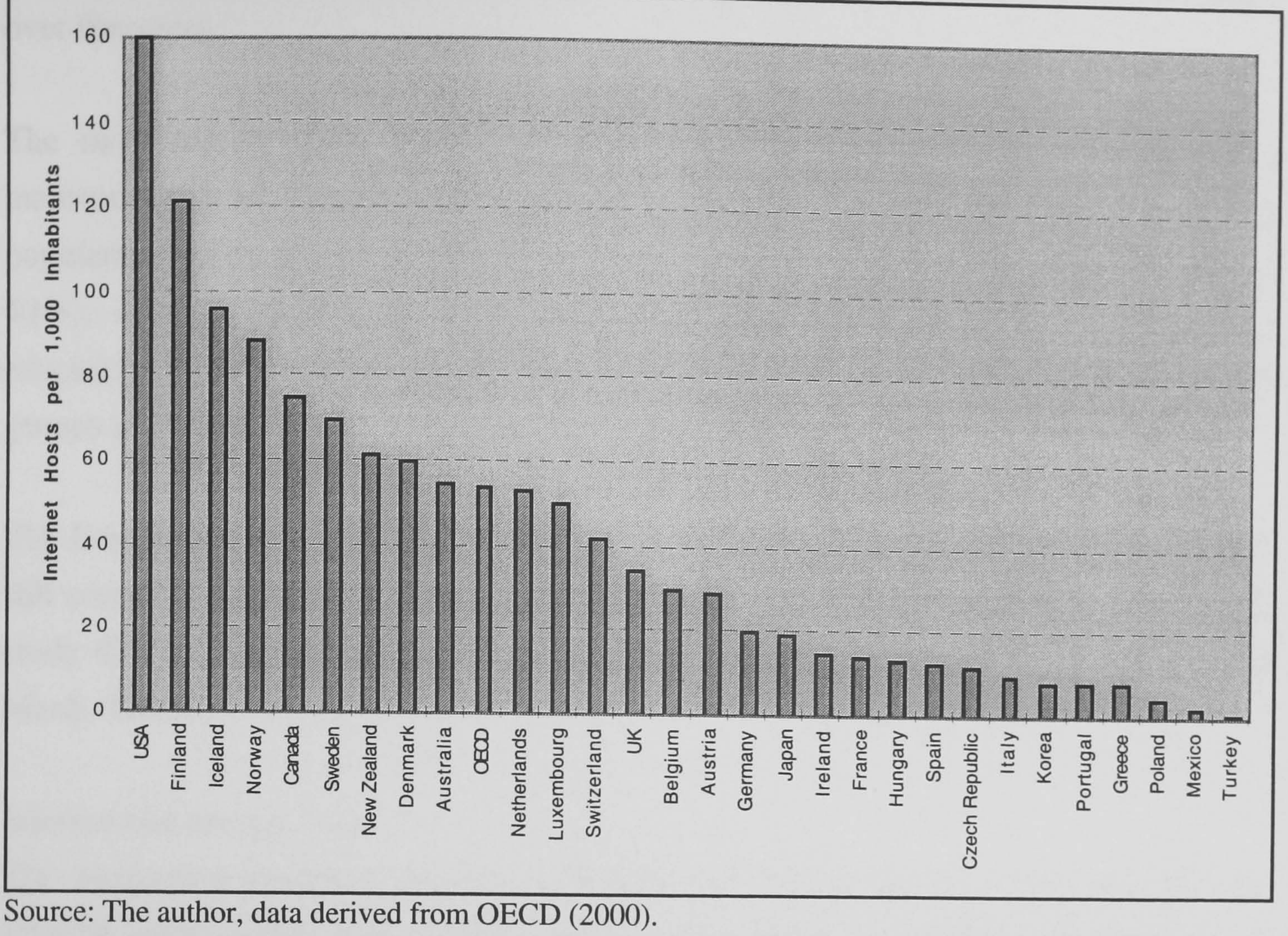
Figure 4.4: Adults Accessing the Internet



Source: OECD, 1998.

While this might be due to the sheer size in population, per capita statistics also clearly show that the USA is currently the dominant nation on the Internet (see figure 4.5).

Figure 4.5: National Internet Diffusion Levels



Source: The author, data derived from OECD (2000).

Besides the growth in information content and users, user demographics, addressing the question of who is using the Internet, are another aspect worth considering.

4.3.2 Internet User Demographics: Individuals and Firms

Research on user demographics usually focuses on consumers from a consumer marketing perspective (see for example: Hoffman and Novak, 1996a, 1996b; McDonald, 1996; GVU, 1994, 1998), as opposed to this thesis' focus on organisations from an industrial marketing perspective.

Although survey results on Internet user demographics are often mixed and contradictory (Hamill, 1997b) – mainly because of differences in methodologies – and although the differences between Internet user and the general public will continuously become marginal as the overall diffusion level of the Internet continues to grow, several trends and characteristics are observable.

Early on, Internet users exhibited classical characteristics of early adopters of new technology (Rogers, 1995). Internet users were predominantly male (94%), mainly in the 21-30 years age group (56%), their average household income and educational attainment was above average and computer and education-related occupations

dominated (GVU, 1994; Hoffman and Novak, 1996b). This user profile has changed over the years.

The most recent global user survey by GVU (GVU, 1998) clearly signals a mainstreaming of Internet users, getting closer to the demographics of the general population, albeit mainly in the USA. The female user population increased (nearly 40%), average income and education levels continue to decrease, computer and education-related occupations dominate less and the under 20 and over 50 years age groups increased.

The European user population has not changed that dramatically (GVU, 1998) and is still comparatively similar to the early adopter characteristics found in the first GVU study (GVU, 1994). For example, females still account for only 17.2% (Fittkau and Maaß, 1999).

Internet Use among Firms

The business-to-business market represents the fastest growing segment of new Internet users (Klein and Quelch, 1997) and Internet use among organisations is considered to be a dominant mode, particularly in the case of e-commerce (BMWi, 1997; Economist, 1997, 1999; OECD, 1998; US Dept. of Commerce, 1998; see section 4.3.3 below). Nevertheless, less is known about what kind of firms use the Internet, apart from heavily cited success stories of Internet start-ups like Amazon.com or Netscape.

Overall, mirroring the above noted overall growth, Internet diffusion among firms in most industrialised countries is already at comparatively high levels. It is currently estimated that between 73% and 24% of all firms have Internet access and between 14% and 45% of firms have a website (DTI, 1998).

In contrast to the overall diffusion levels across firms, the diffusion level among small firms in general is much lower and estimated to be around 44% for SMEs (10-250 employees) with Internet access and to be around 21% for micro firms (up to 9 employees) with Internet access (DTI, 1998, 1999). Overall, small firms (less than 100 employees) are 50% less likely to have a website and micro firms are almost six times less likely to have a website compared to their larger counterparts (DTI, 1999). However, if recent findings among small firms in the USA give an indication of what can be expected to happen in Europe, diffusion level among small firms will

dramatically increase in the coming years. It was found that small businesses accessing the Internet increased dramatically from 19.7% in 1996 to 41.2% in 1998 (IDC, 1998b).

While the observed adoption levels among small firms compared to large firms might suggest a linear relationship between firm size and Internet use, studies have found no significant difference between large and small firms (Boyle and Alwitt, 1999). Often, small firms using the Internet are rather very small (micro firms between 1-10 employees and small firms with less than 50 employees) than medium-sized (Abell and Lim, 1996; Abell and Black, 1997; Bennett, 1997; Fink et al, 1997; Poon and Strom, 1997; Poon and Swatman, 1997; IDC, 1998b; Ng et al, 1998). Also, Internet adopting firms are often relatively young, more likely to use the Internet than more established firms (Bennett, 1997; Fink et al, 1997).

The main reason for the differences between the DTI (DTI, 1998, 1999) study and the above quoted studies relates to industry sector differences. The DTI study sampled across a broad range of industry sectors, while the other quoted studies focus on Internet adopters or populations that are high in Internet potentials in order to assess the Internet's impact on their operations. However, as overall diffusion levels will continue to increase, it is likely that the absolute number of small firms on the marketspace will outnumber larger firms across all sectors, mirroring the marketplace reality that the majority of firms are small firms.

Particularly small firms operating in the Information and Communication Technology (ICT) sector are more likely to use the Internet (Abell and Lim, 1996; Abell and Black, 1997; Fink et al, 1997; Poon and Swatman, 1997; Soh et al, 1997; Ng et al, 1998; Poon and Swatman, 1998; Economist, 1999). This is possibly so because the technical entrepreneurs in those firms are more familiar with the technology, its use and its potential value compared to the "average" owner manager in small firms. Furthermore, the general characteristics of the technical entrepreneur are more congruent with the early adopter characteristics of Internet users as described above (see chapter 2). Another reason might be the above noted characteristics of Internet users. Being highly computer literate, they constitute an interesting potential customer base for small firms operating in such markets. Also, computers related products, most notably software, are often of a digital nature and can therefore be distributed over the Internet. It should however be noted that other industry segments gain in importance (Cockburn and Wilson, 1996; Ng et al, 1998; OECD, 1998), mainly transaction intensive sectors and

sectors transmitting or producing information, especially the service sector among small firms (IDC, 1998b; DTI, 1999).

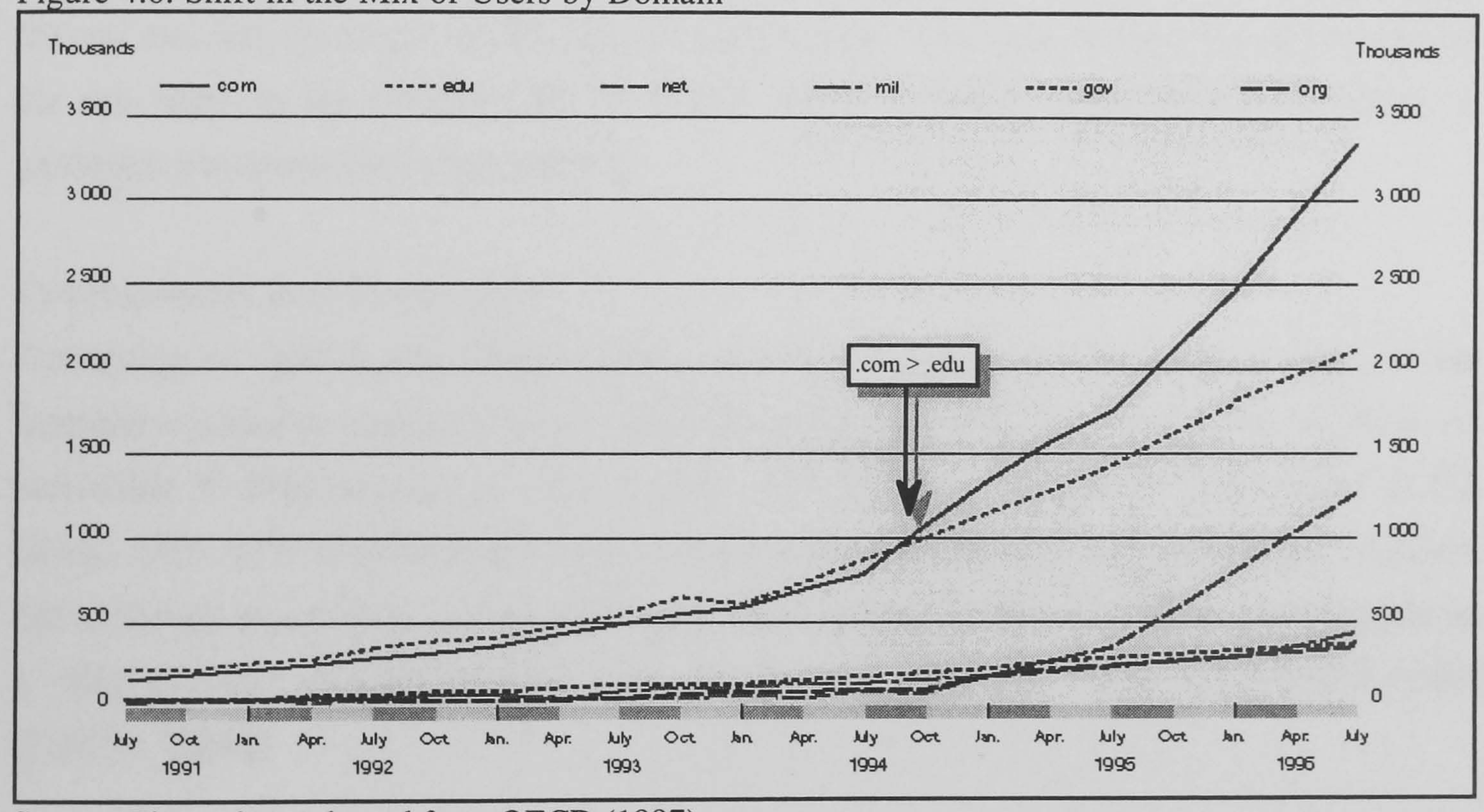
An important aspect of the interaction use of the Internet (see definition of the term interaction in section 4.2.2) for firms are commercial, monetary transactions, also termed "e-commerce".

The next section will review the current state and projected future of e-commerce.

4.3.3 E-Commerce (Electronic Commerce) on the Internet

In 1994, commercial domains (.com) for the first time surpassed the number of registered educational Internet domains (.edu), signalling the beginning of the increasing dominance of the commercial sector (see figure 4.6).

Figure 4.6: Shift in the Mix of Users by Domain



Source: The author, adapted from OECD (1997).

A widely discussed aspect of the commercialisation of the Internet is e-commerce.

Defining E-Commerce

Different definitions of what e-commerce is exist (see for example discussions by: Wigand, 1997; Nath et al, 1998) and there is currently no generally accepted definition of e-commerce (Schmitz, 2000). According to a recent OECD study (OECD, 1998) two extreme types of definitions are observable. At the one extreme, definitions include all financial and commercial transactions that are computer mediated, including

electronic data interchange (EDI), electronic funds transfers (EFT), and all credit/debit card transactions. Other definitions take a more restrictive view, limiting e-commerce to retail sales to consumers, with the transaction and payment taking place on open networks like the Internet. As the OECD report notes further, the broad definition of e-commerce refers to forms of commerce that have existed for decades and result in trillions of dollars worth of activity every day. On the other hand, the second, narrower definition has existed for only about three years and is less significant in volume and economic impact.

For the purpose of this thesis, e-commerce is regarded as "... buying and selling of information, products, and services via [open] computer networks ..." (Kalakota and Whinston, 1996), with the open computer network referring to the Internet as defined in section 4.2.1. Thus, all commercial computer-mediated transactions – between firms, between firms and consumers and between consumers – are included and transactions via closed computer networks (see for example: EDI and EFT as noted above) and non-monetary transactions are excluded. This definition is closely related to the one used by the OECD (OECD, 1998), but in contrast to the OECD definition, it excludes non-monetary transactions.

Developments in E-Commerce

According to Quelch and Klein (1996), in 1995 commercial transaction value on the Internet reached an estimated total value in excess of $400m up from $20m in 1994, an incredible 20-fold increase in only 1 year. 80% of this e-commerce value went to US firms, with 43% constituting international commercial transactions (exports). Against the evidence of such an immense increase in e-commerce, they cite estimates predicting a value of $1bn in global e-commerce by the year 1996. In 1999 it reached $110bn (OECD, 2000).

Several examples at the firm level support the growth of e-commerce further:

- Cisco Systems, a manufacturer of essential computer hardware for the Internet (router), closed 1996 having booked just over $100m in sales on the Internet. By the end of 1997, its Internet sales were running at a $3.2bn annual rate (US Dept of Commerce, 1998), estimated to be around $10bn in 1999 (Economist, 1999)
- In 1996, Amazon.com, the first Internet bookstore, recorded sales of less than $16 million. In 1997, it sold $148 million worth of books to Internet

customers (US Dept of Commerce, 1998).

- In January 1997, Dell, a computer manufacturer, was selling less than $1m of computers per day on the Internet. By 1998, Dell surpassed $10m a day, equivalent to an annual run rate of more than $3.7bn (Dell, 1998).
- Auto-by-Tel, a Web-based automotive marketplace, processed a total of 345,000 purchase requests for cars through its Website in 1996, for $1.8bn in auto sales. As of the end of November 1997, the Website was generating $500 million a month in auto sales ($6bn annualised) and processed over 100,000 purchase requests each month (US Dept of Commerce, 1998).

This increase in e-commerce is also reflected in an increase in advertising spending on the Internet. Current estimates suggest that the total annual advertising spending on the Internet, worth $300m in 1996, reached around $4.3bn in 1999 (as originally predicted for the year 2000) and these are estimated to increase to $28bn by 2005 (IAB, 2000; Jupiter Communications, 1997, 2000). Similar to all other Internet indicators, advertising spending on the Internet is also dominated by the US, accounting for approximately 75% of all global on-line advertising spendings (Jupiter Communications, 2000).

The importance of e-commerce is also reflected in public procurement policy plans. The European Union for example wants to conduct a minimum of 25% of all its public procurement solely via e-commerce means by the year 2003 (Prosser and Muller, 1999).

Overall, although estimates on the overall value of e-commerce vary significantly due to different definitions used (see table 4.3), a consensus of an overall, significant increase in e-commerce value becomes evident.

Table 4.3: Comparison of Various E-Commerce Estimates in USm$

Activity	1995-97	2000-02
Total		
IDC	1 000	117 000
INPUT	70	165 000
VeriFone	350	65 000
ActifMedia	24/400	1 522 000
Data Analysis	2 800	217 900
Yankee	850	144 000
E-land	450	10 000
EITO	475	262 000
AEA/AU	200	45 000
Hambrecht & Quest	1 170	23 200
Forrester	8 000	327 000
Morgan Stanley	600	375 000
Median value	725	154 500

Source: OECD, 1998.

The surveys, statistics and examples reported above can give a misleading impression by focusing only on the Internet as a channel for conducting commercial transactions. Thus, they do not allow for a comparison with other channels of commerce in order to assess the overall importance of e-commerce. A study by the OECD (1998) compares e-commerce to other forms of commercial transactions (see table 4.4).

Table 4.4: Estimates of E-commerce Compared to other Sales Channels

	Estimated revenue from E-commerce	As a percentage of: US catalogue sales	As a percentage of: US credit card sales	As a percentage of: Direct marketing sales	As a percentage of: OECD-7 total retail sales
Current (1996/97)	$26bn	37%	3%	2%	0.5%
Near-Term (2001/2)	$330bn	309%	24%	18%	5%
Future (2003/5)	$1,000bn	780%	54%	42%	15%

Source: OECD, 1998.

According to the OECD synthesis, at present e-commerce sales over the Internet are relatively small compared to traditional sales channels (see table 4.4), although 26 times greater than the optimistic estimates cited by Quelch and Klein (1996) two years prior to the OECD study. But as table 4.4 shows, e-commerce is projected to grow very rapidly and possibly approaching one trillion dollars by 2003-05, significantly exceeding catalogue sales.

Still, even if the optimistic forecasts (acknowledged by OECD) are realised, OECD-wide e-commerce will be the equivalent of "only" 15 per cent of the total retail sales of seven OECD countries. While significant, this level of activity is less than current sales generated by direct marketing in the United States through mail, telephone and newspapers (see table 4.4). More recent estimates share this view (Economist, 2000). However, if the current key technical barrier, the lack of a secure standard for on-line payments, and the related low level of consumer trust in e-commerce (Hoffman et al, 1999) can be overcome in the near future, e-commerce might play a much more prominent role than these forecasts suggest.

In addition, reflecting the above noted dominance of the USA on the Internet, e-commerce on the Internet is mainly a US phenomenon, representing 80% of the global transaction value at present and in the near future (OECD, 1998, 2000). European e-commerce is considered to be around $30bn by the year 2001 (IDC, 1998a), representing roughly 10% of global transaction value. In 1997, Europe spend $1bn buying goods and services on-line (IDC, 1998a).

Despite the current academic focus on e-commerce from a consumer marketing perspective, the projected growth of e-commerce is more likely to be determined by the business-to-business segment than by the business-to-consumer segment (see table 4.5). E-commerce in the business-to-business sector currently accounts for at least 80 per cent of total e-commerce activity (OECD, 1998).

Table 4.5: Estimates of E-commerce in the Business-to-Business Sector

Forecaster	Forecasted Year	Projected Percentage
IDC	1997	61%
Negroponte	1998	70%
Forrester Research	1998	84%
Forrester Research	2001	88%
Active Media	1996	72%
Lorentz	1997	80%
Price Waterhouse	2002	78%
Piper Jaffray	2001	90%
Average		**78%**

Source: OECD, 1998.

In summary it can be seen that at present, the economic role of e-commerce is projected to play a minor role. It is considered to be dominated by the business-to-business sector and, reflecting the USA's current Internet dominance, US firms currently and in the near future dominate.

However, it should be remembered that the above mentioned estimates are based on actual monetary flows occurring on the Internet, following the narrower definition of e-commerce. If e-commerce is viewed in a broader way (e-business according to the Economist, 1999), including any on-line business interaction that initiates, facilitates or enables an off-line monetary exchange of goods in the pre-purchase, as well as post-purchase stages, the role of e-commerce, albeit an indirect one, is likely to be much more prominent. E-commerce thus becomes more than just a sub-dimension of the interaction use of the Internet as defined above, potentially supporting and influencing various stages of the consumer or industrial buying (or selling) process, but not necessarily the financial flow. In a consumer context it was shown for example that while 53% of Internet users had used the Internet to reach to a purchase decision, only 15% conducted the subsequent purchase on-line (Economist, 1997). More recently, the Economist reports of another study that demonstrated quite clearly the importance of the Internet's marketspace indirect role (Economist, 2000). Although only 2.7% of all new car sales in the US were conducted on-line, 40% of sales transactions involved the Internet at some point.

Additionally, it is also important to remember that e-commerce, applying the strict definition, is comparatively product specific.

Besides obvious products like software which, due to their digital nature, are well suited for e-commerce since they can be distributed via the Internet, other product characteristics are also influential. Aldridge et al (1997) suggest for example that especially familiar products of well-recognised brands or vendors, products with definite specifications like event tickets, commodity type products like CDs and products that need a low degree of personal customer service like buying flowers are well suited for e-commerce, because the perceived uncertainty prior to purchase about the performance of this type of products is comparatively low. It follows that the typical products of STBFs (see chapter 2), with the exception of standardised software, are therefore less e-commerce compatible if defined under the narrower terms of this thesis.

After having defined the Internet and its organisational uses in section 4.2 and after having reviewed the development of the Internet from a user and commercial perspective, the next section will relate the Internet and its technological potential to the specifics of the internationalisation of small firms.

4.4 The Internet and the Internationalisation Barriers of Small Firms

It is often argued that particularly for small firms the Internet and its services can be of strategic significance (see for example: Barker, 1994; Poon and Swatman, 1997; OECD, 1998). Due to the Internet's global nature, it is suggested that the Internet is especially useful in helping small firms to internationalise (Quelch and Klein, 1996; Bennett, 1997; Hamill, 1997a; Hamill and Gregory, 1997; Bennett, 1997, 1998). A growth option for small firms that has become more and more relevant and important as the globalisation of the world economy continuous to increase, especially for STBFs (see chapter 3).

Within this international business context, Hamill argues that the Internet "... presents a fundamentally different environment ... and new paradigms will have to be developed to take account of internationalization processes in an electronic age." (Hamill, 1997a). He continues to argue that the incremental internationalisation process that was critically reviewed in chapter 3 no longer makes sense when the Internet provides small firms with a low cost and instant gateway to global markets.

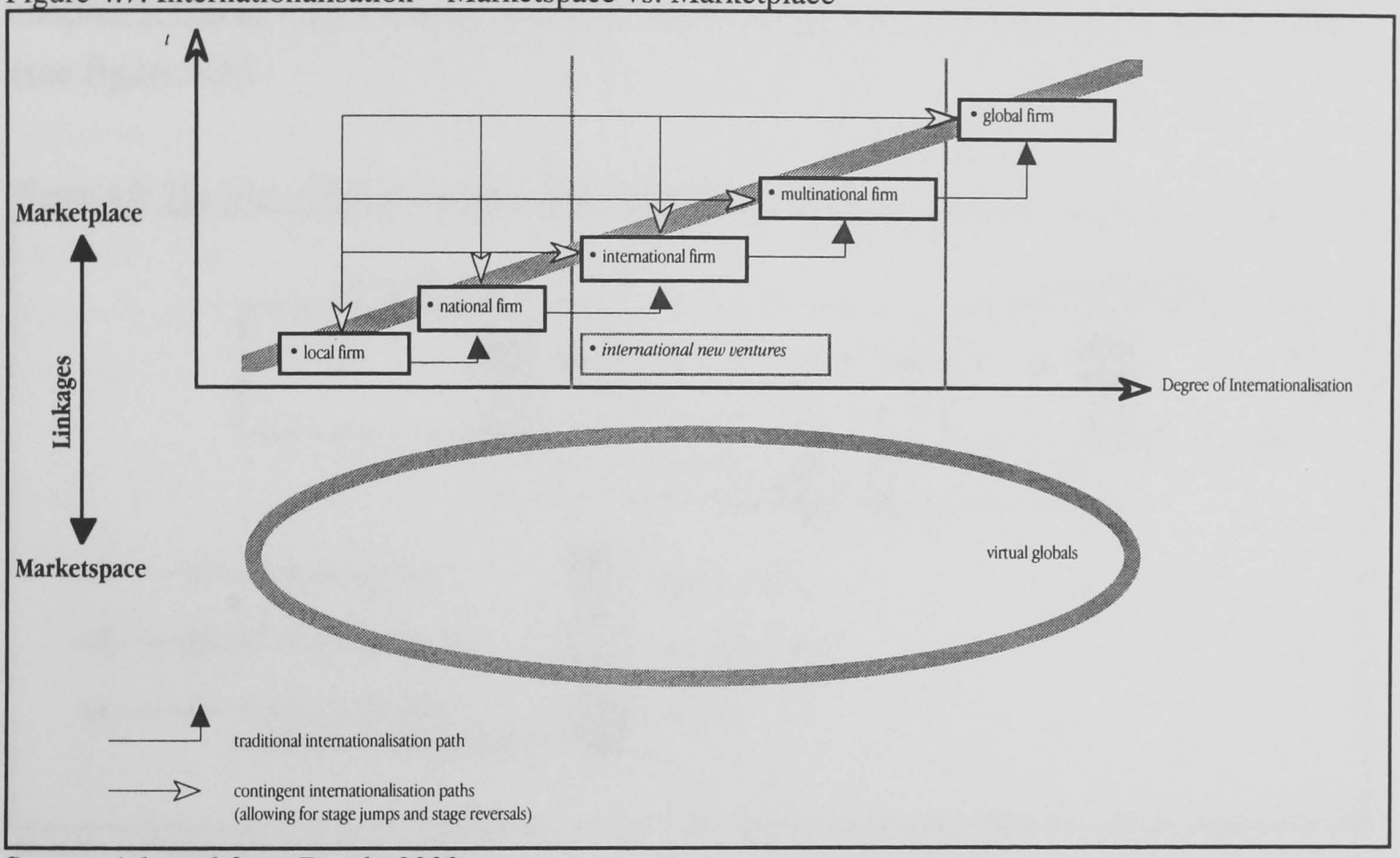
However, this view needs to be differentiated by incorporating an important distinction: the distinction between what has been termed "marketplace" and "marketspace" (Rayport and Sviokla, 1994).

4.4.1 The Marketspace: A New Mode of Internationalisation

The marketplace represents the physical world of resources or what Negroponte (1995) has termed the world of atoms. Whereas the marketspace represents the virtual world of digitised information (Rayport and Sviokla, 1994). The world of "bits" according to Negroponte (1995). This distinction is import, because both worlds represent unique characteristics, albeit being interconnected (see figure 4.7 and figure 4.8), which implies that companies have to operate in both "worlds" (Rayport and Sviokla, 1994).

With regard to the internationalisation process and the traditional internationalisation stages (see chapter 3), in marketspace there are no internationalisation stages and there exists no internationalisation process (see figure 4.7). Every firm that presents itself in marketspace via for example a corporate website, is a "virtual global" the day its website is on-line. Whereas in the marketplace a firm has to be physically present almost everywhere to be truly global, in marketspace a firm's offerings are globally accessible by everybody with access to the Internet's marketspace.

Figure 4.7: Internationalisation – Marketspace vs. Marketplace



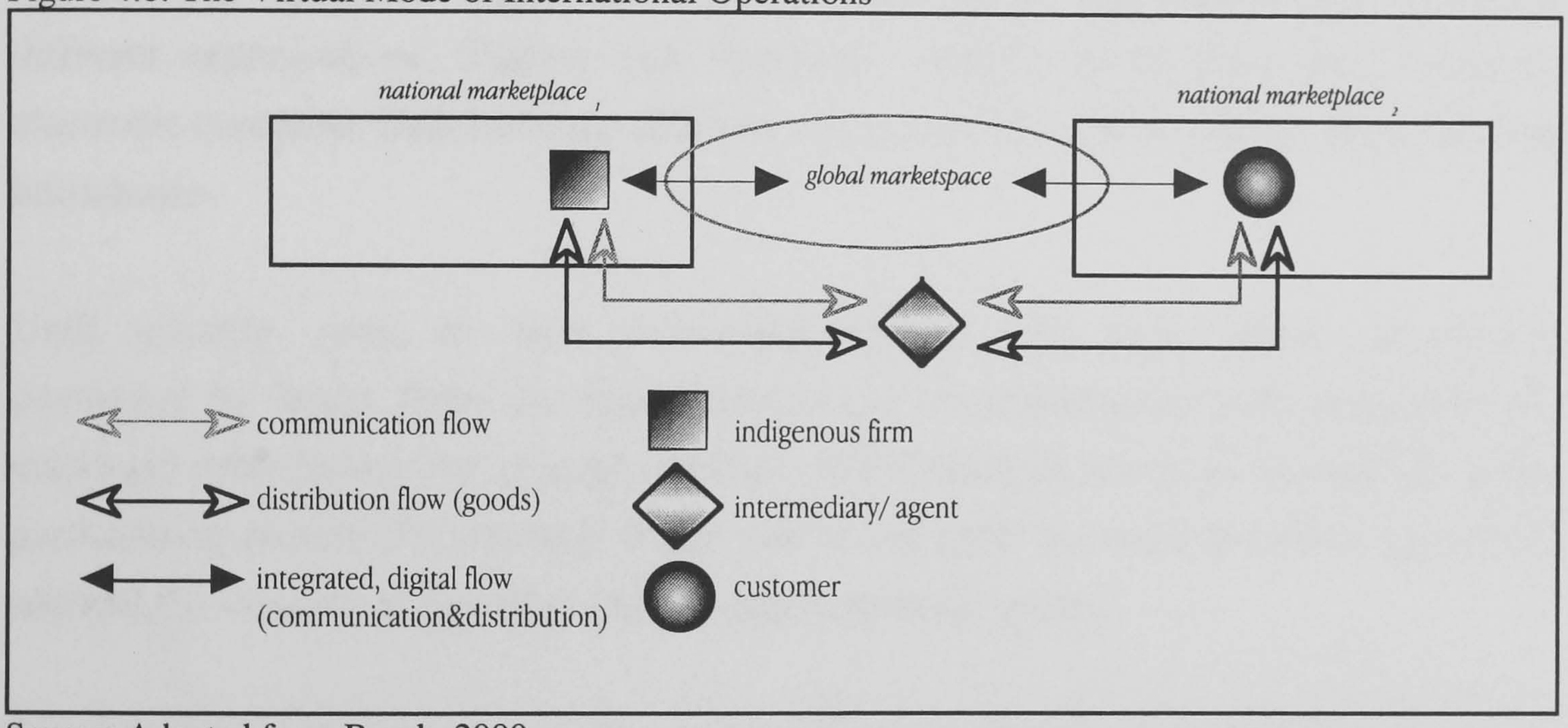
Source: Adapted from Brock, 2000.

Since there are no internationalisation stages and no internationalisation processes, it can for example be argued that one of the classical internationalisation factors, psychic distance (see chapter 3), becomes obsolete in marketspace. The Internet's marketspace actually superimposes a global virtual market with its own norms and rules over the geographically bound markets in the marketplace. The concept of "Netiquette" and the concept of "emoticons" like " :-) " or " :-(" to express happiness and unhappiness respectively (Hamill, 1997c) are explicit examples of this new on-line culture on the marketspace. Moreover, these norms and rules are, as opposed to foreign markets in the marketplace, independent of spatial aspects. Location, nationality and culture matter less. A *technical distance*, that is access to hard- and software that enables Internet access, as well as technical expertise needed to use Internet technologies – particularly taking the Internet's current speed of technological innovations into consideration – are likely to supersede the classical concept of psychic distance in marketspace (Brock,

2000). An empirical investigation by Bennett (1997) gives first support for this notion. Website owners in his survey stated that psychic distance mattered less in their international business operations.

Following the specific characteristics and uses of the Internet as discussed in section 4.2 and the discussed concept of marketspace, the Internet thus opens up a new mode of international operations for firms. Besides the three traditional generic modes of international operations – exporting, licensing and foreign direct investment (see chapter 3, figure 3.2) – a new, "virtual" mode of international operations can be added (see figure 4.8).

Figure 4.8: The Virtual Mode of International Operations



Source: Adapted from Brock, 2000.

This virtual mode of international operations is similar to the "all-in-one"-mode suggested by Vandermerwe and Chadwick in 1989.

Vandermerwe and Chadwick (1989), discussing and reviewing the internationalisation process in service firms, argue that advances in communication and information technology (ICT), have led to a new, ICT-enabled internationalisation mode, which they termed the all-in-one mode.

They termed this new mode the all-in-one mode, because it encompasses elements of all the traditional generic modes (see chapter 3, figure 3.2). This mode includes exporting (a product or service is exported, albeit without a physical movement), externalisation in the form of for example licensing (a third party is needed in the host country to provide the infrastructure and access to the offerings of the service firm; for

example a terminal provider) and a special form of FDI, because of an on-going presence in the host country, albeit only a virtual presence.

The difference between Vandermerwe and Chadwick's (pre-Internet) all-in-one mode and the virtual mode of internationalisation suggested above mainly lies in the different assumptions about the underlying ICT and its implications.

The all-in-one mode is mainly referring to and is based upon the assumption of traditional inter-organisational information and communication systems (ICS). Whereas intra-organisational ICT-based applications are used inside a firm (for example an inventory system, a PC), inter-organisational ICS are used by two or more organisations in order to support the sharing of data and/or applications among users in different organisations (Barrett and Kosynski, 1982). In essence they constitute electronic computer links between different organisations, crossing their organisational boundaries.

Until recently, most of these inter-organisational ICS were either proprietary, developed by larger firms for their international communication with geographically dispersed subsidiaries (for example Apple's old AppleLink system), or specific to the participating parties (for example EDI), that is not open for third parties to participate without the consent of the other parties or the network owner.

In contrast, the virtual mode of internationalisation is based upon the Internet's open, non-proprietary TCP/IP-based technology. It is thus a special form of an inter-organisational ICS. On the open, universally accessible Internet, which can thus be regarded as a supra-organisational ICS (Brock, 2000), firms no longer need to set-up their own network or search for feasible trading partners before they can participate in and benefit from electronic networks. This difference implies that the externalisation aspect, needed in the all-in-one mode, is not needed in the suggested virtual mode of internationalisation.

Still, as indicated in figure 4.7 and 4.8, in most cases the virtual mode of international operations will rely on operations in the marketplace. Only few products like software, music, video and other information-based products can be digitised and distributed over the Internet, thereby blurring the traditional marketing mix distinction between place and promotion, the integrated, digital flow in figure 3.8. The distribution of non-digitisable or partially digitisable products will therefore follow the traditional

physical distribution route. In the case of a small firm, mostly via an intermediary due to their liabilities of smallness as discussed in chapter 2. Amazon Books (www.amazon.com) for example mainly markets itself on marketspace and uses agents like Federal Express in the marketplace to distribute its wares to the customer (Kotha, 1998).

This distinction between marketspace and marketplace is important, since it shows that the internationalisation process of the firm as discussed in chapter 3 remains valid in the marketplace, only in marketspace does this process no longer apply. However, due to the various potential linkages between each "world", both "worlds" can potentially influence each other. A study by Bennett (1997) could for example demonstrate that 62% of exporters viewed the Internet's marketspace as reducing their FDI needs in the marketplace. This is a clear sign of the potential marketplace-marketspace linkages in the internationalisation process of firms.

4.4.2 Overcoming the Liabilities of Smallness

Besides the operational complementary of marketspace and marketplace with regards to international product marketing and distribution, additional potential linkages concerning other aspects of the internationalisation of the firm can be identified.

Elaborating upon Quelch and Klein's (1996) pioneering article, Hamill (1997a) suggests that using the Internet can reduce various of the reviewed internationalisation barriers (see chapter 3). Following the categorisation of barriers used in chapter 3, the Internet's suggested main theoretical impact relates to internal, resource and information related barriers and internal, attitudinal barriers.

As noted in chapter 2, STBFs, particularly in their early years, are faced with resource constraints compared to larger, resource richer organisations. This liability of smallness relates mainly to their limited resources. Chapter 3 showed that especially in international business, these resource constraints constitute a major barrier for small firm's internationalisation, facing the additional liabilities of foreignness (Zaheer, 1995). Hamill (1997a) argues that using the Internet can reduce these resource-related barriers.

4.4.2.1 Reduction in Interaction Costs

Using the Internet can save costs, because communication on the Internet reduces *interaction costs* (Benjamin and Wigand, 1995; Rayport and Sviokla, 1995; Booz, Allan and Hamilton, 1997; Butler et al, 1997; OECD, 1998).

Interaction costs refer to the costs involved in searching (data gathering), co-ordinating and monitoring, as opposed to costs involved in non-interactive tasks like data processing (Butler et al, 1997) and production costs (Malone et al, 1987). Is also relates to marketing (information push) activities on the Internet, considered to be cheaper compared to traditional marketing channels (Angelides, 1997).

In addition, due to the Internet's digital nature, *transformation costs* – the costs of transforming information from one medium to another (for example e-mail to letter) – are reduced (Rice and Bair, 1984; Culnan and Markus, 1987). Written communication on the Internet (for example e-mail) is also faster compared to analogue forms of written communication like mailing a letter (Butler et al, 1997), thereby reducing potential opportunity costs associated with information float (Hammer and Mangurian, 1987). Additionally, "shadow functions" – non-productive microactivities in the communication process like redialling a busy telephone number – are reduced (Rice and Bair, 1984; Culnan and Markus, 1987), since various activities involved in the communication process on the Internet can be automated (Auger and Gallaugher, 1997). Due to its asynchronous (for most services) and global nature, Internet-based services decrease interaction costs further by reducing spatial constraints and the importance for temporal availability (Culnan and Markus, 1987; Kiani, 1998) in the interaction, information pull and information push process. Furthermore, as noted above, due to the Internet's technical openness, firms no longer need to set-up their own network or search for feasible trading partners before they can participate and benefit from electronic networks.

This overall reduction in interaction costs is important, because interaction costs account for a significant percentage of all costs faced by firms (Rice and Bair, 1984; Butler et al, 1997) and the economy as a whole (Rice and Bair, 1984; Coase, 1988 citing an estimation by Wallis and North, 1986; Butler et al, 1997). This reduction is particularly important in the context of the internationalisation of the firm, because organisational growth – often the background to the internationalisation of the firm (see chapter 3) – is inseparably coupled with the collection of additional, interaction cost sensitive information (Egelhoff, 1991; Lybaert, 1998). Particularly so in the

pre-internationalisation stages of a firm (Olson and Wiedersheim-Paul, 1978; Wiedersheim-Paul et al, 1978), because "[d]ue to a lack of experience in a new sphere of activity, a firm incurs substantially higher costs of information acquisition, interpretation, evaluation, absorption and diffusion." (Madhok, 1996). "The reason for this is that [this] effort is subject to diseconomies of scale, scope, and time as a result of the incremental and path-dependent nature of the knowledge development process." (Madhok, 1996). This effect is even more pronounced for firms, like STBFs, operating within the uncertain domain of developing and marketing new technologies, which turns information and access to information into an even more valuable organisational asset (Teece, 1996; see also chapter 2).

In addition to the Internet's direct impacts on all interaction cost sensitive activities of a firm (see below), this reduction of interaction costs is mainly related to two specific aspects of interaction costs, transaction costs and search costs.

Transaction Cost Reduction

Following Wiliamson's (1996) transaction cost theory, considered to be the most dominant formulation of transaction focused organisational theory (Barney and Hesterly, 1996), it was often argued early on that a reduction in transaction costs can have two main effects: a shift to markets and de-intermediation.

Applying Williamson's transaction cost framework, it was initially argued that the Internet's global electronic marketspace – together with related information and communication technologies – can lead to a shift from hierarchies (firms) to markets (Malone et al, 1987) and to "de-intermediation" in a firm's distribution structure (Hammer and Mangurian, 1987; Malone et al, 1987; Benjamin and Wigand, 1995), that is intermediaries are bypassed by firms in order to directly interact with its customers and business partners. While the former argument has found empirical support (Brynjolfsson et al, 1994; Liu and Yang, 2000), the latter effect is more controversial. At present, the literature rather suggest a continuing role for intermediaries, depending on a broad variety of factors like economies of scale and end user risk perceptions (Sarkar et al, 1995; Butler et al, 1997; Klein and Quelch, 1997; OECD, 1998; Sarkar et al, 1998). Simple and straightforward de-intermediation effects across industries are now regarded as too simplistic and unrealistic (Schmitz, 2000; Scott, 2000). Also, "de-intermediation" seems to be regarded by firms as less of a valuable impact of the Internet (Feher and Towell, 1997). This seem to suggest that intermediaries in the marketplace and cybermediaries in the marketspace will still

prosper if they at economic value. Not surprisingly, the concept of de-intermediation is now replaced by the concept of "re-intermediation" (Economist, 1999, 2000).

However, an empirical investigation into these effects, especially the shift to the market thesis, is clearly beyond the scope of this thesis. It would for example imply that the empirical investigation needs to incorporate either a cross-sectional analysis across all industry sectors and firm sizes or it needs to follow a longitudinal within subjects study in order to further assess these two related theses. Neither is in line with the focus, objectives and the research design of this study. Nevertheless, an assessment of the de-intermediation thesis in an international context will be included in the empirical investigation by controlling for the use of indirect modes of internationalisation versus the use of direct modes of internationalisation.

Regardless of the specific impact of the reduction in transaction costs on governance structures and the directness of business relationships, the assertion of an overall reduction in interaction costs, as perceived by firms, is empirically supported (Bennett, 1997; Honeycutt et al, 1998), especially the speed of communication is often noted (Cronin et al, 1994; Markus, 1994; Sillince et al, 1998). Although others noted an increase in costs (Soh et al, 1997), one could argue, following the communication research literature (see for example Culnan and Markus, 1987), that the Internet does not necessarily substitute for all information and communication related transactions of a firm. Firms might simply use it in addition to its mix of other information and communication media used (see information pull/ push and interaction in the marketplace in figure 4.1). Thus, depending on a firm's degree of substitution, different cost impacts will be observable. Also, Internet maintenance costs are estimated to be 2-4 times the initial set-up costs (Quelch and Klein, 1996) and the costs to support a sophisticated website are also significant (Samiee, 1998b; Economist, 2000). This subsequent increase in cost, albeit an overall cost reduction compared to alternative means, might also explain Soh et al's (1997) findings.

Reduction in Search Costs and the Theory of Reversed Markets

The discussed reduction in interaction costs also reduces search costs (Bakos, 1991, 1997; Butler et al, 1997).

Search costs refer to the costs faced by a buyer or seller in order to ascertain the most favourable price of a good (Stigler, 1961). In a broader and less price focused perspective, search costs are costs incurred by the buyer (or seller, or more generally

the information seeker) to locate an appropriate seller (or buyer, or more generally the information provider) of a specific product (or service or piece of information), including the opportunity costs of the time spend searching and associated expenses on obtaining the needed information (Bakos, 1997).

These search costs are an important aspect in the internationalisation process of the firm, because lack of information and the subsequent lack of knowledge constitute the main internationalisation barrier (see chapter 3) and because small firm's usually face higher information costs in their internationalisation process (Mutinelli and Piscitello, 1998) due to their discussed liabilities (see chapter 2).

Bakos (1997) theoretically demonstrates that seller profits decline as buyer's search costs are reduced, because the existence of buyer search costs allows sellers to extract rents in the form of exploiting information asymmetries by pursuing price discrimination strategies. If these search costs become low enough to allow a buyer to evaluate all product offerings, buyers will purchase the product that best serves their need. Thus, computer-mediated markets can benefit the buyer in three ways. First, they can enjoy lower prices. Although such an effect does not necessarily always take place (Lee, 1998), buyers can at least enjoy a narrowing of price spreads (Quelch and Klein, 1996). Second, buyers are better informed about the availability of products and third, their total search costs are lowered, even if they increase the number of their inquiries.

These benefits increase the power of buyers (Bakos, 1991, 1997), because global access to information and a subsequently higher level of knowledge is a key determinant of the bargaining power of parties involved in commercial transactions (Porter, 1980; Hagel and Armstrong, 1997). Hagel and Armstrong (1997) argue that this increase in bargaining power might ultimately lead to "reverse markets" in computer-mediated market environments like the world wide web. Reverse markets are markets in which the buyer or a grouping of buyers – which they have termed "virtual communities" – are armed with comparatively more information than vendors, using this advantage to select vendors offering the best combination of quality and price. They termed this a reverse market, because in most of today's markets vendors have an information advantage over customers. In the context of this thesis this would imply that the often noted important role of unsolicited orders in the initiation of international business operations like exporting (see chapter 3) might increase in marketspace (Brock, 2000). Hence, marketspace activities are likely to have an impact on the

marketplace activities and vice versa due to this effect. A study by Steinfield et al (2000) found support for such an effect in a non-international context. This effect was particularly pronounced for small firms. Greater use of the Internet led to higher levels of inquiries from externals.

These buyer-focused investigations can similarly be applied to sellers, the STBFs in the context of this thesis. As noted by Stigler (1961), sellers can also engage in search behaviour similar to those of buyers. He argues that the optimum amount of search is reached when the marginal cost of search equals the expected increase in potential customers. It follows that an overall reduction in search costs would increase this amount, as the seller is likely to extend his search further.

Besides a search for customers, this search cost reduction could of course also relate to other pieces of needed information. Such organisational search activities include searching for competitors, market-related information, business partners, suppliers or customer-related information. In short, it can relate to all aspects of competitive intelligence activities (Cronin et al, 1994), the information pull aspect of Internet use.

Additionally it should be noted that these benefits could also support internal information search, utilising derived uses of the Internet like the intranet. In sum, these benefits can relate to the whole range of internal and external organisational information gathering. However, since small and comparatively young firm's internal memory regarding international operations is usually limited, as the reviewed barriers of internationalisation suggest (see chapter 3), and internal interaction in small firms is high anyway (Neilsen, 1974), the internal aspect is considered here to be less important than the external aspects.

But these potentially positive effects of a reduction in search costs have to be evaluated against the two factors "data overload" and "hidden information".

Data Overload

The potential reduction in search costs has to be related to the gigantic increase in content of the Internet as reported in section 4.3.

The above discussion of a search cost reduction assumes that each unit of information is of similar retrievability and that the cost of information retrieval per unit of information is the same, too. Bakos (1997) in essence assumes a single electronic

market with universal item accessibility. It follows, incorporating the stated increase in content, that the marginal unit decrease in search cost has to exceed the marginal increase in units of information, if the overall effect of a reduction in search costs is to occur. If the two marginal rates are the same, they offset each other. If the marginal rate of an increase in units of information is higher compared to the unit decrease in search costs, the overall effect will be that search costs increase, because of the time and cost spend to filter out the received information. While it should be noted that this increase in search costs reflects an increase in potential knowledge that the searcher can derive from the larger amount of retrieved information, a problem might arise. If the amount of information competing for ones attention exceeds an individual's processing abilities at a given moment in time, data overload will follow. In other words, the individual is not better informed.

Furthermore, the assumption of a single electronic market does not hold on the Internet. The Internet incorporates a collection of many electronic markets. See for example the discussion of various electronic business-to-business markets on the Internet by Klein and Quelch (1997). This variety of electronic markets further increases search costs, because the searcher needs to know about their existence, their nature and their location. Or, from a buyer's perspective, the customer needs to know about the existence of a firm, its products and services and its location on the Internet.

Additionally, users need to employ much more complicated search algorithms in search engines and directory services – the main route for information search and retrieval on the Internet (Hamill, 1997a) – in order to eliminate irrelevant information and to make the data output manageable. Particularly taking into consideration that the Internet's marketspace becomes increasingly littered with "digital debris" from neglected or abandoned websites (Sandberg, 1997). To illustrate this problem one might think about the following example:

> A firm might be interested in specific information about the productivity impact of information technology in small firms in Germany. A simple, inquiry for the terms "productivity impact", "information technology", "small firm" and "Germany " in one of the popular Internet search engines like AltaVista will retrieve 1,621,867 documents (date of access: 10.9.1998). Assuming only one minute for evaluation per retrieved document, a complete filtering of the retrieved information would consume over 1,126 days or over 3 years, which is highly uneconomic and unlikely to happen.

Only if the firm is knowledgeable enough to employ more advanced search algorithms, like Boolean operators or other operators offered by the search tools, would it be able to reduce the amount of retrieved information and filter out irrelevant information. If the probability of succeeding in doing so is considered to be low and if the search task is perceived to be excessively difficult, such search will not occur (Huber and Daft, 1987), albeit the Internet's general reduction in search costs.

Hidden Information

The issue of an ever increasing amount of information is further amplified by the problem that Internet search engines and directory services have serious limitations, covering only a fraction of the Internet (Jenkins et al, 1998; Lawrence and Giles, 1998, 1999; Gordon and Pathak, 1999). Most websites are actually not listed (Thelwall, 2000). Often, the most valuable information for firms can often only be found in what has been termed "the hidden Internet". A part of the Internet that is not covered by most information retrieval tools (Notess, 1997). To illustrate this, one might think about a website that allows users to download reports and articles formatted in Adobe's ubiquitous pdf (portable document format) document format. While a search engine indexes the content of the web page, the content of the downloadable article will not be indexed and its content is thus "hidden".

Also, because the Internet currently lacks a standardised indexing and searching interface compared to other information repositories (Ahrens and Esquer, 1993; Christensen and Bailey, 1998), search activities are further complicated. Thus increasing search costs, especially for novice users.

In sum it follows that the increasing complexity of information retrieval on the Internet, albeit an overall search cost reduction, might actually increase search costs for inexperienced users. Thus, the impact of the Internet as a search costs reducing information pull medium is likely to differ across firms, depending on their experience with and knowledge about the medium. Research focusing on consumers has shown that experienced user have less problems finding information (GVU, 1998). They also do so faster (GVU, 1998). Thus, the Internet as a global pool of information ranks high on what has been termed knowledge specificity in information acquisition (Choudhury and Sampler, 1997). The speed of the Internet's technical advances aggravates this effect further. The notion of the Internet being the closest thing yet to Adam Smith's idea of a perfect market with ubiquitous and equal access to information (Economist, 1997) might therefore only hold for the truly experienced user. Due to

this, Ahrens and Esquer (1993) even argue that the Internet should be viewed as a global information resource rather than a global information infrastructure.

Some empirical evidence supporting this notion in the case of organisations exists. While the Internet's benefits of easily accessing information is often stated by firms (Cronin et al, 1994; Abell and Lim, 1996; Bennett, 1997; Feher and Towell, 1997; Fink et al, 1997; Soh et al, 1997; IDC, 1998b), firms also report of difficulties in locating relevant information on the Internet (Abell and Lim, 1996; Soh et al, 1997).

Firms replying that a lack of skills is one of the main factors for non-adoption indirectly gives further support (Coyne et al, 1996; Auger and Gallagher, 1997; Bennett, 1997; Hamill and Gregory, 1997; Nath et al, 1998). Furthermore, the noted high diffusion among firms operating in the ICT sector (see section 4.3.2) gives further evidence, as it can be argued that due to their affinity to the Internet's technological base, these firms are more knowledgeable about its effective use.

A longitudinal investigation by Poon and Swatman (1997) supports the importance of accumulating organisational Internet experience by indirectly demonstrating the existence of organisational learning effects. The authors found that the stated extent of saved time to find resources on the Internet increased over time, indicating that firms' expertise in using the Internet effectively has increased over time.

Weak support for the "reversed market" thesis exists, too. A case study based investigation by Honeycutt et al (1998) showed that firms that have launched a website experienced a notable increase in new customer inquiries. Similarly, firms investigated by Bennett (1997) also noted that their websites were valuable means for generating sales leads, by increasing the international exposure of the firms.

However, it should be noted, following the above mentioned problem of item retrievability, that firms will only succeed in profiting from these reversed markets, if they increase the retrievability of their website on the Internet (active information push). As lucidly shown by Honeycutt et al (1998), only after firms started to promote their website (for example by submitting their website address to search engines and stating it on their corporate print material) did they experience an increase in customer inquiries. Their finding might explain the mixed views obtained by Ng et al (1998), with roughly 30% of firms (over a 3 year period) reporting no effect on turnover and

roughly 45% of firms reporting an effect on turnover. This important aspect will be further developed and operationalised in the methodology chapter (chapter 6).

4.4.2.2 Data Security on the Internet

Besides the above discussed increase in information and the difficulties of locating information, it is also crucial to consider the reliability of the transmitted information itself, that is the Internet's ability to reliably transmit information compared to other means of communication.

Currently, security related issues are among the most obvious problems of the Internet (GVU, 1998; Hoffman et al, 1999). Although security issues are often specifically related to e-commerce (Nath et al, 1998; Ng et al ,1998; OECD, 1998; Hoffman et al, 1999), security issues are of importance for any information pull, information push or interaction activity. It therefore comes as no surprise that the security on the Internet is also on the international political agenda (see for example Nicoll and Kehoe, 1998) and a key element in the next IP standard (Feit, 1996).

IT research refers to the three related security issues of authentication, integrity and confidentiality (Feit, 1996). Authentication refers to the reliable identification of the originator or sender of a message, integrity refers to a mechanism that ensures that data was not altered during its transmission and confidentiality refers to a mechanism that prevents the unwanted disclosure of the sent information to third parties (Feit, 1996). An important issue relating to integrity are computer viruses on the Internet (see for example Price, 1998). If data integrity is low, the threat of computer viruses increases.

This aspect of information reliability is important, because if information retrieved and communicated on the Internet ranks low on these dimensions, as perceived by its users, its impact is limited. Organisations will either substitute or reduce Internet use or they will not adopt the Internet in the first place, regardless of its cost and other quality features. The rational being that the verification costs of the acquired information (Choudhury and Sampler, 1997) and the potential threat of computer viruses outweighs the savings in interaction costs.

The concerns about the security of transmitting information on the Internet are reflected in the responses of many firms (Abell and Lim, 1996; Cockburn and Wilson, 1996; Coyne et al, 1996; Auger and Gallagher, 1997; Feher and Towell, 1997; Soh et al, 1997; Nath et al, 1998; Sillince et al, 1998), particularly in the case of e-commerce

(Nath et al, 1998; Ng et al ,1998; OECD, 1998). Some firms also question the reliability and credibility of the information obtained from the Internet (Soh et al, 1997) and they note the perceived risk of an infection with computer viruses (Sillince et al, 1998).

Surprisingly, in a study by Cronin et al (1994) and Auger and Gallaugher (1997), respondents found the risk associated with the Internet as relatively acceptable, with only few opposing views. However, it could be argued that due to the technical sophistication of the analysed samples, the respondents were either aware of ways to increase the security (for example by using encryption software for their e-mail communication) or they were aware of the fact that the Internet, albeit all the public concern about its security, is actually comparably safe. Estimates by Forrester Research for example show that the Internet is more secure compared to other means of standard monetary transactions like using credit cards (Auger and Gallaugher, 1997; see also Economist, 2000). A notion that finds support in the cited user surveys by GVU which show that with experience privacy related issues become less of a concern.

Overall, it can be concluded that while the Internet can overcome the liabilities of smallness by reducing interaction costs, thus supporting the internationalisation process of firms by reducing barriers associated with these liabilities, the Internet does not provide a panacea to overcome these problems (Hamill, 1997a). Firms need to gain experience by using this new medium in order to effectively exploit its reduction in interaction costs. Therefore, it is expected that impacts of the Internet on the internationalisation of the firm differ across firms, depending on their experience with the medium. In the case of STBFs, the experience (pre and post inception) of the technical entrepreneur and his management team. An observation that follows similar observations in the IT literature, stating that it is not the computer technology per se, but the management skills within the firm that make the difference (Cecil and Goldstein, 1990; Mata et al, 1997).

4.4.3 Overcoming Information Barriers and the Liabilities of Newness

Besides the reduction in interaction costs, the second and probably most influential factor of the Internet on the internationalisation of the firm relates to the access to information and interaction partners per se, in addition to the process of information acquisition and its costs discussed above.

The Internet as a global, 24hour information pull/ push and interaction infrastructure has the potential to overcome the main and related barriers to the internationalisation process, the lack of information, the lack of knowledge about foreign markets and the lack of international contacts (see chapter 3). Particularly the latter aspect is an important factor for young firms, facing the additional liabilities of newness (see chapter 2). The Internet's marketspace can also have an impact on an important pre-condition to internationalisation, the international awareness of the key decision-maker in the small firm (see chapter 3).

Each aspect will be discussed in the following sections, starting with the attitudinal, international awareness aspect.

4.4.3.1 The Internet and the International Awareness of Firms

As noted in the pre-export models and the attitudinal dimensions of the internal export barriers, the decision-maker's attitude towards international business is one of the key factors in the initiation of international business in small firms (see chapter 3).

Following the cognitive element of the internationalisation process as defined in chapter 3, an important element influencing the formation of his international awareness is his exposure to international stimuli, also noted by the reviewed pre-export models.

Although still little is known about the specific internal processes of information processing and its role in the internationalisation of the firm (Benito and Welch, 1994; see also chapter 3) and although it was observed that "... limited examination of the potential effect of communication network extension, into more internationally-rich information environments ..." (Korhonen et al, 1996) has taken place (see also chapter 3), it was noted early on that firms located near international "information centres" are expected to be exposed to more external, internationalisation stimuli (Olson and Wiedersheim-Paul, 1978).

While Olson and Wiedersheim-Paul referred to a firm's location in the marketplace – for example they suggests a location near a border to be rich in such stimuli – it can be argued that stimuli exposure taking place on marketspace can have similar effects.

Hamill (1997a) for example argues that the active participation on the global Internet can potentially reduce attitudinal barriers by increasing a firm's exposure to

international stimuli, thereby increasing its international awareness. In a non-international context Louadi (1998) could for example show that increased use of ICT in small firms increased the amount of external information within the firms.

In relation to that, Bennett (1997) found that nearly 20% of his sample of corporate website owners were encouraged to expand their foreign operations. While not offering an explicit explanation of this observation and besides the cost advantages discussed previously, his finding might support Hamill's (1997a) suggestion that Internet use might lead to a general psychological increase in international awareness, confidence and subsequently commitment. A suggestion that can possibly be grounded in the relatively information richness of the medium compared to other indirect communication channels (see section 4.2.1 and especially section 4.4.3.3 below), because the richer the medium, the stronger its potential impact on an individual's attention towards the stimulus (Engel et al, 1993).

However, specific empirical support is currently missing. Nevertheless, this aspect of the Internet's impact on the internationalisation of the firm is considered to be of minor importance in the context of this thesis. As chapter 2 and 3 showed, STBFs and their technical entrepreneurs often exhibit a strong international orientation early on. Thus, the Internet's impact on international awareness, while being assessed in the empirical investigation, is considered to be of little significance.

4.4.3.2 The Internet, Objective Information and Experiential Knowledge

Besides the attitudinal, awareness dimension, lack of information and a subsequent lack of knowledge about foreign markets constitute another key barriers to initiate international business operations, as well as constituting a constraint throughout the on-going internationalisation process (see chapter 3).

Hamill (1997a) argues that the Internet constitutes a global market research resource (information pull aspect) that firms can use regardless of their size to improve their information and subsequently knowledge about international markets.

This aspect of the Internet's theoretical impact on the internationalisation of the firm was discussed above from an interaction cost perspective. Still, in addition to the cost dimension, it is important to reconsider the postulated importance of experiential

versus objective knowledge in the internationalisation process of firms, since the Internet cannot supply firms with marketplace-based experiential knowledge.

Chapter 3 showed that the assumed importance of experiential knowledge about foreign markets (especially market specific knowledge), the main thrust in the internationalisation process of firms according to the Uppsala internationalisation model, rests on the assumption of differences between the home market and markets abroad, with foreign markets exhibiting relative similarities amongst themselves, thus allowing for the sequential exploitation of economies of scope.

As also shown in chapter 3, numerous empirical studies have not found support for the postulated importance of experiential, market specific knowledge. General industry knowledge and objective knowledge derived from systematic market investigations were at least of similar importance. The globalisation of markets, especially in the technology sectors STBFs are operating in, further reduce the overall importance of market specific, experiential knowledge, thereby facilitating simultaneous market entry strategies exploiting economies of scale (Casson, 1993).

Taking these factors as a theoretical background into consideration, the Internet's potential role in reducing knowledge-based barriers, albeit being purely non-experiential, marketspace-based, can indeed be of significance.

However, as noted in chapter 2, STBFs often rely on external links with other firms in order to overcome their liabilities of size and particularly to overcome their liabilities of newness and innovativeness. As further noted in chapter 3, external links often play an important role in the internationalisation of the firm. Especially for firms in industrial markets when they establish links with international networks or with firms with links to an international network of their own. According to the updated Uppsala internationalisation model (see chapter 3, figure 3.5), these external links or networks are another important source of information and knowledge generation in the internationalisation of the firm.

Following this thesis' distinction between information push, information pull and interaction, this aspect of knowledge generation thus refers to the interaction aspect, as opposed to the focus on information pull and push activities in the previous sections.

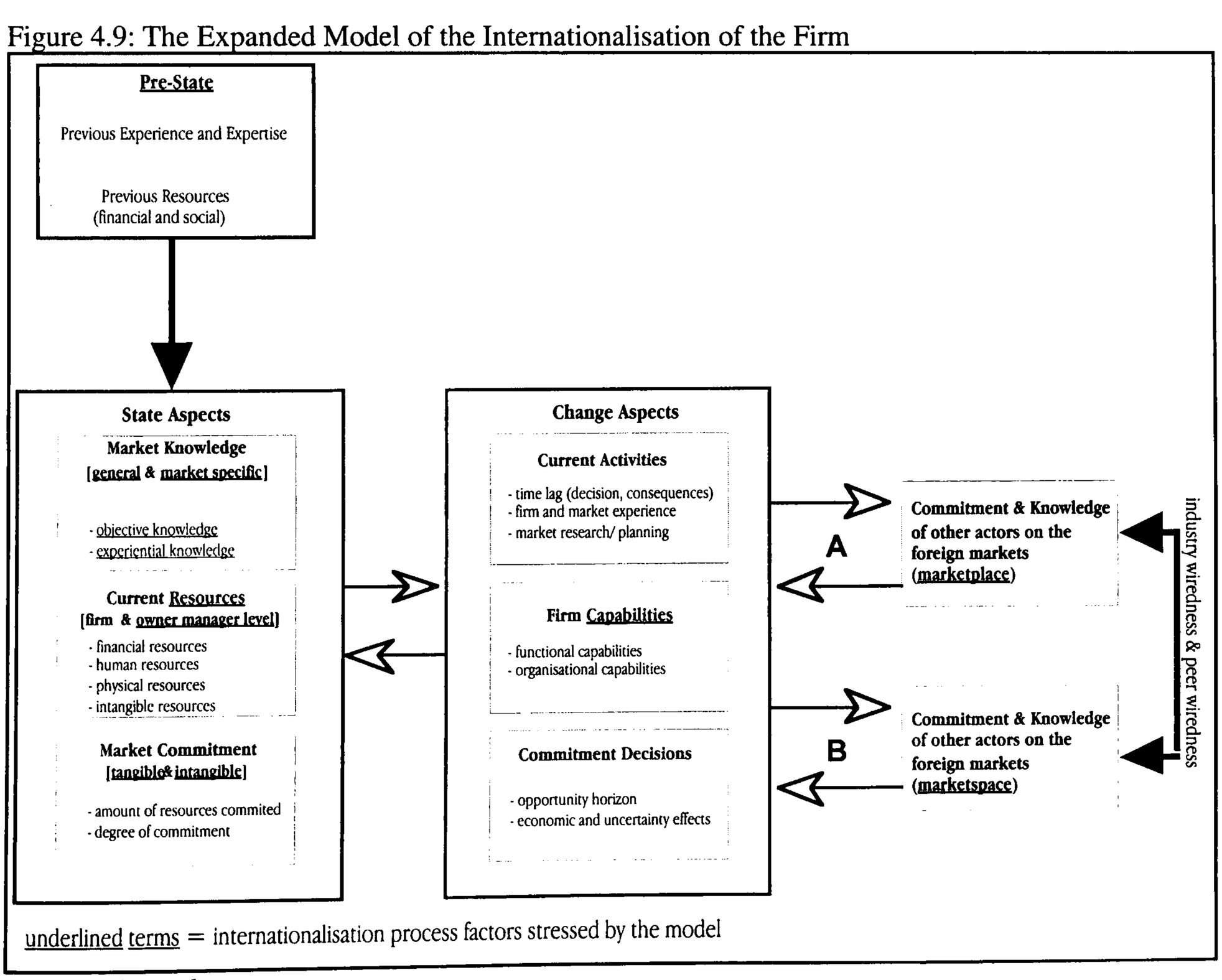
4.4.3.3 The Internet and the Lack of International Contacts

While the pre-state and state aspects of the Uppsala model determine the source and state of a firm's market knowledge and market commitment in foreign markets, it is the change aspect that represents the driving force in the internationalisation process.

As reviewed in chapter 3, this change aspect includes the current activities of the firm and its commitment decisions concerning foreign markets. Influenced by the past activities of the firm and its key decision-maker according to the discussed pre-export models, the current activities of the firm are its prime sources of experience and organisational learning, ultimately accumulating in market knowledge in the state aspect of the model.

According to the extended model of internationalisation, this change aspect can be and often is influenced by a firm's network of business relationships. Taking the distinction between marketplace and marketspace into consideration, the Internet thus opens up a new sphere of network influence (see figure 4.9), enlarging the environment and therefore the reach of firms to scan for business opportunities.

Figure 4.9: The Expanded Model of the Internationalisation of the Firm



Source: The author.

The relationship in the marketplace (see figure 4.9, link A) was discussed and reviewed in chapter 3. It was shown that a firm's degree of network embeddedness, its willingness to grow and expand its range of contacts and the international nature of its industry are among the key factors determining the network effect in the internationalisation process of the firm. Particularly for STBFs, external network relationships were found to be important and influential (see chapter 2).

Although the literature on international industry networks does not explicitly consider the potentially different effects of whether these networks are initiated and maintained in marketplace or marketspace (or both), a review of the communication and IT literature suggests different and additional factors of influence in computer-mediated communication taking place in marketspace (see figure 4.9, link B). These factors need to be considered, because as noted in chapter 3, small firms often rely on informal and personal relationships as sources of information, a type of information relationship whose formation according to traditional, rational media choice theories is hindered in computer-mediated communication.

Rational Media Choice Theories

According to rational media choice theories, of which social presence theory (Short et al, 1976) and media richness theory (Daft and Lengel, 1986; Trevino et al, 1990) are the two main and related theories (Contractor and Eisenberg, 1990; Fulk et al, 1990; Rice and Shook, 1990; Carlson and Zmud, 1999), an individual determines his or her choice of media by rationally assessing the requirements of a communication task and selecting an appropriate medium matching these requirements (Fulk et al, 1990).

Both theories categorise media along a continuum of either the channel's capacity to carry social cues (social presence theory) or along a continuum of the channel's information richness, which depends on the medium's ability for immediate feedback, the number of carried cues, the number of channels utilised, its language variety and its level of personalisation, capable of reducing equivocality (media richness theory). The higher the perceived need for social cues and the higher the perceived need to reduce equivocality in a communication situation, the higher the postulated likelihood of communication partners conducting their information exchange in a face-to-face manner, the richest mode of information exchange with the highest degree of social presence. In contrast to face-to-face communication, mediated communication – like interaction over the Internet – ranks lower on these proposed continuums.

It follows that the reduction in channel capacity on the Internet compared to face-to-face communications makes interaction on marketspace more difficult compared to non-mediated marketplace interactions. This is particularly the case for the important building of trust among relationship partners (Wilson and Jantramia, 1996), which normally requires face-to-face interaction. A type of interaction that is eliminated by the Internet (Ratnasingham, 1998).

Based on rational media choice theory, the Internet thus offers only a limited possibility for interaction and thus its impact in marketspace-based network internationalisation is comparatively low compared to marketplace-based networking opportunities like trade fairs or customer visits.

Social Models of Communication Technology Use

However, mixed empirical findings regarding the predictive validity of the rational media choice theories (Fulk et al, 1990; Lee, 1994; Markus, 1994; Walther, 1996; Ngwenyama and Lee, 1997; Dennis and Kinney, 1998) have led to the development of social influence models of communication technology use (Contractor and Eisenberg, 1990; Fulk et al, 1990; Yates and Orlikowski, 1992; Ngwenyama and Lee, 1997). Social influences are particularly important for new media (Webster and Trevino, 1995) like the Internet, because standardised ways of communication via such new media have not yet fully developed (Markus, 1994; Webster and Trevino, 1995). Thus the above noted importance of a critical mass of user (Markus, 1987), including the degree of "peer wiredness" (Poon and Swatman, 1997) and the overall wiredness of the industry the firm is operating in. Arguments which find support in various empirical investigations (Abell and Lim, 1996; Coyne et al, 1996; Poon and Swatman, 1997; Sillince et al, 1998).

The social influence models of communication technology use all regard information richness or leanness in communications not as attributable to the properties of the communication medium alone (its channel capacity according to media richness theory), but as emerging from the interaction between people and contexts (Ngwenyama and Lee, 1997).

These models criticise the rational media choice school of thought because of its lack of context sensitivity, user sensitivity, its assumption of user independence, user rationality, a passive receiver and its focus on efficiency motivations (Contractor and Eisenberg, 1990; Fulk et al, 1990; Ngwenyama and Lee, 1997). According to this

school of thought, media choice is influenced by the attitudes and behaviours of others, as well as norms that have developed within a group, within organisations or across organisations. Hence, media perception is not fixed but it varies across people, organisations, situations, tasks, time and user experience with the medium.

Because these models make no a priori assumption about any direct relationships between communication richness and the quantity of social cues (Ngwenyama and Lee, 1997), they in essence detach the message from the medium. Any message can be rich (or lean) relatively independent of the medium, more dependent upon the users' experience with the medium, their experience with the communication topic and their experience with the communication partner or the communication context (Carlson and Zmud, 1999). Communication richness is therefore an outcome of social behaviour (Markus, 1994), not solely an outcome of the nominal, rationally determined media richness of the communication channel (Carlson and Zmud, 1999).

Strictly speaking, communication richness is therefore both the outcome of social and rational aspects (Huang et al, 1998).

All this implies that although the amount of social information per communication act in computer-mediated communication is lower compared to face-to-face communication, it is more the *rate* of social information exchange than the *amount* of social cues exchanged that constitutes the key difference between the two forms of communication (Walther, 1996). Compared to non-mediated communication, the exchange of social cues is "just" temporally retarded. Hence, informal, interpersonal communication can take place over computer-mediated communication channels, as user experience with the medium, the topic and the communication partner accumulates and increases. A phenomenon that has been termed the "channel expansion effect" (Carlson and Zmud, 1999), which in a slightly related manner Sillince et al (1998) have termed an organisational learning ladder in computer-mediated communication. Trust and credibility building in marketspace is therefore possible, although usually supported and complimented by marketplace-based relationships and face-to-face meetings, as opposed to a complete substitution (Benson-Armer and Hsieh, 1997; Kraut et al, 1998). Nohria and Eccles (1992) even argue that the need for face-to-face meetings increases to make electronic networks work.

Consequently, the impact of link B in figure 4.9 as a marketspace, interaction-based source of international information and international contacts on the internationalisation

of the firm does not only depend on the degree of peer wiredness and the wiredness of the industry, as well as a firm's related information pull and push activities in marketspace that might induce interaction, but also on the firms experience with the medium, the information topic and the accumulated experience with its interaction partners. Again, as in the above discussion on interaction cost reductions, the accumulated experience and skills of the firm become an important aspect in the Internet's potential impact on the internationalisation of the firm.

New Interaction Capabilities of the Internet

The above discussion compared interaction taking place on the Internet with interaction taking place in the marketplace, particularly face-to-face communication. Such a comparison has been criticised on the grounds that new media offers capabilities and functions that traditional, non-mediated media lack (Culnan and Markus, 1987; Contractor and Eisenberg, 1990). Therefore, it is fruitful to also consider these effects and how they might impact the internationalisation of the firm.

Of major relevance to the context of this thesis is the observation among communication researchers that participation in "communication spaces" (Culnan and Markus, 1987), like the ones offered by the various services of the Internet, can increase the range and diversity of strong and weak interorganisational ties (Contractor and Eisenberg, 1990). It is argued that especially the range and diversity of an organisation's weak ties are important, because they are more likely to provide an organisation with information different from that received via its network of close business contacts due to its "bridging function" to other spheres of information (Granovetter, 1973). Weak network ties can in essence de-encapsulate an organisation from its immediate operational environment of strong network ties, thereby increasing the influential opportunity horizon of firms (see figure 4.9 and chapter 3). The role of weak ties is especially important in the communication process underlying information about innovations (Rogers, 1995). An important aspect, since various internationalisation theories regard the initial decision to internationalise as an organisational innovation (Simmonds and Smith, 1968; Lee and Brasch, 1978; Andersen, 1993; Leonidou and Katsikeas, 1996; see also chapter 3).

Empirical studies support this notion. While not explicitly investigating the role of the Internet in the internationalisation of the firm, studies have shown that using Internet-based services enabled firms to tap into dispersed networks of external expertise (Cronin et al, 1994). It increased external organisational links (Sillince et al,

1998; Steinfield et al, 2000), it made it easier for firms to locate other peers in the industry (Cronin et al, 1994), it resulted in business contacts with new customers (Honeycutt et al, 1998) and it made it easier to make and keep external contacts (Markus, 1994; Sillince et al, 1998). In the majority of firms (62%) in the last study, these external contacts were of an international nature (Sillice et al, 1998), supporting the potential impact of link B in figure 4.9.

After reviewing the Internet's potential theoretical impact on the internationalisation of firms by drawing on theories and empirical findings within the domain of communication research, ICT research and the emerging body of Internet research, the following section reviews studies that explicitly focus on analysing the Internet's role in the internationalisation of the firms.

4.5 The Internet and the Internationalisation of Firms: Empirical Evidence

Despite Quelch and Klein's (1996) pioneering article four years ago and despite theoretical claims of the Internet revolutionising the internationalisation process of firms (Quelch and Klein, 1996; Ellsworth and Ellsworth, 1995, 1997; Hamill, 1997a), there has been little attempt to empirically examine the specific role of the Internet in the internationalisation of small firms, let alone STBFs.

While the international role of the Internet implicitly surfaces in various empirical investigations (see for example Barker, 1994; Auger and Gallaugher, 1997; Honeycut et al, 1998), only the three following empirical studies focusing on the internationalisation of the firm could be identified:

1. Steinfield et al (1993),
2. Hamill and Gregory (1997),
3. Bennett (1997, 1998),

Although the first case study based investigation did not analyse the impact of the Internet on the internationalisation of firms – it investigated the impact on videotext on the internationalisation of firms – it was nevertheless deemed appropriate to include this study in the review, because its findings can give an empirically grounded indication of the Internet's potential impact. The little empirical evidence that currently exists further supports the inclusion.

Steinfield et al (1993) investigated 8 firms of different sizes and industries, analysing their reasons for using international videotext and its impacts on their international operations. Their investigation showed that the existence of this international communication and information infrastructure reduced costs and expanded the base of customers, permitting access to foreign markets that previously were too expensive to access. It also showed a twofold overall impact. For some firms international videotext followed and facilitated their internationalisation process, while for others it led to internationalisation, thus enabling international operations. While limited due to its case study based investigation and its focus on videotext, this study gives a first indication that the Internet can indeed play an influential role in the internationalisation of the firm.

Hamill and Gregory's (1997) study studied the role of the Internet in the internationalisation of firms among a sample of randomly selected small (less than 250 employees) Scottish companies, sampled across various industries (manufacturing, services and distribution) and including exporters and non-exporters. Although a considerate percentage of SMEs in their sample were aware of the Internet, few proactively used the Internet to support their international business operations. However, indirectly indicating the usefulness of the Internet in the internationalisation of firms, exporting firms exhibited an on average higher level of Internet awareness and connectivity.

In contrast to the above studies, a study by Bennett (1997, 1998) explicitly addresses the Internet's specific impacts on the internationalisation of firms. More specifically, it investigates its impact on export barriers.

Bennett's study (1997) is probably the first empirical study investigating the impact of the Internet on firms' international operations. Focusing on exporters with and without a web page in the UK, he investigates whether differences with regards to their perceptions of international operations exists. In line with the theoretical postulations noted above, his sample of firms regard the Internet as valuable for generating sales leads, reducing communication and information related costs – particularly for small firms – and creating international awareness of the firms, as well as viewing the Internet as an information source for market research (information pull) activities. Similarly to Hamill and Gregory's (1997) study, Bennett (1997) also observed limited pro-active use of the Internet, with only 8% of firms undertaking active information push in the form of advertising on the Internet.

Bennett (1997) also found that firms considered the Internet to support selling in remote countries, penetrating unfamiliar markets and increasing the international awareness for the firm. Although he is not making a distinction between marketplace and marketspace, his findings can be interpreted as an indication that the virtual presence in marketspace (see figure 4.7) increased their reach and led to international transactions in the marketplace that otherwise would have been impossible.

Besides the already noted finding that psychic distance mattered less in Internet adopters international business operations, another interesting finding in this study is that Internet adopters felt less of a need to set-up foreign branches, particularly in the case of smaller firms. Unfortunately, no explanation is given to why such a difference was observed. Also, he does not report whether this perception differs for firms in different industries. An additional interesting finding of his study is that younger firms were more likely to establish a website for use in their international operations. The author speculates that more mature firms already have an established network in which they conduct their international operations and thus might feel less a need to use the Internet to support their operations. This might indicate that not only can the Internet be supportive for small firms' internationalisation, but it might be a particularly valuable tool for relatively new firms, in order to overcome its liabilities of newness as discussed above and in chapter 2. Other internationalisation barriers, particularly internal, administrative and external, financial inhibitors (see chapter 3), were found to be exogenous to Internet use. Although Hamill (1997a) argues that these barriers can be reduced by Internet use as well, it is probably to early to show an impact, since standardised ways of conducting automated international business over the Internet are just about to emerge.

However, the reported findings should be regarded with some caution. First, Bennett (1997) does not report differences between industry sectors. Due to the fact that he included a broad variety of industry sectors, ranging from consumer goods and services to chemicals and construction, it can be assumed that responses by firms can be due to industry sector specifics. It was shown in the internationalisation chapter that the internationalisation of the firm is often contingent upon its industry sector. The wide spread of some of his questionnaire items support this. One of his items, 'The Internet makes exporting easier', for example showed a nearly even spread across the applied 5-point Likert scale. Second, Bennett does not distinguish between the level of Internet usage. He treats Internet use as a binary variable. Firms either have a website

or they have not. Although he reports whether firms monitor their website, whether they advertise on the Internet, whether they quote their URL on corporate print material or whether they keep records of number of Internet requests and sales (an indication of higher levels of use), he does not relate these indicators to the impact on international business perceptions. The two other uses of the Internet, information pull and interaction, are also not explicitly addressed either. Third and most importantly, Bennett relies on a purely attitudinal assessment. A behavioural assessment – for example assessing indicators of international operations like export intensity or the spread of countries served – is not included.

Later, Bennett (1998) reported of differences between his UK and his German sample with regards to Internet perception. Thus signalling that cultural differences can also play an important role in the perception of the Internet and subsequently its use. The German sample for example did not report as strongly that the Internet helps avoiding having to set up foreign branches or that it lowers the cost of international marketing. On the other hand, the German sample regarded the Internet as a tool providing a competitive edge and as a useful tool to generate feedback from foreign customers to a higher degree than the UK sample. However, these differences can also be a reflection of the different industry mix in the German sample, as well as a reflection of the German sample being on average more established and involved in exporting.

In sum it can be concluded that no clear and grounded empirical evidence exists that the Internet does actually impact the internationalisation process of the firm and if it does, how it impacts this process. The few studies that exist are either limited in scope, either because they are case study based, therefore exhibiting limited generalisability or because they only use a binary, one-dimensional assessment of Internet use or internationalisation (exports). Also, purely attitudinal assessments were found, as opposed to assessing behavioural impact dimensions like the various manifestations of internationalisation as reviewed in chapter 3.

4.6 Summary

Besides defining the Internet, its communication services, its characteristics and main organisational uses, this chapter has assessed the potential for organisations by reviewing its development from a content and user perspective.

It has been shown that the Internet has experienced an immense growth in content and users and that users all over the world have access to its content and users, with only a handful of countries without Internet access. Regardless of its global nature, it has also been shown that most users and most content originate in the US, the only country where a clear streamlining of its users population became apparent. European users are still reflecting the classical characteristics of early adopters of new technology, turning the technical entrepreneurs in STBFs into a population with potentially high Internet adoption levels due to their technological affinity with the Internet.

On the other hand, the projected mid-term role of e-commerce, to be dominated by the US and the business-to-business sector, has been shown to be less significant compared to traditional means of conducting business, at least if defined in the narrow way of this thesis. Particularly for the STBFs e-commerce is considered to be of little importance due to the specific characteristics of their product offerings.

With regards to the actual internationalisation process of the firm – which needed to be differentiated into processes in the marketplace and processes on marketspace, including a new internationalisation mode – various potential influences have been identified.

Drawing on communication research, ICT research, the emerging literature on the Internet and the few empirical studies that specifically focus on the internationalisation of firms, the following areas of potential influence can be listed (see table 4.6).

Table 4.6: Internationalisation Barriers, Internet Use and Potential Impacts

Internationalisation Barriers	Effective Use of the Internet	Main Potential Effect	Internationalisation Impact
lack of information/ lack of knowledge	- active and passive information pull - active information push - interaction with international information networks	- information and knowledge based barriers are reduced	- earliness of internationalisation - speed of internationalisation - direction of internationalisation
lack of international contacts	- interaction with international information networks - interaction inducing information pull and push	- increase in range and diversity of weak and strong international interorganisational ties - increase in unsolicited inquiries and orders - reduction in the liabilities of newness	- earliness of internationalisation - speed of internationalisation - direction of internationalisation
international awareness	- interaction inducing information push - passive and active information pull - interaction with international information networks	- increase in international awareness	- earliness of internationalisation
lack of resources	- substitution of other communication media, reducing interaction costs and freeing up of resources or more effectively and efficiently utilising existing resources	- reduction in liabilities of smallness	- earliness of internationalisation - speed of internationalisation - direction of internationalisation - mode of internationalisation
Influenced by:			
⇧ pre-state of the firm & current resource base	⇧ ⇧ commitment to and experience with medium, topic and communication partners		⇧ initial NPD

Source: The author.

Lack of Information/ Lack of Knowledge

Chapter 3 has identified lack of information and lack of knowledge as the key barriers in the internationalisation of the firm. This chapter has shown that the effective use of the Internet, that is active and passive information pull, active information push and active interaction with the Internet's global information networks could reduce these barriers by lowering information-based inhibitors.

Although none of the above reviewed studies considered behavioural elements in their investigations, it can be argued that by reducing these barriers the earliness, speed and direction of internationalisation could, ceteris paribus, increase.

Lack of International Contacts

It has also been shown that the barrier "lack of international contacts" could be reduced by effectively using the Internet (interaction inducing information pull and push, as well as active interaction with international networks in marketspace). Such use is likely to increase the range and diversity of international inter-organisational weak and strong ties. It might also lead to an increase in unsolicited inquiries and orders and overall it is likely to reduce the liabilities of foreignness and particularly the liabilities of newness faced by young firms. Therefore, by reducing these barriers, it is likely to, ceteris paribus, positively effect the earliness of internationalisation and the speed of internationalisation, similar to the effects noted above. Additionally, due to a potential increase in unsolicited inquiries on the reverse marketspace, it is also possible that the direction of internationalisation might be impacted as it might become slightly more customer-driven in marketspace.

Lack of International Awareness

An important pre-condition to internationalisation – the international awareness of the key decision-maker in the small firm (see chapter 3) – is also likely to be affected. Passive and active information pull on the media-rich Internet, as well as interaction-inducing information push is likely to increase the decision-makers exposure to international stimuli. Thereby increasing his international awareness and potentially leading to an earlier internationalisation. However, it has been noted that this aspect of the Internet's impact on the internationalisation of the firm is considered to be of minor importance in the context of this thesis. As chapter 3 has shown, STBFs and their technical entrepreneurs often exhibit a strong international orientation early on. Thus, the Internet's impact on international awareness, while being assessed in the empirical investigation, is considered to be of little significance.

Lack of Resources

Besides information related barriers, chapter 3 has noted that resource related barriers constitute the second key category of internal inhibitors to internationalisation. It has been shown that the Internet's technical potential to reduce various dimensions of interaction costs could reduce these barriers. Firms substituting other communication media with the Internet or simply focusing on the Internet in the first place can free up resources and lower the barriers associated with the liabilities of smallness. By lowering these barriers it is again likely that, ceteris paribus, the earliness and speed of internationalisation increases. In addition, it could also impact the direction of internationalisation and the mode of internationalisation. By reducing the liabilities of

smallness, the Internet might enable firms to operate in more distant markets, previously considered to be too expensive due to the involved interaction costs. The mode of internationalisation might also be impacted. By reducing interaction costs, the more costly FDI mode might now be feasible, since for example integrating a one person sales office abroad into the operating infrastructure of the home firm by using intranets is now economically possible, even for small firms. The previous costly need to set-up proprietary networks is no longer necessary.

However, all these potential impacts are influenced by other factors as illustrated in table 4.6.

Besides the noted importance of the pre-state of the firm, it has been shown that the effective use of the Internet not only depends on the firm's commitment to this new medium, but also on its accumulated experience with the medium, the topic of interest and its interaction partners. Experienced users perceived security related issues as less significant, they were able to conduct richer communication over the Internet and they perceived less data overload, being able to find information faster.

Moreover, concerning the timing of the organisational manifestations of the internationalisation process, one can assume that the Internet's effect is influenced by the initial NPD of STBFs. This liability of innovativeness (see chapter 2) is unlikely to be significantly impacted by the Internet.

Overall, it can be concluded that the Internet does not provide a panacea for the internationalisation of the firm (see also Hamill, 1997a). However, if used effectively and at a high level, it can be a very powerful tool to assist small firms' internationalisation by helping to overcome some of their main internationalisation barriers.

In contrast to Hamill (1997a) who argues that the traditional slow and incremental internationalisation process makes no longer sense when the Internet provides firms of all sizes with low cost access to global markets, this chapter has shown that such an argument might be valid in marketspace, but marketplace-based internationalisation is still likely to follow an incremental route as suggested by the Uppsala model. This is despite the possibility that the overall process might start earlier and the overall speed might increase.

The following chapter (chapter 5) will synthesise the findings from the preceding chapters. It will develop the research framework by relating the Internet's reviewed potential to the reviewed internationalisation process and the specifics of STBFs. Specific research objectives for each research aim will be developed and then operationalised in the chapter that follows (chapter 6).

Chapter 5: Literature Synthesis, Research Framework and Research Aims

5.1 Introduction

As stated in the introduction to this thesis, history suggests that new technological innovations such as the Internet may exert as profound an influence on organisations as established technologies did when they were commercially introduced for the first time. The seminal historical business research by Chandler (1977) lucidly demonstrated that other technological innovations like the railroad, the telegraph, the development of continuous process machinery, the refinement of parts manufacture and mass manufacturing techniques enabled the emergence of large, centralised firms, the prototype of today's ubiquitous modern industrial, multidivisional organisation.

Since firms are often conceptualised as information processors (Galbraith, 1973; Stinchcombe, 1990; Egelhoff, 1991; Casson, 1996), it is not surprising that at the core of internationalisation theory is lack of knowledge and subsequently uncertainty about markets abroad, due to a lack of location-sensitive foreign market information (Johanson and Vahlne, 1977, 1990). Hence, recent developments in information and communication technology (ICT) – especially the emergence of a location-insensitive and universally accessible marketspace (see chapter 4) – could therefore significantly impact the nature and process of internationalisation and international organisational operations. Ease of communication is no longer a function of geographical proximity as originally suggested by Vernon (1966). Producers are no longer only aware of local innovations and markets. Due to the emerging global marketspace, the "global scanner" (Vernon, 1979) is not necessarily confined to large multinational firms only, because the location specificity of knowledge (von Hayek, 1945) becomes more and more location independent in the marketspace. Small firms are also increasingly in a position to disseminate and scan for needed information on a global scale, if they utilise this marketspace. Using the marketspace should reduce typical internationalisation barriers and constraints.

After reviewing the relevant literature pertinent to the focus of this thesis, this chapter synthesises the essence of each chapter (section 5.2). This synthesis will subsequently be used to develop the research framework of this thesis (section 5.3). Based on this framework, section 5.4 is going to elaborate upon the research aims stated in chapter 1, by developing the specific research objectives addressing these aims. Furthermore, the research framework developed in this chapter will form the basis for the next

chapter, discussing the research methodology, the applied research design, as well as the operationalisation of the stated constructs of the research framework.

5.2 Synthesis of the Literature

The previous three chapters have reviewed the theoretical and empirical literature relevant to this study, namely the literature relating to STBFs (chapter 2), the internationalisation of STBFs (chapter 3) and the literature relating to organisational use of the Internet and its potential role in the internationalisation process of firms (chapter 4).

5.2.1 The Small Technology-Based Firm

Chapter 2 has defined the population of STBFs and isolated key dimensions, characteristic of their organisational structure, operations and development.

This chapter has shown that the characteristic firm-level dimensions of STBFs, their age (liabilities of newness), size (liabilities of smallness) and research-intensiveness (liabilities of innovativeness), constitute influential factors in the formative years of STBFs. Due to these factors, external links with other economic actors in order to overcome some of these liabilities emerged as characteristic external aspects of the business operations of STBFs. Aspects further pronounced because of STBFs' typical niche market orientation and output customisation. Furthermore, the length of the initial NPD emerged as an influential factor for STBFs (liabilities of innovativeness).

Chapter 2 has also lucidly shown that the various liabilities of STBFs at the firm level are strongly influenced by factors at the owner manager level, due to the typical high level of centralisation in small firms in general. The gained expertise of the technical entrepreneur prior to founding his current business, his accumulated pre-inception resources – turning the liabilities of newness into the liabilities of adolescence – his personal goals, and his transition from a R&D driven scientist to a marketing driven manager as the firm develops and grows impact the discussed firm level dimensions. Chapter 2 has particularly demonstrated the shaping role of the incubator with respect to the technical entrepreneur's gained pre-state experience and his subsequent business activities, as well as the potentially important role of venture teams among STBFs.

5.2.2 The Internationalisation of Small Technology-Based Firm

Chapter 3 has defined the term internationalisation and it has reviewed models and theories of the internationalisation of the firm by focusing on process models and key barriers. Furthermore, it has reviewed the few empirical studies explicitly addressing the internationalisation specifics of STBFs.

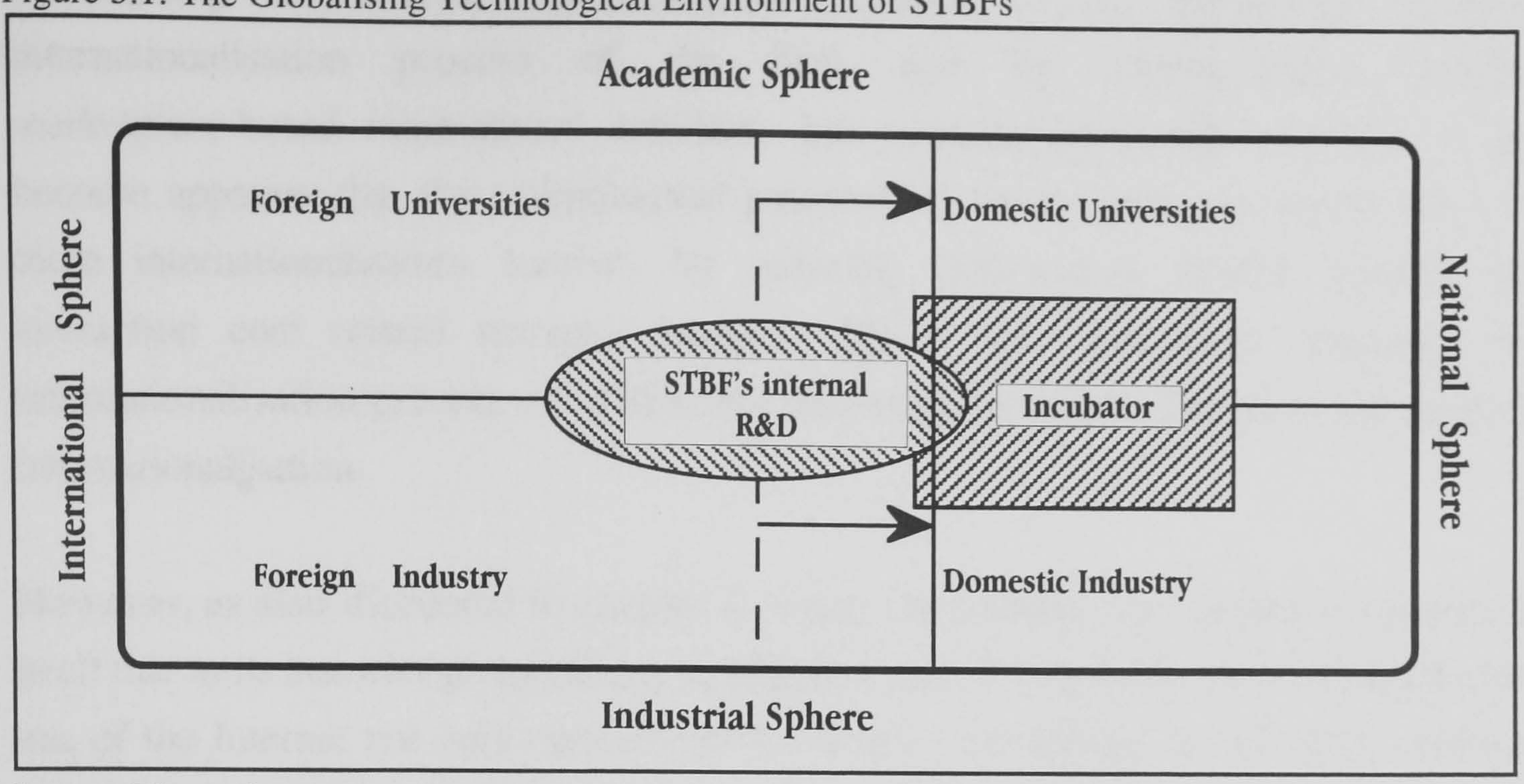
It has become apparent that although no internationalisation theory reflecting the new realities of a globalising world economy currently exists, two key internal barriers or liabilities of foreignness in the internationalisation process of firms can be associated with information related barriers (lack of information, lack of knowledge, lack of international contacts and lack of international awareness) and resource related barriers (lack of financial and/or human resources).

As chapter 3 has shown, overcoming these barriers is of importance for STBFs, mainly because of two factors.

Firstly, due to their typical niche market orientation as noted above, STBFs often tend to address international markets to recover their comparatively high R&D expenditures by targeting a critical mass of customers. The market niches in their domestic market are often too small or even non-existent.

Secondly and most importantly, the above average globalisation of technology-intensive markets in general turns the growth and resource-seeking option internationalisation for STBFs more and more into a competitive necessity rather than a competitive possibility in order to stay competitive. As illustrated in figure 5.1, the technological environment the STBFs are embedded in – namely the national and international input and output channels in the academic and industrial sphere as discussed in chapter 2 – is increasingly of an international rather than a domestic nature. Evidence like early internationalisation and impressive export sales given in chapter 3 underlined the importance of an exposure to international markets for STBFs.

Figure 5.1: The Globalising Technological Environment of STBFs



Source: The author.

However, especially in their early years, STBFs face the dilemma of early internationalisation needs paired with high internationalisation barriers in the form of the discussed liabilities of newness, smallness, innovativeness (chapter 2) and the additional liabilities of foreignness (chapter 3). Thus, it has come as no surprise that the few evidence that exists suggests that STBFs often tend to internationalise indirectly, using co-operative modes or indirect exports to business partners in the host country, before committing greater resources – in the form of for example FDI – to their international operations.

Similar to the general observations in chapter 2, the internationalisation specifics of STBFs are often influenced by its technological environment and, most importantly, by the technical entrepreneur or technical venture team. Internationalisation motives, networks, incubator/ pre-state effects and the international orientation and expertise of the technical entrepreneur and/or venture team have been key influential factors isolated in chapter 3. Although it should be noted that the empirical base for the observations was rather limited and these conclusions are thus of a rather preliminary nature. Again, firm level factors and factors at the owner manager level have emerged as influential internal factors.

5.2.3 The Internet and the Internationalisation of Firms

Chapter 4 has defined the Internet and its potential uses (information pull, information push and interaction) and it has reviewed its development over time.

By relating the Internet's technological potential to the previously reviewed internationalisation process of the firm and by distinguishing between marketplace-based international activities and marketspace-based activities, it has become apparent that the technological potential of the Internet can lessen some of these internationalisation barriers by reducing information related barriers and interaction cost related resource barriers. Hence also potentially impacting the internationalisation process of STBFs, like the earliness, speed, direction and mode of internationalisation.

However, as also discussed in chapter 4, using the Internet can constitute a barrier in itself due to its knowledge specificity in effective use. It has been shown that effective use of the Internet not only depends on the firm's commitment to this new medium, but also on its accumulated experience with the medium. This (again) assigns a key role to the technical entrepreneur (or venture team) in STBFs.

Also, due to the Internet's reciprocal nature, the perceived "peer wiredness" and "industry wiredness", that is the perceived level of Internet use among business peers and the industry, is of importance. Although this effect was not yet assessed in an international context, it can be argued that the lower this perceived level in relation to international business matters, the less likely it is that marketspace-based activities influence the internationalisation of the firm.

Still, very few empirical studies have analysed the Internet's impact on the internationalisation of the firm, albeit a mushrooming emerging body of normative Internet literature suggesting that international operations of a firm are facilitated by Internet use. Besides the discussed methodological weaknesses – mainly in relation to uncontrolled cross-sector approaches (for example mixing manufacturing firms with pure service firms) and an inappropriate assessment of Internet use on a binary basis – it can be argued that this lack of empirical studies is mainly due to the still comparatively limited levels of Internet diffusion among small firms in general. Moreover, for large firms – with relatively higher Internet diffusion levels as reported in chapter 4 – impacts on the internationalisation process are expected to be more secondary and reinforcing rather than formative, because they are more likely to have internationalised prior to the emergence of the Internet. Nevertheless, chapter 4 has made the point that the population of STBFs is considered to be highly Internet aware and potentially rich of Internet adopters, due to the technical entrepreneurs' above average technological affinity with the technical core of the Internet and his high

congruence with the classical characteristics of early adopters of new technology in general and the Internet in specific. In addition, the strong need to be internationally aware (see chapter 3) and the finding that STBF usually operate within the "Internet dense" triad, further supports this assumption.

5.2.4 Concluding Summary

The importance of the Internet's global marketspace for the increasingly essential internationalisation needs of STBFs becomes clear from the above synthesis of the literature. The marketspace's reductions in interaction costs, including the emergence of a new internationalisation mode, and its provision of information on a global scale impacts upon two of the most important internationalisation barriers as suggested by the theories of the internationalisation of the firm. Therefore it is potentially influential with regards to STBFs' perception of these barriers and, subsequently, influential with regards to STBFs actual internationalisation behaviour. If internationalisation needs are high and internationalisation barriers are reduced, ceteris paribus, the internationalisation process of STBFs could be impacted by marketspace-based activities as well.

However, while interaction costs and the location specificity of information is reduced, knowledge specificity in information retrieval, acquisition and dissemination in marketspace is high, at least for inexperienced firms. It follows that STBFs' interaction cost sensitive liabilities at the firm level can only be impacted by the Internet's technological potential if the firm accumulates experience and expertise with the new medium in a "learning by using" fashion. By committing itself to "exploiting" the Internet's potential for supporting international business operations. The technology per se is not supportive, but the effective use of the technology is. Thus, organisational adoption is not of significance, but efficient implementation and effective use is.

This shifts the focus of attention from the firm level to the owner manager level of STBFs. Only with the technical entrepreneur's commitment to this new medium can the Internet's technological potential materialise into benefits at the firm level over time. However, these relationships, if they exist, remain empirically largely unexplored and unaddressed in the "marketplace focused, pre-marketspace literature". Yet, according to the literature review's main findings, it can be concluded that STBFs already represent a fruitful population to explore the Internet's impact on the internationalisation of the firm due to their strong international orientation and their

comparatively high Internet diffusion levels. Hence allowing to explore, describe and explain potential relationships between the above reviewed variables in order to assess potential impacts of the Internet's marketspace on a firm's internationalisation process in the marketplace.

5.3 Research Framework

In order to assess the theoretically suggested impacts empirically, it is important to incorporate an examination of the specifics of STBFs as uncovered in the literature review and synthesised above, thereby controlling for their potential impacts.

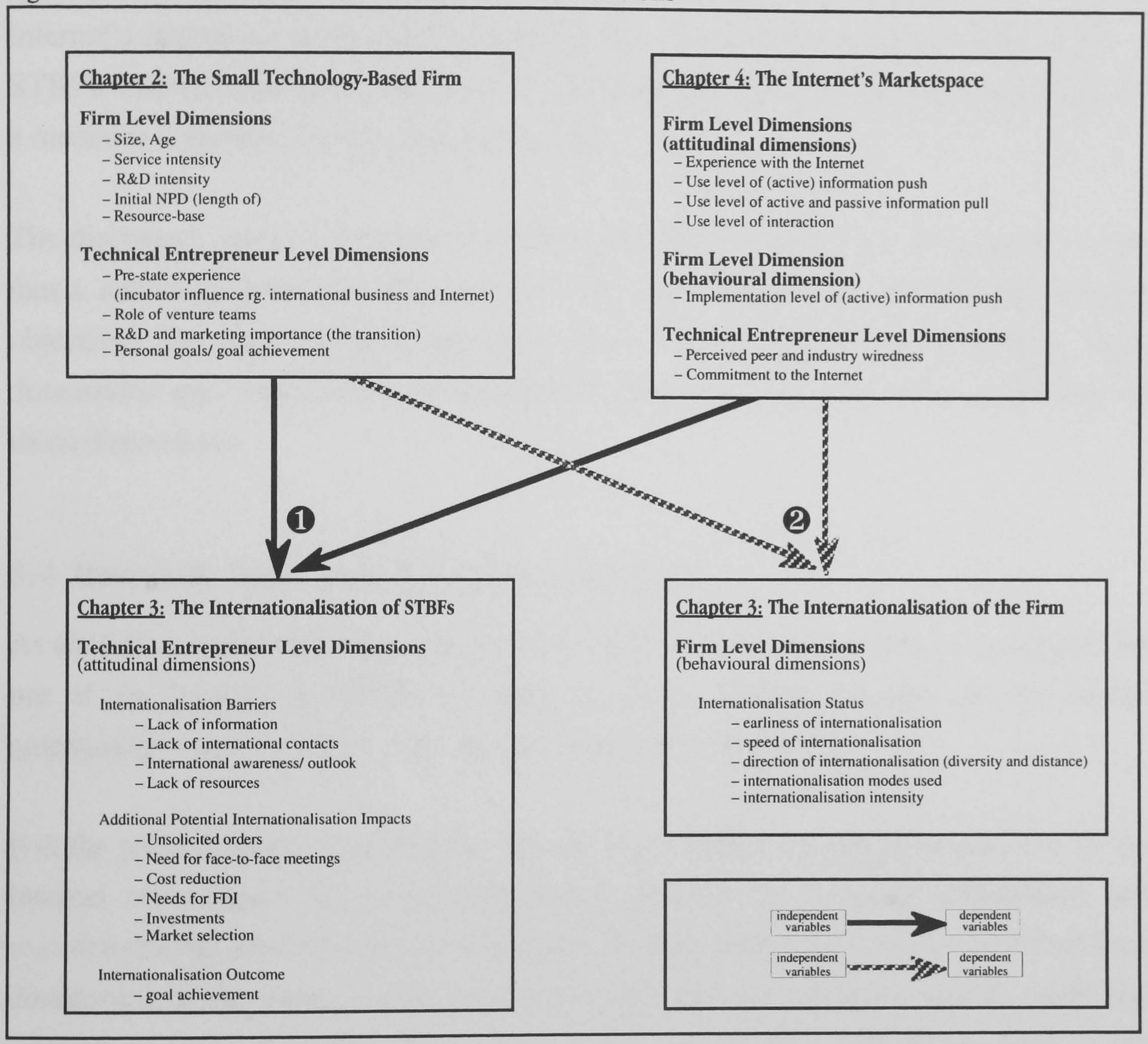
As discussed above, various influential dimensions at the firm and technical entrepreneur level characterise the operations of STBFs, potentially impacting their internationalisation and Internet use.

At the firm level – besides the definition related dimensions age, size and R&D intensity – the initial NPD (time span between inception and launch of the first product) and the existing resource base of the STBF is of influence. The initial NPD is of importance to correctly assess the Internet's impact on the earliness and speed of internationalisation. The existing resource base is of importance with regards to the STBFs organisational liabilities. The possible role of the service intensity among STBFs in their internationalisation, following the observation in chapter 2 that STBFs' operations usually involve some degree of services, will also be controlled for. Furthermore, firm level dimensions of Internet use – reflecting the extent of the three Internet uses (at an attitudinal and behavioural level) and the experience with Internet services – need to be considered to move beyond the superficial, binary assessment of previous studies.

At the technical entrepreneur level, the importance of the management's incubator influenced pre-state international business and Internet experience, the perceived international "peer and industry wiredness" and his personal commitment to the Internet are potentially influential factors. Furthermore, the discussed transition of the technical entrepreneur from an R&D oriented scientist to a marketing oriented manager is also of potential influence. With regards to these factors, the potentially influential role of a venture team also needs to be recognised in the research framework.

Following these observations, the conceptual framework below is developed (see figure 5.2), relating the various constructs and their dimensions to each other. This research framework constitutes the bridge between the secondary research of the literature review and the development and implementation of the primary research that follows in the next chapter.

Figure 5.2: Research Framework and Construct Dimensions



Source: The author.

As indicated in figure 5.2, it is expected that effective, high levels of Internet use impact (lower) the level of perceived internationalisation barriers of STBFs and that it potentially impacts additional internationalisation aspects like the number of unsolicited orders, following the insights of chapter 4 (see link ❶ in figure 5.2). Additionally, potential impacts at the behavioural level, the actual manifestations of STBFs' internationalisation, will be assessed (see link ❷ in figure 5.2).

However, with regards to the impact on the attitudinal internationalisation outcome – the goal achievement of the personal goals of the technical entrepreneur or venture team – it is not expected that significant differences will be found across firms with different levels of Internet use, because the relationship between internationalisation and organisational performance is usually considered to be mediated by the comparatively Internet independent internationalisation strategy pursued by a firm (see for example Cavusgil and Zou, 1994; Hoang, 1998). Since this thesis primarily focuses on the Internet's impact on internationalisation barriers and on behavioural manifestations of STBFs' internationalisation process, an assessment of internationalisation strategies as a mediator is beyond the scope of this thesis.

The discussed research framework reflects the dimensions to be investigated in this thesis and their potential relationships. The development of the specific research objectives for each research aim that follows in the next section reflects these dimensions and constructs and specifically addresses the potential relationships of these dimensions.

5.4 Research Aims and Research Objectives

As already stated in chapter 1, the general research goal of this study is to explore the use of the Internet in STBFs in order to assess whether Internet use can impact empirically – and if so how – the internationalisation of STBFs.

It is the general thesis of this study that effective, high level organisational use of the Internet can support the internationalisation process by reducing information and resource related internationalisation barriers. Thereby potentially impacting behavioural dimensions of the internationalisation of the firm like the earliness, speed, mode and intensity of their international operations. Thus, this study's explanatory focus is on the effects of Internet use at the organisational level on the internationalisation of STBFs (see table 5.1). However, determinants of the organisational level of Internet use will also be explored.

Table 5.1: A Typology of Research Questions

Unit of Analysis	Explanatory Focus	
	Determinants	*Effects*
The Individual	What are the determinants of an individual's information (system) use?	What are the effects of an individual's information (system) use?
The Organisation	What are the determinants of an organisation's information (system) use?	What are the effects of an organisation's information (system) use?
The Market	What are the determinants of a market's information (system) use?	What are the effects of a market's information (system) use?

Source: Swanson, 1987.

Based on the literature review and the synthesis of the literature, the following research aims and their specific research objectives, elaborating on the research aims stated in the introduction, are developed:

5.4.1 Research Aim 1

To examine the current level of Internet use for international business and its determinants among STBFs *at an attitudinal level*.

Research Objective 1a

In order to assess the level of organisational Internet use for international business among STBFs, a description of the organisational levels of adoption and levels of use is needed. Following the insights from chapter 4, this descriptive exercise needs to take non-binary indicators and indicators across the three dimensions of Internet use into consideration.

- Research objective 1a: Describe the organisational level of Internet adoption and use.

Research Objective 1b

Following the findings of chapter 4 that a binary assessment of Internet use cannot reflect the extent of organisational Internet use among firms, this research aim will involve the specific research objective of developing and assessing a multi-dimensional, multi-item measure to scale the level of organisational Internet use for international business among STBFs. This measure needs to reflect the three uses of Internet use (information pull, information push and interaction), as well as the

organisational use indicators suggested in the organisational diffusion of innovations literature (Rogers, 1995). The development of the Internet use scale will involve assessing its reliability and validity. The Internet use scale – if of acceptable quality – will then subsequently be used to assess internationalisation impacts.

- Research objective 1b: Develop and assess a multi-dimensional, non-binary measure to scale the level of organisational Internet use for international business.

Research Objective 1c

Chapter 4 found evidence in non-international contexts that Internet use is often influenced by the levels of use among a firm's business peers (peer wiredness), as well as the overall level of use within a firm's industry (industry wiredness). In order to understand the process that led to the level of organisational Internet use as measured in research objective 1b, the third specific research objective relating to research aim 1 is to develop and assess a multi-item measure to scale the level of both wiredness dimensions: international peer wiredness and international industry wiredness. As in research objective 1b, the development of the wiredness scale will involve assessing its reliability and validity. The wiredness scale – if of acceptable quality – will then subsequently be used to assess each dimensions' impact on the level of organisational Internet use (see research objective 1d below).

- Research objective 1c: Develop and assess a multi-item measure to scale the perceived use at the international industry and international business peers' level (industry and peer wiredness).

Research Objective 1d

As stated in the previous research objective, the perceived Internet use of business peers and the industry as a whole was found to often determine a firm's use level in non-international contexts. In order to assess the wiredness role as a determinant of organisational Internet use levels, research objective 1d will relate the wiredness constructs (see research objective 1c) to the level of organisational Internet use (see research objective 1b). More specifically, this research objective will involve an assessment of the relative importance of each wiredness dimension as a determinant of use levels.

- Research objective 1d: Assess the relative role of international industry and peer wiredness perceptions as determinants of organisational Internet use for international business.

Research Objective 1e

Besides the potentially influential role of international wiredness perceptions, experience with the medium Internet also emerged as a key variable. It was clearly shown in the literature review that using the Internet effectively requires experience with the medium. Therefore, the role of experiential factors as determinants of Internet use levels is the specific goal of research objective 1e. Addressing this research objective will involve relating the potential importance of experiential factors to the relative importance of the two wiredness dimensions as use level determinants (see research objective 1d).

- Research objective 1e: Assess the relative role of Internet experience as a determinant of organisational Internet use levels for international business.

5.4.2 Research Aim 2

To examine the internationalisation characteristics of STBFs, their manifestations and determinants.

Research Objective 2a

Following the findings of chapter 3, this research aim will involve the specific research objective of assessing the international attitude, the international outlook of STBFs. This assessment will involve the development and assessment of a multi-item scale to measure the level of an international orientation across the to be sampled STBFs. As in the previous scale development related research objectives, the development of the scale will involve assessing its reliability and validity. The international business attitude scale – if of acceptable quality – will then subsequently be used to assess its role in the organisational internationalisation of STBFs (see research objective 2e below) and it will be used to gauge possible effects of Internet use on the international orientation of STBFs (see research objective 4a below).

- Research objective 2a: Develop and assess a multi-item measure to scale the international business attitude of STBF.

Research Objective 2b

In addition to the important role of a positive international business attitude, chapter 3 also showed that the resource-base of the STBF is of importance in its internationalisation. Therefore, research objective 2b will involve the specific research goal of measuring the internal international business resource-base of STBFs. This research goal will involve the development and assessment of a multi-item scale to measure the level of the internal resource-base. As in the previous research goal, the development of this scale will involve assessing its reliability and validity. The international business resources scale – if of acceptable quality – will then subsequently be used to assess its role in the internationalisation of STBFs (see research objective 2e below). It will also be used to gauge possible effects of Internet use on the internal resource-base of STBFs (see research objective 4a below). The former aspect will involve an assessment of the relative importance of the internal resource-base on the internationalisation of STBFs in comparison with the importance of the international attitude of STBFs (see research objective 2a above).

- Research objective 2b: Develop and assess a multi-item measure to scale the internal international business resource-base of STBFs.

Research Objective 2c

The third core internationalisation process variable that emerged from the literature review in chapter 3 is lack of international business information. Therefore, research objective 2c will be to develop and assess a multi-item scale to measure the level of internal international business information within STBFs. As in the previous research goal, the development of this scale will involve assessing its reliability and validity. The international business information scale – if of acceptable quality – will then subsequently be used to gauge possible effects of Internet use on internal levels of international business information among STBFs (see research objective 4a below).

- Research objective 2c: Develop and assess a multi-item measure to scale the perceived level of internal international business information among STBFs.

Research Objective 2d

The goal of research objective 2d is to identify the organisational manifestations of STBFs' internationalisation. Following the definition of internationalisation in chapter 3, this research objective will involve identifying inward, co-op (for example

international R&D co-operations, international joint ventures) and outward internationalisation (for example indirect and direct exporting, FDI) manifestations. Furthermore, this research objective will include assessing the earliness, direction and speed of internationalisation, as well as the international business outcome intensity of STBFs.

- Research objective 2d: Identify the organisational manifestations of the internationalisation process of STBFs.

Research Objective 2e

The goal of research objective 2e is to examine the determinants of the organisational manifestations of STBFs' internationalisation. This examination will particularly involve an assessment of the role of STBFs' international business attitude (see research objective 2a) and the role of STBFs' internal resource-base (see research objective 2b) as determinants of the organisational internationalisation manifestations of STBFs.

- Research objective 2e: Examine determinants of STBFs' internationalisation.

5.4.3 Research Aim 3

To explore the role of the technical entrepreneur or venture team both in the internationalisation process of STBFs and in relation to the level of Internet use for international business.

Following the literature synthesis it became evident that an understanding of STBFs purely at the firm level is insufficient and a complementary investigation at the management or technical entrepreneur level is important. Hence, the third research aim will involve three specific research objectives addressing organisational specifics among STBFs at the management level.

Research Objective 3a

With regards to the internationalisation process, chapter 3 could show that the pre-state of the firm is influential. In relation to the specifics of STBFs' internationalisation, it is incubator related international business experience among the managers of a STBF prior to founding or joining the firm. In addition, team ventures effects might impact the internationalisation of STBFs. It is therefore the goal of research objective 3a to assess these effects at the management level on the internationalisation of STBFs.

- Research objective 3a: Assess the role of previous (pre-state and pre-joining) international business experience among STBFs' managers and the role of team ventures on the internationalisation of STBFs.

Research Objective 3b

Since the pre-state of the firm is influential with regards to its internationalisation, the pre-state of the firm might also be influential with regards to its Internet use levels. Incubator related Internet use experience among the managers of a STBF prior to founding or joining the firm might therefore also have played an important role in their current levels of Internet use. This is in addition to the possible effects of wiredness perceptions (see research objective 1d) and post-inception experience (see research objective 1e) on organisational use levels. Moreover, team ventures effects might also impact the level of organisational Internet use. It is therefore the goal of research objective 3b to assess these effects at the management level.

- Research objective 3b: Assess the role of previous (pre-state and pre-joining) Internet experience among STBFs' managers and the role of team ventures on the level of organisational Internet use among STBFs.

Research Objective 3c

The final key characteristic of STBFs at the management level that was uncovered in chapter 2 is the transition of the owner manager(s) from a scientist to a business manager, at least according to the stage views of organisational developments among STBFs. Research objective 3c will address this by controlling for its impact on the internationalisation of STBFs and by controlling for its impact on the STBFs' level of organisational Internet use for international business.

- Research objective 3c: Assess the impact of the technical entrepreneur's/ venture team's managerial transition on STBFs' internationalisation and Internet use levels.

5.4.4 Research Aim 4

To explore and assess the impact of Internet use levels for international business on the internationalisation characteristics of STBFs. Research aims 1 to 3 therefore prepared the ground for the fourth research aim of this thesis.

Following the assumption previously made that the Internet might reduce internationalisation barriers and might subsequently impact the internationalisation process and the organisational performance of the firm, this research aim will involve three specific research objectives.

Research objective 4a

Research objective 4a involves an assessment of Internet use impacts on attitudinal internationalisation dimensions by asking respondents directly or indirectly about their perceived impacts of the Internet. This assessment will involve assessing impacts on the previously developed constructs level of internal international business information (see research objective 2c), level of international business attitude (see research objective 2a) and level of the internal resource-base (see research objective 2b), previous impact variables used by Bennett (1997, 1998) and impact variables derived from the discussion in chapter 4 (see table 4.6 there).

- Research objective 4a: Evaluate potential attitudinal impacts of Internet use for international business on the internationalisation of STBFs.

Research objective 4b

Research objective 4b follows the assessment of Internet use impacts on internationalisation dimensions of the previous research objective 4a. But in contrast it focuses on the behavioural level, the actual organisational outcomes of STBFs' internationalisation. Therefore, this objective will involve assessing impacts on the direction of internationalisation, the timing of internationalisation, the intensity of internationalisation and the directness of the internationalisation modes used.

- Research objective 4b: Evaluate potential behavioural impacts of Internet use for international business on the internationalisation of STBFs.

Research objective 4c

Chapter 4 defined different dimensions of organisational Internet use. Research objective 1b tries to develop a measure to reflect these use dimensions. If the empirical

data supports these dimensions, research objective 4c will assess the relative importance of each use dimension on the previously assessed attitudinal (research objective 4a) and behavioural (research objective 4b) impact dimensions.

- Research objective 4c: Evaluate salient Internet use dimensions with regards to the attitudinal and behavioural internationalisation impact dimensions.

5.4.5 Research Aim 5

To assess the levels of website implementation among website adopters *at a behavioural level*, to investigate the role of experiential factors and to explore potential internationalisation impacts.

As indicated in the research framework in figure 5.2, the assessment of the organisational use of the Internet's marketspace proceeds at an attitudinal level (see research objective 1b). However, one of the organisational use dimensions, information push in the form of a corporate website, can also be assessed *at a behavioural level* by externally analysing the actual implementation levels across website adopters, assuming that the sampled STBFs will include enough website adopters to proceed with a quantitative assessment. Such an assessment would include assessing the role of experiential factors as in research aim 1 (see research objective 1e). As chapter 6 will further show, such an assessment offers the additional advantage of controlling for potential methodological artefacts (validity assessment across methods). Research aim 5, the final research aim of this study, is therefore a combination of research objective 1b, 1e and research aim 4 utilising a different method of investigation (see chapter 6 for details).

Four specific research objectives are developed addressing this research aim, reflecting the need for an assessment model, the cross-method validity assessment, the assessment of experiential effects and the assessment of potential internationalisation impacts.

Research objective 5a

In order to assess potential impacts of website implementation levels on STBFs' internationalisation, it is important to develop an instrument to measure the different aspects and levels of websites across the website adopters. This model, which will be developed and operationalised in chapter 6, will be used as a basis for describing the

different website implementation levels across the website adopters and, if the empirical data supports the model, it will be used for the internationalisation impact assessment.

- Research objective 5a: Develop a model for assessing different salient website dimensions and describe the levels of website implementation across STBFs.

Research objective 5b

As stated above, research aim 5 allows for a validity assessment across methods, since research objectives 1b and 5a both assess levels of organisational Internet use by using different research instruments (for more details see chapter 6). Research objective 5b addresses this aspect.

- Research objective 5b: Validate the levels of Internet use and levels of website implementation across the two research instruments used.

Research objective 5c

Following the observations in chapter 4 that experience with the Internet might play an important role in firms' organisational use of the Internet, the third research objective of research aim 5 is to investigate potential experiential effects on website implementation levels. This assessment is similar to research objective 1e.

- Research objective 5c: Assess the role of experience with a website on STBFs' web site implementation levels.

Research objective 5d

The final research objective of research aim 5 is to extent the impact analysis of research aim 4, by evaluating the potential impacts of different levels of website implementation dimensions on the internationalisation (attitudinal and behavioural dimensions) of STBFs. This objective includes identifying key website dimensions of impact importance.

- Research objective 5d: Evaluate levels of website implementation impacts on the internationalisation of STBFs.

Table 5.2 gives an overview of the research aims and their related research objectives.

Table 5.2: Research Aims and Research Objectives

Research Aims	Research Objectives
1. To examine the current level of Internet use for international business and its determinants among STBFs *at an attitudinal level*.	1a. Describe the organisational level of Internet adoption and use. 1b. Develop and assess a multi-dimensional, non-binary measure to scale the level of organisational Internet use for international business. 1c: Develop and assess a multi-item measure to scale the perceived use at the international industry and international business peers' level (industry and peer wiredness). 1d: Assess the relative role of international industry and peer wiredness perceptions as determinants of organisational Internet use for international business. 1e: Assess the relative role of Internet experience as a determinant of organisational Internet use levels for international business.
2. To examine the internationalisation characteristics of STBFs, their manifestations and determinants.	2a. Develop and assess a multi-item measure to scale the international business attitude of STBF. 2b. Develop and assess a multi-item measure to scale the internal international business resource-base of STBFs. 2c. Develop and assess a multi-item measure to scale the perceived level of internal international business information among STBFs. 2d. Identify the organisational manifestations of the internationalisation process of STBFs. 2e. Examine determinants of STBFs' internationalisation.
3. To explore the role of the technical entrepreneur or venture team both in the internationalisation process of STBFs and in relation to the level of organisational Internet use for international business.	3a Assess the role of previous (pre-state and pre-joining) international business experience among STBFs' managers and the role of team ventures on the internationalisation of STBFs. 3b. Assess the role of previous (pre-state and pre-joining) Internet experience among STBFs' managers and the role of team ventures on the level of organisational Internet use among STBFs. 3c: Assess the impact of the technical entrepreneur's/ venture team's managerial transition on STBFs' internationalisation and Internet use levels.

Source: The author.

Table 5.2: Research Aims and Research Objectives (continued)

Research Aims	Research Objectives
4. To explore and assess the impact of Internet use levels for international business on the internationalisation characteristics of STBFs.	4a. Evaluate potential attitudinal impacts of Internet use for international business on the internationalisation of STBFs. 4b. Evaluate potential behavioural impacts of Internet use for international business on the internationalisation of STBFs. 4c. Evaluate salient Internet use dimensions with regards to the attitudinal and behavioural internationalisation impact dimensions.
5. To assess the levels of website implementation among website adopters *at a behavioural level*, to investigate the role of experiential factors and to explore potential internationalisation impacts.	5a. Develop a model for assessing different salient web site dimensions and describe the levels of website implementation across STBFs. 5b. Validate the levels of Internet use and levels of web site implementation across the two research instruments used. 5c. Assess the role of experience with a website on STBFs' website implementation levels. 5d. Evaluate levels of website implementation impacts on the internationalisation of STBFs.

Source: The author.

After synthesising the literature, developing the research framework and elaborating upon the research aims, the following chapter will discuss and develop the applied methodology, research design and the operationalisation of the variables constituting the construct dimensions of the discussed research framework. Furthermore, the following chapter will report of the influential findings of the two exploratory stages of this thesis that preceded the development of the research design and the finalisation of the research instruments.

Chapter 6: Methodology – Selection, Operationalisation, Exploratory Insights and Implementation

6.1 Introduction

The previous chapters have reviewed the literature pertinent to this thesis' topic in order to develop the research framework and the specific research objectives. Addressing these research objectives requires an appropriate research design in order to ensure that the data gathered is sufficient, valid, reliable and generalisable. A research design can be viewed as forming the blueprint for the entire research process and as a guidance for completing a study successfully (Churchill, 1987; Chisnall, 1997; Aaker et al, 1998). Making a decision on which research design to apply is the most significant, because it pre-determines how the data will be collected and what kind of data will be collected. Various research designs (and its combinations) are available from which a researcher can choose, depending on the aims and context of the research task, his personal preferences and skills, as well as other factors such as timing considerations and research costs.

The purpose of this chapter is to develop an appropriate research design to meet the specific objectives of this study. Following the "contingency view" of research approaches (Klein et al, 1991) – suggesting that sound methodologies and research designs are not wrong nor right until applied to a specific research problem – section 6.2 briefly reviews the main research designs, data needs and research instruments available and discusses their main weaknesses and main strength. Based on this overview, and the stated research objectives (see chapter 5), the adopted research design is presented and defended.

Section 6.3 then proceeds to discuss and present the operationalisation and implementation of the adopted research design. This section will include the results of the exploratory research stage of this thesis, namely the informatory and exploratory interviews. These interviews are included in this chapter rather than the following, because these interviews were conducted prior to the finalisation of the research methodology and the findings impacted some of the instruments and constructs utilised at later stages in the research.

6.2 Research Methodologies: Overview and Selected Approach

Research methodologies can be categorised in various ways and at different levels. For example, one can distinguish between objective versus subjective research methods (Burrell and Morgan, 1979), one could distinguish between positivistic, interpretive and critical research philosophies (Orlikowski and Baroudi, 1991), as being concerned with the discovery and/ or testing of laws (nomothetic view) versus the uniqueness of a particular context (idiographic view) (Morgan and Smircich, 1980), or they can be classified according to the researcher taking an outsider (etic) versus an insider (emic) perspective (Morey and Luthans, 1984).

However, at a more pragmatic and practical level, most categorisations broadly identify three generic, non-exclusive research designs (Hartman and Hedblom, 1979; Lehmann, 1979; Tull and Hawkins, 1990; Kinnear and Taylor, 1991; Chisnall, 1997; Aaker et al, 1998):

- exploratory research designs
- descriptive research designs
- causal or explanatory research designs

The next sub-sections discuss each research design.

6.2.1 The Exploratory Research Design

If not much is known, no or few precedents exist, or if information that could aid in the specification of a study is not available, then research is exploratory in nature and an exploratory research design is best employed (Hartman and Hedblom, 1979). The general goal of the exploratory research design is to gain new insights and ideas (Churchill, 1987; Kinnear and Taylor, 1991; Chisnall, 1997; Aaker et al, 1998) and to uncover the general nature of the research problems and the variables that relate to it (Tull and Hawkins, 1990). Due to its expeditionary nature (Hartman and Hedblom, 1979), its design is characterised by flexibility and sensitivity to the unexpected. Versatile research approaches like observations, group interviews and interviews with experts are typical in exploratory research designs (Kinnear and Taylor, 1991). Hence, exploratory research is often carried out in the initial phases of studies addressing new and emerging research areas or investigating into fields in which contradictory findings

have prohibited the accumulation of knowledge. Pure exploratory research on its own is however almost never done (Lehmann, 1979).

6.2.2 The Descriptive Research Design

According to Churchill (1987) a descriptive research design is mainly used for the following three purposes:

1. to describe the characteristics of certain groups
2. to estimate the proportion of people (or organisations) in a specified population who behave in a certain way
3. to make specific predictions

As the name suggests, the main purpose of this research design is to describe certain magnitudes provided in the form of descriptive information, either qualitative or quantitative (Chisnall, 1997). Its emphasis is on reporting events or phenomena as accurately as possible, without regard for how the units under investigation might be tied together or what relationship they might have with each other (Hartman and Hedblom, 1979). Hence, descriptive research designs do not aspire to explain relationships that may exist (Chisnall, 1997). Such a research design is therefore appropriate for studies that seek to portray characteristic variables of a phenomenon and determine their frequencies, as well as make predictions regarding the occurrence of the phenomena under investigation.

In contrast to exploratory research designs, descriptive designs are less flexible and more rigid, assuming prior knowledge about the phenomenon under investigation, allowing for clear-cut objectives to be established and data requirements to be identified apriori. Researchers conducting descriptive research should therefore have a clear idea about the "whos", "whats", "whens", "wheres", "whys" and "hows" of a study (Churchill, 1987).

6.2.3 The Causal Research Design

Causal research designs, also termed explanatory, analytical or experimental research designs (Hartman and Hedblom, 1979) or viewed as a specific sub-form of conclusive research designs (Kinnear and Taylor, 1991), generate data under controlled conditions, therefore capable of establishing cause and effect relationships between variables. Inferences about cause and effect relationships cannot be made with the two previously stated research designs. Causal research designs are usually based on the

assumption that enough is known in an area of interest to designate specific theories and to test specific hypothesis that are specified apriori, in order to infer causality by the use of probability statistics (Hartman and Hedblom, 1979), as well as evaluating relationships and their possible interactions (Chisnall, 1997). Such research designs offer the advantage of allowing the researcher to make causal inferences about the relationships between variables and to gauge the magnitude of these relationships. Often, particularly in experimental laboratory settings (see also section 6.2.5.2), the researcher deliberately intervenes in the natural settings of a number of variables (the independent variables), in order to assess their impact on another set of unaltered variables (the dependent variable). Hence, in explanatory research designs the quality of the research results are very much dependent on how well the researcher can control important research parameters like the population and the various sets of independent and dependent variables that are of particular interest within this population. Failure to do so can lead to misleading results.

6.2.4 Data Needs

The appropriateness of any of the three generic research designs (or of any combination) not only depends on the state of knowledge within the particular field of interest, but it also depends on the nature of the data needed to address the specific research aims. As noted by Kinnear and Taylor (1991), an appropriate research design has to make sure that the data gathered is congruent with the aims of the study.

When it comes to the nature of the data needed in research, the literature usually distinguishes between qualitative versus quantitative data and cross-sectional versus longitudinal data.

6.2.4.1 Qualitative versus Quantitative Data

According to Miles and Huberman (1994) qualitative data, usually viewed as non-numerical representations of a phenomenon (Stablein, 1996), can be very attractive due to its contextual richness, allowing to preserve chronological flows, to assess local causality and to derive fruitful explanations for the phenomena under investigation. It produces findings not derived by means of statistical procedures or other means of quantification (Strauss and Corbin, 1990), seeking to describe, decode, translate or otherwise come to terms with the meaning, not the frequency, of phenomena in the social world (Van Maanen, 1983). Thus, qualitative methods are frequently used in the social science and rarely, if at all, in the natural science. The essence of research employing qualitative data is the attempt to uncover factors that

may account for certain types of behaviour, seeking a deeper understanding and insight of these potentially influential factors (Chisnall, 1997). Qualitative data can thus provide a richer representation of the phenomena, which is difficult to achieve with the quantitative methods to be discussed in the next sub-section. Hence, qualitative data is particularly helpful in theory building, traditional preliminary explorations, as well as exploring and explaining complex behaviour (Hart, 1987).

However, in contrast to quantitative data analysis, analysing qualitative data is the most serious and central difficulty in using qualitative data, because methods of analysis are not as well formulated (Miles and Huberman, 1994). Due to its interpretive nature, a major concern relates to its lack of objectivity (Hart, 1987) and low intersubject testability, with the researcher constituting a potential source of bias. Therefore, the expertise and objectivity of the researcher is of great importance. Furthermore, from a practical perspective, collecting qualitative data is often labour intensive and therefore costly.

On the other hand, research designs employing quantitative data do not suffer from a lack of analytical procedures (see for example: Backhaus et al, 1996; Hair et al, 1998). Its obvious strength lies in its comparability due to its standardised numerical format (Hart, 1987), thereby reducing the potential bias of subjective interpretations. Its less labour intensive data gathering allows for greater sample sizes, enhancing the representativeness of the sample and thereby allowing assessing its generalisability.

The increased numerical accuracy offered by employing quantitative sets of data has to be related to its loss in perspective. Just like a magnifying glass increases the accurate representation of its limited focus area by revealing more details, it decreases the scope of the observation at the same time. Applied to this context, quantitative data can capture details more accurately and precisely, but usually lacks the contextual sensitivity and scope of qualitative data.

Taking both its strength and weaknesses into account, quantitative data are especially appropriate for (Hart, 1987):

- testing hypothesis
- synthesising a large number of variables to determine associations (and its strength)
- controlling for generalisability

6.2.4.2 Cross-Sectional versus Longitudinal Data

In addition to the three generic research designs and the quantitative or qualitative nature of the data needed to address the research aims of a study, the needed time frame of the study is another important aspect. This refers to the need for either cross-sectional and/or longitudinal data.

Often, research is interested in processes that take place over a period of time. Process research, as opposed to static variance-based research (also termed factor research), addresses this (Franz and Robey, 1987; Markus and Robey, 1988). In the traditional longitudinal model of process theory, a set of variables, of a quantitative or qualitative nature, is assessed at different time periods across the same pre-defined sample of units (individuals or organisations). If different but similar groups are assessed at different time periods, we refer to it as a quasi-longitudinal model (Hartman and Hedblom, 1979). The main question that these models try to address is whether there has been a significant change in a criterion between time periods t_1 and t_2 (Hartman and Hedblom, 1979). However, while many variables are processual in such non-cross-sectional research approaches, it is acknowledged that it is difficult to measure the process per se (Hartman and Hedblom, 1979). Thus, traditional longitudinal research approaches are often more focused on process manifestations at different moments in time.

The related non-cross-sectional approach of processual analysis is in contrast more interested in understanding processes per se, linking them to outcomes that occur over time (Pettigrew, 1997). It focuses its attention on the importance of time and it is driven by the assumption that social reality is not a steady state, that human conduct is perpetually in a process of becoming (Pettigrew, 1997). The actual data collection process can be either passive (longitudinal observations) or active (longitudinal action research).

Despite its strength in uncovering processes and manifestations that unfold over time, cross-sectional studies remain the norm in academic marketing research in general (Kinnear and Taylor, 1991) and international business research (Macharzina and Engelhard, 1991; Tesar and Moini, 1998) or information systems research (Orlikowski and Baroudi, 1991) in particular. This is probably best explained by the unique problems of this particular approach. Not only is it difficult to keep track of respondents over time (Hartman and Hedblom, 1979; Aaker et al, 1998), to monitor the complexities of processes and its outcomes over several time periods, but most of

all it is time consuming. Thus, taking the usually limited amount of time and other resources for academic research projects into consideration, truly longitudinal research approaches, despite their potential and merits, are often not feasible.

6.2.5 Research Instruments

The above discussed research designs and data needs are comparatively independent of the data collection instrument employed (Hartman and Hedblom, 1979).

Besides using secondary data in the form of internal or external information – as was done in the literature review chapters of this thesis – primary data may be collected by any combination of the following three main methods (Chisnall, 1997; note that less applicable data collection instruments for the context of this thesis like the use of simulations are not discussed), each with its subsets of different instruments:

- observation
- experimentation
- surveys/ questioning

6.2.5.1 Observation

Observation essentially consists of observing the phenomena of interest. Either by watching people's behaviour or by analysing recorded data (Chisnall, 1997). Logically, unobservable phenomena like attitudes cannot be assessed using observation as a data collection technique, only its behavioural manifestations can be observed. Nevertheless, it is possible to make inferences about internal conditions leading to the observed manifestations (Tull and Hawkins, 1990). Besides the overall need for observability, Tull and Hawkins (1990) state two additional conditions. First, behaviour must be repetitive, frequent or otherwise predictable. Otherwise the amount of time that would have to be spend waiting for an observable behaviour to occur becomes excessive. Second, the observable event must cover a reasonable period of time. Observing extremely short or long events can be very time consuming and expensive, even impossible.

Besides these limitations, the observation method has various advantages over other data collection instruments. Its main advantage is that often observation is the only technique that can be used to collect the needed data (Tull and Hawkins, 1990). Particularly when respondents are unable (for example babies or animals) or unwilling to provide accurate data (for example criminals). Another advantage of this method is

that it is also less prone to bias, since observable manifestations can be recorded more objectively (Kinnear and Taylor, 1991). That is why the observation technique is often used and particularly valuable in information systems research (see for example: Straub et al, 1995; Szajna, 1996; Deane and Podd, 1998). However, the recording of observations goes hand in hand with a loss in potentially important background information from the observees' point of view (Chisnall, 1989).

6.2.5.2 Experimentation

The experiment is a method of collecting data that originated in the natural science (Phillips, 1966). It is designed to aid in the development of theories and testing of specific hypothesis by means of consciously manipulating and controlling variables (the independent variables) and measuring its impact or effects on a set of pre-specified variables (the dependent variables). Thus, cause-and-effect relationships are at the heart of experimentation (Phillips, 1966). It calls for a high level of control in selecting matched groups of subjects, selecting and administering the different treatments and controlling for potentially influential extraneous variables. If these requirements can be met sufficiently, the main advantage of this data collection method lies in its accuracy. However, experimentation in the field of social science is problematic. As Chisnall notes, the ideal testing environment of experimentation, the lab, is the very antithesis of the conditions which are experienced in the complexities of the commercial world (Chisnall, 1989). Its Achilles' heel lies in the difficulty of replicating human behaviour of interest, taking place in continuums of time and space, in a remote laboratory setting altering these continuums.

6.2.5.3 The Survey

Although the term survey has been used widely in the literature, its exact definition is not clear and varies by usage (Hartman and Hedblom, 1979). For the purpose of this chapter, survey is viewed as the systematic collection of data directly from a population (a sample or a census), utilising a standardised set of instruments (not questions!) other than observation or experimentation (for a similar view see Tull and Hawkins, 1990).

Four main data collection instruments in survey research can be identified (Crimp, 1990; Tull and Hawkins, 1990; Aaker et al, 1998):

- personal surveys,
- mail surveys,

- telephone surveys and
- computer surveys.

The Personal Survey

As a direct survey method, as opposed to the other three indirect methods, face-to-face interviews offer the advantage of interaction between interviewer and interviewee. Although this very interaction can lead to response bias (Kinnear and Taylor, 1991), direct interaction offers the advantages of opening up the opportunity for the interviewer to probe responses, explain questions and explore new dimensions. However, to properly unlock this methodological potential requires considerable skills of the interviewer (Crimp, 1990; Chisnall, 1997) and the overall process of conducting face-to-face interviews (locating respondents, visiting respondents, interviewing respondents) is labour intensive and time consuming (Crimp, 1990).

Personal surveys can be further sub-categorised into structured, unstructured and depth interviews (Hart, 1987).

Structured Interviews

Structured interviews, as the name implies, follow a pre-specified structure and standardised questions are asked, thereby increasing data comparability across interviews and interviewers (Nachmias and Nachmias, 1976), but at the same time decreasing the richness of the data collected (Hart, 1987). According to Hart (1987) this type of interview is based on the following three assumptions. First, the respondents have a common vocabulary so that it is possible to pre-formulate questions that will have the same meaning to all respondents. Second, it is possible to phrase questions in a form that is meaningful to all respondents. Third, the sequence of the questions has to be identical, because preceding questions form the context of the proceeding questions.

Unstructured Interviews

In unstructured interviews most of the questions are open, designed to encourage the interviewee to freely elaborate on each question in a non-prespecified way. While decreasing comparability across subjects due to its lack of rigidity in structure, its flexibility allows the collection of richer data, allowing for a fuller understanding of the respondents' views relating to a phenomenon of interest, rather than superimposing the view of the researcher. However, this advantage naturally increases the potential problem of interviewer bias, since the scope for interpretation increases (Hart, 1987).

Similar to the structured interviews, unstructured interviews are based on important assumptions as well. Hart (1987) identifies four main assumptions. First, it takes place with knowledgeable respondents. Second, it refers to situations that have been analysed prior to the interview. Third, it proceeds on the basis of an interview guide specifying topics related to the research objectives. Fourth, it is focused on the subjective experiences of the interviewee regarding the phenomena of interest.

Depth Interviews

The third category of face-to-face interviews is the so-called depth interview. In this type of interview interviewees are encouraged to freely talk about a rather broad subject of interest to the researcher. No pre-specified structure or set of questions is employed. Depth interviews are thus more unstructured than the unstructured form of interviews, with the researcher's role being confined to clarifying and probing (Hart, 1987). Its advantages and disadvantages can be best described as an amplification of the advantages and disadvantages of the unstructured interview form. Originally, this type of interview was intended to get at inner feelings or basis dynamics of people's personalities (Hartman and Hedblom, 1979).

The Mail Survey

Mail surveys are a very popular data collection technique (Cavusgil and Elvey-Kirk, 1998). Some of its key advantages are: wide distribution, less distribution bias, central control, no interviewer bias, time and cost savings, as well as little or no requirements for trained interviewers (Hart, 1987; Kinnear and Taylor, 1991)

As a self-administered tool, respondents need to fill out the questionnaire without personal guidance and help from the researcher. While this eliminates interviewer bias as stated above, it increases the likelihood of misinterpretations. Thus, the nature, type and language (terminology) of the questions, as well as its sequence, need to be considered carefully since there are no opportunities for ex post clarifications (Hart, 1987). The main problem of this form of data collection is non-response and/ or response error (Kinnear and Taylor, 1991; Delener, 1995; Chisnall, 1997). The importance of this problem becomes apparent when considering the observation of generally low response rates in organisational mail surveys (Tomaskovic-Devey et al, 1994). However, the literature suggests ways to pre-test questionnaires (Reynolds et al, 1993) and ways to increase response rates (see for example: Hansen et al, 1983; Brown, 1987; Yammarino et al, 1991; Jobber and O'Reilly, 1998) potentially reducing these disadvantages.

The Telephone Survey

As an indirect, technology-mediated interview technique, the telephone survey reduces the advantages of social interaction (but it also reduces the potential disadvantages of it!) in personal interviews, particularly between unfamiliar parties (see also the channel expansion theory as mentioned in chapter 4). Other main disadvantages include (Hart, 1987) the inappropriateness of long and complex questionnaires and the use of scaled questions, as well as the inability to use visual elements. Its main advantage compared to direct interviews is that it is less costly and time consuming. It is often used as a pre-notification technique only, with the subsequent use of another research instrument (see for example: Mitchell and Nugent, 1991).

The Computer Survey

Although the supportive use of computers for interviewing is no longer new, including CATI (Computer-Assisted Telephone Interviewing) systems or inviting (pre-selecting or self-selecting; Tull and Hawkins, 1990) participants to locations with a computer terminal (Crimp, 1990; Tull and Hawkins, 1990), it was usually argued that due to logistical and other cost factors computer surveys are of limited use (Crimp, 1990). However, as chapter 4 indirectly showed, these limitations become more and more irrelevant as the diffusion of information technology continues to increase. This overall increase in diffusion levels paired with the increasing levels of networked computers (see chapter 4) led to the emergency of a new kind of computer interviewing technique. A technique that no longer necessitates inviting respondents at some place, to go to another, in order to answer questions displayed on a computer screen. In the absence of a better term one might call these "marketspace-based surveys". Two sub-classes can be identified. E-mail based surveys (see for example Schaefer and Dillman, 1998) and world-wide-web-based surveys (see for example Stanton, 1998). While the same methodological advantages and disadvantages of indirect questioning also apply to this specific form, additional advantages and disadvantages apply. The main advantage of any of the two sub-forms over any other of the discussed methods is speed and cost (Mehta and Sivadas, 1995; Schaefer and Dillman, 1998). Obviously its main disadvantage is that it can only reach individuals or firms that have e-mail or access to the world-wide-web, thereby constituting a potential pro-innovation bias (Rogers, 1995). This effect can be particularly problematic if the effects of this new medium are of interest in the study, since non-adopters cannot be reached and "low-level" adopters are less likely to respond. Although the literature assessing the quality of such data collection techniques compared to traditional means like postal questionnaires is still in

its infancy, the current state of knowledge suggests that marketspace-based data collection methods produce similar results to traditional methods (Mehta and Sivadas, 1995; Stanton, 1998), unless the study of interest focuses on computer related issues (Finegan and Allen, 1994; Shaw and Davis, 1996).

6.2.6 Adopted Research Design, Its Phases and Its Instruments

From the above brief review it becomes apparent that no apriori perfect methodology exists. Each design, each type of data and each instrument has its advantages as well as its disadvantages. However, when considering the stated research aims and objectives (see chapter 5) from the "contingency view" of research approaches (Klein et al, 1991), it becomes clear that a combination rather than a single design is needed.

In order to fully address the research objectives, this study's inquiry, albeit its rather exploratory rather than confirmatory nature, has to be at once exploratory, descriptive and explanatory and it is in need of both qualitative and quantitative data. Thus, following the suggestions by various authors (see for example: Churchill, 1987; Baker, 1991; Chisnall, 1997; Aaker et al, 1998 and more specifically Kaplan and Duchon, 1988; Gable, 1994; Leonidou, 1998) advocating a combination of methodologies to enhance research output, a multi-stage, pluralistic research design was developed to address the research objectives. Such a combination should not only help in addressing the research issues at hand, but it should also lead to higher levels of validity, reliability and generalisability compared to a singular, one-stage design. This is particularly important for the research task at hand, since it is usually argued that the organisational adoption and implementation of new information technology (and its subsequent organisational impacts), follows a rather emergent than deterministic route (Markus and Robey, 1988). The exploratory nature of the study further supports such a procedure.

A multi-method approach, with qualitative stages exploring, describing and explaining quantitative findings in more detail and depth, was suggested recently as particularly fruitful in STBF research (Cooper, 2000). Other authors in the field have applied similar designs successfully (see for example: Berry, 1993; Sieber, 1996; Poon and Swatman, 1997; Poon and Swatman, 1998; Webb and Sayer, 1998), giving further support for the appropriateness of the selected research design.

From a time frame perspective – although the research objectives lend themselves perfectly to a longitudinal study – this study will follow the cross-sectional tradition of

research on the internationalisation of the firm taking the time limits of a PhD into consideration. Nevertheless, the more exploratory and qualitative stages of the overall research, as well as some parts of the survey will address the time dimension indirectly by asking respondents about various time dimensions.

Thus, this study will follow a single period design and its purpose is to both discover (via the literature review and the exploratory phases) and explore associations and correlations between variables (via the descriptive and explanatory phases) pertinent to the stated research objectives (see table 6.1).

Table 6.1: A Typology of Research Strategies

Purpose	**Time Frame**	
	Single Period	*Multiple Period*
Discovery	Observe current state (generate ideas for factor theories)	Observe on-going processes (generate ideas for process theories)
Testing	Test static associations (correlation analyses)	Test dynamic changes (cause and effect)

Source: Franz and Robey, 1987.

From a data collection point of view it was decided to both utilise the observation technique and the survey technique. Taking the nature of the study into consideration, experimentation was not deemed to be appropriate, following Chisnall's notion stated above.

The observation technique was chosen because of its objectivity in assessing behavioural manifestations and because one aspect of the empirical investigation, the information push aspect of organisational Internet use in the form of corporate home pages (see research aim 5 in chapter 5), fulfils the necessary requirement for this technique as discussed above. Using observation in addition to the survey technique also increases the validity of the findings derived from the survey, as it allows to assess instrument validity across methods (Campbell and Fiske, 1959).

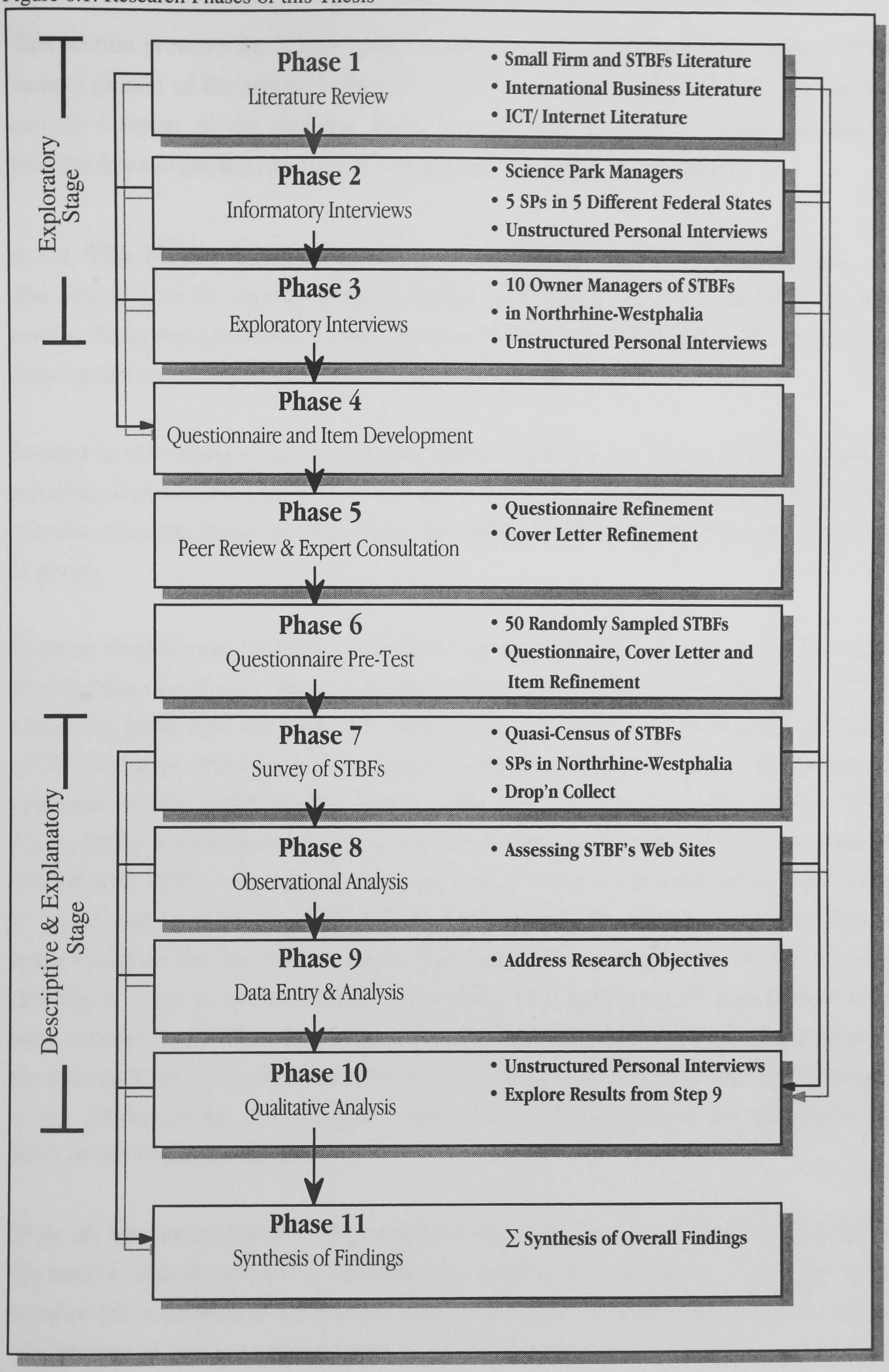
As discussed above, the survey offers a variety of specific data collection techniques. For the more exploratory and qualitative phases of the research design the personal interview data collection technique was considered to be the most appropriate technique due to its advantages in gathering rich data and allowing for social interaction (see discussion above). Due to the overall exploratory rather than confirmatory nature of this study, an unstructured approach, with mostly open questions, was considered the

most applicable and feasible (see questionnaire design below). In-depth interviews were not considered since the existing literature already suggested several potential research dimensions for exploration purposes. For the more descriptive and explanatory phases of the research design, the mail survey was chosen. Due to its discussed advantages in cost and coverage, this should allow for an assessment of a bigger sample of firms compared to the more qualitative phases. A possible computer (Internet) survey was not used in order to avoid a pro-innovation bias and a response bias due to this study's focus on computer-related issues. As reported above, computer surveys were found to be biased when it comes to studies focusing on themes related to computers (Finegan and Allen, 1994; Shaw and Davis, 1996).

Findings from previous phases in the research design were incorporated into subsequent phases. Figure 6.1 illustrates the overall research design and its stages.

The following sections will describe each step in more detail, including the findings from the exploratory research stages. This section will focus on presenting how the variables of interest were operationalised and how the adopted research instruments were actually implemented.

Figure 6.1: Research Phases of this Thesis



Source: The author.

6.3 Operationalisation, Exploratory Insights and Implementation

This section presents the actual operationalisation and implementation process of the various phases of the adopted research design as discussed above. This section will include a report of the findings from the exploratory research stage, because its findings have impacted parts of the research design and its instruments.

6.3.1 The STBF: Chosen Country, Population and Sampling Design

The first step in the overall research design (see figure 6.1), the literature review, involved reviewing and synthesising theories and empirical findings in the three related areas pertinent to this study. Chapter 2 defined the population of STBFs.

In order to investigate systematically the stated research aims among STBFs, a proper sampling frame is required. However, before specifying the used sample frame and the specific sampling design for this study, the rational for the chosen country, Germany, is given.

From an international business perspective Germany was chosen, because few studies investigating Germany exist in general (Cox and Vetter, 1998; Bennett, 1998; Leonidou, 1998; Zou and Stan, 1998) and, more specifically, the previously published STBFs literature either focused on small countries (Lindqvist, 1991), disadvantaged countries (Fontes and Coombs, 1997) or English speaking countries (Berry, 1998; Jones, 1998). Furthermore, Germany can be viewed as a "middle of the road country" (Dichtl et al, 1990), where small firms are not as domestically oriented as small firms in bigger countries like the USA and not as internationally oriented as small firms in small countries like the Nordic states. This "neutrality" is supportive for the focus of this thesis, since its overall internal focus at the firm and technical entrepreneur level does not allow controlling for all the potentially important environmental dimensions at the country level. Thus, it is expected that the internationalisation of firms in Germany is less influenced by, for example, country size characteristics as is the case in the USA or the Nordic countries.

From an Internet perspective, the comparatively high number of Internet adopters in Germany is another reason for choosing this country (see chapter 4). Since this thesis is interested in impacts of the Internet rather than adoption versus non-adoption aspects (see chapter 5), this is a crucial aspect. Low diffusion levels would at least question the applicability of the quantitative survey phase.

Moreover, as Bennett (1998) could show, Internet use exhibits cultural differences. Thus, an investigation within Germany could enhance the validity of our view on how the Internet impacts organisations, since most other studies reviewed in chapter 4 focus on the USA, UK or Asia.

An additional reason for choosing Germany is that the researcher is German, which should facilitate the data collection process and the communication with the population.

The Population and the Sampling Frame

Although STBFs have been defined differently and although no generally accepted definition has yet emerged (see chapter 2), with regards to their identification usually only two methods are applied: using SIC codes considered to be R&D intensive (see for example: Butchart, 1987) or using the population of small firms located in science parks as a sampling frame due to their high propensity of being R&D intensive (Cooper, 2000). Both approaches have been used successfully for PhD projects in the past (Berry, 1993; Jones, 1998).

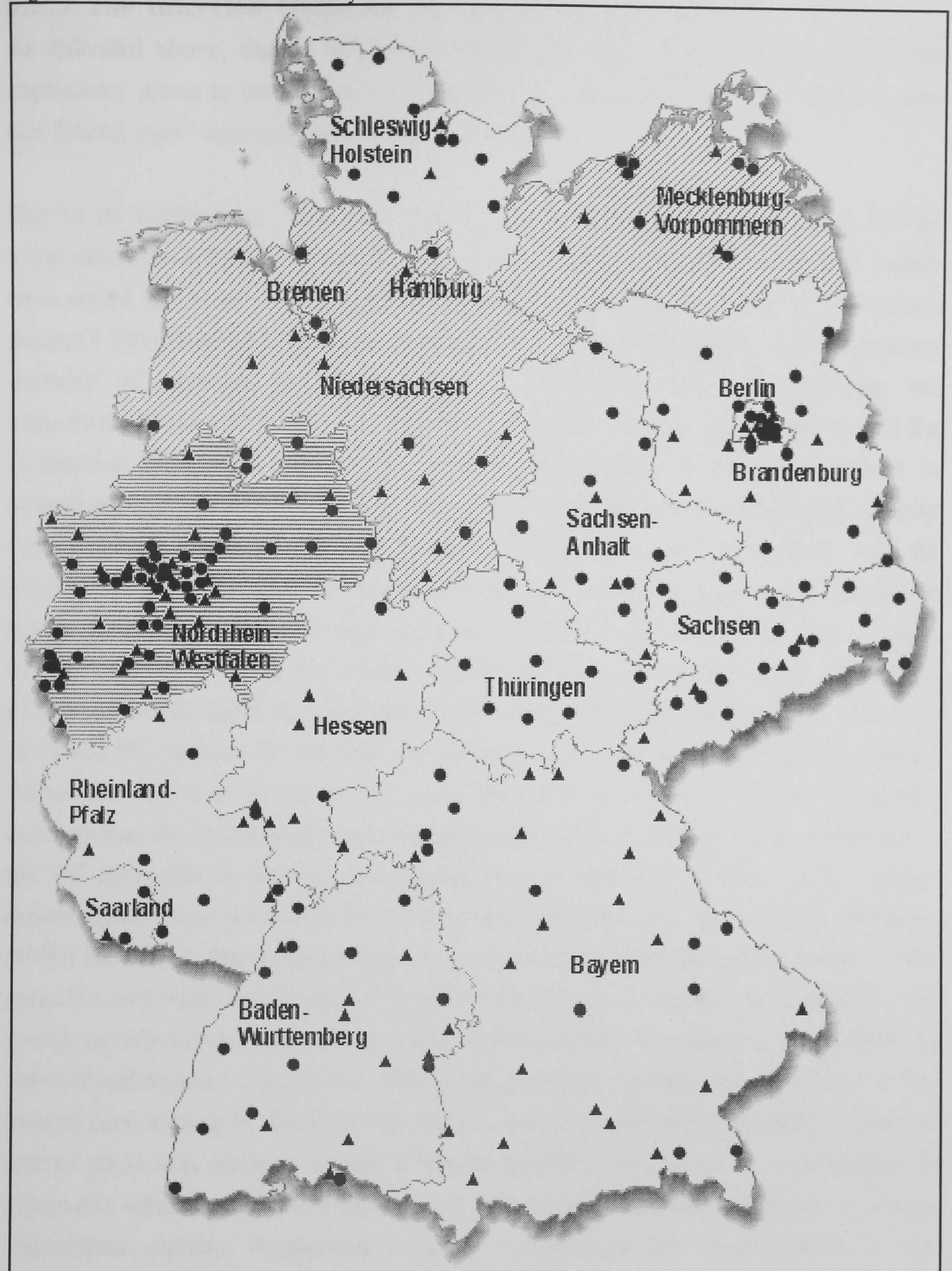
This thesis follows the science park approach. The rationale for this is twofold. The first reason is that it is assumed that the typical infrastructure support for firms in science parks (Sternberg, 1990; Baranowski and Raetz, 1998) lowers the Internet adoption barriers for these firms. While constituting a bias for a pure adopter versus non-adopter study, this bias is advantageous for an impact study like this one, as it potentially increases the population of adopters and their diversity (different use levels). However, due to the fact that the available published literature at that time did not explicitly state whether science parks in Germany support Internet adoption, the exploratory phase of this thesis was extended to include informatory interviews with science park managers in 5 different federal states (see figure 6.1, phase 2). The goal of these interviews was to explore the validity of this assumption, as well as the assumption derived from previous research that the majority of firms in science parks are congruent with the STBF definition (see sections 6.3.2 and 6.3.3 below). The second main reason relates to data availability and accessibility. It emerged during the informatory interviews (see below for more details) that data about STBFs located in science parks is available at no cost. A key advantage over using the SIC approach, for example purchasing firm data from database vendors, which would have been costly. Despite its advantages it should however be noted that this approach is not without problems. The main problem relates to the fact that the actual number of internationally active STBFs congruent with this study's definition is not known ex ante. Therefore

"response waste" is considered to be high. The SIC approach, which would allow for a pre-specification of the needed parameter international activity, would however have faced a similar problem. This is so, because at the time no database was available that reports of small firms' use of the Internet. Taking these factors into consideration, the science park approach was deemed to be the more appropriate sampling design.

Due to this thesis' pluralistic research design, it was further decided to focus on one federal state in Germany. The main reasons for this are costs and the findings of the exploratory research stages reported below. Since in phase 10 a results-dependent sample of STBFs is personally interviewed in order to explore findings from phases 7 and 8 (see figure 6.1), these firms are not known ex ante. Their location could be anywhere in Germany, thereby significantly increasing travel time and costs. Thus, one federal state was chosen. The chosen federal state is Northrhine-Westphalia (see figure 6.2). The main reason is that most science parks are located in this federal state (see figure 6.2). In addition, this region is considered to be one of the top ten high-tech regions in Europe (EUROSTAT, 1998). However, in order to avoid a potential selection bias, the informatory interviews with science park managers (see research phase 2 in figure 6.1) were conducted with science park managers from different federal states. The goal was to explore the generalisability of the "one federal state"-approach.

For the actual sampling frame the database of the ADT (Arbeitsgemeinschaft Deutscher Technologie- und Gründerzentren [Association of German Technology and Start-Up Centres]), the so-called "blue book", was used. It lists all firms within the existing science parks in Germany (Baranowski and Groß, 1994; Baranowski and Raetz, 1998). The "blue book" entries were updated by using the Internet-version of this database (http://www.tznrw.de).

Figure 6.2: Science Parks in Germany



▲ = non-ADT centres, ● = ADT member centres; ▨ federal states where the informatory interviews were conducted, ▤ federal state where the informatory and exploratory interviews, the survey and the post-survey interviews were conducted.
Source: The author, adopted from Baranowski and Raetz, 1998.

6.3.2 The Interview Guide for the Informatory Interviews

As indicated above, due to the limited knowledge at the time, an extension of the exploratory phase to incorporate an exploration of the feasibility of the "science park/ one federal state"-approach was considered fruitful.

Due to its exploratory, qualitative nature, the developed interview guide for the unstructured face-to-face interviews with science park managers encompassed mainly open-ended questions (see appendix 6.1). The actual guide consists of 6 sections. Section I was designed to elicit background details of the respondent, with the primary intention of ensuring his "expert status". Section II relates to exploring the infrastructure support of innovation centres. The goal of this section was to test the assumption made above regarding potential Internet support for firms located in science parks, as well as the potential idiosyncrasies of individual science park support (see question 2, section II). Section III relates to the actual nature of the firms, with the goal of assessing whether the majority of the population of small firms located in science parks are in line with the population of STBFs as defined in this thesis. Again, in order to assess whether the nature of firms differs across science parks, question 2 of this section addresses the potential idiosyncrasies of science parks. In an extension to section III, section IV assesses the policy of the science parks regarding eligible firms. The idea was to control for a potential bias in "selection policy", potentially confounding the representativeness and generalisability of this approach compared to the SIC approach. In addition, this section tries to explore the science parks' policy regarding the allowed duration for firms to stay inside the park. Research by Sternberg (1990) has shown that a limited stay is characteristic of German science parks. If this period is very short, for example 2-3 years only, STBFs in science parks might be too young, mostly still in their start-up phase and on average less likely to be involved in international business operations. This could potentially threaten the feasibility of the science park approach. Additionally, since at that time data access to firms located in science parks was unclear, section V tried to possibly gain access to or references to potentially valuable sources of information and support regarding the study by asking respondents directly. Furthermore, section V addressed the actual interest in and perception of the overall study and methodology by the respondents. The main purpose for this was to gain an insight into the feasibility and practicability of the study. Particularly since the literature suggests that the population's interest in a research topic can significantly impact response rates (Martin, 1994; Delener, 1995; Diamantopolous and Schlegelmilch, 1996; Greer et al, 2000). The last section, section

VI, was included to capture any potentially important observations or reflections prior to, during and after the interview.

Finally, it should be noted that at the time the informatory interviews were conducted, the specifics of this thesis were not yet precisely defined. The interviews did therefore cover some areas that are not reflected in the research framework that was developed after the informatory interviews were conducted. Only the findings that relate to the present research framework are reported below.

6.3.3 Informatory Interviews with Science Park Managers: Findings

Five taped, face-to-face interviews were conducted in Germany (end of May, 1998) in 5 different federal states (see figure 6.2). In 2 city-states: Hamburg and Bremen, one federal state in the East: Mecklenburg-Vorpommern (Schwerin), one in Lower Saxony (Osnabrück) and one in Northrhine-Westphalia (Münster). Confidentiality was ensured by supplying the respondents with a written non-disclosure agreement, signed by the researcher prior to the start of the interview. Due to financial limitations regarding travel expenses, the selected federal states were neighbouring states in the northwest of Germany. The science parks in the selected federal states were selected randomly, but in Northrhine-Westphalia where the hometown of the researcher was chosen to reduce travel costs. The science park in Bremen was the only centre refusing to give an interview, thus, the science park in Bremerhafen, in the same federal state, was selected instead.

Four out of the five interviews were conducted with managers of the selected science park, one interview was conducted with an owner manager of a firm located in a science park (Münster, Northrhine-Westphalia), supporting science parks in Germany regarding Internet usage and Internet-based science park promotions. The actual science park manager was unavailable at the time and suggested this owner manager due to his involvement in an Internet database project at the federal state level. Overall, the information given relates to 246 firms located in these science parks.

Findings: Science Park Infrastructure

All five interviewees stated an in-house Internet-provider as the main source of technical support regarding Internet use for firms located inside the science park. Two interviewees regarded this type of support as idiosyncratic (Schwerin, Hamburg), while three interviewees (Bremen, Osnabrück, Münster) regarded it as typical for all science parks in Germany. However, as interviewees elaborated on their statement on

why they regard the support as either idiosyncratic or typical, it became apparent that the support structure as such is actually typical, while the actual content and extent of the support is idiosyncratic.

Findings: Nature of Firms

With regard to the industry and technology sectors the firms in the science parks are operating in, typical technology intensive sectors and services were stated (see appendix 6.2).

Not surprisingly, regarding the overall nature of the firms, all interviewees also stated technology-based firms and service firms. All respondents but one (Osnabrück) also stated subsidiaries of bigger firms. However, subsidiaries were regarded as an exception for firms located in the interviewed parks. All interviewees considered the constellation of firms in their centre to be idiosyncratic, while the overall nature of firms was regarded as typical across all parks.

Regarding the firm age, the stated age ranged from 0 (born inside the science park) to 14 years. However, the majority of firms is supposed to be less than five years old. An explicit age limit of five years was noted for Northrhine-Westphalia. Still, the respective interviewee also hinted at the rather theoretical nature of this age limit. Firms usually stay longer due to various economic factors that the science parks face. However, due to space limitations within the typical science park, firms usually leave the premises as they grow beyond the confines of the park. The resulting firm fluctuation within the science park was estimated to be around 20% per year.

Regarding the firm size, the following size ranges (by number of employees) were stated by the interviewees:

- 1–40 employees (Schwerin), with an emphasis on firms with 1-15 employees; only 3 firms with 30-40 employees,
- 1–40 employees (Hamburg),
- 1–20 employees (Osnabrück),
- 1–25 employees (Bremen), number of employees differ temporarily (20-25), depending on project engagement by the firms,
- 1–50 employees (Münster), whereas the average for all centres is between 5-8 employees

The spatial nature of the markets (local, regional, national or international) served by the firms was stated to be normally interregional and national (Schwerin, Hamburg, Bremen, Münster), with few firms exhibiting purely local orientations (Bremen) and some firms starting international (Hamburg). Regarding the timing and direction of internationalisation, most interviewees stated a national start (Schwerin, Osnabrück, Hamburg) or a European start (Osnabrück) as the norm. The US and Asia were regarded as the "second stage" target markets by one respondent (Schwerin). Eastern Europe was explicitly excluded by one interviewee (Schwerin) due to a high degree of country risk.

Findings: Policy of the Innovation Centre

Regarding the selection criteria for "eligible" types of firms, the following answers were given by the respondents:

- a good idea (Schwerin), not necessarily technology-based, if internal science park synergies can be achieved (for example a financial controller for the other firms in the centre),
- a technology base in the products and/ or process and/or synergies with the centre (Bremen, Osnabrück),
- high-tech firms in innovative areas (production and R&D) (Münster, Hamburg), including services and knowledge-based firms (Münster, Osnabrück, Bremen),
- only independent firms (Osnabrück),
- university spin-offs (Münster).

Overall, no specific decision rule, for example a minimum level of R&D intensity, or definition of terms like "high-tech" or "innovative" was given by any of the respondents.

The science parks' policy with regards to the "allowed" length of staying inside a park differed slightly, despite the age similarity of firms noted above. The manager in Schwerin noted for example that after 4 years a firm's development potential will be reviewed and a marketable product has to exist. If positive, a firm can stay longer. An unlimited stay was noted by one respondent (Hamburg) and a flexible solution was stated by another (Bremen). The respondent for Lower Saxony (Osnabrück) stated a

maximum period for subsidised office space of 5 years. Firms can however stay longer if they wish to.

Comments and Suggestions by Interviewees

Overall all respondents regarded the research project as interesting and the findings of value to them, as well as the firms themselves. The responses regarding the use of a web-based questionnaire for the survey stage of the project (note that at that time no decision was yet made regarding the delivery system of the survey) were very mixed. Respondents could not assess the value of such a tool.

When prompted for response rates among the population, a uniform pattern emerged. "*Nobody ... has time.*" (Schwerin), "*The firms do not like to answer.*" (Hamburg), "*...difficult...*" (Bremen) are some of the typical statements. A further investigation on the possible additional response effects of the survey's potentially unknown source (University of Strathclyde) provided only mixed responses. While some regarded it as advantageous (Osnabrück), maybe supportive (Schwerin) or neutral (Hamburg, Bremen), one respondent viewed it as disadvantageous (Münster).

6.3.4 Implications for Subsequent Research Stages

The interviews uncovered that firms in science parks are not all in line with the definition of a STBF. Furthermore, the STBFs in science parks are not representative of the whole population of STBFs in Germany. This is mainly due to the infrastructure support, the pre-selection by the science parks' management, the age (firms are very young) and the size (firms are very small). On the positive side, however, this increases the chances of a higher share of firms born with Internet experience prior to their internationalisation. In such cases, the Internet's formative impact on the internationalisation might be more fruitful in order to assess the nature and magnitude of potential impact dimensions. Additionally, overall Internet diffusion levels, as noted by the interviewees, seem to be at a level that can be considered feasible for the purpose of the study. Particularly taking into consideration that all respondents stated an in-house Internet provider. Explorations at the firm level are however needed before deciding on whether to follow the science park approach, particularly with regards to international activities. The responses given by the science park managers did not indicate high shares of internationally active STBFs.

In addition, support for the "one federal state only"-approach was obtained. There were no apparent major differences between the federal states and the respondents

mostly viewed their science park characteristics as rather typical for science parks in Germany.

A list of relevant contacts and studies (for example: Baranowski and Raetz, 1998; Technologiezentren im Land Nordrhein-Westfalen e.V. (ed.), 1996) could also be obtained. Particularly access to an up-to-date science park database via the Internet could be obtained. This point is probably one of the most important achievements of the interviews. It implies that access to needed data relating to a later stage in the research is secured, if support for the feasibility of the science park approach is established after the exploratory interviews at the firm level (see the following section).

Although no usable feedback could be obtained regarding the usefulness of a web-based questionnaire, the positive feedback regarding the project as such was reassuring. The potentially low response rates of STBFs in science parks might however be very problematic. This implies that alternative means of conducting the survey should be considered. The impact of University of Strathclyde as sender in the questionnaire was perceived both as positive and negative, as well as neutral, implying that seeking a co-operation with a known German University might be helpful, but it is not a crucial response determinant.

6.3.5 The Interview Guide for the Exploratory Interviews

Due to the limited amount of knowledge addressing the specifics of this study and in order to clarify some of the concerns that emerged from the informatory interviews, exploratory, unstructured face-to-face interviews were conducted with owner managers of STBFs following the interviews with science park managers.

Like the informatory interviews in phase 2, these interviews were exploratory in nature. In contrast to the informatory interviews, which were more concerned with exploring the feasibility of the selected sample frame, phase 3 focused on explorations at the firm and technical entrepreneur level.

The goal of the exploratory interviews was five-fold.

First, to assess whether the randomly selected firms are congruent with the used definition of STBFs (see appendix 6.3, interview guide page 1, section I).

Second, to get an understanding of the role of internationalisation processes within STBFs and to understand the importance and manifestations of various internationalisation dimensions (see appendix 6.3, interview guide page 1, section II).

The third goal was to gain an understanding of the different facets of Internet use within STBFs. This was addressed by exploring use dimensions and diffusion indicators (to be discussed further below in section 6.3.8.4) in order to test their face validity and measurement practicality. This goal also includes uncovering potential use dimensions or sub-dimensions not thought of prior to the interviews (see appendix 6.3, interview guide page 2).

The fourth goal was to explore the Internet's potential impact on the internationalisation of STBFs, building upon the insights from the literature review (see appendix 6.3, interview guide page 3).

The fifth and final goal of the exploratory interviews was to investigate the STBF's interest in participating in the questionnaire pre-test, their preference regarding the format of the questionnaire (at that time it was still not finally decided whether to use more than one survey format or not), their interest in the overall study and the potential response impact of "University of Strathclyde" as sender. Aspects considered important for the next phase of the research project, the survey phase.

6.3.6 Exploratory Interviews with Technical Entrepreneurs of STBFs: Findings

Eight taped face-to-face interviews, one untaped face-to-face interview and one telephone interview with owner managers of STBFs were conducted (in January, 1999) in the federal state of Northrhine-Westphalia, reflecting the previously made decision to focus on this federal state. Confidentiality was ensured by supplying the respondents with a written non-disclosure agreement, signed by the researcher, prior to the start of the interview (with the exception of the telephone interview). Due to financial limitations regarding travel expenses, the selected technology centres of the STBFs were located near the home of the researcher. Using the ADT's (the Association of German Technology Centres) "blue book" (Baranowski and Raetz, 1998), listing all firms in science parks and the Internet equivalent (http://www.tznrw.de), 4 science parks were selected randomly. Within these 4 science parks, firms undertaking R&D and either owning a website or an e-mail address – as an indication of Internet use – were randomly selected. It should however

be noted that not all firms are completely qualified in the database, that is not all database entries state whether a firm has e-mail or a home page and whether they conduct R&D. But for this exploratory stage, it was deemed appropriate and not considered to be a major bias. Also, no data was available on whether they operate internationally. This process yielded 23 firms. Taking the definition of a STBF into consideration, 9 firms were excluded. One firm moved (no longer in the science park), two firms were not independent (subsidiaries), three firms were a branch of a University, one firm was a non-profit organisation and two firms had over 100 employees. Of the remaining 14 firms, 4 firms rejected to participate. The remaining 10 firms were interviewed. Due to timing difficulties and appointment changes, one interview was conducted over the phone. One of the nine face-to-face interviews was not taped, because of the interviewee's disapproval.

Findings: Organisational Characteristics

Appendix 6.4 shows the organisational characteristics of the interviewed STBFs. As expected against the background of the findings of the informatory interviews, the interviewed firms can be best characterised as young, small, service and research intensive firms.

Findings: Role and Nature of the Internationalisation Process

Most technical entrepreneurs (TE) noted that international business (IB) is important and the majority (7 cases) foresees an increase in IB in the near future. Only one TE noted a decrease in IB. This was due to a more nationally focused product offering introduced recently, following the use of pre-state (incubator) international contacts for comparatively high levels of international business at or shortly after inception. Regardless of the overall importance, organisational manifestations (measured as export share of turnover) were on average comparatively low. Four firms stated 0%, 1 firm 2%, 2 firms 10%, 2 firms 15% (one of them 30% previously, see above) and 1 firms (the largest) 70-80%.

The main reason stated for the on average low international business intensity levels related to the resource poverty of STBFs (for example financial resources and human resources), capacity limits and the stage of the product development, supporting the findings of the literature review (see chapter 2). TEs noted that first they need to establish a self-sustainable resource-base and a competence to compete. The main reason for considering international business as important clearly related to the notion that high-tech is a global issue, not a local issue. Only one firm (in the engineering

sector) noted that the strong home base of the German market ("... *the engineering industry is a German industry...*") explained its early focus on its home base rather than abroad. Nevertheless this firm also regarded international business as important for its future.

Most STBFs internationalised indirectly via partners (exporting to distributors abroad) or exhibited emerging, not planned and proxy internationalisation pattern (their national customers are large MNEs with international networks). Only two firms mentioned FDI. One of them is about to invest in an international joint venture (co-op FDI) and the other is about to establish a sales subsidiary in the US. Licensing was only used in the software firms. The IB activities take place mainly in the triad, mostly Europe. The major motive that was stated for conducting IB and its future importance related to market seeking and growth related motives. The home market niche was considered to be too small. However, it should be noted that one firm explicitly stated that they currently do not pursue growth and have low expansion plans due to resource constraints. Besides market seeking motives, resource-seeking motives (technical expertise), although not as often and mostly informal, also emerged. The two motives often blurred. One firm also mentioned that a low home market receptivity of its products drove it to consider IB. Related to the mentioned proxy internationalisation pattern, customer following also emerged as an IB motive. Overall, support for the findings of the literature review (see chapter 3) was found.

Besides the above mentioned outward IB pattern, inward and co-op pattern did emerge as well, albeit at a relatively low level, with inward pattern mainly relating to importing and co-op pattern relating to project co-operations and contract R&D. One firm mentioned internationalisation reciprocity, with the local firm distributing products of a foreign firm and the foreign firm distributing products of the local firm. But one important and surprising finding emerged: the inward pattern caused quite some confusion among the TEs! They considered it to be a standard business procedure, independent of their other international business operations (for example indirectly importing components like computer chips from Asia). Assessing inward pattern with the two software firms was even more difficult. For example: "*If you buy a license for a software development tool from an American software firm via a local retailer with an international call centre support, is that inward internationalisation?*" was one of the replies. Overall, inward internationalisation was not really viewed as part of their internationalisation process.

Overall, firms regarded their internationalisation behaviour as typical for their industry. Being aware of what happens in their technological field on a global scale was of importance for all firms. However, how they actually addressed international business and how it manifested itself differed.

Findings: Internet Use

All firms stated a daily Internet use. Identifying a usage percentage per use dimensions as defined in chapter 4 was hardly possible. All firms used the Internet for information search (info pull). Besides market, product, technology and competitor related information, the specific search for patent information was stated several times. Passive information pull (subscription to listservs) was mentioned by three firms and active info push in the form of participating in newsgroups or listservs was mentioned by two firms. None of the firms set up their own listserv or newsgroup. Ftp data exchange (interaction/ info pull) was explicitly mentioned by four firms and two firms had an intranet. None of the firms had an extranet. Info push in the form of a web page emerged as a much more recent phenomenon, between three months to 1.5 years after Internet access. However, only one firm was without a web page. Only one firm mentioned e-commerce. This firm has actually set up an on-line shop for its products. Overall, Internet use has increased over time in all firms, but for one. This firm noted IT de-investments, that is it installed an intranet and subsequently de-installed it. Since adoption (50% of firms had e-mail and www access since inception), some firms noted that they experimented with the new medium and have gradually evolved from a passive to a more active use.

The level of internal diffusion differed across the respondents ranging from one (one central e-mail address and one central point of Internet access) to 100% (all employees with their own Internet access and email address). The level of internalisation also differed. Three firms used an agency to develop their web presence completely, most firms do not have their own web server, html programming was only conducted by two firms and only three firm developed the web page content themselves. The level of institutionalisation differed slightly. Four firms appointed an employee (full-time or temporarily) to be responsible for Internet related issues. None of the firms mentioned to have an Internet budget (expenses were usually all part of the more general advertising budget). Overall, Internet use was not perceived as something very new. The level of investigation also differed. While firms often mentioned to monitor their web page, monitoring was often infrequent and passive (for example standardised reports from the Internet provider). The level of integration exhibited a controversial

picture. Although every TE stated that they integrate their Internet activities into their marketplace-based activities (for example stating web page URLs in ads, stating email addresses on business cards), when their actual behaviour was examined (for example asking them for their business card), a different picture emerged and only roughly half of the firms integrated their activities. Overall, the software firms exhibited very different Internet usage pattern, basically because they considered the Internet as a foundation of their business or as a crucial part of their product offering (for example remote product services), as opposed to a mere business support tool. Two firms mentioned that they are about to establish a virtual network with partner firms (combining web pages with cross-links) with complementary technology in order to compete with large firms. Media substitution was mentioned by a few firms with an increase of Internet-based communication at the expense of fax, traditional ads and telephone. All TEs were familiar with Internet terminology, which should facilitate the survey investigation.

All firms but one stated that the Internet would become more and more strategically important, regardless of the different use level as observed above. Besides the technical advantages stated above, TEs said that there exists an important image factor in Internet adoption, which is high-tech firms have to be knowledgeable about the Internet and the customers do expect that. One TE, elaborating further on this issue, mentioned a duality of the Internet. Not only are STBF more global due to the Internet, its customers are also more global. Thus, STBFs have to deal with the Internet.

Findings: Internet's Impact on International Business (IB)

Half of the firms explicitly noted that IB related information barriers were reduced due to the Internet, either actively by searching for information or passively by receiving unsolicited inquiries. Only two firms said that they do not see a reduction, it remained at the same level. This firm actually regarded their previous IB contacts and info sources, not Internet-related, as the main reason for this observation. One firm, although comparatively Internet-centric, questioned the content representativeness of the Internet and another firm mentioned difficulties in finding information.

One firm mentioned a more reactive Internet use. Due to their Internet activities they receive much more inquiries then they can handle. Thus, they intend to first react to these inquiries before conducting a proactive search for IB opportunities. Two firms said that it was too early to assess the Internet's impact on IB. A statement that was less due to the newness of Internet use and more due to the little IB activities of these

firms. 3 firms mentioned an increase in unsolicited inquiries. One firm even mentioned an unsolicited co-op offer. Although the majority of inquiries were of a national nature, inquiries from more remote countries were also mentioned (for example Australia, Mexico, Iraq (!), Taiwan).

Surprisingly and in contrary to expectations nearly half of the firms reported an attitudinal impact. The Internet increased their international awareness and changed their thinking with regards to IB, although it did not manifest itself in IB manifestations yet.

With regards to the importance of face-to-face meetings in IB, all TEs said that it was reduced but not completely substituted. Once business partners have met and know each other, subsequent meetings can be significantly reduced and substituted with Internet communication.

Overall STBFs regard the Internet as an IB facilitator, not so much of an enabler, because IB was possible before as well, albeit at higher costs. The firm that regarded the Internet as an IB enabler viewed a facilitating technology and an enabling technology as semantically similar. The firm stating a neutral effect ranked low on both Internet use and IB activities.

Additionals and Comments

All but 1 firm agreed to participate in a pilot unless the questionnaire was too time-consuming (max. 20min to fill it out). Most firms agreed to participate because of this exploratory interview, otherwise they would not participate. They replied that they receive far too many questionnaires. The one firm not willing to participate stated that they would participate only if the research was supported by their science park management.

Most TEs suggested the use of a world-wide-web-based survey, 2 TEs preferred e-mail and 1 TE a postal mail survey.

All TEs regarded the project and the topic as interesting, most TE were interested in the results. All TEs but one – who suggested the additional inclusion of a known German University to be important – regarded the sender (University of Strathclyde) as relatively unimportant, the relevance of the topic of the study was considered more important.

One interesting and unplanned observation also emerged. One firm exhibited a "reverse transition". The TE started off marketing his company and its future products, only to realise that his technological base was far from commercial viability roughly a year later. He then refocused on developing a viable technological base first.

Additional Activities

In addition to the interviews with the owner managers of STBFs, it was also possible to talk to Mr. Baranowski (ADT president; Association of German Technology Centres) and Dr. Rosenfeld (president of technology centres in Northrhine-Westphalia), with the aim of obtaining additional support. Both signalled their interest. Mr. Baranowski suggested focusing the empirical investigation on the federal state of Northrhine-Westphalia (the highest number of firm in science parks) rather than across Germany because of co-ordination issues. These firms can be considered representative of all science park based firms in Germany according to him. He also suggested discussing the details for potential support with Dr. Rosenfeld, who is the president for this federal state. Dr. Rosenfeld was contacted over the phone, but he said he would like to see the questionnaire before deciding on potential support (which was later denied).

6.3.7 Implications for Subsequent Research Stages

Concerning the organisational characteristics of the sampled firms it emerged that all the firms were highly research intensive, supporting the fruitfulness of using the science park approach. However, it also became evident that due the firms' smallness, the used turnover categories need to be more discriminating. In addition, the unexpected observation of a reverse transition of one of the firms questions the planned assessment of the potential role of the transition, indicating that such a deterministic view might not hold. Still, this case might have been a singularity and it was decided to include the transition assessment in the survey stage and wait for the statistical results to decide on the applicability of this view.

With regards to the internationalisation of STBFs the interviews showed that it is a complex process with a variety of internationalisation motives (project-based internationalisation, contract R&D, proxy internationalisation). Especially the inward dimension emerged as equivocal and difficult to assess. Therefore it was decided that inward internationalisation dimensions will be excluded from the survey and an assessment of co-operative IB and outward IB aspects will be assessed only.

A second goal of the interviews was to gain an understanding of the different facets of Internet use within STBFs, testing and exploring use dimensions uncovered during the literature review. The use dimensions found strong support. All firms used the Internet but at very different levels. However an exact use quantification of the various dimensions proved to be impractical. One firm also mentioned an additional use dimension not explicitly thought of at the time: electronic links over the Internet with international business partners (via website links or extranets). A use dimension that needs to be added to the level of use instrument in the survey. The use dimension level of integration needs to be reconsidered due to assessment difficulties and discrepancies at the behavioural level. Also, the level of strategic importance and commitment needs to be reconsidered. All TEs regarded the Internet as strategic and themselves as committed, despite strong differences at the behavioural level. The indicator levels of institutionalisation also exhibited little fit with the sampled firms due to their less formalised structures in general. Overall it became however clear that assessing Internet use on a binary basis (adopter or non-adopter) is not acceptable and that diffusion of innovation related dimensions and Internet use dimensions need to be included. Moreover, due to the high Internet adoption levels it can be concluded that the STBFs in science parks constitute a fruitful population.

The exploration of the Internet's potential impacts on the internationalisation of STBFs, building upon the theoretical elaboration developed in the literature review, revealed that contrary to expectations, the international awareness dimension showed impactedness and thus needs to be considered. A reduction of information related barriers and an increase in unsolicited orders showed mixed results, potentially relating to different use levels and different internationalisation outcome levels. Findings indicate that the need for face-to-face meetings in international business might be reduced. The responses actually gave support for the channel expansion thesis (see chapter 4). Overall, it emerged that the Internet's impact on STBFs' internationalisation needs to be related to the levels of Internet use and that possibly only high use levels lead to the theoretically possible impacts.

The results of investigating the STBF's interest in participating in the questionnaire pre-test, their preference regarding the format of the questionnaire (mail, e-mail or web form), their interest in the overall study (for response purposes) and the potential response impact of "University of Strathclyde" as sender clearly signalled that research fatigue will be *the* major hurdle for the survey stage (see also informatory interviews). Although the general interest in the study should be supportive, the feasibility of a

traditional survey emerged as rather limited, despite format (a postal survey, an e-mail or web-based survey) indifference, with this specific industrial population. Other means should be considered. Again, see the informatory interview implications, "University of Strathclyde" as sender is not a crucial issue, the topic was of greater importance. A co-operation with a German university would thus be helpful, but not an essential element of the next research stage.

6.3.8 The Survey of STBFs

The survey questionnaire development and implementation process that proceeded the informatory and exploratory interviews can be divided into four sub-stages, namely:

1. the initial questionnaire design,
2. the peer review,
3. the pre-test,
4. the implementation of the final questionnaire

6.3.8.1 Initial Questionnaire Design

An initial cover letter and questionnaire was drafted following typical structural guidelines derived from the literature (for more details see section 6.3.8.4.). Where possible, dimensions and variables were operationalised by either drawing on relevant existing theories and their suggested constructs or by referring to applicable existing variables, scales or questions previously used in the relevant literature. Applicable findings from the empirical pre-survey phases (the informatory and exploratory interviews) were incorporated, too. In order to allow for statistical analyses, mainly structured questions with fixed response options were used. However, in the pre-test open items were used for key dimensions with few or no applicable prior instruments, in order to potentially capture additional variables from the population (see below) as suggested by Reynolds et al (1993).

Attitudinal questions used 7-point Likert scales instead of the typical 5-point scales, because it was shown that such procedures could increase the reliability of constructs (Churchill and Peter, 1984). Both numerical labels (for all scale points) and verbal scale points (for mid and both end points) were used to clarify the scale and help respondents to better locate their "right" scale point per item. If applicable and practical, multi-item measures were used to further increase reliability and allow for its assessment (Churchill, 1979; Churchill and Peter, 1984).

At this stage of the questionnaire development process the important factor questionnaire length (Tomaskovic-Devey et al, 1994; Greer et al, 2000) was not considered. The subsequent stages were seen as purification steps that will lead to a reduction of potential redundancies and a "weeding out" of less feasible measures based on expert feedback. Thus, the initial questionnaire was quite long with 15 A4-pages, plus one page for the cover letter.

For more details regarding the structure of the cover letter, the questionnaire and the specific operationalisation of key dimensions see section 6.3.8.4 where the final questionnaire is presented and discussed.

6.3.8.2 The Peer Review

At this stage, the questionnaire was subjected to a critical peer review by experienced colleagues in the department, with either expert knowledge in the study's research area or expert knowledge with regards to the population and the research instruments. This peer review followed a sequence of pre-peer review meetings with both supervisors. Overall nine colleagues (Prof. Steven Young, Prof. Mike Saren, Dr. Maureen Berry, Dr. Jim Hamill, Dr. Marian Jones, Dr. Steve Tagg, Dr. John Webb, Mr. Karl Alorbi, Mr. Prathap Oburai) participated in this stage. Comments and feedback from this phase were collected, analysed and then incorporated into the updated and revised version of the questionnaire.

The updated questionnaire and cover letter was then translated into German, back-translated into English and then re-translated by the author. A German market research expert for industrial populations (Mr. Jens Christophers, director of Christophers Market Research) additionally checked the German version of the questionnaire, with the goal to further increase the quality of the questionnaire. Minor changes were made and the revised German cover letter and questionnaire (now 12 pages long) was then pre-tested.

6.3.8.3 The Pre-Test

While sample size estimates for pre-tests vary significantly (from 5-100, see: Reynolds et al, 1993), it was decided that a sample size of 50 firms for the pre-test was more than sufficient, since this pre-test is an instrument rather than a construct pre-test which would imply a larger sample size. However, as stated above, due to the nature of the sampling frame it was expected that the net number of firms actually pre-testing the instrument to be much lower. But specifically this information about the prevalence of

eligible STBFs in the population was considered helpful for the actual survey and sample size determination later on.

Through the pilot study it was intended to assess the following aspects as suggested by Reynolds et al (1993):

- length, layout and structure
- sequence of sections and questions
- wording, terminology, meaning, categorisations
- open items
- the cover letter and the general questionnaire instructions

The 50 randomly selected STBFs were contacted via telephone. The questionnaires were sent via mail and non-eligible firms according to the STBFs definition were filtered out (see table 6.2). Nine STBFs completed the whole questionnaire (beyond the filter section; see appendix 6.6, survey page 2). But for one firm (protocol method) the debriefing method (again over the telephone) was used (Reynolds et al, 1993), one to three weeks after the questionnaire was sent.

Table 6.2: Firms excluded from the pre-test

No. of firms	percentage of sample	reason (non-exclusive)
17	34%	no international business activities
13	26%	no response (no time, no interest)
5	10%	pure service firm
3	6%	subsidiary
2	4%	firms' address no longer valid
1	2%	no R&D

Source: The author.

Comments and feedback regarding the stated aspects of interest were collected, analysed and then incorporated into an updated and revised final version of the questionnaire. The low prevalence of eligible STBFs (18%) and the high share of non-respondents led to an increase in the size of the sample for the final survey dissemination, as well as to a change in the delivery method (see below).

6.3.8.4 The Final Questionnaire and the Operationalisation of Key Constructs

A copy of the final cover letter and questionnaire is provided in appendix 6.5 and 6.6.

The cover letter, on University letterhead, used an altruistic appeal, considered to increase response rates amongst industrial populations (Schneider and Johnson, 1995; Jobber and O'Reilly, 1998). It was directly addressed to the managing director, also considered to increase response rates (Diamantopoulos and Schlegelmilch, 1996). Additional suggestions from the literature to potentially increase response rates like confidentiality (Jobber and O'Reilly, 1998), the non-commercial, academic nature of the study (Faria and Dickinson, 1992; Greer and Lohtia, 1994; Schneider and Johnson, 1995; Jobber and O'Reilly, 1998) and a short explanation of the study (Albaum and Strandskow, 1989) were incorporated in the cover letter. A note that the research was conducted in co-operation with a German university – the researcher's former university – was added to the cover letter, hoping for a positive response rate effect.

The main questionnaire was divided into 4 sections, a front page with questionnaire guidelines and a back page with an "information voucher" for interested respondents.

Section 1: Filter Section

As stated previously, the science park approach does not allow to completely filter out non-eligible STBFs according to this thesis' definition. Hence, section 1 was included in the questionnaire to filter out non-eligible firms at the start. Only internationally active (question 3), independent business firms (question 4) conducting R&D (question 1) and developing and marketing their own products (question 2) thus proceeded to section 2. Based on feedback from the pre-test, an explanation of R&D was added.

Section 2: International Business Details

Section 2 addresses needed information regarding the international business activities of the firm.

Question 1 addresses one of the standard measure international business intensity, measured as international turnover to total turnover. Objective profitability measures were excluded, as it was considered to be a major trigger for non-response.

Question 2 assesses the influential factors (see chapter 3) international orientation (items 1-5) and the resource/capability-base for international business activities (items 6-9). Both scales were borrowed from Preece et al's (1998) "item synthesis", where it

was used for exactly the same population. Based on the expert feedback during the peer review, the original international orientation scale was slightly changed (item 4 was reworded and an additional item capturing competitive forces, item 5, was added). While such a procedure could lead to lower reliability (Churchill and Peter, 1984), the not very high reliability of 0.65 (Cronbach's α) for both the original scales justified this procedure.

Question 3 (items 1-7) scales the perceived internal level of international business information. Information type items were derived from the literature (see for example: Leonidou and Adams-Florou, 1999), the exploratory interviews and the open item suggestions of the pre-test. The last item of question 3 (item 8) measures the perceived lack of international business contacts.

Question 4 assesses the internationalisation of the firm. Its matrix format was derived from Lindqvist (1991), capable of capturing a variety of internationalisation dimensions. Although the complexity of this matrix might trigger non-response, the pre-test showed no such effects. This was probably because most STBFs' international activities are rather limited, therefore they only need to fill out a small amount of matrix cells. It should however be noted that due to the findings in the exploratory interviews and due to questionnaire length considerations, the holistic definition of the term "internationalisation" (see chapter 3) could not be completely operationalised here. This suggested a focus on outward-bound and co-operative activities only. The actual internationalisation dimensions derived from this matrix were:

- *earliness of internationalisation* (operationalised as the time difference between inception and first international activity, as well as the time difference between first product launch and first international activity),
- *speed of internationalisation* (operationalised as the time that has passed until three countries were entered, following Lindqvist, 1991),
- *diversity of internationalisation* (operationalised as the number of countries entered),
- *directness of internationalisation* (internationalisation via intermediaries or the use of a direct mode; to asses the "de-intermediation thesis" as discussed in chapter 4),
- *involvement in FDI* (Yes or No),
- *the predominant internationalisation mode used* and

- *the direction of internationalisation.*

The dimension direction of internationalisation was operationalised in a multi-dimensional manner. Similar to Luostarinen (1980), the internationalisation direction was captured by 5 distance measures. The first and second measure is economic distance, measured as the host countries' 1997 GDP per capita deviation from Germany's and measured as the total market size in 1997 GDP figures. Figures are based on World Bank 1999 Word Development Indicators. The higher the difference, the higher the distance of the first measure and the opposite relationship holds for its second measure. The third measure is geographic distance. Measured as the capital-to-capital, as-the-crow-flies distance in km, based on distance measures provided by Xerox's PARC website (http://www.indo.com/distance/). The higher the difference, the higher the distance of this dimension. The fourth measure, cultural distance – the usual way of operationalisation psychic distance (Fletcher and Bohn, 1998) – follows the operationalisation and formula of Kogut and Singh (1988), based on Hofstede's (1980) 4 cultural dimensions (see equation 6.1). The higher the host countries' difference from the home country's value, the higher the distance of this dimension.

Equation 6.1: Cultural Distance

$$CD_j = \sum_{i=1}^{4} \left\{ \frac{\left(I_{ij} - I_{iu}\right)^2}{V_i} \right\};$$

a composite index based on deviations from Germany along the four cultural dimensions power distance, uncertainty avoidance, masculinity and individualism

I_{ij} = index for the ith dimension and jth country
V_i = Variance of the index of the ith dimension
u = Germany
CD_i = Cultural difference of the jth country from Germany

Source: The author, based upon Kogut and Singh, 1988.

The last direction measure, technical distance, uses national Internet diffusion levels as provided by Headcount.Com (http://www.headcount.com). The higher the national diffusion level, the lower the distance of this dimension.

Section 3: Internet Use Details

As indicated in chapter 4, binary Internet use indicators are not appropriate to capture the extent of organisational use of a new technology. Therefore, the author conducted an extensive literature review in search for appropriate measures (Brock, 2000). Since

the Internet can be regarded as a relative recent technological innovation, diffusion of innovation theory (Rogers, 1995) was chosen as an appropriate theoretical foundation and previously used non-binary organisational post-implementation dimensions were searched for applicable measures.

Following the construct suggestions in the literature (Tornatzky and Klein, 1982; Zmud and Apple, 1992; Saga and Zmud, 1994; Rogers, 1995; Kierzkowski et al, 1996; Price, 1997), several organisational post-implementation dimensions – to allow for validity assessments – were used and operationalised. The first measure is internal diffusion. It is a structural dimension that captures the extent of spread of use within an organisation. It is especially appropriate with regards to innovations – like organisational Internet use – where implementation occurs gradually (Fichman, 1995). It was operationalised as a two item measure, extent of access to the world-wide-web and extent of employees with their own business e-mail address (questions 2 and 3). The second measure scales organisational Internet use for international business activities (question 4). While several use assessment measures do exist (Brock, 2000), one usually distinguishes between actual use (reported or recorded amount/ duration of use) and perceived levels of use. Although the original questionnaire draft included both dimensions, it was decided to focus only on one measure: perceived levels of use. Besides practicalities – the questionnaire was too long if both dimensions were included – the pre-test showed that the appropriateness of the first assessment measure at the firm level was questionable (the first measure is usually only used at the level of the individual) and access to recorded data was also not possible. Thus, the use dimension was captured by the common level of use construct "routinisation of use" (Zmud and Apple, 1992; Saga and Zmud, 1994; Price, 1997). Using an extended 7-point Likert scale (a not used option is included), each use dimension of organisational Internet use (see chapter 4) was included. The use of electronic links that emerged from the exploratory interviews was also added as an item. If appropriate and feasible, a multi-item measure per sub-dimension was used. The third measure is infusion (Zmud and Apple, 1992; Saga and Zmud, 1994; Fichman, 1995), a structural dimension at the technology level (as opposed to internal diffusion, which is at the organisational structural level). It simply captures the extent of technical configurations of use (Zmud and Apple, 1992). Its subdimension extended use (Saga and Zmud, 1994) is captured in question 11 and is represented as the sum of used key Internet services as discussed in chapter 4. Other post-implementation indicators like the level of institutionalisation were not included following the insights from the exploratory interviews concerning potential assessment ambiguities and difficulties.

As chapter 4 has argued, the experience of an organisation with using the Internet is influential. Therefore, a historical dimension was added. The organisations' experience with the Internet is also captured in question 11 and is operationalised as the amount of time that has passed since the organisation started to access the world-wide-web (item 2) and the time that has passed since the organisation launched its own corporate homepage (item 3). Although other experience dimensions exist (Reuber and Fischer, 1999; Smith et al, 1999), this assessment was adopted because it can be captured in one single item, thereby minimising crucial questionnaire length impacts. The post-survey interviews can further explore the other experience dimensions if the survey data results suggest a further clarification of the role of experience.

Chapter 4 also showed that industry (industry wiredness) and direct network influences (peer wiredness) often influence the technical entrepreneur's perception of the Internet. In order to assess this potential impact for international business activities over the Internet, questions 5 (industry wiredness) and 6 (peer wiredness) address both factors in a multi-item fashion, focusing on "visibles" at both levels. The amount of specific international business information on the Internet (industry wiredness) and the amount of (observable) Internet use for international business activities among business partners (peer wiredness).

Questions 7 to 10 assess the specific sub-dimension of Internet use: information push in the form of a corporate website. Since no clear theoretical base currently exists with regards to assessing websites (see also section 6.3.9), items were in parts derived from related empirical studies and from the exploratory interview insights. Besides asking respondents for their website address (needed for the observational study), questions 8 to 10 try to capture the organisational website commitment by asking about levels of intentional use in the form of frequencies of effectiveness analyses (question 8, item 1) and information updates (question 8, item 2). Since Likert scales were not appropriate, a 5-point scale with full verbal scale points was used. Chapter 4 also showed that information retrievability on the Internet is an increasing problem, thus the number of registrations in international search engines (question 9) was used as a proxy. An increased number of registrations should lead to an increase in website retrievability and consequently potential impacts. Question 10 addresses the level of internationalisation of website development and maintenance, by summing up the number of internally performed tasks. Such an internal-external assessment is typical

in ICT research among small firms (Brock, 2000), since small firms do often not have the internal resources to implement and maintain a new technology.

Questions 12 to 13 finally assess the various potential impacts of the Internet (the dependent variables) on the internationalisation of STBFs on an attitudinal level. Since each variable (especially items 1 to 6 of question 12) constitutes an individual dependent variable that will be discussed and analysed in the next chapter, further descriptions and explanation are not given here. Question 13 also includes non-Internet-related factors (the last item) in order to allow assessing the relative importance of Internet-related factors.

Section 4: Management and Firm Details

Section 4 addresses needed information of the STBFs at the firm and technical entrepreneur level, in order to describe, compare and group STBFs.

Question 1 seeks background information regarding the status of the respondent. This should help to assess the source credibility of firm information given. Furthermore, as indicated in chapter 2, this question allows controlling for the potential influential effect of team ventures versus a single technical entrepreneur venture.

Question 2 addresses the discussed "transition" of STBFs (see chapter 2). Despite indications from the exploratory interviews to the contrary, it is hoped that the three items can be used to cluster STBFs according to their transition status from a start-up (comparatively high focus on financing), to a technology-driven product developer (comparatively high focus on R&D), to a more matured, market-driven STBFs (comparatively high focus on marketing). Failure to do so – instrument limitations aside – will then obviously give some support to the rather emerging view of STBFs' development.

Questions 3 and 4 follow the findings of chapter 2 and more specifically chapter 3 that previous (pre-state and pre-joining) international business experience of the firm's top management is an influential factor in their internationalisation. It follows the format of a previous empirical investigation by Reuber and Fischer (1997).

Similar to international business experience, Internet experience is potentially influential (see chapter 4). Hence prior Internet experience by the management team

might have an influential effect on the extent of Internet use and consequently on the internationalisation process. Question 5 investigates the existence of such experience.

Question 6 is used to calculate the important factor age of the STBF (see chapter 2). Although a firm's actual inception date is by no means clear (Oviatt and McDougall, 1994), it was though that the starting date of business operations is a more relevant date than for example the legal date of inception. It also follows so far unreported findings from the exploratory stage. It was found that some firms were founded by students for tax purposes while their actual business operations started years later after they finished their studies.

But it is not only the actual start of business operations of the STBF, it is also its first product launch. As the literature review showed, STBFs often exhibit comparatively long initial product development phases (liabilities of innovativeness). In order to control for such an effect, question 7 will be used to calculate the length of the initial new product development phase (date of product launch minus date of inception).

Questions 8 to 11 address additional important firm information to describe, group and compare STBFs. The size of the firm as measured in employee size (question 8), the turnover service share in question 9 (for the importance of services in high-tech manufacturing industries see chapter 2) and the R&D intensity as discussed in chapter 2 (questions 10 and 11). Following recommendations by the OECD (OECD, 1994), the definition in chapter 2 and the found 20% share of part-time employees among STBFs in the exploratory interviews, employee related items are measured as full-time equivalents.

Question 12 classifies the responding STBFs according to their industry. The 10 categories are derived from the most common industry sectors of science park STBFs in Northrhine-Westphalia (Technologiezentren im Land Nordrhein-Westfalen e.V., 1996).

Since financial information can easily trigger non-response (Tomaskovic-Devey et al, 1994), the last two questions use categorical (question 13) and subjective (question 14) rather than exact measures to reduce potential non-response. The turnover categories are adapted from the ones used by the German Chambers of Commerce to classify registered firm. The subjective measures assess overall financial and growth goals, as well as their international equivalent. The reliability and validity of subjective rather

than objective measures was previously shown (see: Dess and Robinson, 1984; Venkatraman and Ramanujam, 1987) and it better reflects the personal, often not purely economic goals of the technical entrepreneur (see chapter 2).

The questionnaire closes with an "information voucher" for interested participants and a reminder of the estimated pick-up date. It was professionally printed (off-set) on gloss paper in an "A3-folded to-A4 booklet"-format to give it a professional appeal and double-sided printing gave it a less lengthy appearance.

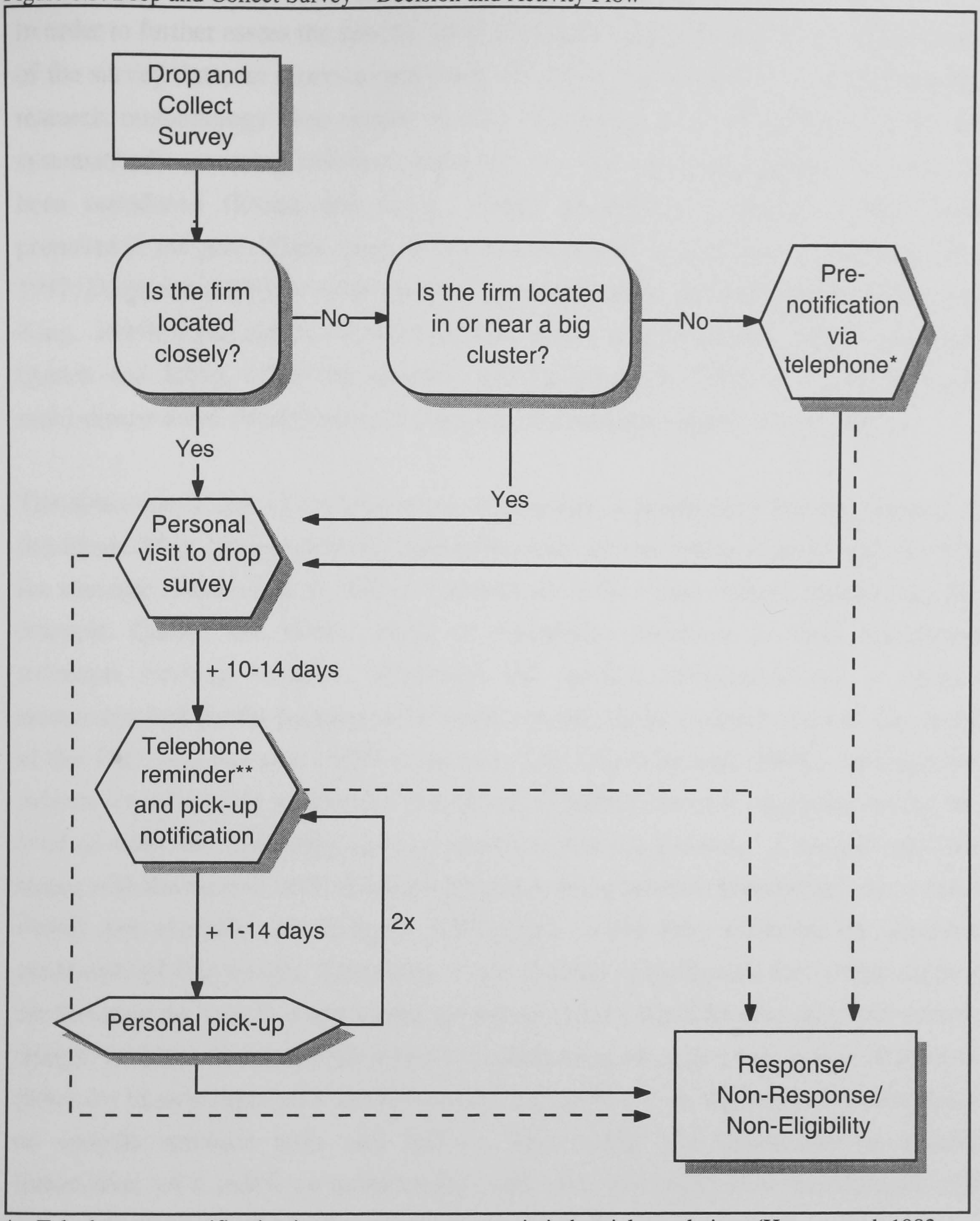
6.3.8.5 Survey Implementation

The length of a questionnaire is important for response rates (Tomaskovic-Devey et al, 1994; Baldauf et al, 1999; Greer et al, 2000). But because this 12-page questionnaire is rather long and because the specific population of this study has been described as suffering from research fatigue (Cooper, 2000; see also the findings from the informatory and exploratory interviews) – one of the key reasons for non-response in industrial populations (Baldauf et al, 1999) – it was decided to implement the questionnaire by using the drop and collect technique in order to increase response rates. The drop and collect technique is known to achieve extremely high response rates in surveys (Brown, 1987) and its key disadvantage, a limited applicability for non-clustered populations (Brown, 1987), is of advantage for the highly clustered population at hand (see figure 6.2). Also, it is cheaper compared to a mail survey to Germany. Each STBF would have cost £1, respondents £2! The disadvantage, it is rather time consuming for large samples, was considered acceptable for the time frame of this phase of the project.

Using the sampling frame as described above, 803 potential STBFs were filtered from the population of 1,748 firms located in science parks in the chosen federal state (quasi-census). Since not all firms are classified completely, firms with an unclear status remained and were not excluded apriori. Details of this filter process are given in the next chapter.

The actual drop and collect survey with these 803 firms was implemented from August to October 1999. It followed the decision and activity flow in figure 6.3.

Figure 6.3: Drop and Collect Survey – Decision and Activity Flow



* Telephone pre-notification increases response rates in industrial populations (Hansen et al, 1983; Mitchell and Nugent, 1991; Yammarino et al, 1991; Jobber et al, 1998)

** Follow-ups increase response rates in industrial populations (Yammarino et al, 1991; Jobber et al, 1998).

Source: The author.

The gathered data was entered into a three-dimensional Excel sheet and subsequently imported into SPSS and EQS for the statistical analysis addressing the stated research aims. The next chapter provides the findings of this analysis.

6.3.9 The Observational Study of STBF's Websites

In order to further assess the specific level of website use and in order to validate parts of the survey data, an observational study of STBF's websites was included into the research methodology (see section 6.2.6). However, a comprehensive model for systematically assessing websites, especially for non-consumer markets, has not yet been introduced (Evans and King, 1999). Nevertheless, various models were proposed in the past. These range from simple scoring models (see for example: Ho, 1997; Dutta et al, 1998) to more advanced scoring models (see for example: Evans and King, 1999); from simple two-dimensional matrix categorisations (see for example: Quelch and Klein, 1996; Patnayakuni and Patnayakuni, 1999) to more advanced multi-dimensional classification schemes (see for example: Berthon et al, 1997).

The direct use of any of these previous approaches is problematic for the purpose of this thesis. They cannot readily be applied because they are either industry specific (see for example: Berthon et al, 1997), focused on only a few salient factors (see for example: Quelch and Klein, 1996) or potentially subjective in their assessment technique (scoring models). Moreover, the specific development of a website assessment tool for the population of interest in this study is clearly beyond the scope of this PhD. It constitutes a PhD in its own right (see Loiacono, 1999). Although the subjectivity of scoring models can be reduced by utilising several raters and testing the level of inter-rater reliability, such an approach was not possible. A second rater (or more) with the needed skills (German speaking, some Internet knowledge) was (were) simply not available and hiring a professional would have exceeded the financial constraints of this project. Therefore, it was decided to synthesise the current state of the literature on website assessments and extract salient characteristics of good website design. In order to achieve the highest possible level of objectivity, it was decided to either use binary measures ("Does A exists? Yes or No?") or objective measures based on specific software tools (see below). This avoids the subjectivity of scaling dimensions on a metric or quasi-metric scale. The following two sub-sections will present the extracted dimensions and their assessment.

6.3.9.1 Key Dimensions of Organisational Websites

The main and first challenge of a website is to attract visitors (Hoffman et al, 1995; Kierzkowski et al, 1996). Therefore, website promotion is critical (Breitenbach and Van Doren, 1998; Evans and King, 1999). While important marketplace-based website promotions of a firm ("piggyback advertising" according to Kierzkowski et al, 1996), for example adding website addresses to print ads, cannot be assessed in this

observational analysis, two additional and observable dimensions are suggested in the literature. The first dimension might be termed "searchability". It addresses the important ease with which a potentially interested entity (individual or organisation) can find the website of a firm (Hoffman et al, 1995; Berthon et al, 1996; Kierzkowski et al, 1996; Pitt et al, 1996; Breitenbach and Van Doren, 1998; Long et al, 1998; Evans and King, 1999). The second dimension relates to the importance of extensive external links form other websites (Hoffman et al, 1995; Berthon et la, 1996; Pitt et al, 1996; Palmer et al, 2000) and might be termed "locatability". The higher a firm rates on both these dimensions the higher the "marketspace embeddedness" of its website and the easier it is for someone to (actively or passively) find their site. Marketspace embeddedness therefore operationalises the suggested importance of reach in marketspace (Evans and Wurster, 1999). Recently, Palmer et al (2000) found empirical support for parts of this argument in a non-international context. Note that additional marketspace-based attractors that are important to promote a website, like banner ads on the world-wide-web, are beyond the possibilities of this observational analysis.

Once visitors are attracted, it is important to engage and retain them (Kierzkowski et al, 1996). This stage relates to the actual design and content of the website itself. However, while an assessment of the web design and its visual appeal is highly subjective, as well as customer, product and industry specific (Hoffman et al, 1995; Berthon et al, 1996; Palmer and Griffith, 1998), a set of "meta rules" emerged form the literature synthesis. First and foremost is the provision of information (Quelch and Klein, 1996; Ho, 1997; Setz and Schubert, 1997). The website should provide the visitor with rich (Hoffman et al, 1995; Breitenbach and Van Doren, 1998; Palmer and Griffith, 1998; Evans and Wurster, 1999) and up-to-date (Berthon et al, 1996; Kierzkowski et al, 1996; Pitt et al, 1996; Ho, 1997; Long et al, 1998; Wong and Chung, 1998; Evans and King, 1999) information. But it is not only important to provide rich and up-to-date information, it is also important for the visitor to easily find the information within the website. Hence an important element of information provision is the "navigatability" of the site (Berthon et al, 1996, 1997; Dutta et al, 1998; Long et al, 1998; Palmer and Griffith, 1998; Misic and Johnson, 1999). It is the ease of finding information and navigating within a website.

A second key aspect of websites that takes advantage of its unique media characteristics (see chapter 4) is interactivity (Hoffman et al, 1995; Kierzkowski et al, 1996; Ghose and Dou, 1998; Watson et al, 1998). The essence of interactivity is

exchange (Haeckel, 1998) and the goal of the website should be to turn a high number of passive surfers into interactors (Berthon et al, 1996), that is to achieve high conversion efficiency (Pitt et al, 1996). This is mainly achieved by offering marketspace-based dialogues between the visitor and the firm (Hoffman et al, 1995; Berthon et al, 1996; Pitt et al, 1996; Dutta et al, 1998; Long et al, 1998; Evans and King, 1999).

A related dimension of interactivity that needs to be investigated is e-commerce (see chapter 4). The possibility of a website to offer on-line transactions (Hoffman et al, 1995; Berthon et al, 1996, 1997; Quelch and Klein, 1996; Ho, 1997; Breitenbach and Van Doren, 1998; Dutta et al, 1998; Palmer and Griffith, 1998; Evans and King, 1999). Similar to interactivity, the goal is to achieve high conversion efficiency (Pitt et al, 1996).

The above seven salient characteristics of websites (searchability, locatability, navigatability, rich and up-to-date information provision, interactivity and transactions) constitute the generic meta rules suggested in the literature that are assessable via the observational analysis. However, in order to assess the international business dimensions of this thesis, an additional factor needs to be taking into consideration. Only Quelch and Klein's classification model (1996) shares this thesis' focus. In addition to some of the above factors they suggest a customer focus dimension that categorises websites according to whether the customer focus is domestic or international. Hence, the nature of a firm's business focus is included in the observational analysis as the eighths salient aspect of STBF's websites.

The following section presents how these key dimensions were assessed in the observational analysis.

6.3.9.2 Assessment of the Key Dimensions

As stated above, an objective assessment of each of the synthesised dimensions was considered crucial. Therefore, each dimension was either assessed by using binary measures or by using website assessment tools.

Marketspace-Embeddedness: Searchability and Locatability

Both indicators of marketspace-embeddedness can be assessed objectively by using website assessment tools. The use of search engines assesses the searchability dimension. As noted in chapter 4, search engines are usually the main routes for

information search and retrieval on the Internet. Thus, if an individual is interested in a firm and/ or in specific products/services (that this firm offers) and he or she is unable to find it in one of the major search engines, the websites level of attracting potential visitors, its searchability, is low. However, in order to avoid checking all the major search engines manually, software was recently developed that can check a range of search engines automatically. All the interested researcher has to do is type in the website address of the firm (the URL) and the relevant keywords in relation to that firm. Since licensed software was not available, a trial version of a top rated software (TopDog; see http://tucows.mirror.ac.uk/promo95.html) was used for this part of the analysis. For each firm the address of their website and three sets of keywords were used. The keywords included the full name of the firm, the specific industry the firm is operating in and the specific type of products/ services the firm offers. This was considered to be a good proxy of the type of search words used by a potential customer. The information with regards to the words used as keywords in the assessment was derived from the survey and the content of the STBF's websites. Table 6.3 gives an illustrative example.

Table 6.3: Assessment of Searchability: An Illustration of Keywords Used

Website address (URL)	**Keyword 1 (name of the firm)**	**Keyword 2 (specific industry of the firm)**	**Keyword 3 (specific product of firm)**
www.nameoffirm.de	Full name of the firm	Fiberoptic technologies	Fiberoptic devices for minimal invasive surgery and diagnostics

Source: The author.

For each of the search engines covered by the software, the researcher prespecified a search depth of 100. This means that the software will give a ranking for the firm's website from 1 to 100 for each of the search engines. A "1" is the highest possible level of searchability and it simply indicates that the firm's website is the first listed website in relation to the keywords used. The lower the rank, the lower is the searchability. The sum of the reversed ranks for each search engine was then used as a proxy for searchability. The higher the value of this variable (WPSEARCH), the easier it is to locate the website. The reasons for limiting the search depth are mainly pragmatic and logical. Higher search depths would not only significantly increase the time of the analysis, but it is also unlikely that an individual interested in a firm or in a specific range of products will scan through much more than 100 website links (see also the section on data overload in chapter 4).

The second dimension relating to marketspace-embeddedness is locatability. The number of external links to a firm's website was assessed by using a special search feature of the AltaVista search engine (http://www.altavista.com). Using the search option "link: 'website address of the firm' ", AltaVista lists all the covered websites with links to the website under investigation. The more external links a website has the higher its locatability and subsequently its marketspace-embeddedness.

If both measures correlate significantly, they will be summed up to form the marketspace-embeddedness dimension of the observational analysis.

Information Provision: Richness, Newness and Navigatability

Information richness and navigatability were measured by summing up a set of binary indicators (0= feature does not exists, 1= feature does exist).

For information richness the existence of the aspects listed in table 6.4 were assessed. Their selection was guided by the technical possibilities of the Internet (see chapter 4) and key organisational attributes of STBFs (see chapter 2), mainly the firm itself, its products and its business partners. The possible values for the information richness variable range from 0 to 10. In order to assess the validity of the information richness scale objectively, its values will be subsequently correlated with the actual amount of data on a firm's website.

Table 6.4: Information Provision: Binary Information Richness Indicators Used

Does the website provide:								
textual	graphical	audio	video	textual	graphical	audio	video	
information about the product(s)/service(s) of the firm				information about the firm itself (its history, size, employees etc.)				information about business partners/ previous customers
Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No
0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1

Does the website offer the possibility to download detailed information (e.g. regarding product specifications)
Yes/No
0/1

Source: The author.

For the navigatability dimension the existence or non-existence of the following three aspects, considered to facilitate information search and navigation, were considered.

The first binary indicator assesses the existence or non-existence of a table of contents, giving an overview of the various pieces of information provided by the website (see for example Long et al, 1998; Evans and King, 1999). The second binary indicator used assesses the existence or non-existence of navigational aids such as "frames". These aids facilitate the navigation within a website by offering intra-site links (see for example Palmer and Griffith, 1998), as opposed to the linear back/ forward options of the browser. The third and last binary indicator considered assesses the existence or non-existence of an intra-site search option (see for example Ghose and Dou, 1998). Such a function allows the visitor to easily search for and pinpoint the specific information he or she is looking for on the website. The possible values for the navigatability variable ranges from 0 to 3. The higher its value the higher its navigatability.

Using the "page info" -option of the world-wide-web browser Netscape Navigator objectively assessed the newness of the information content of the website (its updatedness). The page info option gives the date the selected web page was last updated. Deducting its numerical value from the numerical value of the access date of the analysis establishes then the newness of the web page information in days. The lower the value of this variable the more up-to-date the website. For each website either the homepage itself or the "what new"-page was considered as a proxy for content newness.

If the three measures correlate significantly, they will be summed up to form the information provision dimension of the observational analysis.

Interactivity

The level of interactivity was assessed by determining the existence or non-existence of four aspects of establishing interaction (a dialogue) with website visitors (in parts derived from Ghose and Dou, 1998; Hagel and Singer, 1999) as listed in table 6.5.

Table 6.5: Interactivity: Binary Indicators Used

Does the website allow visitors to establish a dialogue with:			Does the website offer continuos interaction for visitors (e.g. newsletters)?
the firm	individual employees	the firm's business community (open discussion forums)	
Yes/No	Yes/No	Yes/No	Yes/No
0/1	0/1	0/1	0/1

Source: The author.

The possible values for the interactivity variable range from 0 to 4. The higher its value the higher its interactivity.

Transaction and Business Focus

The last two dimensions were both assessed on a binary level as dummy variables for subsequent analyses. If a website offer on-line transactions it was coded with a "1", if it does not it was coded with a "0". The international orientation of a firm's website, its business focus, was operationalised by establishing whether the content of the website is available in English (the language of international business) and not just in German. Foreign language provision was coded with a "1", a domestic focus (the website is purely in German) was coded with a "0".

6.3.10 The Post-Survey Interviews

As stated in section 6.2.6, the adopted research design incorporates a qualitative stage exploring, describing and clarifying parts of the quantitative findings of the survey and observation stage. The plan for this final empirical stage is to interview a post-finding selected sample of STBFs that responded to the survey. Since this selection, as well as the findings to be explored is based on the results and outcomes of the previous research stages (mainly the survey and the observational stage), an interview guide for the post-survey interviews can of course not be pre-specified and presented here. This section will therefore rather present the specific goals and the analytical procedures that will be used during this stage. The results of the qualitative data analysis, based on the outlined procedures, are then presented in chapter 8.

The specific goals of the post-survey interviews are mainly three-fold.

The first goal is to assess and clarify local causality (Miles and Huberman, 1994). An assessment that is not possible within the previous two research stages, where the researcher has to predetermine, either based on theoretical or logical grounds, the direction of causality. Exploring the causal direction as viewed by the STBFs not only helps interpreting the quantitative results, but its also enhances the overall validity of the study. This is particularly important since this study is of a rather exploratory nature.

The second goal of the post-survey interviews relates to the clarification of the empirical results beyond assessing local causality. It is expected that both unexpected

significant, as well as unexpected insignificant findings that are difficult to be unequivocally interpreted with the existing knowledge will be discovered during the quantitative stages. The post-survey interviews will then explore these in order to clarify the potential cause or causes. This goal mainly relates to clarifying spurious correlations or relationships by uncovering explanatory third variables not covered or considered in the two quantitative research stages previously discussed.

The third goal, which is related to the second, is to further explore some of the binary variables that were incorporated in the survey for control purposes (for example the existence of a team venture). If effects are found contrary to what was expected, the post-survey interviews will explore and clarify these further.

The analytical procedures applied to the qualitative data mainly follow the guidelines of Miles and Huberman (1994). First, thematic categories as coding units for the extended text (the transcribed interviews) will be established for the various questions and areas to be explored. These categories will be defined ex ante and ex post. The ex ante defined categories will be directly derived from the results of the quantitative research stages and the ex post defined thematic categories are categories that might emerge while the post-survey interview actually take place. Based on these categories within-case displays (Miles and Huberman, 1994) will be developed first, to enable exploring and describing the themes under investigation. These within-case displays should also help identifying possible linkages across themes and questions that might exist within each case. Cross-case displays (Miles and Huberman, 1994) will follow. These displays will allow the researcher to compare and group cases according to thematic similarities and dissimilarities that might emerge across firms. The cross-case displays will then be linked back to the survey and observational data from the two previous research stages. The idea is to relate the results of the interviewed cases to the sample of STBFs in order to allow for an estimation of their degree of representativeness. Clearly, if some of the findings in this final stage are derived from a set of statistical "outliers" (for example outside 3x the standard deviation) their generalisability is limited compared to findings derived from a set of "average" (usually within 2x the standard deviation) cases. Finally, the results of each of these three steps will be synthesised and related to the three main goals of the post-survey interviews.

The overall analysis will be conducted with the original, untranslated extended text. Only at the final stage of the analysis, the presentation of the outcomes of the analysis,

will the relevant text (themes and quotations) be translated into English by the researcher.

6.4 Summary

This chapter has developed, presented and defended the adopted research design following the "contingency view" of research approaches (Klein et al, 1991). Furthermore, the operationalisation and implementation of the adopted multi-stage and multi-method approach has been presented, including the influential exploratory findings from the informatory and exploratory interview. The exception to this was the operationalisation of the post-survey interviews, which will be reported in chapter 8 due to the dependency on the empirical results presented in the next chapter.

The following two chapters will present the empirical findings of this thesis addressing the research aims as specified in the previous chapter. Chapter 7 will present the empirical findings that relate to the survey and the observational stage of this research. The synthesis of the findings presented there and its potential impact for the post-survey interviews will then form the basis for the post-survey interview developed and presented in chapter 8. Chapter 8 will also present the findings of the post-survey interviews. In chapter 9, these findings will then in turn be synthesised with the findings of chapter 7 and an overall synthesis of this study's findings will be presented.

Chapter 7: Findings – Survey Stage and Observation Stage

7.1 Introduction

This chapter presents the empirical findings with regards to the survey and observations stage of this thesis.

Section 7.2 presents the empirical results of the survey stage. Before each research aim and its specific research objectives are addressed, sub-section 7.2.1 presents the overall outcome of the drop and collect survey (response rate), assesses a potential response bias and describes the characteristics of the sample. Then the assessment of the research aims follows. For the purpose of clarity, each assessment of the research aims will close with a synthesis of the main findings and its implications.

The second main section, section 7.3, presents the findings with regards to the observational analysis.

An overall summary of the empirical findings and its implications for the post-survey interviews close this chapter, leading to the next chapter's development of the post-survey interview guide, the selection of post-survey cases and the presentation of the post-survey interview results.

7.2 The Drop and Collect Survey of STBFs

The following sub-sections report the response rate, the sample characteristics and the findings of the survey stage of this thesis. But before proceeding to present the drop and collect survey results, the following paragraphs will outline the statistical procedures used in the data analysis.

Outline of Statistical Procedures Used

Throughout the analyses a 95% confidence interval was applied. Before statistical tests sensitive towards normality violations were utilised, non-normal variables were transformed, if possible, as suggested in the literature (Sharma, 1996; Hair et al, 1998). If normality could not be achieved, as determined by visual inspections of univariate histograms and normal probability plots, as well as the one-sample *Kolmogorov-Smirnov test*, non-parametric tests were used (Lapin, 1990). This was done either directly without altering the non-normal variable (for example using *Spearman's correlation coefficient* as opposed to *Pearson's correlation coefficient*), or

indirectly with an alteration of the non-normal variable. The latter mainly relates to the use of logistic regression when a multiple (linear) regression analysis was not applicable due to normality violations. Logistic regression was used because it requires fewer assumptions compared to the related discriminant analysis and because it is a more robust technique if assumptions like multivariate normality and equal variance-covariance matrices across groups are not fully met (Hair et al, 1998). To transform the dependent variables into the needed binary format, each variable was either dichotomised by the common median split rule (Jaccard et al, 1991) or trichotomised using the polar extremes procedure suggested by Hair et al (1998). The latter was only used if the necessary minimum of 20 observations per group (Hair et al, 1998) could be achieved. If group sizes for each of the variables did vary a lot, groups were balanced by randomly selecting or deselecting cases from either of the two groups. These newly established binary variables were then subjected to a logistic regression analysis if the required minimum number of observations per group permitted the analysis.

In order to control for the potential significant influence of outliers, particularly in the multiple regression analyses, an "influentials analysis" as suggested by Hair et al (1998) was performed. Only if significant influentials were identified are influentials explicitly stated and (if feasible) removed in order to re-estimate the equation in question.

If feasible, indirect effects (moderating effects) of independent variables were also assessed, in addition to their potential direct effects. Following suggestions in the literature (Sharma et al, 1981; Jaccard et al, 1990; Hair et al, 1998) a traditional product term analysis was performed to assess moderating effects. Assumed moderator variables were multiplied with each of the original predictor variables to form the multiplicative term that is tested for significance. If the R^2 of the moderated regression increases significantly compared to the R^2 of the unmoderated regression, a moderator effect is present (Sharma et al, 1981; Jaccard et al, 1990; Hair et al, 1998). In order to reduce potential problems due to multicollinearity of the multiplicative term(s), the original predictor variables (metric variables only) were centred before the new interaction terms were computed (Jaccard, 1990).

Unless specified otherwise, all the applied factor analytical investigations used the principal axis factoring method. This factor extraction method is the recommended method if the researcher's objective is to identify the latent dimensions represented in

the original variables (Backhaus et al, 1996; Sharma, 1996; Hair et al, 1998), as it focuses solely on the common variance of the items. Furthermore, the more flexible and realistic oblique rotational method (Hair et al, 1998) was employed. Orthogonal methods like Varimax were considered less appropriate since it seems more theoretically sound if potential constructs and construct sub-dimensions are allowed to correlate, as opposed to forcing an orthogonal structure on possibly related data sets. Before each factor analysis was performed, an analysis of the correlation matrix for its factor analysis appropriateness is strongly suggested (Backhaus et al, 1996; Sharma, 1996; Hair et al, 1998). The main results of this analysis will be reported prior to each major factor analysis. The actual resulting scales were constructed using the recommended summed average score method to create a surrogate variable reflecting the scale (Hair et al, 1998). Their reliability was assessed using *Cronbach's* α (Churchill, 1979; Peter, 1981) and in addition to the assessment of discriminant and convergent validity of the scale's items during the factor analysis, the nomological validity was assessed by correlating the constructed scales with other variables derived from theory (Peter, 1981). Nomological validity was only assessed if a strong theoretical base allowed its assessment.

Overall, the multivariate statistical procedures used in the analysis follow the guidelines and recommendations of Backhaus et al (1996) and Hair et al (1998).

7.2.1 Response and Sample Characteristics

As outlined in the previous chapter, 803 STBFs were filtered from the total population of 1,751 firms. The majority of excluded firms were pure service firms (see appendix 7.1). This high share of pure service firms is similar to the 63% share in a previous analysis of firms located in science park in Northrhine-Westphalia (Technologiezentren im Land Nordrhein-Westfalen e.V. (ed.), 1996). The other non-exclusive categories of excluded firms are also shown in appendix 7.1. Their exclusion was based either on information provided by the sampling frame (see previous chapter) or the pre-test.

Only full business entities were considered for this study, thus GbRs [Gesellschaft des bürgerlichen Rechts] were excluded (Schauwecker and Lane, 1985). GbRs are the usual legal form for freelancers, temporary organisations, craftsmen and non-commercial organisations in Germany (Wöhe, 1990). The selected 803 firms were then accessed following the drop and collect procedure presented in chapter 6.

At first sight, the number of purely national firms was surprisingly large (see appendix 7.1) taking the observation of chapter 3 into consideration that STBFs are usually considered to be early internationalisers. However, this might have been in parts due to the surprisingly large share of subsidiaries. All previous research stages did not indicate that the science park diffusion with subsidiaries is so high. Additionally, the average age of 6.34 years (see table 7.1) is below the observed mean of previous studies (Autio, 1997; see also chapter 2), possibly another explanation for the low share of international firms. Hence, a large share of the excluded pure domestic firms might be still in their founding process (see also the findings from the exploratory interview stages presented in the previous chapter). Finally, the number of firms that moved was a bit disappointing, taking all the care that went into the selection of firms into consideration. Still, it is in line with the estimated 20% fluctuation rate stated during the informatory interviews.

The overall response rate was a high 79% (see appendix 7.1), in line with previous drop and collect surveys (Brown, 1987) and the net response rate was also high with 40%. The overall number of 112 eligible respondents, although expected to be higher, was still large enough for most multivariate techniques (Hair et al, 1998). A visual inspection regarding potential missing value problems using EQS showed no bias-inducing pattern. The majority of firms answered all applicable questions. Even the rather complex internationalisation matrix was filled out by 89.3% of firms. A univariate missing value analysis with SPSS showed that mostly variables that were not applicable to all firms and a few of the calculated variables – variables based on more than one original variable – had higher percentages of missing values. The highest percentage for a single item that applied to all firms was 13.4% for the output research intensiveness measure (RNDISALE). The missing value percentage for the vast majority of the other items was below 10%. This is important, because it was the intention of the researcher to use the listwise deletion procedure throughout the statistical analysis, avoiding potential biases that substitution techniques might introduce. Missing months in the time related variables were however substituted with a "June"-value.

7.2.1.1 Assessing Potential Response Bias

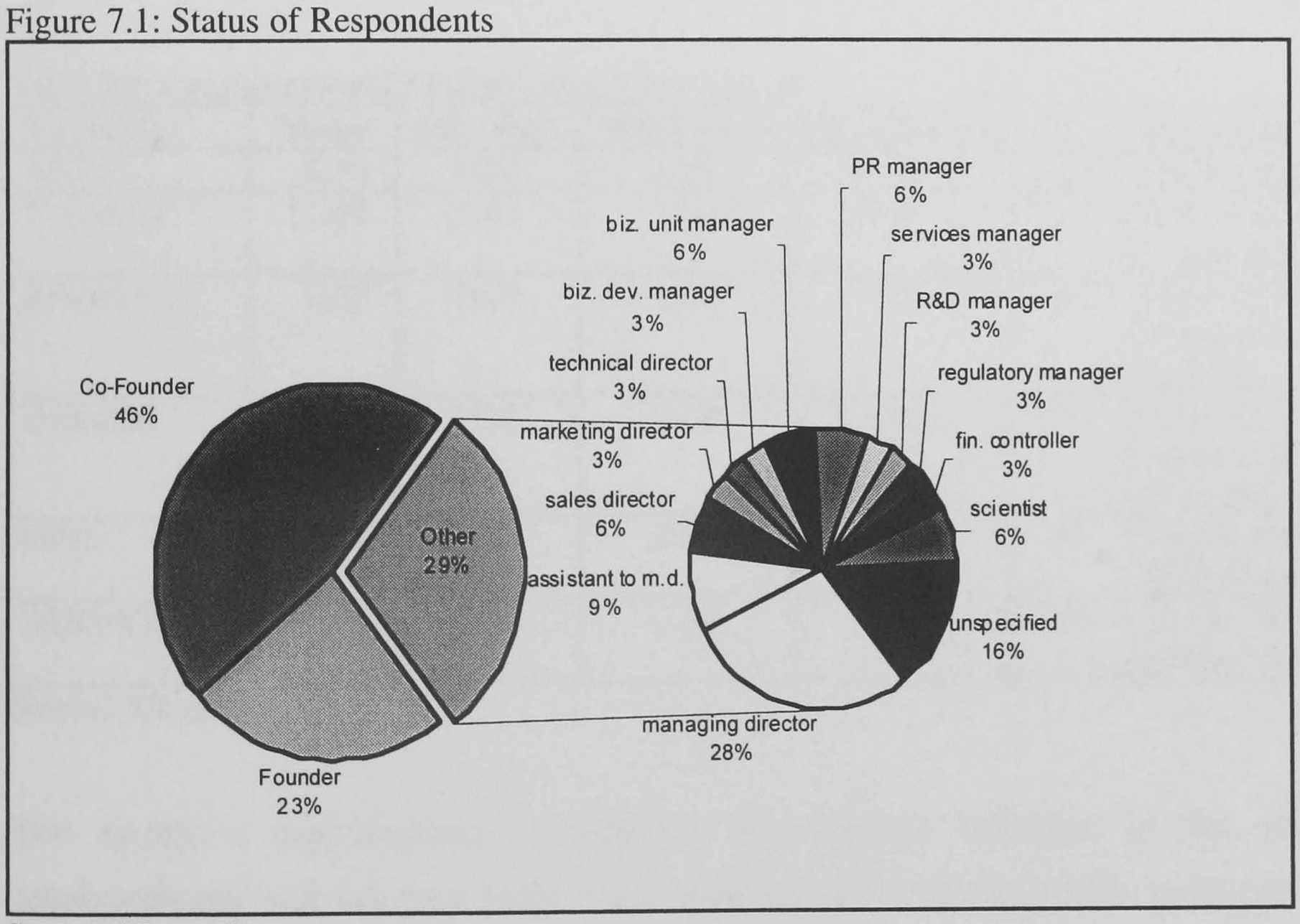
The share of non-respondents was very low (see appendix 7.1). This nearly eliminated the usual problem of non-response in survey based studies. Nevertheless, because high response rates do not automatically eliminate potential response biases (Tanner,

1999), it was decided to compare respondents and non-respondents in order to control for a potential bias.

The only relevant and known variable for all sample frame members was their location as identifiable by their 5-digit postcode. Since this 5-digit postcode is not a truly metric variable and its distribution was not normal, the non-parametric *Mann-Whitney U test* (Lapin, 1990) was used and the grouped postcodes were tested for differences across the two groups (respondents and non-respondent). The results (*z-value -1.32, p-value 0.19*) suggested that a significant response bias, based on a location bias, did not exist. The responses could therefore be treated as representative of and generalisable to the whole population of STBFs in science parks in Northrhine-Westphalia.

The status of the respondent within the firm could constitute another response bias. Although the survey was addressed to the owner manager, it does not ensure that the same person filled out the questionnaire.

Figure 7.1: Status of Respondents



Source: The author.

In order to control for a potential response bias based on who actually responded to the survey, non-founders (29% of the respondents; see figure 7.1) were compared to founders' responses on two salient organisational variables (see chapter 2): the age and the size of the organisation. Particularly the age dimension was considered important since the questionnaire addresses various time sensitive variables that could be affected

by the recall of non-founders. A *t-test* revealed that with regards to the age dimension no significant differences could be identified (*t-value=1.55, p-value 0.13*). However, with regards to the size dimension significant differences were found (*t-value=2.58, p-value 0.01*), indicating that non-founders worked for significantly larger small firms. But because interaction is usually high in small firms (Neilsen, 1974), because the majority of non-founder respondents held important positions (see figure 7.1) and because age was considered here as a more important factor due to some of the survey's historical items, the size differences were not considered to constitute a significant influential bias. Overall, it could thus be concluded that there was no apparent response bias in the sample that might have reduced the generalisability of the results.

7.2.1.2 Characteristics of the Sample

As expected, the STBFs in the sample were comparatively young and small (see table 7.1), meeting the organisational parameters of a STBFs as defined in chapter 2. Only one firm needed to be excluded due to its age (see appendix 7.1).

Table 7.1: Organisational Characteristics of the Sample

Variable	Mean	Std Dev	Minimum	Maximum	N	Meaning
AGE	6.34	3.98	1.00	20.50	106	age of firm in years
FTENOW	11.69	11.02	1.00	58.00	103	size of the firm in no. of full-time employees
RNDISALE	0.33	0.27	0.00	1.00	97	research intensity: research cost in % of turnover
RNDIHR	0.45	0.28	0.00	1.00	95	research intensity: research personnel in % of total personnel
NPD	0.96	1.43	0.00	8.83	98	length of the initial NPD process
SERVICE	0.31	0.26	0.00	0.90	98	service intensity in % of turnover

Source: The author

The sample's organisational smallness was further reflected in the size of their organisational outputs (see table 7.2), meeting most of the upper turnover thresholds proposed in the literature (see chapter 2).

Table 7.2: Classification by Annual Turnover

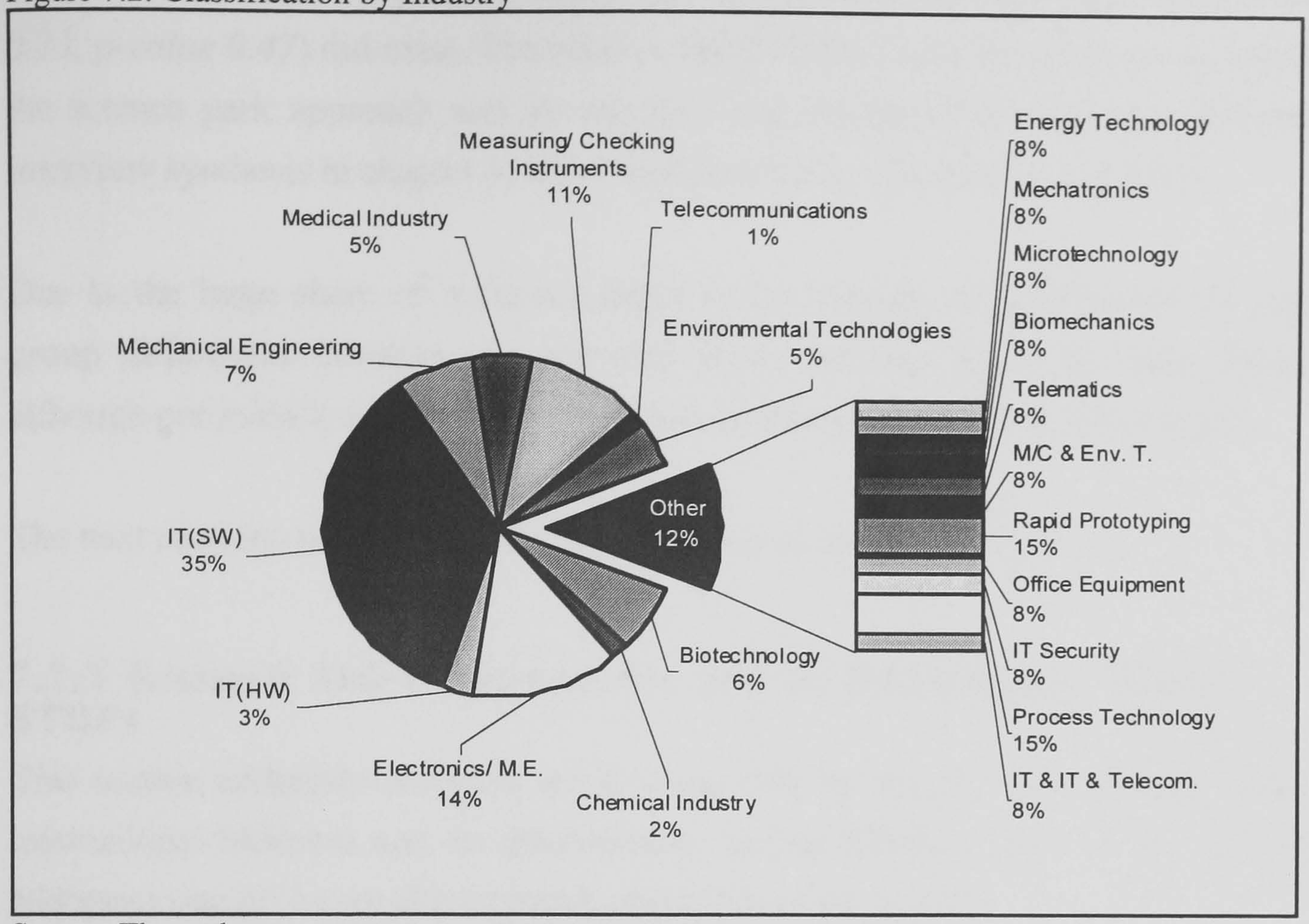
Turnover category in DM	Turnover category equivalent in £ (£1 ≡ 3DM)	Sample share in % (n=103)
<500kDM	<£166k	15.5%
500kDM – 1mDM	£166k – £333k	32.0%
1mDM – 3mDM	£333k – £1m	26.2%
3mDM – 5mDM	£1m – £1.6m	10.7%
5mDM – 10mDM	£1.6m – £3.3m	8.7%
>10mDM	>£3.3m	6.8%

Source: The author

Research Intensiveness

Since research intensiveness cut-off points were not specified ex ante (see chapter 2), a closer examination of both indicators used was essential before proceeding to further analyses. At the total sample level, the 45% mean of R&D human resources input intensity (RNDIHR) compared favourably with Felsenstein and Bar-El's (1989) high-tech cluster (a mean of 35.4%) and reported means of previous studies investigating STBFs (see for example: Lindqvist, 1990: 25%; Burgel and Murray, 2000: 30.7%). The research intensiveness as measured in sales had a mean value of 33% (see table 7.1), also above previous STBFs studies' mean values (see for example: Lindqvist, 1990: 8.6%; Karagozoglu and Lindell, 1998: 10%; Burgel and Murray, 2000: 16.7%). Moreover, the finding that research intensiveness as measured in sales had a lower mean value also indirectly supports the observation made previously that R&D is more of an informal nature in STBFs (OECD, 1994; Symeonidis, 1996; Roper, 1999). However, table 7.1 also shows that both indicators had "0" values. In order to check whether this was due to respondents stating a "0" on either both or on only one of the measures, a case by case analysis was performed. This analysis revealed that only two cases stated a "0" for both indicators. However, both firms also stated in section 1 of the questionnaire that they conduct R&D. This could only indicate that they currently conduct R&D in a measurable fashion, while during their last financial year (the time frame of the research intensiveness related question) they did not. Furthermore, one of the two firms stated an initial new product development (NPD) process of 6 months. Thereby indicating some R&D activity in the past. Only 4 cases did have a missing value for both indicators, all of which stated in section 1 of the questionnaire that they conduct R&D. It could therefore be concluded that the vast majority of respondents could be treated as relatively research intensive and thus congruent with this thesis' definition. Their industry composition supported this view further (see figure 7.2).

Figure 7.2: Classification by Industry



Source: The author.

Service Intensity

The STBFs were also comparatively service intensive, with an average of 31% of turnover derived from services. This supports the observation in chapter 2 that high-tech products usually need pre- and post-sale service support due to their complexity. It also supports the observation that especially among young STBFs services are important additional fund generators to support early product development processes (Lamont, 1972; Van de Ven et al, 1984; Roberts, 1990; Cooper, 2000 and chapter 2)

Initial New Product Development Phase

The average initial NPD of the sampled STBFs was nearly one year (see table 7.1). 67% of firm introduced their product within the first year after their inception. Only 12% of firms had an initial NPD of more than 2 years. Although this observation is rather low compared to the 2 year average as reported in one exemplary study in chapter 2 (Susbauer, 1967), it indirectly gives support to the overall trend in high-tech industries towards shortening product development cycles (Backhaus, 1997). But this finding could also be an artefact of the industry composition of this sample (see figure 7.2). A high percentage of STBFs in the sample operated within the software industry, an industry in which NPDs are usually less long due to little financial investment and research needs (see chapter 2). However, a *t-test* showed that no significant

differences between NPDs in the software industry and the other industries (*t-value - 0.73, p-value 0.47*) did exist. The relative short NPDs could therefore be an artefact of the science park approach and its selection and infrastructure bias (see informatory interview synthesis in chapter 6) that could potentially effect the initial NPD.

Due to the large share of software firms in the sample, an assessment of potential group differences between the software firms and the firms in other industries, although not initially planned, was therefore conducted throughout the analysis.

The next sections will address the research aims as stated in chapter 5.

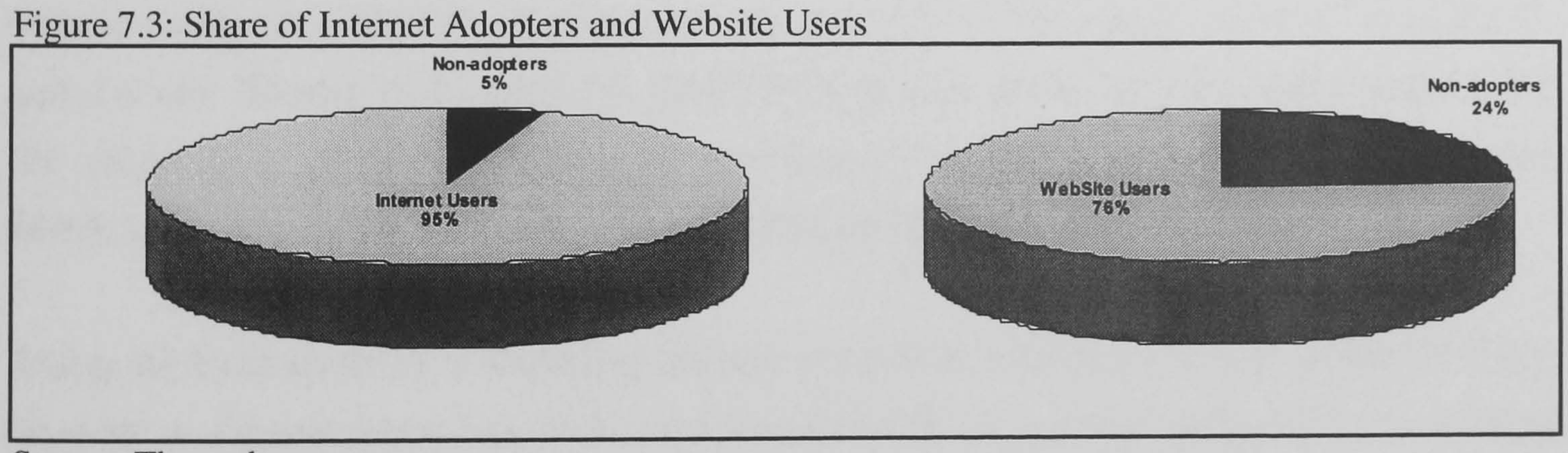
7.2.2 Research Aim 1: Internet Use and Its Determinants Among STBFs

This section addresses research aim 1: examining the current level of Internet use for international business and its determinants among STBFs. Each of its sub-sections addresses one of the specific research objectives relating to it.

7.2.2.1 Objective 1a: Describe the Level of Internet Adoption and Use

The assumption that the population of STBFs in science parks is rich in Internet adopters clearly holds as figure 7.3 indicates. Not only did the vast majority of STBFs use the Internet for business purposes (only 6 firms did not), but the majority of STBFs also possessed their own website.

Figure 7.3: Share of Internet Adopters and Website Users



Source: The author.

This overall high level of Internet adoption is also reflected in the various post-implementation and use indicators (see appendix 7.2).

Internal Internet Diffusion

Both measures to assess the internal diffusion of Internet use were high with means of 64% and 71%. An analysis of their respective histograms further showed that both

distributions are strongly skewed with complete internal diffusion (100%) exhibiting the highest grouping for both indicators. Indeed 40% of all respondents showed a perfect internal diffusion on both measures. Not surprisingly both measures were highly correlated (*Spearman's r = 0.78, p-value = 0.00*).

The indicators for the second post-implementation indicator used, routinisation of use, exhibited a more differentiated pattern. This already clearly indicated that binary use assessments are inappropriate.

The Post-Implementation Indicator "Routinisation of Use"

The first indicator, using the Internet for international personal communication (PCOMUSE), exhibited by far the highest level of use with a mean of 6.13 and 0% non-use. 62% of respondents actually gave it the highest possible value of "7" on the 7-point Likert scale. This clearly supports the previous literature that e-mail use is the highest form of Internet use among firms (Abell and Lim, 1996; Poon and Swatman, 1997; Abell and Black, 1997; Poon and Strom, 1997; Feher and Towell, 1997; DTI, 1998; Haynes et al, 1998; Teo and Tan, 1998). It also shows that it was a weak indicator to differentiate firms' use levels, at least among Internet use rich populations. It seems that just like the telephone, the fax and the PC before, e-mail use is a standard management communication tool among STBFs.

The second indicator, active search for IB information (INFOPULA), painted a similar picture, albeit slightly less extreme. It had the second highest use mean and the second lowest variance, with 40% of responses stating a "7" (65% stated a 6 or a 7) on the 7-point scale. Similar to PCOMUSE,(INFOPULA also seems to be a daily routine for the majority of STBFs. Just like the previous indicator, it did not discriminate use levels well. The other indicators were distributed differently.

Using the Internet to internationally advertise the firm and its products (INFOPUSH), in order to electronically link with international business partners (ELINKS) and using it in order to receive international business information (INFOPULP) was relatively evenly distributed across the 7-point scale. These use indicators seem to be better discriminators.

The e-commerce indicators (ECOMMER1 and ECOMMER2) exhibited the lowest use and the highest non-use levels. A finding that is in line with the argument made in chapter 4 that the typical products of STBFs (software firms excluded) are of little

e-commerce compatibility due to their complexity. Although both indicators were significantly correlated (*Spearman's r=0.53, p-value 0.00*), STBFs used the Internet more often to order foreign products than to sell their products on-line. Nevertheless, it was surprising that the non-use share was comparatively low. This observation might be due to the industry mix of the sample (see figure 7.2). 35% of STBFs were software firms, firms whose input factors (for example programming tools) and outputs are easily distributable over the Internet. In order to test this assumption a *t-test* was performed. Due to their high correlation the summed average of both e-commerce indicators was used as the test variable. The *t-test* revealed that e-commerce was indeed significantly higher among software firms (*t-value 4.38, p-value 0.00*), supporting the suggestion that e-commerce is product sensitive (Aldridge et al, 1997).

Internet Infusion

The third post-implementation indicator used, infusion, also reflected high levels of use among STBFs at the technology level. All adopters used the e-mail service, nearly all had access to the web (99%) and the vast majority had its own website (see figure 7.3). Even more sophisticated Internet-based services and technologies were used. 53% of firms had an intranet and 37% of firms had their own webserver. Use of other investigated Internet services was however rather the exception. 17% of firms utilised an extranet and videoconferencing, and Internet telephony was very rarely used (4% and 2% respectively). The average STBFs was infused with nearly 4 Internet-services (see appendix 7.2).

Internet Post-Inception Experience

The sample of STBFs was also comparatively experienced in using the Internet. Some firms even started to use the Internet since their inception. 23% of firms used the Internet since their inception. The sample's experience with a website was slightly lower. On average it was over half a year less and only 4% of firms had a website since their inception. Therefore, not surprisingly – and as already speculated in the informatory interview synthesis – the share of STBFs who have used the Internet prior to their internationalisation, the formative group, was relatively high with a share of 44.7%. Enough observations per group to allow analysing potential differences for STBFs who have used the Internet after starting their internationalisation, the supportive group, and those who have used the Internet prior to starting their internationalisation (the formative group).

Aspects of STBFs' Websites

With regards to the implementation and maintenance of their website, the majority of firms completely relied on their internal resources. 33% completely internalised their website development and maintenance and another 27% of firms utilised external support for the web server maintenance only. The rest was also internalised. Only 4% of firms have completely externalised their website development and maintenance. The internalisation measure thus offered little discriminatory value across the sampled firms.

With regards to the way the STBFs operate their websites, the following could be noticed. The majority of STBFs with a website investigated who accesses their website (IINVEST) on a monthly basis (the mode value). Only 12% of firms did so on an annual basis and only 6% on a daily basis. The main frequency of updating the information content on their websites (IUPDATE) was on a quarterly basis (the mode value). Daily updates were not stated and 15% of STBFs only updated their information content on an annual basis. The last item in the survey that assessed the way STBFs operate their website (IREGIS) addressed the important aspect of attracting visitors by facilitating the searchability of the site (Hoffman et al, 1995; Berthon et al, 1996; Kierzkowski et al, 1996; Pitt et al, 1996; Breitenbach and Van Doren, 1998; Long et al, 1998; Evans and King, 1999). Appendix 7.2 shows that this variable exhibited some unusual pattern. Not only was the number of missing values relatively high compared to the other variables – quite some firms noted a "?" in their survey response – but its variability was also extremely high. A stated maximum value of "1,000" clearly questions its content validity. It is very unlikely that 1,000 general search engines do actually exists on the Internet and that a firm did register with all of them. It seems rather more likely that the extreme values stated (only 8% of firms stated values higher than 100) are reflections of the increasingly popular use of web promotion tools (see for example: http://www.hello-engines.de). These software tools automatically register a firm's website to a vast number of search engines. If firms utilised such tools, it is clear that their stated number of search engines used was nothing more than an educated guess rather than the exact number.

The validity of the last two items will be assessed in section 7.3 by using an abbreviated version of the Multitrait-Multimethod Matrix (Campbell and Fiske, 1959). The assessment of how the level of website use impacts the synthesised international business dimensions will also be reported in section 7.3, when the observation-based variables will be discussed.

7.2.2.2 Objective 1b: The Internet Use Construct

From the above descriptives it becomes clear that different levels of Internet use existed among the sample of STBFs. In order to assess whether different levels of Internet use have different impacts, this section develops the level of use measure.

Instrument Validation: Level of Routinised Use for International Business

For the analysis all routinisation items, except PCOMUSE (international personal communication) and INFOPULA (active search for international business information) were used. The reason for their exclusion was their non-discriminatory nature as stated above. The validated industry wiredness construct (see section 7.2.2.3) was included to assess convergent and discriminant validity of the items included. This scale was chosen, because it exhibited the highest reliability of all constructs in the study. Note that the other constructs in the questionnaire were developed first to allow for an assessment of the discriminant validity of the routinisation items.

The initial reliability value for the routinisation construct was as high as 0.82, far beyond the recommended minimum of an α of 0.6 for exploratory research (Hair et al, 1998). The test also indicated that dropping any item would only lead to a decrease in the reliability of the overall construct.

The analysis of the correlation matrix for its factor analysis appropriateness revealed that the indicators fell within the feasible range for a factor analysis. All correlations but one were significant and the Kaiser-Meyer-Olkin measure of sampling adequacy was at a "meritorious" level (Backhaus et al, 1996; Hair et al, 1998) of 0.84. Thus, the variables were appropriate for the factor analysis.

The actual factor analysis revealed two factors (see table 7.3), with all the factor loadings greater than the suggested cut-off point of 0.50 (Backhaus et al, 1996; Hair et al, 1998). It explained 62% of the original variance, a satisfactory level in the social science (Hair et al, 1998). The inter-factor correlation was 0.55. A first indication that the wiredness construct is related to levels of Internet use. All items loaded high on their hypothesised construct and low on the other, giving support for the convergent and discriminant validity of the level of use construct. However, sub-dimensions within the use construct as defined in chapter 4 could not be detected. This either means that they do not exist as defined in chapter 4 or that firms tended to exhibit comparatively homogeneous use levels across all use items. But an analysis of the

intra-case item variance did not support this idea. For only 7% of firms was the variance 0 and for only 20% of firms was the variance below 1. Another reason might be the use of too few items per sub-dimension to clearly separate the strongly related use indicators. Still a more probable reason might be the low statistical power level of this analysis, increasing type II errors (Hair et al, 1998). If a small effect size – here the magnitude of the level of use intra-dimensional correlation differences – does exist, the low power level of this analysis was not able to detect it via the factor analysis. Assuming an α-level of .05 and a small effect size of .1, even a sample as large as 400 firms would not be enough to achieve the suggested power of .8. It would only be at a low .65 level (Cohen, 1988). This clearly suggests the need for future re-evaluations of the level of use construct and its potential sub-dimensions.

Table 7.3: Pattern Matrix Routinisation of Internet Use

	Factor	
	1	2
Routinised Internet Use Infopush	-.167	**.841**
Routinised Internet Use E-commerce1	.109	**.532**
Routinised Internet Use E-commerce2	.068	**.699**
Routinised Internet Use E-links	.114	**.605**
Routinised Internet Use InfoPull Passive	.046	**.684**
Industry Wiredness1	**.622**	.096
Industry Wiredness2	**.756**	.088
Industry Wiredness3	**.837**	-.004
Industry Wiredness4	**.764**	.071
Industry Wiredness6	**.788**	-.032
Industry Wiredness7	**.670**	-.070
Extraction Method: Principal Axis Factoring Rotation Method: Oblim with Kaiser Normalisation		

Source: The author.

In order to assess the nomological validity of the routinisation scale (Peter 1981), its surrogate variable (SROUTINE) was correlated with the other post-implementation indicators. Following diffusion of innovation theory (Saga and Zmud, 1994; Rogers, 1995), these indicators should exhibit a significant and positive correlation.

Table 7.4: Nomological Validity: Level of Use Construct Correlations

	SROUTINE (surrogate variable: summed average scores)
INFUSION (infusion with Internet technology)	.4783**
SINTDIFF (summed score of both internal diffusion indicators)	.4166**

** *Spearman's R*, significant at the 0.01 level (1-tailed significance).
Source: The author.

Table 7.4 clearly supports this. The level of use construct positively correlated with the post-implementation measures at a significant level. Hence, the level of use measure exhibited good reliability and validity for its exploratory stage and, taking the above stated limitations into consideration, could thus be used for subsequent analyses. An additional, across methods validity assessment of this construct will be presented in section 7.5.2.

7.2.2.3 Objective 1c: The International Wiredness Construct

The research framework as laid out in chapter 5 assumed that Internet use levels for international business depends upon the technical entrepreneurs' perception of its usefulness. Due to the Internet's network sensitivity (Markus, 1987), it was argued that the perceived use among international business partners (peer wiredness) and the industry as a whole (industry wiredness) influences the use levels among STBFs. If the perceived wiredness level is low, it was argued that the perceived usefulness and subsequent use levels would be low, too. An argument that was already empirically supported in non-international contexts (Abell and Lim, 1996; Coyne et al, 1996; Poon and Swatman, 1997; Sillince et al, 1998). In order to assess this thesis empirically in an international context, the international wiredness construct needed to be developed.

From the univariate overview (see appendix 7.3) it can be seen that the respondents regarded the overall availability of international business information, industry wiredness, differently. While information about technology and competitors was above the scale mean, all other items, particularly information on how to conduct international business activities, ranked low. Also, the average of the level of perceived international peer wiredness, particularly item 1, was higher than industry wiredness.

Before examining why the wiredness perception differed across firms and how it impacted their use levels, the following section will assess the reliability and validity of the instruments to determine its applicability for subsequent analyses.

Instrument Validation: International Industry and International Peer Wiredness

The initial value for the industry wiredness reliability was as high as 0.90. The initial value for the peer wiredness reliability was also high with an α of 0.75. Particularly taking the test's sensitivity towards the number of indicator variables into consideration (Hair et al, 1998). However, with regards to the industry wiredness construct, the test also indicated that dropping item 5 (information about foreign technology on the Internet) would slightly increase the reliability of the construct to an α of 0.903. Since

this increase is only minor, it was decided to depend the decision on whether to drop this item on the results of the factor analysis.

The correlation matrix analysis showed that the variables were appropriate for a factor analytical investigation. All correlations were significant at the 0.05 level of significance and the Kaiser-Meyer-Olkin measure of sampling adequacy was at a "meritorious" level (Backhaus et al, 1996; Hair et al, 1998) of 0.85.

The factor analysis itself revealed two factors as expected (see appendix 7.4), with all the factor loadings greater than the cut-off point of 0.50 (Backhaus et al, 1996; Hair et al, 1998). It explained 62.78% of the original variance. The inter-factor correlation of 0.56 gave first empirical support that both measures are related. All items loaded high on their hypothesised construct and low on the other, giving support for the convergent and discriminant validity of the wiredness construct and its two sub-dimensions. However, one item (industry wiredness 5) just passed the cut-off point with a loading of 0.51. The very same item that did slightly decrease the reliability of the industry wiredness construct.

Since the reproductive fit of this initial factor solution was not very high with 40% non-redundant residuals with absolute values above 0.05 (Sharma, 1996). The model was re-estimated by dropping the industry wiredness item 5.

Overall, the re-estimated model fared slightly better. The explained variance increased from 62.76% to 66% and the reproductive fit increased by reducing the residuals above the suggested 0.05 value from 40% to 27% of. The actual factor structure was very similar to the initial model (see table 7.5).

Table 7.5: Re-estimated Wiredness Pattern Matrix

	Factor	
	1	2
Industry Wiredness1	**.669**	.049
Industry Wiredness2	**.731**	.112
Industry Wiredness3	**.897**	-.083
Industry Wiredness4	**.832**	-.024
Industry Wiredness6	**.800**	-.058
Industry Wiredness7	**.581**	.082
Peer Wiredness1	.011	**.655**
Peer Wiredness2	-.077	**.875**
Peer Wiredness3	.222	**.545**
Extraction Method: Principal Axis Factoring Rotation Method: Oblim with Kaiser Normalisation		

Source: The author.

This left the researcher with the difficult decision of whether to drop item 5 or not. The differences between both models were marginal but for the increased reproductive ability of the re-estimated model. But since the actual semantic item content (technology) suggested it to be less of a perceptual low-use determinant, as further indicated by its high mean value (see appendix 7.3), it was decided to use the re-estimated model rather than the initial model.

In contrast to the previous scale assessment, the nomological validity of the scale was not assessed due to a lack of a strong theoretical reference point and the fact that its impact on levels of Internet use will be explored separately later on.

Overall, the international wiredness measure exhibited high reliability and item validity for its exploratory stage and its surrogate variable for each wiredness sub-dimension (SINDWIR and SPEERWIR) could thus be used for subsequent analyses.

7.2.2.4 Objective 1d: Wiredness as a Determinant of Levels of Use

In order to assess the proposition that perceived international wiredness levels influence Internet use levels for international business purposes empirically, the level of use construct was regressed on both wiredness dimensions.

In order to control for potentially significant effects of outliers effecting the regression estimates, an analysis of influential observations was performed. The analysis of influential observations was based on the diagnostic measures suggested by Hair et al (1998). This analysis identified 7 cases that were consistently identified across the various diagnostic measures. Out of these 7 cases three cases did not follow the general direction of the regression equation, that is either low levels of use with high wiredness perceptions or high use levels with low wiredness perceptions. The remaining 4 cases showed clear response style effects (Hair et al, 1998), for example indicating a "7" on all industry wiredness items. All influentials were excluded for a re-estimated model. Table 7.6 shows the results of the influentials-free model.

Table 7.6: Re-estimated Level of Use Regression Model

Equation Number 1: Dependent Variable SROUTINE

Block Number 1. Method: Enter, SINDWIR, SPEERWIR

Variable(s) Entered on Step
1. SPEERWIR
2. SINDWIR

		Analysis of Variance			
			DF	Sum of Squares	Mean Square
Multiple R:	.83800	Regression	2	191.13347	95.56674
R Square:	.70224	Residual	87	81.04475	.93155
Adjusted R Square:	.69539				
Standard Error:	.96517				

F = 102.58908, Signif F = .0000

---------- Variables in the Equation ----------

Variable	B	SE B	Beta	Tolerance	VIF	T	Sig T
SINDWIR	.529156	.107269	.343279	.706771	1.415	4.933	.0000
SPEERWIR	.799269	.092569	.600846	.706771	1.415	8.634	.0000
(Constant)	-2.024815	.399751				-5.065	.0000

End Block Number 1 All requested variables entered.

Source: The author.

Based on the re-estimated model it became evident that Internet use levels were indeed significantly influenced by the technical entrepreneur's international wiredness perception. However, although both wiredness sub-dimensions were significant, the magnitude of the sub-dimension international peer wiredness on use levels was nearly twice as high as the international industry wiredness sub-dimension. This gives strong empirical evidence that in marketspace, use levels for international business are more determined by the marketspace-embeddedness of international business partners rather than the marketspace-embeddedness of the overall industry. This observation is also supported by the high levels of Internet use for communication purposes (see appendix 7.2). Such a use is not viable if the international peer wiredness is low.

In order to control for potential effects of the large share of software firms in the sample, group differences were assessed for use levels and the wiredness perception. A *t-test* revealed that software firms exhibited higher levels of Internet use (*t-value -3.74, p-value 0.00*) and their perceived peer wiredness was higher compared to firms in other industries (*t-value -2.04, p-value 0.04*). Significant differences with regards to the wiredness perception at the industry level could not be found. Group differences for the formative group could not be found either.

7.2.2.5 Objective 1e: Experience as a Determinant of Use Levels

In chapter 4 it was argued that the accumulated experience with the new medium Internet is an important factor, due to its knowledge specificity in information acquisition (Choudhury and Sampler, 1997) and experience sensitive channel expansion effects (Carlson and Zmud, 1999). Therefore, experience with using the Internet (WEBEXP) and experience with using a website (WEBPEXP) was incorporated into the previous analysis. The goal was to empirically explore whether experiential factors directly or indirectly influence the observed use levels.

The regression analysis of the previous section was used in order to assess a potential direct impact of experience on levels of Internet use for international business. Both experience variables were added to the regression equation as additional explanatory variables.

The results showed that neither of the experiential factors entered the equation as a significant determinant of levels of use (WEBEXP *t-value -.50, p-value .62*; WEBPEXP *t-value -1.46, p-value .15*). If entered separately (both variables strongly correlated; *r=0.72, p-value 0.00*) to reduce problems associated with multicollinearity, no significant level could be achieved either (highest level of significance: WEBEXP *t-value 1.81, p-value 0.07*).

The above regression equations were further examined to control for potential moderator effects, in order to examine whether the two experiential factors are more of an indirect nature. Both wiredness variables, each experience variable separately (two avoid multicollinearity problems) and their respective two-way interaction terms were entered into the regression equation. The result of this moderated multiple regression analysis showed that no interaction effect could be observed. Both interaction terms were insignificant (b_4 *t-value –1.130, p-value .2580*; b_5 *t-value 0.904, p-value .3686*).

Experience as a Determinant of International Wiredness Perceptions?

The above analysis showed that experiential factors did, surprisingly, not significantly influence levels of use. At least when experience was operationalised the way it was here (for further detail see 7.2.2.6). However, it might thus be that experiential factors determine the perceived wiredness levels among STBFs. A potential relationship that can again be grounded in the found knowledge-specificity of information acquisition on the Internet (see chapter 2) and the potential "communication space"-effect of increases in a firm's number of contacts that unfold over time (Contractor and

Eisenberg, 1990). In order to assess this, both wiredness dimensions were subjected to a regression analysis, with the two experiential factors as explanatory variables.

The results showed that experiential factors did indeed influence wiredness perceptions, although both factors explained only a very small proportion of the wiredness variance (see table 7.7). While both factors entered simultaneously in each regression equation did not show significant levels, entered separately they did. Surprisingly however, each experiential factor correlated significantly with a different wiredness dimension.

Table 7.7: Experiential Factors and Wiredness Perception

Equation Number 1: Dependent Variable SINDWIR			
	t-value	p-value (= Sign. F-value)	Adjusted R Square
WEBPEXP	2.109	.0383	.04342
Equation Number 2: Dependent Variable SPEERWIR			
	t-value	p-value (= Sign. F-value)	Adjusted R Square
WEBEXP	2.147	.0343	.03626

Source: The author.

International industry wiredness was only significantly influenced by experience with a website, while international peer wiredness was only significantly influenced by experience with using the web in general.

Moreover, group differences for the formative group and software firms were assessed with regards to their experience with the Internet. A *t-test* revealed that software firms were more experienced Internet users with regards to both website use (*t-value -2.26, p-value 0.03*) and web use (*t-value -1.99, p-value 0.05*). The formative group only showed significant differences for web use (*t-value -3.67, p-value 0.00*). The formative group of STBFs was more experienced with using the Internet than the supportive group of STBFs. The latter finding is particularly interesting since it was also found that the formative group was significantly younger than the supportive group (*t-value 2.17*; *p-value 0.03*). At first sight a rather surprising and puzzling finding, because the older a firm is the more time it should have had on average to accumulate marketspace experience. But plotting STBFs' inception to Internet adoption time lags across the age of firms revealed a nearly perfect straight line (r = *-0.90*; *p-value 0.00*). This strongly suggests that the younger the STBFs were, the earlier they started to use the Internet, with the inception to adoption time lag approaching 0 (instant Internet adoption).

7.2.2.6 Synthesis Research Aim 1

The examination of the current Internet use levels for international business among STBFs clearly showed that the assumption that the sample of the selected population is rich in Internet adopters holds. Only 6 cases did not use the Internet at all and only 24% of firms had not yet adopted their own website. This richness in Internet adoption allowed for an assessment of differences in use levels, which could be captured in a valid and reliable instrument. Even though the suggested use sub-dimensions could not be empirically demonstrated, the captured variety in use levels allows for the subsequent assessment of its impacts. This is an important achievement, since it allows for the first time for a non-binary assessment of the potential role and impacts of Internet use in international business.

The findings could also demonstrate that the network sensitivity of the Internet (Markus, 1987) also played an important role as a use determinant in an international context. Especially the perceived international peer wiredness significantly and strongly – twice as strongly as international industry wiredness – determined use levels across the STBFs.

Although initially not planned, interesting sectoral differences could also be found. Software firms exhibited various significant group differences compared to STBFs in other industries. Their levels of e-commerce were higher, their overall Internet use for international business was higher, they were more experienced in using the Internet and their perceived peer wiredness was higher. This already gives a clear indication for future research to focus more on investigations at the industrial level, in addition to this thesis' focus on the firm and management level.

Another interesting finding with regards to group differences is the finding that the formative group was significantly more experienced in using the Internet despite being significantly younger. The related finding of decreasing inception to Internet adoption time spans could therefore indicate that in recent years STBFs initial internationalisation has become more and more influenced by marketspace factors.

The last key finding relating to research aim 1 is the relatively unimportant role of experience with the medium Internet. Experience did not significantly influence use levels and its influence as a determinant of wiredness perceptions was only very small. This is a very interesting finding, since it is in direct contrast to the arguments and

theories put forward in chapter 4. However, the operationalisation of Internet experience only captures one of the several experience dimensions as for example conceptualised by Smith et al (1999). It might well be that the other experience dimensions are more influential with regards to use level. Furthermore, taking Reuber and Fischer's discussion of the experience construct in a different context into consideration (Reuber and Fischer, 1999), the view of experience as a stock of gained experience (length or duration of experience) might not be appropriate in this context. It might be more appropriate to view experience as a stream. A view, which suggests that it is the quality of particular, experiences that matter rather than its mere quantities (Reuber and Fischer, 1999). Yet another possible reason might relate to the specifics of the population. As elaborated upon in chapter 2, STBFs often emerge from within the technological environment of a country, with the incubator organisation playing an influential role. This pre-state of the STBF might have already endowed the STBFs with high levels of Internet experience. The assessment of the potential effects of the pre-state of STBFs in research aim 3 will clarify this argument. Moreover, it has to be remembered that the experience measure related to Internet experience in general, while the use measure did not relate to use in general but to international use in particular. Despite its global nature, firms might not necessarily have used it for international business purposes since adoption. Last but not least it might be that the Internet is a rather easy to use new medium with low learning barriers, despite the arguments put forward in chapter 4. Experience would therefore play only a minor role and other use determinants like social influences (Taylor and Todd, 1995; Karahanna and Straub, 1999; Venkatesh and Davis, 2000) become more important. The post-survey interview will explore the role of experiential factors among STBFs further, in order to clarify its role and the validity of the possible arguments made above.

7.2.3 Research Aim 2: The Internationalisation Characteristics of STBFs

After examining Internet use among STBFs, this section examines the second key dimension of interest: the internationalisation characteristics of STBFs.

7.2.3.1 Objectives 2a and 2b: The International Business Attitude and Resources Constructs

Appendix 7.5 lists the various indicators used for the international business attitude and resources construct. It shows that the sample of STBFs exhibited a slightly above average (the scale mean) international orientation. Only item 3 ("International Markets are more profitable than the domestic market") fell below the scale mean. Appendix 7.5

also shows that the slightly more future-oriented items 4 and 5 ("We need to address foreign markets pro-actively before our technologies become obsolete" and "We need to address foreign markets pro-actively before our competitors catch up") had the highest means. This is potentially an additional reflection of the finding in the exploratory interview stage that STBFs regarded the role of international business as increasing in the future.

With regards to the resource-related items, appendix 7.5 shows that the presence of human resources related items 2 and 3 ("Our top management does not have the time to really focus on international opportunities" and "Our current staff has the necessary expertise to assess foreign market opportunities") was stronger (on average over 1 scale point) than the presence of financial (item 1) and planning (item 4) resources. Particularly the planning item ("We regularly conduct a systematic analysis of foreign market opportunities") exhibited a low mean value compared to the other scale items. This indicates that although on average STBFs regarded IB as important and although they considered to have the necessary human resources to pursue their international business activities, they did so in a less planned and structured way. This mirrors the rather unplanned and opportunistic internationalisation of STBFs in previous studies (Coviello and Munro, 1992), as well as the internationalisation of small firms in general (OECD, 1997).

Instrument Validation: IB Attitude and Resources Construct

It was proposed in the synthesis of the literature review that the degree of a positive attitude towards international business operations and the existence of a supportive resource-base for international business operations are influential in the internationalisation process of the firm. In order to examine this, the instrument used to measure both constructs will be developed and assessed below.

The initial value for the attitudinal construct reliability was an α of 0.79, exceeding the recommended minimum of an α of 0.6 for exploratory research (Hair et al, 1998) and also higher compared to the α of 0.65 in the original scale (Preece et al, 1998). That this was not due to the added item – Cronbach's α is sensitive towards the number of indicators (Hair et al, 1998) – can be seen in appendix 7.6. Even if the added item (item 5) were dropped, α would still be higher as the original scale (at 0.73). The initial value for the resources construct reliability was 0.70, also beyond the recommended minimum, as well as exceeding the reliability of the original scale (0.65).

However, with regards to the international business (IB) attitude construct, the test also indicated that dropping item 3 ("International markets are more profitable than the domestic market") would slightly increase the reliability of the construct to an α of 0.80. Since this increase was only minor, it was decided to depend the decision on whether to drop this item on the results of the factor analysis.

The analysis of the correlation matrix for its factor analysis appropriateness revealed that all but 8 correlations (22%) were significant at the 0.05 level of significance and the Kaiser-Meyer-Olkin measure of sampling adequacy was at an acceptable "middling" level (Backhaus et al, 1996; Hair et al, 1998) of 0.71. Overall, the correlation matrix was therefore appropriate for a factor analysis.

The actual factor analysis revealed two factors as expected (see appendix 7.7). However, two items (IBATTI3 and IBRES4) failed to achieve loadings greater than the suggested cut-off point of 0.50 (Backhaus et al, 1996; Hair et al, 1998). Additionally, the factors explained only 55% of the original variance, below the recommended level of 60% (Hair et al, 1998). The inter-factor correlation was 0.282 showing that both dimensions were positively related, although not strongly. All items loaded higher on their hypothesised variable and lower on the other, giving support for the convergent and discriminant validity of the constructs' items. But because two items failed to load above the minimum loading level, particularly since one of them (IBATTI3) also reduced the reliability of the attitude scale, a second model was tested dropping both items. The low reproductive fit of the model, with 50% non-redundant residuals with absolute values above 0.05 (Sharma, 1996), further supported this re-estimation.

Overall, the re-estimated model fared better. The explained variance increased from 55% to 62.73% and the reproductive fit increased by reducing the residuals from 50% to 38%. The actual factor structure was very similar to the initial model. This time all items loaded above the suggested cut-off point of 0.5 (see table 7.8).

Table 7.8: Revised Pattern Matrix IB Attitude & Resources

	Factor	
	1	2
IB Attitude 1	**.521**	.311
IB Attitude 2	**.645**	.177
IB Attitude 4	**.887**	-.101
IB Attitude 5	**.760**	-.128
IB Resources 1	.043	**.642**
IB Resources 2	-.046	**.661**
IB Resources 3	-.068	**.521**
Extraction Method: Principal Axis Factoring Rotation Method: Oblim with Kaiser Normalisation		

Source: The author.

While the decision to drop item IBATTI3 could be further supported by its semantic content – why should foreign markets in high-technology products per se be more profitable than the German home market? – dropping item 4 of the resources scale (IBRES4) would have the negative effect of reducing the overall reliability of the scale to an α of 0.67 (see appendix 7.6; note that in another factor model that only dropped IBATTI3, IBRES4 also loaded below the minimum level of 0.50). However, since the increase in the construct validity as revealed in the factor analysis was greater than the 0.04 loss in reliability (still above the reliability of the borrowed scale), it was decided to use the re-estimated model for subsequent analyses.

In order to assess the nomological validity of both scales (Peter 1981), their surrogate variables (SIBATTI and SIBRES) were correlated with other organisational and IB indicators derived from theory. Following internationalisation theory (see chapter 3), firms' international orientation should increase as they increase their international involvement and exposure. Therefore, SIBATTI should exhibit a significant and positive correlation with the two behavioural involvement indicators number of foreign markets served (IBDIVERS) and the international turnover intensity of the firm (IBINTENS).

Chapter 2 showed that as firms develop over time they tend to increase in size (employees/ turnover), which in turn endows them with additional internal resources (liabilities of smallness thesis). Larger STBFs firms should therefore exhibit a higher resource-base compared to smaller STBFs, assuming that larger STBFs do not completely focus on their domestic market (implying a high resource-base for their domestic business and a low resource-base for international business activities). However, taking the characteristics of STBFs' – like early internationalisation needs (see chapter 3) – into consideration, it can be argued that this assumption is well grounded. Therefore, SIBRES should exhibit a significant and positive correlation

with the two size indicators number of employees (FTENOW) and annual turnover. Moreover, SIBRES should also increase as the firm increases its involvement, since the international activities themselves can endow a firm with IB resources in a reciprocal fashion. Therefore, SIBRES should also exhibit a significant and positive correlation with the two behavioural involvement indicators number of foreign markets served (IBDIVERS) and the international turnover intensity of the firm (IBINTENS).

Table 7.9: Nomological Validity: IB Attitude & Resources Scale

	SIBATTI	SIBRES
IBINTENS (International Business turnover intensity in % of total turnover)	**.420****	**.458****
IBDIVERS (diversity (number) of served foreign markets)	**.272****	**.195***
FTENOW (size of the firm in number of full-time employees)	.115	**.217***
TURNOVER# (annual turnover)	.080	**.308****

* significant at the 0.05 level, ** significant at the 0.01 level (1-tailed significance).
# the turnover correlation coefficients are based on *Spearman's r*, due to its ordinal scaling.
Source: The author.

Table 7.9 supports the assumed positive correlations. Both developed constructs correlated positively with the theoretically derived variables. Although the magnitude of the correlations was not very high, all were significant at the stated significance levels. Thus, further support for the validity of both constructs was clearly established.

Overall, both scales exhibited acceptable levels of reliability and validity for its exploratory stage and could thus be used for subsequent analyses.

Significant differences for both constructs with regards to the software firms in the sample or the formative group of firms could not be found.

7.2.3.2 Objective 2c: The Level of Internal International Information Construct

The perceived level of internal international business information of the sampled STBFs was on average comparatively high (see appendix 7.8). Only 3 of the 7 indicators were slightly below the scale mean. This was possibly due to the fact that all firms were already involved in international business operations. Not surprisingly the item capturing this, that is the more operational side of international information barriers (item 7), exhibited the third highest mean. The overall highest perceived level of information was information about foreign technologies (item5). Again, this is not surprising taking into consideration that technology is the core business of STBFs (see

chapter 2). The lowest perceived level of internal international business information was information about foreign intermediaries. A potential explanation for this is the observation reported below (see section 7.2.3.3) that the sampled STBFs tended to use mostly direct methods of conducting their international business operations. A correlation analysis supported this notion. STBFs using more direct international business modes perceived less an amount of internal information about foreign intermediaries (*Spearman's r=0.29, p-value 0.02*).

Instrument Validation: Level of Internal International Business Information

In order to assess the quality of the instrument used to scale the perceived level of internal international business information, the previously validated international business attitude scale and its items were incorporated to assess the convergent and discriminant validity of the internal information items.

The initial reliability for the information instrument was as high as 0.90. The test also indicated that dropping item 5 (lack of information about foreign technology) would marginally increase the reliability of the construct to an α of 0.904. But since this increase was only minor and the level of reliability was very high anyway, it was decided to depend the decision on whether to drop this item on the results of the factor analysis.

The correlation matrix exhibited an acceptable level of appropriateness for a factor analytical investigation. All correlations but 14 (25%) were significant at the 0.05 level of significance and the Kaiser-Meyer-Olkin measure of sampling adequacy was at an acceptable "middling" level (Backhaus et al, 1996; Hair et al, 1998) of 0.79, just missing the "meritorious" status.

The actual factor analysis itself revealed two factors as expected (see table 7.10), with all the factor loadings greater than the cut-off point of 0.50 (Backhaus et al, 1996; Hair et al, 1998). It explained 63.55% of the original variance, a satisfactory level (Hair et al, 1998). The inter-factor correlation was (expectedly) positive at 0.236. All items loaded high on their hypothesised construct and low on the other, giving support for the convergent and discriminant validity of the level of internal information construct items. The slightly reliability decreasing item 5 also loaded above the recommended minimum. Thus, there seemed to be no strong indication to re-estimate the factor model by dropping item 5.

Table 7.10: Pattern Matrix Level of Information & Business Attitude Scale

	Factor	
	1	2
Level of IB Information 1	**.720**	-.188
Level of IB Information 2	**.733**	-.080
Level of IB Information 3	**.823**	-.034
Level of IB Information 4	**.849**	.064
Level of IB Information 5	**.574**	.055
Level of IB Information 6	**.816**	-.046
Level of IB Information 7	**.699**	.097
IB Attitude 1	-.106	**.580**
IB Attitude 2	-.102	**.703**
IB Attitude 4	.108	**.861**
IB Attitude 5	.065	**.698**
Extraction Method: Principal Axis Factoring Rotation Method: Oblim with Kaiser Normalisation		

Source: The author.

In order to assess the nomological validity of the information barrier scale (Peter 1981), its surrogate variable (SINFOS) was correlated with the perceived lack of international business contacts (IBCONTAC), the turnover intensity of international business operations (IBINTENS) and the number of countries entered (IBDIVERS). But for the perceived lack of international business contacts, all variables were expected to be positively correlated with the level of information construct. These assumptions were again grounded in internationalisation theory (see chapter 3), postulating that firms' stock of international business information increases as they increase their international involvement and exposure, as well as the observation that small firms usually rely on personal contacts as sources for information (Specht, 1987; Smeltzer et al, 1988; Julien, 1995; Walters, 1996; Pineda et al, 1998).

Table 7.11: Nomological Validity: Level of Internal Information Scale

	SINFOS
IBCONTAC (perceived lack of international business contacts)	**-.495****
IBDIVERS (diversity (number) of served foreign markets)	**.217***
IBINTENS (international business intensity in % of total turnover)	**.401****

* significant at the 0.05 level, ** significant at the 0.01 level (1-tailed significance).
Source: The author.

Table 7.11 gives strong support for the nomological validity of the lack of information construct. Not only did all theory derived variables correlate significantly with the construct, they also did correlate in the postulated direction. With increasing international exposure the perceived level of internal international business information

increased and the perceived lack of international business contacts decreased as the level of internal information increased.

In summary it can be concluded that the level of information measure exhibited high reliability and validity for its exploratory stage and can thus be used for subsequent analyses. Its surrogate variable (SINFOS) will be used for subsequent analysis.

Significant differences for this construct with regards to the software firms in the sample could not be found. The perceived level of information barriers did not significantly differ for the software firms. Significant differences were however found for the formative group of STBFs. This group perceived lower levels of internal information compared to the supportive group of firms (*t-value -2.60, p-value .01*). The reason for this finding was uncovered during the assessment of the next research objective, showing that the supportive group was less involved in international business operations.

After the various international business constructs were validated, the following two sections identify and assess the internationalisation of STBFs.

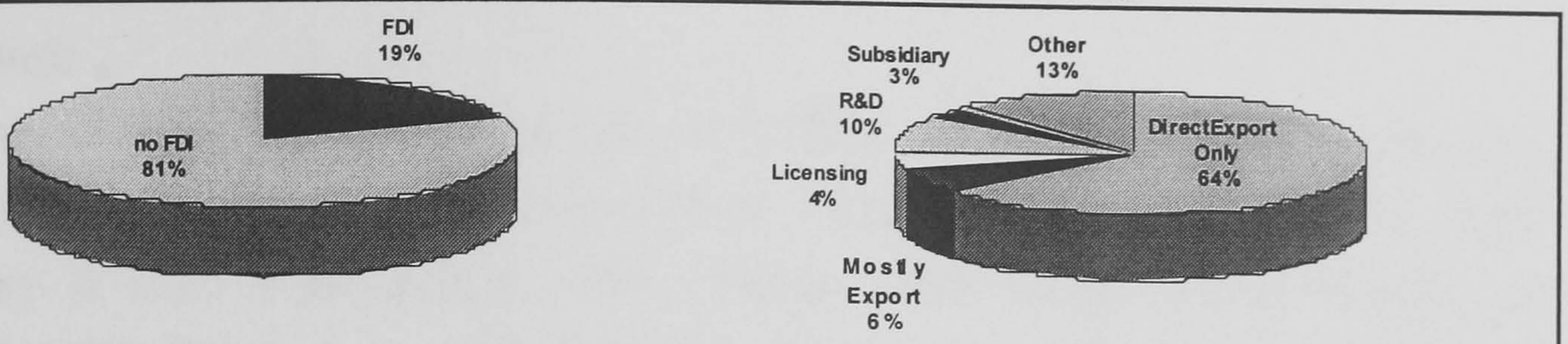
7.2.3.3 Objective 2d: Manifestations of STBFs' Internationalisation

Appendix 7.9 gives an overview of the various international business indicators used. Despite their smallness in employee and turnover terms (see table 7.1 and 7.2), the STBFs' international exposure was quite high. On average, they derived 25% of their turnover from international activities, they had over 4 years of international business experience and they did business in slightly over 4 foreign markets. However, appendix 7.9 also shows that the number of firms serving more than 2 markets (in order to assess the speed of internationalisation) was much lower than the total number of responding firms. The mean value for the number of markets entered was therefore not very informative. The mode value for IBDIVERS was 1 country – actually, the number of firms dealing with two markets is as high with 18.4% of cases – and 50% of the firms dealt with only up to 3 foreign markets. Hence, the majority of firms were dealing with only a limited number of countries.

The vast majority of firms utilised direct modes (54.6% use direct modes only). Direct exporting constituted the main mode used (see figure 7.4), with 41% of direct exports to foreign intermediaries. Particularly service intensive STBFs utilised a significantly higher share of direct modes (*Spearman's correlation coefficient r=.44, p-value .00*),

the only significant difference service intensity showed on the internationalisation of STBFs. This was not a surprising finding taking the specifics of service firms in international business into consideration (see for example Buckley et al, 1992). A previous comparative empirical study actually showed that service firms use more direct modes (Chadee and Mattsson, 1998).

Figure 7.4: Share of FDI and Predominant International Business Modes Used



Source: The author.

Significant group differences were found as well. Both, the software firms as well as the formative group, used significantly more direct internationalisation modes (*z-value –2.00, p-value .04* and *z-value –2.15, p-value .03* respectively). The main reason for this finding was that both groups were also significantly more service intensive (*t-value –4.30, p-value .00* and *t-value –2.37, p-value .02* respectively).

Mode Progression

Another aspect of the internationalisation of firms is their mode progression within a foreign market (see the internationalisation vector in chapter 3). Traditional internationalisation theory argues that firms progress from less committing to more committing modes. However, chapter 3 also argued that such deterministic mode typologies are out of date due to empirical findings to the contrary. Unfortunately, little can be said with regards to the mode progression of the sampled STBFs. The majority of STBFs did not progress intra-country wise but inter-country wise (see appendix 7.10). Only 20% of STBFs progressed within their first market, 17% progressed within their second market and 10% progressed within their third foreign market. While exporting, mostly direct exporting, was the dominant mode, contractual R&D and licensing were also common first modes, at least for the first two markets. Even FDI, considered to be the last mode in traditional establishment thinking, was sometimes the very first country mode used by STBFs.

In summary, taking the limitations stated above into consideration, no clear pattern supporting the deterministic stage theories could be found.

7.2.3.4 Objective 2e: Determinants of STBFs' Internationalisation

Despite the survey's cross-sectional nature, some of the international business indicators used reveal the actual timely process of the internationalisation. In order to move beyond the mere descriptives of the previous section, this section tries to explain the internationalisation dimensions earliness, speed, diversity and intensity of the sampled STBFs.

IB Earliness

As shown in appendix 7.9, the sample of STBFs internationalised relatively early, supporting the previous literature on STBFs' internationalisation (Lindqvist, 1991; McKinsey & Co., 1993; Rennie, 1993; Fujita, 1995; Oakey, 1995; Knight and Cavusgil, 1996; Keeble et al, 1997; OECD, 1997; Burgel and Murray, 2000). Indeed, nearly 10% of firms (9.4%) were instant internationalisers and nearly 35% (34.4%) did internationalise within their first year of operation. This share further increased if their initial product development phase (NPD) was considered (IBEARLI2). 32.6% of firms did internationalise instantly and 58.4% internationalised within their first post-NPD year.

In order to assess what determined the earliness of internationalisation, a simple regression analysis was performed using the organisational age of the firm as a regressor. Past studies have shown that the internationalisation process is starting earlier and it is accelerating (see for example Nordström, 1990; Lindqvist, 1991; Oviatt and McDougall, 1998). Younger firms start their international operations at an earlier stage than older firms do. A second potential regressor is previous international experience of the management team (Reuber and Fischer, 1997). Since this variable relates to research aim 3, its potential impact will be further analysed there. Other potentially influential variables like the international attitude and resources of the STBF are not considered here due to their different time frame. Their past pre-international levels might have been completely different to their present post-international levels.

The results of the regression gave strong support for the previous findings. Earliness in internationalisation was indeed strongly influenced by the age of the firm (*adj.* R^2 *0.32; Beta 0.58; t-value 6.70, p-value 0.00*). The younger firms in the sample internationalised earlier than their older counterparts. Taking the influential initial product development process into consideration (IBEARLI2) revealed a similar albeit less strong relationship (*adj.* R^2 *0.08; Beta 0.31; t-value 2.93, p-value 0.00*). The difference could indicate that older firms in the sample tended to exhibit longer initial

product development phases. However, the data did not support this notion (*r=0.12, p-value 0.13*). Thus, it rather indicated international business activities of the younger STBFs prior to finalising the first product (see negative values for IBEARLI2 in appendix 7.9; 19% of firms did actually start their internationalisation prior to finalising their first product).

Significant industry group differences for software firms or the formative group of STBFs with regards to their earliness of internationalisation could not be found.

IB Speed

As stated above, previous research has also shown that the speed of internationalisation is increasing (see above). Following the same assessment as above, the regression analysis also supported this internationalisation dimension. Younger STBFs in the sample not only internationalised earlier, but they also internationalised at a faster pace (*adj. R^2 0.31; Beta 0.57; t-value 5.08, p-value 0.00*). Taking the initial product development process into consideration (IBSPEED2), the analysis revealed an even stronger relationship (*adj. R^2 0.47; Beta 0.70; t-value 6.85, p-value 0.00*). The strong change indicates that STBFs with longer initial NPDs internationalised faster, possibly to recoup their upfront investments faster by addressing more markets. A significant negative correlation between NPD and IBSPEED2 (*r=-0.32, p-value 0.01*) and a significant positive correlation between NPD and IBSPEED1 (*r=0.29, p-value 0.02*) seem to support this.

Significant industry group differences for software firms or the formative group of STBFs with regards to their speed of internationalisation could not be found.

IB Diversity and IB Intensity

The diversity of the international business activities of STBFs was captured by the number of foreign markets they were dealing with and was described above (see appendix 7.9). Since this indicator was related to the present situation of the firms, additional potential determinants were considered. Following the literature review on the internationalisation of the firm, the international attitude of the firm (Dichtl et al, 1990), its international resource-base (Preece et al, 1998) and its gained international experience (Johanson and Vahlne, 1990) were considered as potentially influential predictors of international business diversity. The potentially influential existence of past pre-state international business experience within the management team (IBEXP1 and IBEXP2) will be considered in the section addressing research aim 3 (see section

7.2.4). Table 7.12 shows the result of the regression analysis. All variables but the resource-related variable significantly influenced the number of international foreign markets served. More internationally experienced and oriented firms served more foreign markets, relatively regardless of their internal resource-base.

While this does not necessarily imply a strict unidirectional cause-effect relationship (Bonaccorsi, 1992), it does support the importance of operational experience and a positive attitude towards international business operations. Surprisingly, the resource-base did not significantly influence international diversity, despite its positive association with the resource-base at the bivariate level (see table 7.9). Resource-richer STBFs did not necessarily deal with more foreign markets than resource-poorer STBFs. This was further supported by a tested re-estimation of the model that included the crude resource indicators age and size. Both indicators also failed to significantly relate to foreign country diversity (AGE: *t-value -1.09, p-value .28*; FTENOW (size): *t-value 1.10, p-value .27*).

Table 7.12: Regression of IBDiversity

Equation Number 1: Dependent Variable IBDIVERS
Method: Stepwise

		Analysis of Variance			
Multiple R:	.49977		DF	Sum of Squares	Mean Square
R Square:	.24977				
Adjusted R Square:	.23310	Regression	2	2.61750	1.30875
Standard Error:	.29556	Residual	90	7.86197	.08736

F = 14.98192, Signif F = .0000

---------- Variables in the Equation ----------

Variable	B	SE B	Beta	Tolerance	VIF	T	Sig T
SIBATTI	.058945	.019872	.271201	.997213	1.003	2.966	.0039
IBEXP	.054313	.012239	.405718	.997213	1.003	4.438	.0000
(Constant)	-.112031	.122516				-.914	.3629

---------- Variables not in the Equation ----------

Variable	Beta In	Partial	Tolerance	VIF	Min Toler	T	Sig T
SIBRES	.141802	.156673	.915834	1.092	.915834	1.497	.1381

Source: The author.

However, the number of foreign markets served does not necessarily indicate high levels of international business involvement and dependency. Each market might only contribute very little to the firm's annual turnover, a logical argument that an empirical study by Preece et al (1998) supported. They found no significant correlation between

internationalisation diversity and internationalisation intensity among STBFs. Therefore, high levels of international business resources might not be as important. The results of regressing international business intensity (IBINTENS) on international business attitudes, experience and resources is presented in table 7.13 below. The age and size of the firm was included as well for control purposes.

Table 7.13: Regression of IBIntensity

Equation Number 1: Dependent Variable IBINTENSITY
Method: Stepwise

Multiple R:	.58427	Analysis of Variance			
R Square:	.34137		DF	Sum of Squares	Mean Square
Adjusted R Square:	.31571	Regression	3	6.11507	2.03836
Standard Error:	.39144	Residual	77	11.79839	.15323

F = 13.30295, Signif F = .0000

---------- Variables in the Equation ----------

Variable	B	SE B	Beta	Tolerance	VIF	T	Sig T
SIBATTI	.100043	.028616	.336778	.921741	1.085	3.496	.0008
SIBRES	.114755	.034266	.322615	.921703	1.085	3.349	.0013
IBEXP	.048451	.019202	.233512	.998750	1.001	2.523	.0137
(Constant)	-2.037507	.207513				-9.819	.0000

---------- Variables not in the Equation ----------

Variable	Beta In	Partial	Tolerance	VIF	Min Toler	T	Sig T
AGE	-.190947	-.170730	.526546	1.899	.526546	-1.511	.1350
FTENOW	-.112728	-.131806	.900443	1.111	.899965	-1.159	.2500

Source: The author.

The results support that it is less the diversity of foreign markets per se, but the extent of the international involvement of STBFs that make resources important, with age and size being insignificant. STBFs with a strong international involvement had a stronger international business resource-base, a more positive international attitude and more operational experience. These factors were of relatively even importance, with a slight lower role of operational experience as a determinant for international business intensity. This finding reflects the findings of Preece et al (1998). Although the STBFs' resource-base was also important for the internationalisation diversity of their sample of STBFs (in contrast to this study's findings), the resource-base was also *more* important for the internationalisation intensity of STBFs.

Significant industry group differences for software firms with regards to either their international business intensity or their international business diversity could not be

found. However, the supportive group of firms showed significant group differences with regards to their international business intensity (*t-value 2.22, p-value .03*). The supportive group's international business intensity was higher than the intensity of the formative group of firms. This finding explains why the formative group had significant lower level of internal international business information (see above) and it also shows that deepening internationalisation endows a firm with international business information.

Direction of Internationalisation

Table 7.14 gives an overview of the direction of the internationalisation of STBFs in terms of the foreign markets they were dealing with. In total 50 different markets were stated. However, as can be seen by the overall number of entries per country, the majority of all the entries reported focused on 12 countries (over ten reported entries). All of which were triad countries. Actually 83% of the reported entries were within the triad, supporting the literature reported in chapter 3 that international high-tech trade is mainly intra-triad trade (Kleinschmidt and Ross, 1984; Fujita, 1995; Guerrieri and Milana, 1995, 1998; Patel, 1995). Furthermore, with the notable exceptions of Japan and the USA, the directional focus of STBFs is Western Europe, particularly neighbouring countries like the Netherlands, Switzerland, Austria and France.

Table 7.14: Foreign Countries Ranked by MER (Mean Entry Rank)

Country	Rank Number of Entry											Σ	MER*
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th		
Bangladesh	0	0	0	0	0	0	1	0	0	0	0	1	0.142857
Croatia	0	0	0	0	1	0	0	0	0	0	0	1	0.2
Russia	0	0	0	0	0	0	0	1	1	0	0	2	0.236111
Macedonia	0	0	0	1	0	0	0	0	0	0	0	1	0.25
Israel	0	0	0	1	0	0	0	0	0	0	0	1	0.25
Gabun	0	0	1	0	0	0	0	0	0	0	0	1	0.333333
Vietnam	0	1	0	0	0	0	0	0	0	0	0	1	0.5
Slovak Rep.	0	0	1	0	0	1	0	0	0	0	0	2	0.5
Arab States	0	0	0	0	2	0	1	0	0	0	0	3	0.542857
Portugal	0	0	1	1	0	0	0	0	0	1	0	3	0.683333
China	0	1	0	0	1	0	1	0	0	0	0	3	0.842857
Iran	1	0	0	0	0	0	0	0	0	0	0	1	1
Hong Kong	1	0	0	0	0	0	0	0	0	0	0	1	1
Latvia	1	0	0	0	0	0	0	0	0	0	0	1	1
Hungary	1	0	0	0	0	0	0	0	0	0	0	1	1
Paraguay	1	0	0	0	0	0	0	0	0	0	0	1	1
Ireland	1	0	0	0	0	0	0	0	0	0	0	1	1
South Africa	1	0	0	0	0	0	0	0	0	0	0	1	1
El Salvador	1	0	0	0	0	0	0	0	0	0	0	1	1
West Africa	1	0	0	0	0	0	0	0	0	0	0	1	1
Singapore	1	0	0	0	0	0	0	0	0	1	0	2	1.1
Turkey	1	0	0	0	1	0	0	0	0	0	0	2	1.2
Czech Rep.	0	0	1	3	0	0	1	0	0	0	0	5	1.22619
Poland	0	1	1	1	0	1	0	0	0	0	0	4	1.25
Malaysia	1	0	0	1	0	1	0	0	0	0	0	3	1.416667
India	1	1	0	0	0	0	0	0	0	0	0	2	1.5
New Zealand	1	1	0	0	0	0	0	0	0	0	0	2	1.5
Brazil	1	1	0	0	0	0	0	0	0	1	0	3	1.6
Norway	0	3	0	0	0	2	0	0	0	0	0	5	1.833333
Thailand	2	0	0	0	0	0	0	0	0	0	0	2	2
Taiwan	1	1	0	1	0	1	0	0	0	0	1	5	2.007576
Indonesia	2	0	0	0	0	0	0	0	0	1	0	3	2.1
Greece	1	2	1	0	0	0	0	0	0	0	0	4	2.333333
Luxembourg	1	0	3	0	1	1	0	0	0	0	0	6	2.366667
Denmark	1	3	1	1	0	0	0	1	0	0	0	7	3.208333
Australia	3	2	0	0	0	0	0	0	0	0	0	5	4
Canada	3	1	0	2	1	1	0	0	0	0	0	8	4.366667
Spain	2	2	1	3	0	0	1	0	0	0	2	11	4.408009
Korea (South)	3	1	1	3	0	0	0	1	0	0	0	9	4.708333
Finland	2	4	1	1	1	0	1	1	0	0	0	11	5.05119
Japan	4	4	3	2	1	3	0	1	0	0	0	18	8.325
Italy	5	2	5	3	0	1	0	0	0	0	0	16	8.583333
Belgium	5	3	4	1	3	1	0	1	0	0	0	18	8.975
Sweden	4	7	3	2	1	0	0	0	0	0	0	17	9.2
UK	5	4	4	4	5	1	1	0	0	0	0	24	10.64286
France	8	6	5	1	4	2	3	1	0	0	0	30	14.60357
Austria	11	8	5	3	1	0	1	0	1	1	0	31	17.97063
Switzerland	18	15	4	2	2	1	0	0	0	0	0	42	27.9
USA	20	9	6	4	4	3	0	1	2	0	0	49	29.14722
Netherlands	21	12	8	1	2	0	0	1	0	0	0	45	30.44167

* MER=Mean Entry Rank

Source: The author.

In order to move beyond a mere description of the direction of the internationalisation of STBFs, the above country-based model was used in a multiple regression analysis. A mean entry rank per country was computed (see equation 7.1), adapting a similar measure used by Nordström (1991) and Lindqvist (1991). This MER-value per country (the dependent variable) was then regressed on the five distance measures presented in chapter 6 (cultural distance, economic distance (relative and absolute), geographic distance and technical distance). In order to reflect the differences in importance per case – cases in this equation were not of equal importance, the country case USA represents for example 49 entries while the country case Croatia represents only 1 entry – each case was weighted according to its MER-value.

Equation 7.1: Mean Entry Rank (MER)

$$MER = \sum W_i \times \left(\frac{1}{R_j} \right); \text{ where:}$$

W_i = number of entries of a certain rank (j) within a certain market

R_j = the entry rank (1st, 2nd, 3rd, ... 11^{th})

Source: The author.

The final regression model is presented in table 7.15. But for a significant correlation between relative economic distance (ED) and technical distance (TD) (*r=-0.89, p-value 0.00*) – which was therefore excluded – it showed no significant violations with regards to the assumptions of the multiple regression technique.

Table 7.15: Re-estimated MER Regression Model

Equation Number 2: Dependent Variable MER

Method: Enter, ED2, GD, ED, CD

Multiple R:	.772	Analysis of Variance			
R Square:	.596		DF	Sum of Squares	Mean Square
Adjusted R Square:	.588	Regression	4	97.685	24.421
Standard Error:	.5624	Residual	209	66.223	.316

F = 77.200, Signif F = .000

---------- Variables in the Equation ----------

Variable	B	SE B	Beta	Tolerance	VIF	T	Sig T
ED2	.588	.048	.602	.790	1.266	12.187	.000
GD	-.557	.047	-.604	.730	1.370	-11.751	.000
ED	-.183	.054	-.185	.650	1.537	-3.400	.001
CD	.077	.047	-.083	.732	1.365	1.615	.108
(Constant)	.052	.039				1.358	.176

Source: The author.

According to the final model, which was significant and explains 59% of the MER variance, the higher the geographic distance the lower the MER and the bigger and richer the foreign market the higher the MER. This suggests that mainly spatial and economic dimensions determined the internationalisation direction of STBFs. Supporting the psychic distance critique of chapter 3, psychic distance showed no impact on the internationalisation direction of STBFs. This seems to support recent findings by Wood and Robertson (2000) showing that culture related information is less important for industrial markets. However, this finding might also be due to its operationalisation rather than the concept per se (O'Farrell et al, 1995; O'Grady and Lane, 1996; Petersen and Pedersen, 1997). The post-survey interviews will explore this finding further.

However, it should be noted that the finding of the model is a bit contradictory particularly with regards to the second most important foreign market: the USA, clearly not a geographically close country. Upon inspection of a curve estimation for geographic distance and MER only (see appendix 7.11 and 7.12), it became evident that there existed a weak, albeit not significant, offsetting effect (∪-shaped relationship). While spatial proximity paired with economic richness – the geographically close but poorer countries in Eastern Europe all ranked low (see also the remarks of one of the science park managers in the informatory interviews) – seemed to promote STBFs' dealings with a foreign country, a large foreign market (mainly the USA and Japan) could offset this effect and attract STBFs. Spatial closeness is therefore a facilitating factor, but spatial distance is not necessarily an inhibiting factor in the internationalisation direction of STBFs.

Significant group differences for either software firms or the formative group with regards to their direction of internationalisation, using a *t-test* at the firm level, could not be found.

Foreign Direct Investment (FDI) by STBFs

The previous analysis considered all modes used by STBFs in order to describe and explain their direction of internationalisation. A similar analysis focusing on FDI-modes was unfortunately not possible due to the limited share of STBFs engaged in FDI activities (see figure 7.4). Overall there were only 30 cases of FDI (see table 7.16) and only three countries did have more than one observed FDI entry: Switzerland, the Netherlands and the USA. More or less reflecting their importance

with regards to all the internationalisation modes considered (see table 7.14). Despite the few observations, one could however observe that the establishments in the USA accounted for nearly 40% of all establishments, clearly suggesting that the USA is an attractive overseas market for STBFs in Germany.

Although it was not feasible to quantitatively assess the direction of FDI by STBFs, it was nevertheless possible to try to explain the organisational determinants of FDI by using logistic regression.

Table 7.16: Countries Ranked by FDI Establishments (MER2)

Country	Number of Establishments												
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	Σ	MER2*
Poland	0	0	1	0	0	0	0	0	0	0	0	1	0.33
Italy	0	1	0	0	0	0	0	0	0	0	0	1	0.50
Czech Rep.	0	1	0	0	0	0	0	0	0	0	0	1	0.50
Switzerland	0	1	1	0	0	0	0	0	0	0	0	2	0.83
Slovak Rep.	1	0	0	0	0	0	0	0	0	0	0	1	1.00
Australia	1	0	0	0	0	0	0	0	0	0	0	1	1.00
Latvia	1	0	0	0	0	0	0	0	0	0	0	1	1.00
Austria	1	0	0	0	0	0	0	0	0	0	0	1	1.00
Japan	1	0	0	0	0	0	0	0	0	0	0	1	1.00
Canada	1	0	0	0	0	0	0	0	0	0	0	1	1.00
West Africa	1	0	0	0	0	0	0	0	0	0	0	1	1.00
France	1	1	0	0	0	0	0	0	0	0	0	2	1.50
UK	2	0	0	0	0	0	0	0	0	0	0	2	2.00
Netherlands	3	0	0	0	0	0	0	0	0	0	0	3	3.00
USA	7	4	0	0	0	0	0	0	0	0	0	11	9.00

* MER2=Mean Establishment Rank

Source: The author.

Based on previous research and theories about FDI in small firms, 9 independent variables were explored as explanatory factors in the analysis:

- size of the firm in turnover (dichotomised) and number of full-time employees (Buckley, 1989; Fujita, 1995b; Mutinelli and Piscitello, 1998),
- age of the firm (Buckley, 1989),
- the level of international business resources (Buckley, 1989; Fujita, 1995b; Mutinelli and Piscitello, 1998),
- the level of an international business attitude (Buckley, 1989),

- the stock of accumulated international business experience (Buckley, 1989; Yu, 1990; Mutinelli and Piscitello, 1998),
- the amount of international business information (Buckley, 1989; Mutinelli and Piscitello, 1998) and
- the R&D intensity in sales and human resources (Fujita, 1995b).

The potential impacts of previous international business experience of the management team and the role of a team venture will be assessed in section 7.2.4.

Surprisingly, none of the variables could explain FDI. They all failed to achieve significant levels. So did a model with equal group sizes, where cases from the non-FDI group were randomly deselected until a group balance was achieved, to check for potential insignificant results due to group size heterogeneity (Hair et al, 1998). To make sure that these finding were not due to possible interactions among the independent variables, each variable was also subjected to a visual scatter plot inspection with the binary dependent variable. This inspection also showed no indication of a possible logistic curve fit.

This suggests that organisational variables or non-organisational variables not captured in this analysis might explain FDI among STBFs or that the very nature of their FDI involvement was of a rather stochastic nature. One explanation might relate to the non-assessed motive for their FDI. Traditionally, internationalisation theory assumed that firms grow first domestically and then exploit their home-grown resources and products internationally. But in chapter 3 it was also argued that resource-seeking motives might play a role in the internationalisation of STBFs. The above could be interpreted in the light of home base augmenting FDI (Kuemmerle, 1999), despite the fact that the majority of FDI investments related to sales subsidiaries (see appendix 7.10). Still another possible explanation relates to Bonaccorsi's (1992) interpretation of small firm internationalisation. She argued for a potential reversed interpretation of the process. That is the firm does not grow and then invests abroad, but it invests abroad in order to grow and develop. International operations thus become a source for resources and capabilities (Bell et al, 1998b) rather than a way of exploiting home-grown resources and capabilities. Also, due to the fact the majority of STBFs were very young, the FDI-induced growth in resources, turnover or size might have simply not yet materialised. Another possible explanation might be the nature of the FDI by STBFs in the sample. None of the firms invested in production facilities abroad. The FDI was of a rather low committing nature. Sales subsidiaries and R&D

subsidiaries were the only two forms of FDI and the matrix assessment did not allow discriminating between investment levels of FDI. Some of the FDI might be low, while other FDI might be high, despite their similar type. The post-survey interviews will have to elaborate further on the validity of these interpretations.

Finally, significant industry group differences for software firms or the formative group with regards to FDI could not be found either.

7.2.3.5 Synthesis Research Aim 2

The analysis of the internationalisation characteristics of the sampled STBFs showed that despite their organisational characteristics (size and age) STBFs were already comparatively internationally active. This supports the notion in the literature that STBFs are early internationalisers (Lindqvist, 1991; McKinsey & Co., 1993; Rennie, 1993; Fujita, 1995; Oakey, 1995; Knight and Cavusgil, 1996; Keeble et al, 1997; OECD, 1997; Burgel and Murray, 2000), albeit in a seemingly opportunistic and not highly planned manner. Especially younger STBFs internationalised earlier and faster than older STBFs. It will be interesting to see whether this difference in timing was due to Internet-related factors.

With regards to the determinants of STBFs' internationalisation outcomes, attitudinal, experiential and resource-related factors exhibited significance. Particularly the finding that age and size indicators did not show significant impacts but the internal resource-base did, supports the argument made in chapter 3 that internal resources are important factors in order to understand the internationalisation of firms. The crude resource indicators size and age used in most of the previous studies do simply not capture the actual internal resource-base for international business activities well. This has important implications for future research (for more see chapter 9).

With regards to STBFs' direction of internationalisation, it was shown that mainly spatial and economic factors determined the direction, mainly consisting of intra-triad trade. What was however particularly interesting is that psychic distance – operationalised as cultural distance – did not effect the direction of internationalisation at all. However, as already noted above, this might be rather due to the operationalisation than the concept per se. The post-survey interviews will therefore have to further explore the role of cultural distance at the managerial level, as opposed to the country level. Nordström (1991) could demonstrate that psychic distance at the managerial level did indeed significantly influence the direction of internationalisation.

It will be particularly interesting to uncover whether managers' regard the Internet as an influential factor in their personal distance perception.

The final key finding relates to FDI among STBFs. None of the survey variables could explain FDI among STBFs. While various possible interpretations were already given above, the next research aim will have to examine whether pre-state factors of the firm might explain FDI among STBFs. Still, the finding is puzzling and the post-survey interviews will have to clarify this puzzle by exploring the motives and factors that led to FDI among STBFs. Again, it will be interesting to see whether the Internet played any role in the FDI of STBFs.

Overall, the findings of research aim 2 support the fruitfulness of analysing the role and potential impact of the Internet on the internationalisation of STBFs due to the observed levels of international exposure.

7.2.4 Research Aim 3: The Role of the Technical Entrepreneur

The previous assessments at the firm level did not incorporate and evaluate the potential impacts at the management level. Chapter 2 clearly showed that the technical entrepreneur or the team of entrepreneurs is (are) of importance in order to understand STBFs. This section will therefore expand the previous investigations by controlling for potential impacts at the management level. In particular this section will assess the potential role of previous international experience within the STBFs management team (IBEXP1: marketing products abroad and IBEXP2: working abroad) and the role of team ventures versus single technical entrepreneurs (STATUS2). Moreover, the role of previous Internet experience among the management team will be assessed (IEXP). Thus, the pre-state of the firm and the founding factor "team venture" are analysed.

Descriptives

The majority of STBFs was founded by a team of technical entrepreneurs (66.7%), supporting the literature (Cooper, 1973; Litvak and Maule, 1976; Cooper and Bruno, 1977; Bollinger et al, 1983; Cooper, 1986; Berry, 1993; Oakey, 1995; Cooper, 2000). Nearly half of the firms (49.5%) had managers with previous Internet experience (IEXP). With regards to previous international experience in marketing products abroad (IBEXP1), 34.5% of firms stated to have such experience within their management team, while 39.6% of firms had management members who previously worked abroad (IBEXP2). Similar to the study from which both items were borrowed (Reuber and Fischer, 1997; *r=0.40, p-value 0.01*), both items did significantly

correlate (*r=0.34, p-value 0.00*). Both items and previous Internet experience (IEXP) did however not correlate significantly with team ventures (STATUS2), indicating that team ventures did not have a significantly more internationally experienced or Internet experienced management. That in turn indicated that the single entrepreneurs in the sample have either hired employees with the respective expertise or that they had such experience themselves. Previous Internet experience and international business experience was also unrelated. Significant group differences for the software firms in the sample with regards to the above indicators could only be found for the Internet experience indicator. Software firms tended to have a higher share of managers with previous Internet experience (χ^2 *4.20, p-value 0.04*), although the difference is rather small (*φ-value 0.19*). Significant group differences for the formative group in the sample with regards to the above indicators could be found for two indicators. While the formative group had less international experience (working abroad) among their managers (IBEXP2: χ^2 *4.71, p-value 0.03; φ-value -0.22*), it had more Internet experience among their managers than the supportive group (χ^2 *12.60, p-value 0.00; φ-value 0.37*).

Despite the significant correlation of both international experience items, they were not combined to a single measure. The strength of their correlation was not that strong and a separate analysis for potential differences between each type of previous international experience might reveal interesting insights. Each variable was included in the analyses as a binary dummy variable.

7.2.4.1 Objective 3a: Past Experience, Teams and Internationalisation

In order to assess the influence of the three variables on the internationalisation of STBFs, the previously used regression models were extended to additionally include each of the above variables at a time. The results for earliness of internationalisation (IBEARLI1 and IBEARLI2), speed of internationalisation (IBSPEED1 and IBSPEED2), number of foreign markets (IBDIVERS) and international business intensity (IBINTENS) are given in appendix 7.13.

Overall there was little direct impact of previous experience and team ventures on the internationalisation process. A similar picture emerged when all the variables were included at once. This is surprising, because previous research has found a significant impact of previous international business experience in STBFs' management teams on at least the earliness of internationalisation (Reuber and Fischer, 1997). The only significant impact that could be found relates to the number of foreign markets served

(IBDIVERS). STBFs with a manager or managers who previously worked abroad (IBEXP2) tended to operate in fewer foreign markets. This finding could indicate a more focused internationalisation compared to firms without such international business experience. However, at the bivariate level, no significant group difference was found (*t-value 1.02, p-value 0.31*). Taking the low significance of the indicator in the regression into consideration, this rather indicates inefficiencies in the regression caused by the slight – although not significant – departure of the dependent variable from normality (Backhaus et al, 1996). It is therefore safer to conclude that no significant relationship existed, particularly taking into consideration that the statistical power of the bivariate test was higher due to a larger number of cases.

In order to assess whether the managerial factors were more of an indirect nature, the above regression models were further extended to control for potentially moderating effects. Thus, for each of the above regression models a two-way interaction regression model was estimated. However, this analysis did not reveal any moderating effects.

Past Experience, Teams and International Business Attitudes and Resources

In addition to the timing and outcome of the STBFs' internationalisation, past experience and team venture effects on the international business attitudes and resources of the STBFs were assessed. The results of the *t-tests* showed that firms with previous international marketing experience (IBEXP1) had a significantly larger internal resource-base (*t-value -2.75, p-value .01*) and firms with managers who previously worked abroad (IBEXP2) had both a significantly larger internal resource-base (*t-value -3.88, p-value .00*) and a stronger international orientation (*t-value -2.51, p-value .01*). Significant differences for team ventures on both measures could again not be found. Therefore, previous international experience in the STBFs' management seems to play an important indirect role. It positively effected the internal resource-base and the attitude of the firm and these did in turn influence the internationalisation (see findings of research objective 2e).

Past Experience, Team Ventures and the Direction of Internationalisation

In order to examine whether previous managerial experience and team ventures influenced the direction of internationalisation, the country-level model used in research objective 2e (see table 7.14) was changed to a firm-level model. For each STBF a distance variable for each of the 5 distance measures (cultural distance, economic distance (relative and absolute), geographic distance and technical distance)

was created, based on the averaged distance values within each distance dimension. The means of these firm-level distance variables were than compared. Appendix 7.14 gives the results of the *t-test*. It clearly shows that none of the distance measures differed significantly.

Past Experience, Team Ventures and FDI

The previous section, addressing research aim 2, could not find any significant variables explaining FDI among the sampled STBFs. The logistic model used there was extended in this section to include the three managerial variables IBEXP1, IBEXP2 and STATUS2. First, the three new variables were included alone. Second, the most significant of the new variables was included in a second model, incorporating the previously most significant of the non-significant predictor variables. Third, to control for moderating effects, the product of the two previously used predictors were included as a third predictor.

The first step of the assessment yielded no significant variables. The "best" of the insignificant variables was IBEXP1 (*Wald statistics 2.28, significance 0.13*). The second step also yielded insignificant results (model improvement over a classification due to chance: χ^2 *3.95, df 2, p-value 0.14*; *Pseudo-*R^2 *0.04*), despite a slight increase in model fit. The third and last step of the analysis also resulted in an insignificant model (model improvement over a classification due to chance: χ^2 *4.03, df 3, p-value 0.26*; *Pseudo-*R^2 *0.04*).

Hence, the only conclusion from the above analysis is that nothing can be concluded. The additional managerial variables did not help to explain FDI among STBFs and the potential explanations given in the previous section remain.

7.2.4.2 Objective 3b: Past Experience, Teams and Internet Use

The assessment of experiential factors in research aim 1 showed that the gained experience with the Internet did surprisingly not significantly influence use levels among STBFs. In order to assess whether managerial Internet experience prior to joining or founding the STBF (IEXP) influences use levels, the regression analysis of research objective 1d was expanded to incorporate IEXP. Table 7.17 shows the results of the regression analysis.

Table 7.17: Level of Internet Use Determinants and Previous Internet Experience

Equation Number 1: Dependent Variable SROUTINE

Method: Enter, SINDWIR, SPEERWIR and IEXP

Variable(s) Entered on Step
1. SPEERWIR
2. SINDWIR
3. IEXP

		Analysis of Variance			
Multiple R:	.81802		DF	Sum of Squares	Mean Square
R Square:	.66915				
Adjusted R Square:	.65775	Regression	3	174.29673	58.09891
Standard Error:	.99525	Residual	87	86.17624	.99053

F = 58.65428, Signif F = .0000

---------- Variables in the Equation ----------

Variable	B	SE B	Beta	Tolerance	VIF	T	Sig T
SINDWIR	.486641	.105808	.329992	.738714	1.354	4.599	.0000
SPEERWIR	.742182	.102788	.550093	.655190	1.526	7.220	.0000
IEXP	.468769	.223983	.138530	.867982	1.152	2.093	.0393
(Constant)	-1.844975	.427754				-4.313	.0000

Source: The author.

In contrast to gained Internet experience with the firm, experience with the Internet gained prior to joining of founding the firm did significantly influence use levels. STBFs with managers (or a manager) who bring(s) previous Internet experience to the firm did use the Internet more intensively for international business activities. This could indicate that some of the reasons for the insignificant findings regarding the role of gained experience with the firm are to be found in the pre-state of the firm. The post-survey interviews will have to explore the validity of this interpretation.

The other managerial variables (IBEXP1, IBEXP2 and STATUS2), as well as moderating effects were also tested but showed no significance.

7.2.4.3 Objective 3c: The Transition of the Technical Entrepreneur

Chapter 2 showed that the transition of the technical entrepreneur from a technology-driven scientist to a market-oriented manager can often be a key characteristic as the STBF develops and grows (Schrage, 1965; Roberts, 1991; Berry, 1996). To assess and control for its potential impacts on the internationalisation of STBFs, the survey included an instrument that asked the respondent about their levels of current business priorities in relation to financing, R&D and marketing (see chapter 6). Following the stage theory of high-tech venture founding and development

(Galbraith, 1982; Kazanjian and Drazin, 1990), the levels of business priorities should shift from financing to R&D and finally to marketing as the STBF develops and grows.

In order to empirically assess the existence of such a managerial transition, a *k-means clustering* procedure was applied, pre-specifying 3 clusters (a finance focused, a R&D focused and a marketing focused cluster) and using both random and manual cluster centre seeds in order to reduce the cluster seeds sensitivity of this procedure (Backhaus et al, 1996; Hair et al, 1998). A subsequent *discriminant analysis* using the age and size of the firms as the independent predictor variables was then performed to assess their discriminant significance. Following the introductory statements made above, age and/or size should discriminate significantly between the three clusters, if they do exist according to the stage theory of the transition of STBFs.

The analysis revealed that both factors were not significant discriminators (*Wilks Lambda for AGE .98, F-value .92, significance .40; Wilks Lambda for FTENOW .99, F-value .30, significance .75*) and the nature of the clusters did not support typical transitional groups either. The first cluster consisted of marginally more marketing focused STBFs, the second cluster consisted of marginally more R&D focused firms and the third cluster consisted of "unfocused" STBFs (all three foci had high cluster means). Scatterplots plotting the composition of foci of STBFs along their age and size to control for potentially recurring foci or non-linearities did reveal no structured pattern either. The foci of the sampled STBFs was thus independent of their age and size and a typical transition could not be found, therefore rather supporting the view that high-tech ventures' development and growth follows an emerging, non-linear trajectory (Hansen and Bird, 1997). The surprising finding of a reverse transition in the exploratory interviews supports this interpretation further.

However, this finding could also be an artefact of the science park approach rather than a falsification of the stage view of high-tech venture development and growth per se. The sampled firms could simply be too homogeneous to reveal a managerial transition. The infrastructure support and the pre-selection of firms (see informatory interviews) could imply that finance focused STBFs (unclear finance and business plans in the start-up phase) were "weeded out" by the science park managers. But then the problem remains that the two subsequent stages were not identifiable with the age and size indicators either, thereby again supporting the less deterministic view of the development of STBFs. Yet another possible explanation could relate to a possible

instrument bias. In the filter section of the questionnaire (see appendix 6.6, questionnaire page 2) respondents were asked whether their firm develops and markets its own products. It might be that respondents in firms that have not yet finished developing their first product might have answered this question with a "No", thus not answering the rest of the questionnaire. If that had been the case, possible pre-transition STBFs would have been excluded, which in turn would explain the inability to find a managerial transition among the STBFs that were included in the analysis.

7.2.4.4 Synthesis Research Aim 3

Exploring the role of managerial pre-state or pre-joining international business experience and the existence of a team venture revealed little direct impacts. Team ventures were not endowed with more managerial pre-state or pre-joining Internet or international business experience and international business experience did not significantly impact the investigated behavioural internationalisation dimensions. Particularly the latter was at odds with a previous investigation by Reuber and Fischer (1997) that actually found a positive effect (internationally experienced managers in STBFs internationalised earlier) using the same instrument. However, an indirect effect was found. Firms with managerial pre-state or pre-joining international business experience had a stronger international orientation and a stronger internal resource-base and these did in turn impact internationalisation outcomes. This finding shows the importance of the human resources factor in STBFs, as well as the observation made in chapter 2 that each venture is unique (Starr et al, 1993; Reuber and Fischer, 1994) and previous experience might therefore not directly translate into advantages in the newly found or jointly found venture. The previously noted importance of venture teams per se (Cooper and Bruno, 1977; Feeser and Willard, 1990) also found no empirical support. This supports more differentiated views arguing that it is not the sheer existence of a team venture, but the diversity and complementarity of skills of its members (Lamont, 1972; Smith and Fleck, 1987; Eisenhardt and Schoonhoven, 1990; Schoonhoven et al, 1990; Weinzimmer, 1997; Cooper, 2000).

In stark contrast to previous international business experience, which was particularly high for software firms, previous Internet experience showed a direct impact on Internet use levels. This gave empirical support to one of the interpretations given in the synthesis of research aim 1, where it was argued that the pre-state of STBFs (the incubator) might have endowed them already with high levels of Internet experience rendering post-inception stock of experience measures ineffective. However, the effect

of previous Internet experience on Internet use levels was rather small and a post-survey assessment of the other interpretations given in the synthesis of research aim 1, as well as a post-survey assessment of potentially other factors is therefore still important. So is the post-survey investigation regarding FDI among STBFs, since the puzzle about the factors determining FDI among STBFs remained unsolved. Prior experience and the existence of a venture team did not determine FDI among STBFs.

The final key finding of research aim 3 was the inability to empirically find support for the stage theory of high-tech venture founding and development (Galbraith, 1982; Kazanjian and Drazin, 1990). The findings rather support the emerging, non-linear view (Hansen and Bird, 1997). A finding that also gave support, at least indirectly, to the inapplicability of the stage theories in the internationalisation of firms, as was argued in chapter 3. If STBFs often internationalise early, which they did according to this study and other studies previously cited, and if their overall organisational development does not follow a deterministic path, how could one expect their internationalisation to follow a deterministic path?

7.2.5 Research Aim 4: The Impact of Internet Use on Internationalisation

After the previous research aims have addressed Internet use, the internationalisation process and management factors among the sampled STBFs, research aim 4 will explore the potential impacts of Internet use for international business on the internationalisation process, incorporating the significant findings presented previously.

7.2.5.1 Objective 4a: Impacts on Attitudinal Dimensions

The attitudinal internationalisation dimensions that were considered directly (respondents were directly asked to rate these impacts) in the survey are listed in appendix 7.15 for the total sample and for the two sub-samples (formative group vs. supportive group and software firms vs. non-software firms).

Appendix 7.15 shows that on average each impact variables' mean value was rather low. Only one variable had a mean value above the scale mid point. In comparison to the control variable IMPNOI (the role and impact of non-Internet related information variables) for the last three impact variables, all Internet-related factors ranked rather low. However, it should be noted that non-Internet related factors did not substitute for the three Internet-related factors on the selection of foreign markets or vice versa. Both

– a surrogate variable (AVIIMP) to capture the relative importance of Internet factors on the selection of foreign markets was formed by calculating the average importance of the three impact items – were actually positively correlated (*Spearman's r=0.21, p-value 0.02*). Only two variables showed significant group differences with regards to the formative group. Impacts on investments (IMPINVES) and the role of Internet-based unsolicited inquiries (IMPUINQ) on the selected foreign markets were perceived to be significantly higher for STBFs that started using the Internet prior to their internationalisation. With regards to group differences for software firms, the Internet's impact on reduced FDI needs (IMPFDI) and the role of Internet-based unsolicited inquiries (IMPUINQ) on the selected foreign markets were rated significantly higher.

In order to move beyond a mere description, each of the impact variables assessed below was regressed with the following variables. According to the behavioural theory of organisational ICT use (Seddon, 1997), the more an ICT like the Internet is used within an organisation, the higher its potential impacts. Since this thesis is essentially about exploring what impacts (if any) the Internet has on STBFs' internationalisation, the level of use construct (SROUTINE) was used as the first regressant. Furthermore, the two experiential factors of Internet use (WEBEXP and WEBPEXP) were explored; separately to avoid problems relating to multicollinearity (Hair et al, 1998). Despite their relatively insignificant role with regards to Internet use and perceived wiredness levels, it could well be that the importance of Internet use experience has a direct effect on the impact variables. The last variable that was considered as a regressant is the accumulated international business experience of the firm (IBEXP). The findings of research aim 2 showed its importance and it might therefore also play a role in the Internet's potential impacts on internationalisation characteristics. Other international business variables were not considered, since these variables were later assessed as dependent variables themselves. Unfortunately, each of the direct attitudinal impact variables (see appendix 7.15) exhibited strong non-normality and suggested transformations could not achieve normality. A multiple (linear) regression analysis was therefore not feasible and a logistic regression as described in the introduction to section 7.2 was performed instead.

Internet's Direct Attitudinal Impacts: The Number of International Contacts

The literature suggests that an ICT system like the Internet can increase the range and diversity of contacts (Contractor and Eisenberg, 1990). A proposition that empirical

studies have already confirmed in non-international contexts (Cronin et al, 1994; O'Connor and O'Keefe, 1997; Honeycutt et al, 1998; Sillince et al, 1998).

The results of the logistic regression (see appendix 7.16) clearly support the previous literature. In an international context, high levels of Internet use also led to an increase in contacts. Experiential factors played no role. The proposition that the Internet can increase the opportunity horizon of firms (chapter 4) finds therefore first empirical support.

Internet's Direct Attitudinal Impacts: Unsolicited Foreign Orders

Given an increase in international contacts, the often noted importance of unsolicited foreign orders (Bilkey and Tesar, 1977; Graham, 1999) could also increase over the Internet, particularly as the power of buyers on the Internet is supposed to increase (Bakos, 1991; Bakos, 1997; Hagel and Armstrong, 1997; see chapter 4). However, chapter 4 also argued that the typical products of STBFs are usually rather complex and therefore unsolicited orders might not occur very often, regardless of experience and use levels. The low mean of this impact variable (see appendix 7.15) – actually the lowest mean of all impact variables – seems to support this.

The results of the logistic regression surprisingly show that with increased use levels, STBFs perceived an increase in the number of unsolicited foreign orders over the Internet, regardless of their Internet or international business experience. This is an interesting finding, particularly taking this sample's sensitivity to the liabilities of newness (Stinchcombe, 1965) into consideration (see chapter 2), as it is usually argued that it is more likely for a customer to order (in an unsolicited fashion) over the Internet from a renown (usually larger and older) firm (Aldridge et al, 1997).

Internet's Direct Attitudinal Impacts: The Need for Face-to-Face Meetings

Face-to-face meetings in international business are expensive and it therefore comes as no surprise that small firms, suffering from liabilities of smallness (Aldrich and Auster, 1986), tend to use this form of interacting with their overseas customers rather infrequently (Walters, 1996). Due to the media richness and interaction costs reducing properties of the Internet (see chapter 4), the need for face-to-face meetings can therefore be further reduced. However, as discussed in chapter 4, traditional media choice theories argue that a medium like the Internet offers only a limited possibility of personal interaction. Nohria and Eccles even argue that to make a virtual network of people work requires more, not less, face-to-face meetings (Nohria and Eccles, 1992).

Hence, Internet use for international business should not reduce the need for face-to-face meetings with foreign business partners and customers. In direct contrast, social influence models (Contractor and Eisenberg, 1990; Fulk et al, 1990; Yates and Orlikowski, 1992; Ngwenyama and Lee, 1997) argue that a reduction is possible as users increase their experience with the medium and the interaction partner: experiencing the "channel expansion effect" (Carlson and Zmud, 1999). A view which the exploratory interview findings supported.

In contrast to the exploratory interview findings, the survey findings (see appendix 7.16) show that none of the independent variables were significant. Among the sampled STBFs, a reduction, let alone a substitution, in international face-to-face meetings due to the Internet was not considered to significantly impact their internationalisation, regardless of use levels and experience. This finding therefore gives support to the rational media choice theories.

Internet's Direct Attitudinal Impacts: International Business Costs

The Internet can save firms costs by reducing interaction costs (Benjamin and Wigand, 1995; Rayport and Sviokla, 1995; Booz & Allen & Hamilton, 1997; Butler et al, 1997; OECD, 1998), transformation costs (Rice and Bair, 1984; Culnan and Markus, 1987) and search costs (Bakos, 1991; Bakos, 1997; Butler et al, 1997). But as chapter 4 also argued, the Internet can also increase costs (or at least do not lead to a reduction), particularly for inexperienced firms. Data overload, hidden information and data security issues (see chapter 4) could have potential negative effects on cost reductions.

Appendix 7.16 exhibits the results of the logistic regression. Overall there was little impact on a reduction in international business costs (*Pseudo-R^2 0.06*), independent of use levels, international business experience and Internet use experience. The only significant determinant of a reduction in costs was experience with a website. STBFs with older websites perceived higher levels of cost reductions in international business due to the Internet. While at this moment in time it is difficult to interpret this finding, particularly taken the insignificant findings regarding website experience so far into consideration, it could well be for example that STBFs with older websites provide more information. Thus, this increase in information provision could have led to a decrease in the provision of information via other (usually more expensive) media like printed catalogues, a possible interpretation that would logically be congruent with the previously reported insignificant findings regarding website experience. The

subsequent assessments of impact variables, as well as the observational study will give an indication of the validity for such an interpretation.

Internet's Direct Attitudinal Impacts: The Need to Establish a Foreign Presence (FDI)

Chapter 4 introduced a new mode of internationalisation: the virtual mode of international operations. This mode, which allows for a virtual global presence of a firm, might therefore reduce the need of firms to establish a "real" foreign marketplace presence. As reported, Bennett (1997) found that the majority of exporting firms in his sample (62%) perceived a reduction in FDI needs. On the other hand, chapter 4 also argued that small firm FDI can also be facilitated, even enabled, by the Internet due to its cost reducing properties.

The results of the logistic regression shows that both use levels and website experience had a significant positive effect on reduced FDI needs (see appendix 7.15). The significant role of website experience could indicate that firms with more established websites were more involved in e-commerce, that is the virtual mode of international operations, which might have led to reduced FDI needs (see chapter 4). The findings of significant group differences for software firms with regards to reduced FDI needs (see appendix 7.15) and the findings of research objectives 1a and 1d showing that software firms were more experienced with websites and were more involved in e-commerce, seem to support such an interpretation. A subsequent correlation analysis did actually support this interpretation. STBFs with older websites were significantly more involved in e-commerce ($r = 0.25$, *p-value 0.10*). However, in order to indirectly assess whether the stated perceived reduction in FDI needs was more of a projection rather than an already experienced impact and in order to assess whether the perceived reduction was more of a temporary rather than an absolute nature, STBFs with FDI were included in the analysis. The results showed that STBFs with FDI did significantly correlate negatively with reduced FDI needs ($R = -0.17$). This indicates that the FDI group perceived significantly less reduced FDI needs. Taking the overall low mean of the original scale into consideration, this indicates that FDI firms did actually not see a reduction in FDI needs. Moreover, this was independent of them being a software firm or not, since there was no significant difference in FDI between software firms and other firms (χ^2 *0.04*, *p-value 0.84*). This raises the question of why did STBFs with high use levels or established websites perceive a reduced need in FDI? Was it a mere projection? The post-survey interviews will have to explore this issue further.

Internet's Direct Attitudinal Impacts: International Business Investments

Given the various potential impacts assessed so far, the Internet should actually also impact the international business investments of firms. Instead of solely investing in other (possibly more expensive) means of conducting international business operations like tradeshows or traditional advertising, firms might substitute parts of their international business investments for Internet-based investments.

The data clearly supports this. Use intensive and website experienced STBFs, as well as, software firms and the formative group of STBFs perceived a significant impact of the Internet on their international business investments. However, whether this was due to the enabling and facilitating cost reducing properties of the Internet or the Internet per se – which implies that the firms regarded the Internet itself as their business (Internet start-ups) – will have to be explored in the post-survey interviews. At least the industry mix of the formative group did not suggest it to be full of Internet-start ups. The share of industry sectors more or less mirrored the mix shown in figure 7.2.

Internet's Direct Attitudinal Impacts: Selected Foreign Markets

It was previously argued and empirically shown that the Internet can increase the range and diversity of contacts and that it can lead to an increase in unsolicited orders. Given this impact, the Internet should also play an influential role in the actual selection of foreign markets. Three potentially influential factors were considered: the role of active Internet information searches (active information pull) by the firm (IMPIPULA), the role of Internet information receipts (passive information pull) by a firm (IMPIPULP) and the role of unsolicited inquiries (IMPUINQ). The problem of different time frames is acknowledged and has to be viewed as a limitation of the analysis.

The results show that with increased use levels, STBFs' direction of internationalisation – that is their selection of foreign markets – was indeed significantly influenced by the three Internet-related factors, with little difference in importance between them (see also the mean values for each impact variable in appendix 7.15). Website experience with regards to directional impacts due to unsolicited inquiries was, once again, the only other significant variable. This is an interesting finding and the observational study will have to assess potential differences for older websites that might give a rational for the found significance.

Internet's Indirect Attitudinal Impacts

Besides the direct impact variables considered in the survey, indirect impact variables were also assessed. To avoid misunderstandings: the term indirect relates to the fact that the respondents were not directly asked to rate the Internet's impact on these variables. Impacts on perceived information barriers, on the international outlook of firms, their internal resource-base for international business and their overall performance evaluation were assessed. Potential differences between the two sub-groups, if not previously assessed, were also examined.

Internet's Indirect Attitudinal Impacts: Level of Internal Information

Chapter 4 argued that the Internet has the potential to reduce the common internationalisation barrier lack of information by providing information on a global scale. Not only does it reduce information related costs (Benjamin and Wigand, 1995; Rayport and Sviokla, 1995; Booz & Allen & Hamilton, 1997; Butler et al, 1997; OECD, 1998), but its global nature also reduced the typical location sensitivity of information and knowledge in the marketplace (von Hayek, 1945). Intensive Internet use for international business should thus increase the amount of international business information provision, thereby reducing one of the key barriers in the internationalisation process of firms (see chapter 3).

In order to empirically assess this argument, the previously validated level of internal information scale (see research aim 2) was regressed on levels of use, both experience indicators, as well as international experience (IBEXP), shown to influence internationalisation outcomes in research aim 2.

The results of the multiple regression revealed that the level of use was the only significant variable (*Beta .29; t-value 2.61; p-value .01*) in a significant model (*adjusted adj. R^2 .06; F-value 3.54; p-value .03*). All experiential factors failed to achieve significant levels. Intensively using the Internet for international business purposes can therefore reduce the crucial information related barrier in the internationalisation process by providing a firm with international business information. However, it should be noted that the magnitude of the effect was not very strong. Other factors or rather other media supplying the STBF with international business information like tradeshows or communications with foreign customers over the telephone are therefore likely to be possible additional determinants of the perceived level of international business information.

Internet's Indirect Attitudinal Impacts: International Business Attitudes

It was noted early on in the literature that firms located near international "information centres" are expected to be exposed to more external, internationalisation stimuli (Olson and Wiedersheim-Paul, 1978) than otherwise. An exposure which could in turn positively influence the important international outlook of firms (Olson and Wiedersheim-Paul, 1978; Dichtl et al, 1990). It was therefore argued by Hamill (1997) that the active participation on the global and media rich Internet can potentially reduce attitudinal barriers by increasing a firm's exposure to international stimuli, thereby increasing its international awareness and orientation.

As noted in the exploratory interview synthesis (see chapter 6), some of the interviewees already noted that they considered Internet use to have a positive impact on their international business outlook. A surprising finding taking the high international orientation of STBFs in general (Kleinschmidt and Ross, 1984; Reid, 1986; Meer Van der and Calori, 1989; Litvak, 1990; Oakley, 1996; Coviello and Munro, 1997; Davies and Brush, 1997; Lindell and Karagozoglu, 1997) into consideration. In order to explore the thesis of Internet-induced increases in international attitudes empirically, the previously validated international business attitude scale (see research aim 2) was regressed on the same indicators used throughout the impact analyses.

The results showed that levels of use and only levels of use had a significant impact (*Beta .23; t-value 2.41; p-value .018*) on the level of an international orientation in a significant model (*adjusted adj. R^2.10; F-value 6.30; p-value .00*). Intensive exposure to the Internet did therefore indeed increase the anyway high average international orientation of STBFs (see appendix 7.6). Empirical support for "Hamill's thesis" was thus found.

Internet's Indirect Attitudinal Impacts: Internal International Resources

Due to its interaction cost reducing characteristics (see above), it was argued in chapter 4 that intensive Internet use could also positively effect the resource-base of the firm. Not that Internet use in itself will automatically and mainly lead to the creation of resources as captured in the construct SIBRES, but the cost reducing characteristics of the Internet could free-up existing resources and thus lead to a more efficient utilisation of these resources.

In order to test this argument empirically, the previously validated international business resources scale (see research aim 2) was regressed on the indicators previously discussed.

The results showed that levels of use had indeed a significant impact on the internal resource-base for international business of the sampled STBFs (*adjusted adj. R^2 .03; F-value 4.41; p-value .04; Beta .21; t-value 2.10; p-value .04*), although the strength of the effect was not that strong. The experiential indicators were again insignificant. However, the finding that STBFs that use the Internet intensively for their international business activities had a stronger internal resource-base does not necessarily imply a unidirectional causality. The opposite interpretation, resource-rich STBFs use the Internet more intensively, is logically also possible. At this stage caution needs to be exercised and a causal interpretation will have to wait until the post-survey interviews are analysed.

Internet's Indirect Attitudinal Impacts: Perceived Firm Performance

Various significant impacts were found so far. However, can using the Internet for international business operations also lead to a higher level of performance? According to the literature a direct effect is rather unlikely, because impact variables on organisational performance are usually considered to be mediated by strategic factors like the adopted international marketing strategy of the firm (Cavusgil and Zou, 1994; Hoang, 1998) and these factors were not considered in this study.

In order to examine this research question empirically, the subjective performance indicators were regressed on previously used indicators. Although the four subjective performance indicators addressed different facets of performance (see chapter 6), they all showed strong intercorrelations. A factor analytical investigation supported this further. All three dimensions loaded significantly on one factor with factor loadings of .740, .784, .771 and .804 respectively. The total item reliability was also high with an α of 0.86. International and domestic performance, as well as growth and financial performance were therefore closely related in the sampled STBFs. The four indicators were thus combined to form a single surrogate variable (SPERF), similar to the procedure used for the other scales.

The findings of the multiple regression analysis did show that a significant effect was not present for neither of the variables. Group differences were not found either. The sum of the various significant impacts of the Internet on the internationalisation of

STBFs that were found so far, did therefore have no direct impact on the performance of firms. This is in line with the previously cited literature suggesting marketing strategy as a mediating variable on performance.

7.2.5.2 Objective 4b: Impacts on Behavioural Dimensions

The previous sub-section analysed potential Internet use impacts on direct and indirect attitudinal international business dimensions. Various impacts were found. In order to assess whether these impacts did also manifest themselves at the behavioural level, the following section will examine potential impacts on the direction of internationalisation, the timing of the internationalisation and the outcome of the internationalisation process.

Internet Impacts on the Direction of Internationalisation

In order to assess whether Internet use levels impacted the direction of internationalisation – or in other words: do firms that use the Internet intensively for their international business trade with different countries? – the country-based model used in section 7.2.3.4 was changed to a firm-level model identical to the one used in research aim 3. As before, levels of Internet use (SROUTINE), international business experience (IEXP), experience with the Internet (WEBEXP) and experience with websites (WEBPEXP) were used as the independent variables.

Of all the five distance measures, only technical distance showed a significant impact (*adjusted adj. R^2.11; F-value 11.54; p-value .00*), with levels of use constituting the only significant variable (*Beta .33; t-value 3.40; p-value .00*). STBFs that use the Internet intensively for their international business tended to trade more with foreign markets that have a high national level of Internet diffusion. While supporting the notion of a technical distance in marketspace (Brock, 2000), it was nevertheless surprising to find a directional effect at all. As research aim 2 has shown the direction of the internationalisation of STBFs was rather "triad-focused" and directional impacts were therefore masked by the foreign country homogeneity. It was therefore not surprising, that overall little directional impact on the internationalisation of STBFs could be found. However, it could well be that Internet related factors did actually impact the direction of the internationalisation of STBFs as captured in the other direction dimensions. That is the selection of foreign markets was strongly influenced by Internet related factors, but the foreign markets themselves did not differ compared to STBFs' internationalisation that was not influenced by Internet related factors. The significant findings regarding Internet effects on the selection of foreign markets

support this view. In order to further assess this possibility, the average impact of the three Internet-based factors on the selection of foreign markets entered (AMIIMP) was regressed on levels of Internet use for international business. Again, the problem of different time frames is acknowledged and has to be viewed as a limitation of the analysis.

The analysis revealed that high levels of Internet use for international business did indeed significantly and strongly influence the direction of internationalisation (*adj.* R^2 *.44; F-value 81.12; p-value .00*; *Beta .67; t-value 9.01; p-value .00*).

Internet Impacts on the Timing of the Internationalisation

It was argued in chapter 4 that due to the various internationalisation barrier-reducing properties of the Internet, the timing of the internationalisation process might also be impacted by Internet use, especially taking the various significant impacts found so far into consideration. Particularly the finding that younger STBFs internationalised earlier and faster could be due to higher levels of Internet use among young STBFs, if the Internet did indeed increase the speed of internationalisation.

Four timing related variables were examined. The earliness of the internationalisation process, with and without taking the initial NPD into consideration (IBEARLI1 and IBEARLI2), and the speed of the internationalisation, again with and without taking the initial NPD into consideration (IBSPEED1 and IBSPEED2). The assessed indicators were the same indicators as used in the previous analyses.

The regression analysis revealed no significant direct impacts of Internet use on both the timing related variables. Neither the earliness nor the speed of the internationalisation process was significantly impacted by Internet related factors. It should however be noted that the time frames are not congruent. The analysis assumed a linear use increase over time, an assumption that might not necessarily hold (see the same discussion with regards to international business resources and attitudes in research aim 2). Therefore, the average impact of Internet-based factors on the selection of foreign markets entered was again used as the independent variable (AMIIMP; see above). This variable is independent of the time frame. Incorporating this variable allows for a time-independent assessment of differences in the timing of the internationalisation for STBFs whose selection of foreign markets was strongly influenced by Internet related factors.

The analysis revealed no significant effects for neither of the timing related variables. In addition, a correlation analysis to assess potential levels of use differences for younger STBFs did also reveal no significant differences (*r = -.02, p-value .42*).

The insignificant findings could imply two things. First, the timing of internationalisation among the sampled STBFs, particularly their earliness of internationalisation, was so quick (remember that nearly 60% of firms internationalised within their first post-NPD year) that Internet related factors could not speed up this process any further (if at all). Second – and more likely – other factors were more influential. After all, younger STBFs did internationalise significantly faster and earlier and this took place independent of Internet use levels. The second interpretation does however assume linearity in use levels over time, an assumption that might not hold. The post-survey interviews will therefore investigate further what factors, including Internet-related factors, have influenced the timing of the internationalisation process and what differences do exist for younger STBFs.

Internet Impacts on Internationalisation Outcomes

The last set of potential Internet impacts on the internationalisation of STBFs at the behavioural level relates to impacts on internationalisation outcomes. Three outcome variables were described in research aim 2. The turnover intensity of the international business (IBINTENS), the diversity of foreign markets served (IBDIVERS) and the degree of directness (IBDIRECT). Particularly the last outcome variable allows indirectly for an assessment of the controversial "de-intermediation-thesis" (Hammer and Mangurian, 1987; Malone et al, 1987; Benjamin and Wigand, 1995) and the "re-intermediation-thesis" (Economist, 1999) stated in chapter 4. All three variables were regressed on the indicators used in the previous analyses. For the third outcome variable (IBDIRECT), a linear regression analysis was not possible due to its non-normality. IBDIRECT was therefore dichotomised following the procedures stated in the introduction to this section (see section 7.2) to allow for a logistic regression.

Only the directness of international business modes used showed a significant impact (*χ^2 12.19, df 1, p-value 0.05*; *Pseudo-R^2 0.12*), again only with levels of use (*Wald statistics 10.14, significance 0.00*). While this result is not a proof of the de-intermediation thesis, it only shows that STBFs intensively using the Internet utilised more direct modes in a static, cross-sectional fashion, it will be an interesting aspect for further explorations in the post-survey interviews. Did de-intermediation

take place, leading to the above findings, or is it just a reflection of intensive Internet-based links with direct international business partners? If so, do managers view this level of directness as a result of Internet use, or rather as a result of their industry specifics? Taking the age of the STBFs into consideration, at least de-intermediation is expected to be a highly unlikely explanation for the above found significant impact.

7.2.5.3 Synthesis Research Aim 4

Research aim 4 explored the role of the Internet in the internationalisation process of STBFs. Attitudinal and behavioural internationalisation characteristics were considered. Following the behavioural theory of ICT use (Seddon, 1997), potential internationalisation impacts were assessed for different levels of Internet use for international business. Additionally, experiential Internet and international business indicators, as well as potential group differences were examined.

Exploring direct attitudinal impacts showed that on average Internet impacts were considered rather low by the overall sample, especially in comparison to non-Internet related factors. However, when controlling for the different Internet use levels across the sampled STBFs, several significant impacts (of similar magnitude) were found. Intensive Internet use for international business increased the number of international business contacts, the number of unsolicited foreign orders, it reduced the need for a foreign establishment (FDI) and it influenced international business investments. Increasing levels of use also significantly impacted the influence of Internet information searches, receipts and unsolicited Internet inquiries on the actual selection of foreign markets. These findings support the behavioural theory of ICT use and they provide a first empirical indication of the Internet's marketspace potential as a barrier-reducing medium. On the other hand, the importance of face-to-face meetings remains. Although social theories of media choice (Contractor and Eisenberg, 1990; Fulk et al, 1990; Yates and Orlikowski, 1992; Ngwenyama and Lee, 1997) suggest that the richness of face-to-face meetings can be transported over a medium like the Internet, as interaction partner experience the "channel expansion effect" over time (Carlson and Zmud, 1999), no such effect was found. Neither levels of use nor experiential factors showed any significance. It might therefore well be that in an international context – all of the above theories are not explicitly considering international aspects and they are grounded in national data – such effects do not happen, or other factors not considered come into play (see also chapter 9). A surprising finding was that website experience showed direct impacts. In contrast to

the little impact found previously, firms with more established (older) websites perceived a significant reduction in international business costs, a reduction in the need to establish a foreign presence (FDI), an increase in the Internet's impact on international business investments and an increase in the importance of unsolicited Internet inquiries on their selection of foreign markets. Accumulated international business experience on the other hand showed no significant impacts.

Significant group differences for the formative and the software group were found, too. Software firms perceived a higher level of reduced FDI needs and a higher impact on international business investments, possibly indicating that due to their product specifics the Internet's new mode of internationalisation (see chapter 4) could substitute for traditional internationalisation modes like FDI. However, the assessment of FDI impacts also showed that STBFs that have already conducted FDI (a group which includes software firms) perceived no real impact. The perceived reduction in FDI needs were therefore maybe solely a projection of non-FDI STBFs. The formative group exhibited significant differences with regards to the role unsolicited inquiries over the Internet play in their selection of foreign markets and with regards to international business investments. Since this group of firms did only internationalisation after they started using the Internet internationally and since the previous research aims have established that they were significantly younger, less international (international business intensity) and that they perceived lower levels of international business information, these findings might indicate that they have mainly internationalised due to the Internet, or that at least that the role of the Internet's marketspace was greater in their initial internationalisation. This indicates a potential recent shift from the marketplace to the marketspace as an internationalisation initiator. Moreover, this raises the interesting question of whether they would have internationalised differently (or at all) without the Internet.

The assessment of impacts on indirect attitudinal factors also revealed a significant role of Internet use. Not only did Internet use provide STBFs will international business information, thereby reducing one of the main internationalisation (Leonidou, 1995), but Internet use also positively impacted the international attitude and resource-base of STBFs. A direct impact on STBF's overall performance could however not be found, supporting the "strategy as a mediator to performance" literature (Cavusgil and Zou, 1994; Hoang, 1998). Particularly support for "Hamill's thesis" (Hamill, 1997) was surprising, since STBFs are usually very internationally oriented anyway and it was

therefore thought – despite the exploratory findings to the contrary – that such an effect might not occur.

In contrast to the attitudinal assessment, behavioural impacts showed little impact. Only technical distance, as previously argued by Brock (2000), and the directness of the modes used showed an impact with increasing Internet use. However, it was also argued that the assessment of research aim 2 showed that the sampled STBFs were relatively homogeneous with regards to their timing and direction of internationalisation. Differences at the behavioural level might therefore have existed, but they were hidden in the homogeneity of the manifestations. The attitudinal assessment at least suggested that the direction of internationalisation was indeed influenced by the Internet for use intensive STBFs.

The findings of research aim 4 have important implications for the two subsequent research stages: the observational study and the post-survey interviews. The finding that experience with operating a website showed some significant impacts raises the question of why was that the case. Taking the previously discussed limitations of this experience measure into consideration (see above), qualitative differences not captured in the survey, but accessible in the observational stage might help answer this question. More specifically: Do older websites differ compared to newer websites? What are the differences and how might they explain the observed impacts?

The findings presented above have also direct implications for the post-survey interviews. The implications mainly relate to causality assessments. As discussed above, some of the findings can be interpreted in a bi-directional way. Did using the Internet increase the international orientation of STBFs or did a strong international orientation lead to high levels of Internet use? Did Internet use free-up resources or did resource-rich STBFs use the Internet more intensively? Finally: Did the Internet lead to the use of more direct internationalisation modes or did firms that use direct modes (due to product or industry specifics) use the Internet more intensively?

Besides the assessment of local causalities, other aspects need further clarification as well. First experience. Although experience with operating a website showed some significant impacts, more general experience with using the Internet showed no impact on any of the variables. The possible explanations given previously remain and the post-survey interviews will have to explore the reasons for failure to demonstrate experiential effects. Another area worth clarifying relates to FDI among STBFs. As

argued above, the perceived reduction in FDI needs might have been rather a projection of possible future impacts, rather than an actual experienced impact. This obviously includes exploring reasons for the perceived FDI differences for software firms. Did the new mode of internationalisation substitute traditional FDI? A question raised during the examination of research aim 2 also remained unresolved. Research aim 2 showed that especially young STBFs internationalisation earlier and faster. It was argued there that this might have been due to Internet-related factors. However, this section showed that the differences seemed not to be due to Internet related factors. Acknowledging the potential limitations of this interpretation due to the cross-sectional nature of the survey investigation, the post-survey interviews will explore the reasons for the differences in their timing of internationalisation. After all, Internet factors might still emerge as one of the key factors. Finally, the Internet's impact on international business investments needs to be explored further, because the found impact could be due to STBFs regarding the Internet per se as their business (Internet start-ups), rather than using the Internet as an enabling and facilitating support tool. Although the industry mix suggested otherwise, a clarification is crucial, since it has important implications for the generalisability of this study's findings.

7.3 Research Aim 5: Observational Analysis of STBFs' Websites

The observational analysis of STBFs' websites was conducted a couple of months after the survey data was collected and analysed. All the 85 survey-based website adopters were included in the analysis. However, 8 STBFs were excluded due to web server non-response or non-retrievability of the stated website address. In total, 77 websites of STBFs were thus analysed according to the methodology laid out in the previous chapter.

7.3.1 Objective 5a: Assessment Model and Website Levels

Before proceeding to the cross-method validation and the assessment of website implementation levels on the internationalisation of STBFs, this sub-section presents the empirical development of the assessment model developed in chapter 6 and the descriptive evaluation of the website implementation levels across the adopting STBFs.

Marketspace-Embeddedness: Locatability and Searchability

The average number of external links to a STBFs' website (WPLINKS) – the operationalisation of the searchability dimension – was slightly over 21 and it ranged from 0 to 200 external links (see appendix 7.17). Four websites exhibited no external

links and only 4 websites showed over 100 external links. For the majority of websites the number of external links was below 21. Compared to values of established IT firms like Apple or Microsoft (values of 274,720 and 4,272,802 respectively) or famous Internet start-ups (Amazon.com: 3,031,913 links; Netscape: 1,067,745 links) the number of external links can be regarded as very low, mirroring STBFs' organisational smallness (see table 7.1 and 7.2).

With regards to the searchability measure (WPSEARCH) a similar picture emerged. The average score of 127.47 – out of a theoretical maximum of 500 – was rather low, too (see appendix 7.17). Indeed 23 firms (30%) scored a "0". That is an interested customer is unable to find their website of any of the popular international search engines. Only if he already knows their website address is he able to access its content.

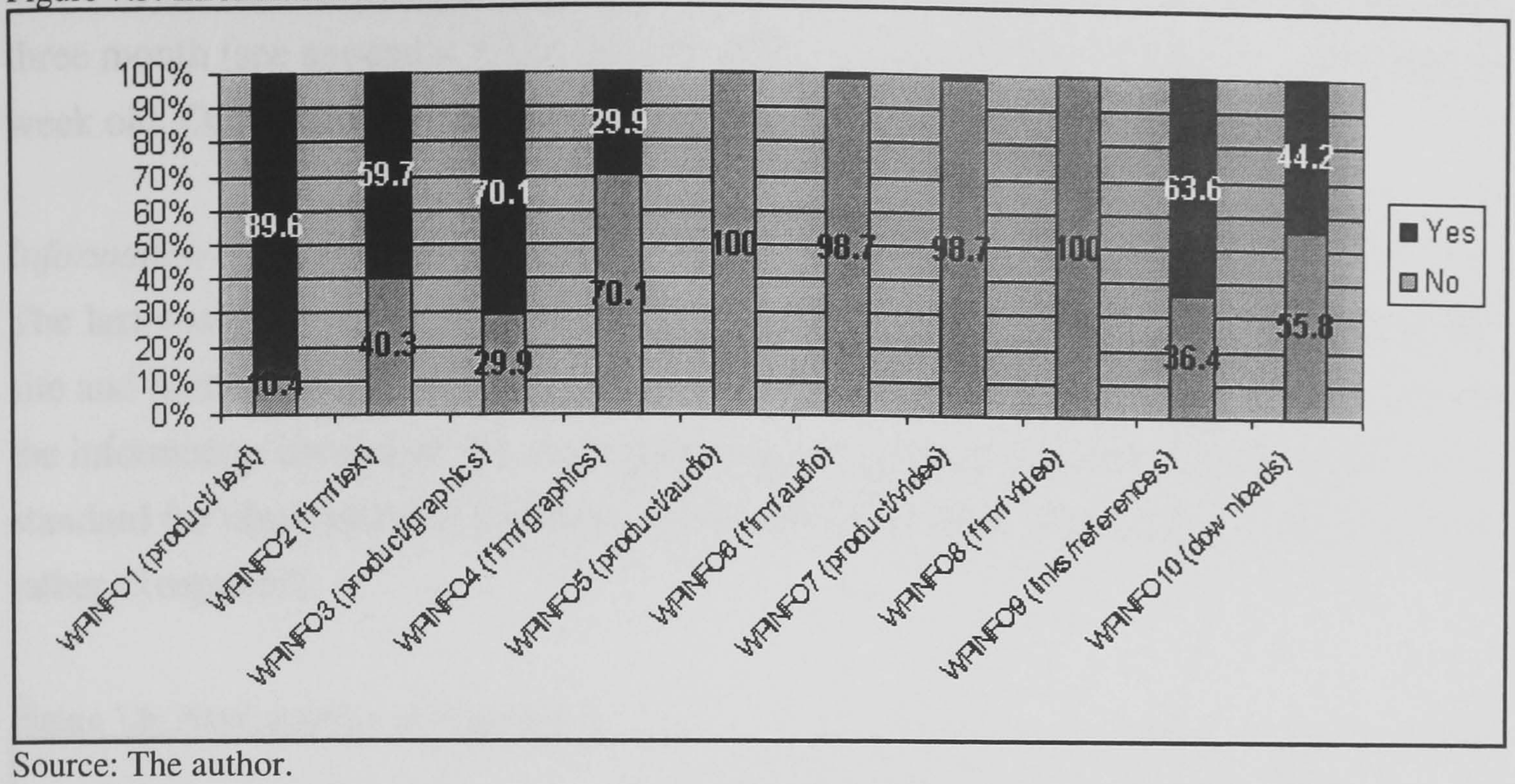
Both indicators did correlate significantly (*Spearman's r=0.54, p-value 0.00*) and their respective z-scores – to overcome their scale differences and enable their comparability (Backhaus et al, 1996) – were thus combined (added) to represent the STBFs' website marketspace-embeddedness for subsequent analyses (ZEMBED). Significant group differences for software firms or the formative use group were not found for this website implementation dimension.

Information Provision: Information Richness

Figure 7.5 shows the information richness of the analysed websites. It can be seen that product/ service information was a standard for most STBFs, especially textual information. Only slightly over 10% of websites did not provide the visitor with product information. The provision of richer, graphical product information was also a standard for most STBFs (70.1%). The provision of technically more complex product information (audio or video based) was however a rare exception. Only one firm provided video-based product information and no firm provided audio-based product information.

Information about the firm itself was less frequent. While textual information still accounted for 59.7% of the websites, graphical information about the firm was already a non-standard, with only 29.9% of firms providing such information. Only one firm provided audio-based firm information and no website provided video-based firm information. Overall, product information far outweighed firm information and the technical possibilities of the Internet were implemented in a limited fashion only.

Figure 7.5: Information Richness of Websites



Source: The author.

The use of references and links to business partners/ customers was widespread. 63.6% of websites used this feature of information provision. The last aspect of information provision, the possibility of downloading information, was provided by nearly half of the analysed websites (44.2%).

The ten binary variables relating to information provision were added into a single richness variable (WPINFOS). Before it was used for subsequent analyses, WPINFOS was correlated with the actual amount of information on a firm's website (as measured by the total amount of bytes of all web pages within 3 levels below the firm's main domain level) to assess its content validity as stated in chapter 6. The results showed that the richness scale WPINFOS correlated significantly, albeit not too strongly, with the actual amount of information on a firm's website ($r = 0.46$; *p-value 0.00*). This gave support for the validity of the scale and it will thus be used for subsequent assessments.

Information Provision: Information Updatedness

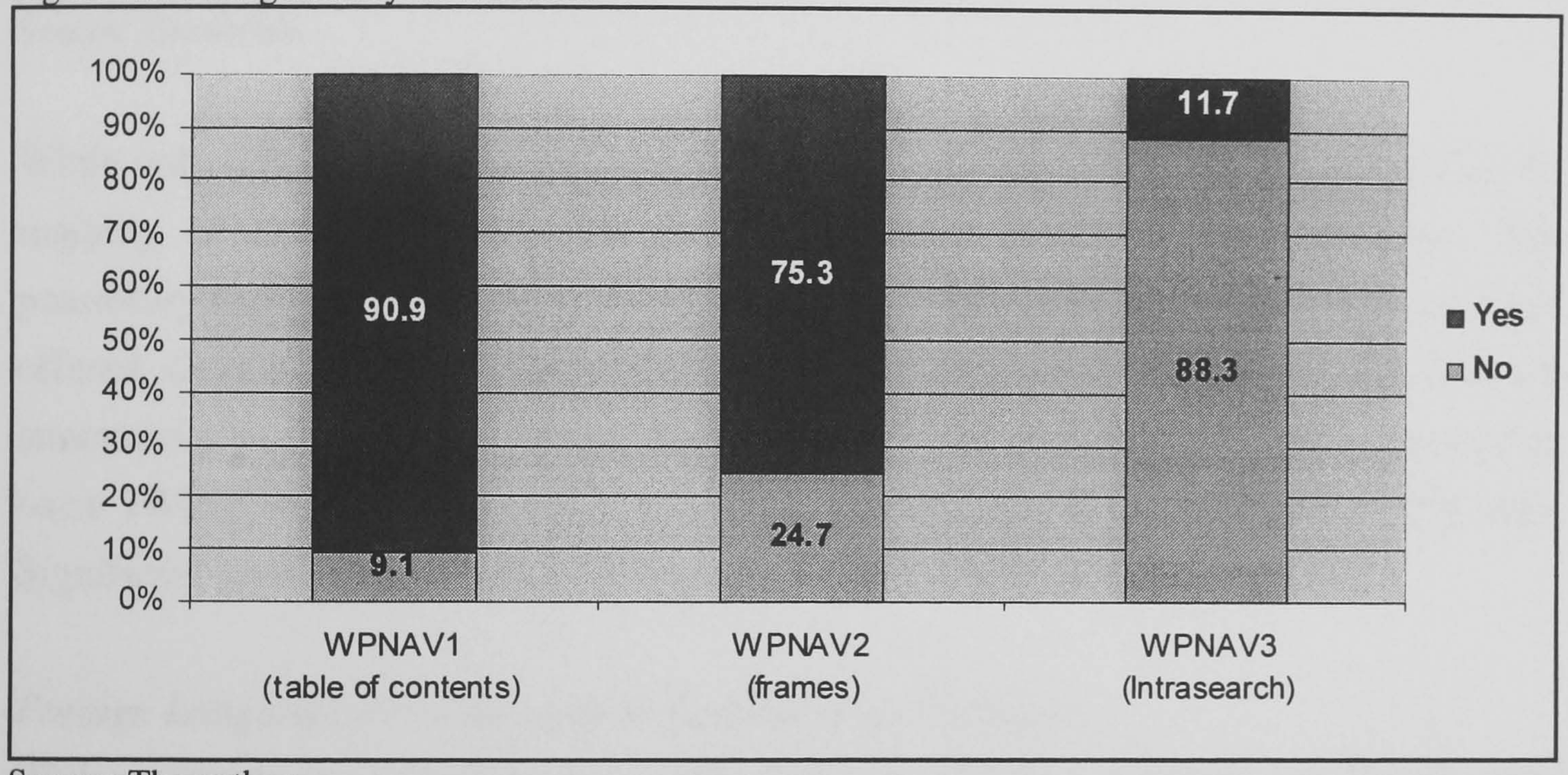
Besides the richness of information provided on the website, the updatedness of the provided information, its newness, is another of the synthesised salient dimensions of information provision (WPUPDATE). For all but 4 firms could the newness of their website be assessed. These firms simply disabled the "last update to the page"-option of the browser.

The average newness of the provided information was slightly over 100 days or over three month (see appendix 7.18). For 21 firms (29%) the information was less than a week old. Only 4 firms (5.5%) did not update their information in 1999.

Information Provision: Navigatability

The last analysed aspect of information provision relates to the ease of navigating the site and finding relevant information. Figure 7.6 shows that providing an overview of the information content of the site and providing navigational aids (like frames) was a standard for most assessed websites, while providing intra-site search possibilities was rather exceptional.

Figure 7.6: Navigatability of Websites



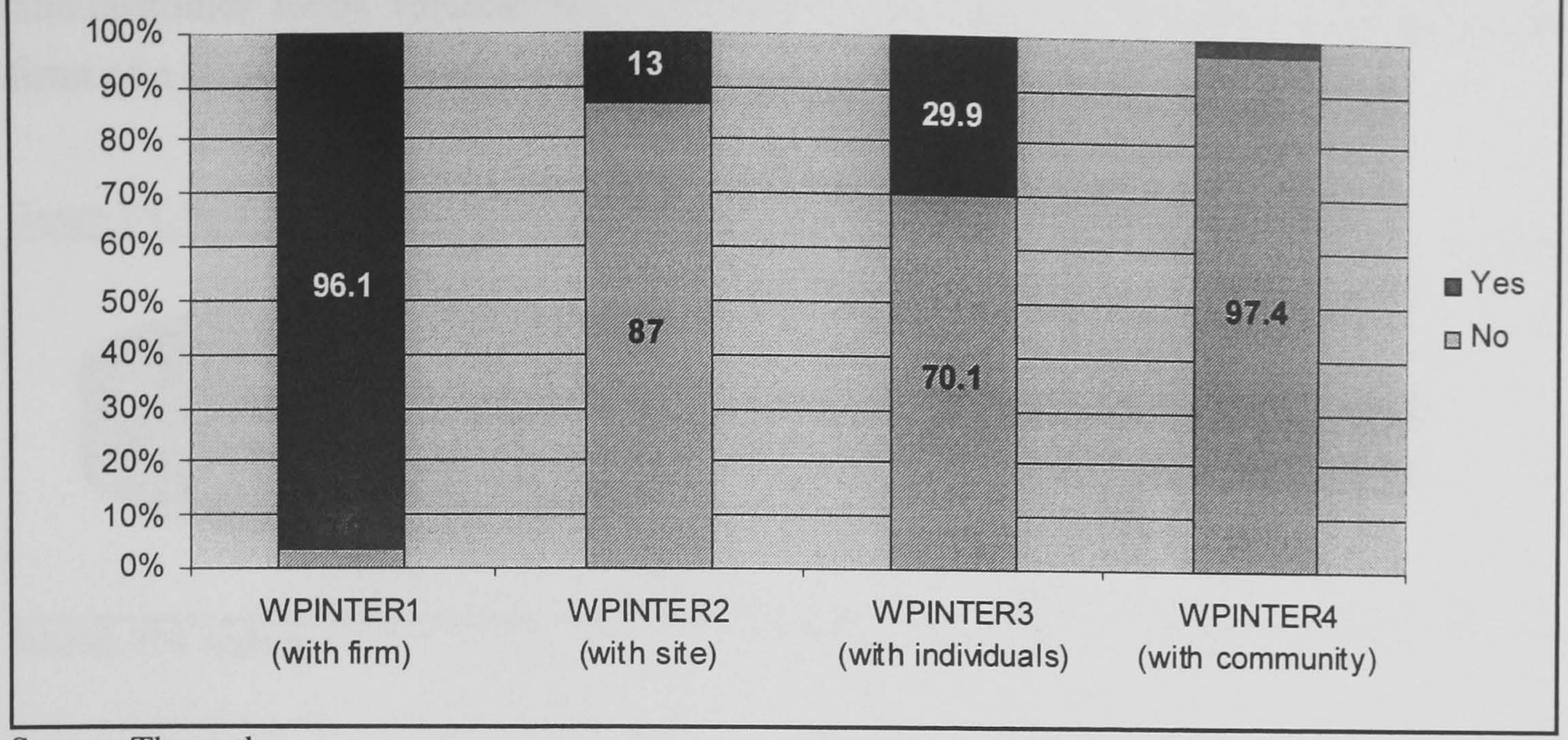
Source: The author.

The variables relating to the information provision scale all correlated significantly (see appendix 7.19) and their z-scores (see above) were thus combined (added) to a single scale (ZINFOPRO), with the newness variable (WPUPDATE) reversed prior to forming the new variable to prevent "cancelling out" effects (Hair et al, 1998). Significant group differences for software firms and the formative use group with regards to the information provision of their websites were not found.

Interactivity

Figure 7.7 exhibits the observed level of interactivity, operationalised as the possibility to establish a dialogue with the firm and its site (see chapter 6).

Figure 7.7: Interactivity of Websites



Source: The author.

While only 4% of websites did not offer any interaction, it becomes evident that the majority of websites only offered an anonymous dialogue with the firm. The possibility to directly contact a firm's employees is less common. Only 29.9% of firms offered such a form of interactivity. More advanced forms of interactivity, like site interactivity in the form of newsletters or product updates on an e-mail subscription basis (WPINTER2) or an open discussion forum (WPINTER4), were very rare. Significant group differences with regards to this dimension were not found.

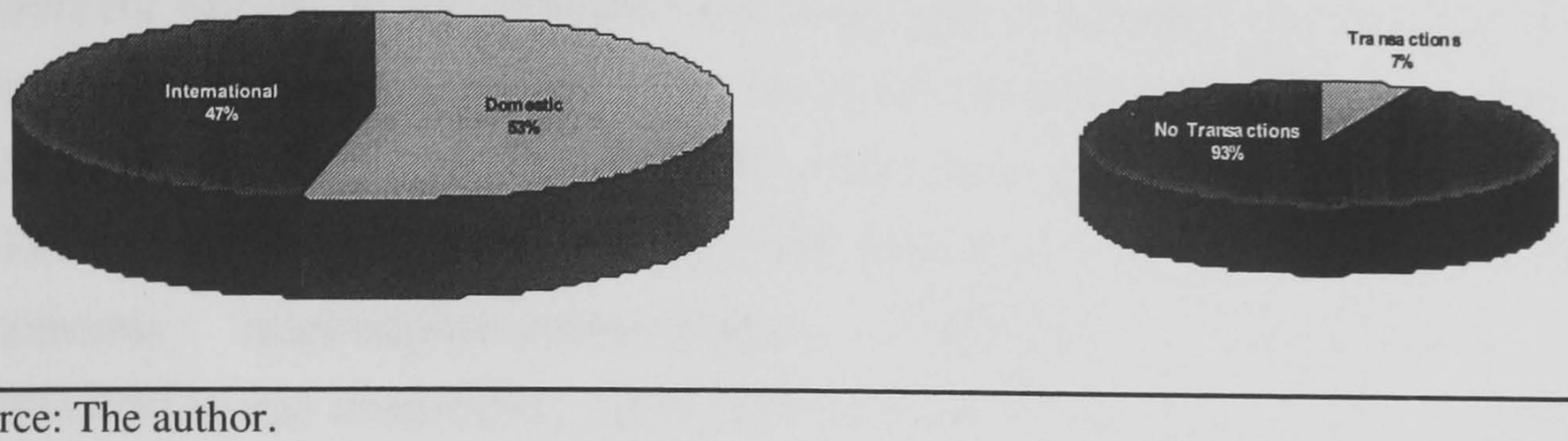
Foreign Language Provision and E-Commerce on Websites

With regards to the business focus of the analysed websites, a nearly 50/50 split could be observed (see figure 7.8). 47% of the observed websites addressed an international audience, that is they provided their information in English, either in English only or in more languages including English. Four firms provided their website information in three languages, including English and German. It should however be noted that the international (English) information for some websites did not fully reflect the domestic (German) information. The provision of international information was quite limited in some cases, while the domestic information was rather plenty. However, the previous information provision assessment examined only the international part of the website content in the case of multi-lingual websites, regardless of its domestic content.

Significant group differences were found for the formative group (χ^2 *7.45, p-value 0.00;* φ*-value -.33*) only. This implies that firms starting to use the Internet for international business purposes prior to their internationalisation had more domestic websites than the supportive group of firms.

The customer focus variable was included in the subsequent impact analyses in the form of a dummy variable (Hair et al, 1998).

Figure 7.8: Foreign Language Provision and E-Commerce on Websites



Source: The author.

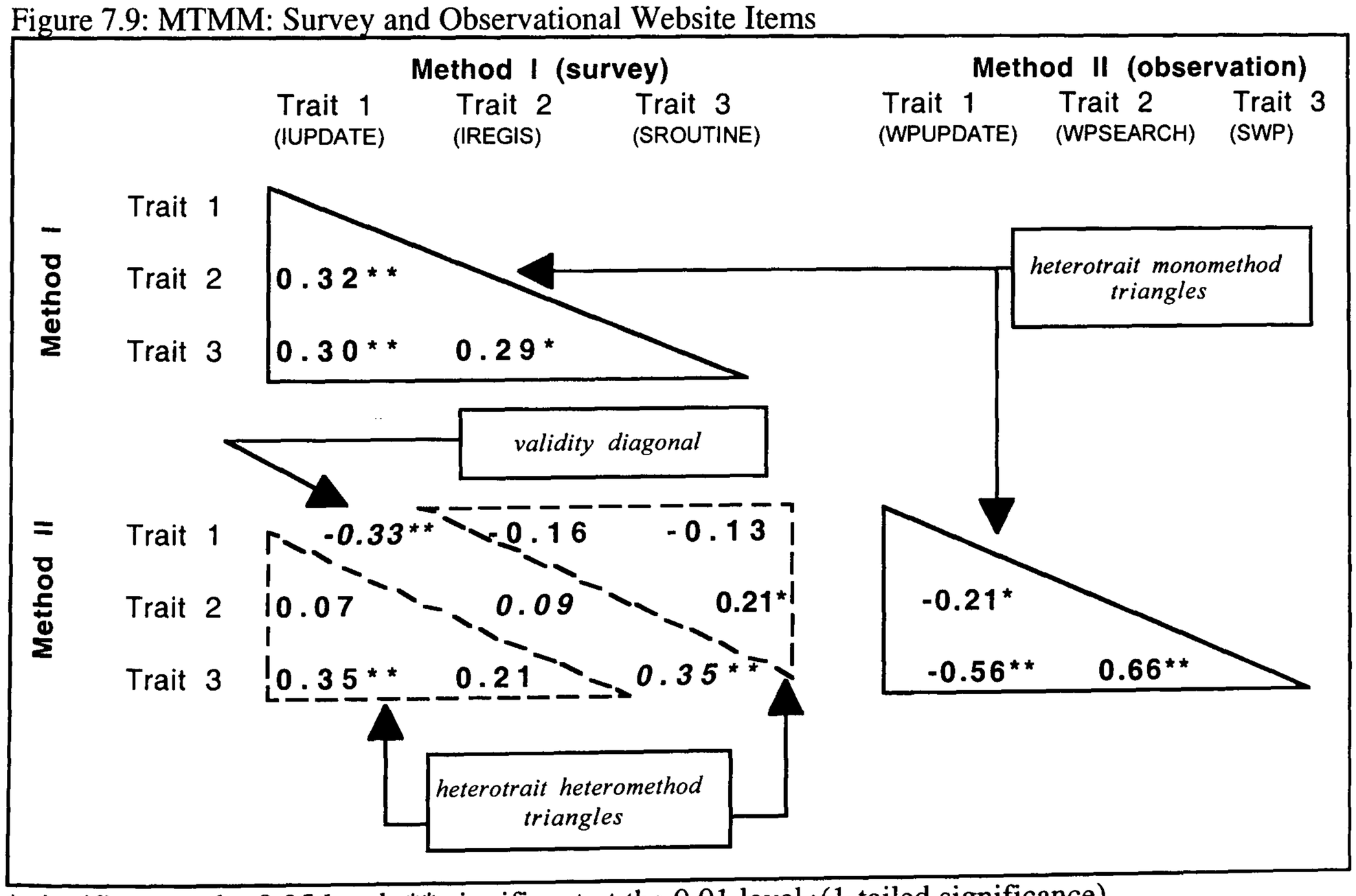
As expected (see above and chapter 4), e-commerce as defined in this thesis was rather the exception than the rule (see figure 7.8). Only 5 websites offered on-line ordering. Due to this low count of e-commerce sites, this variable was dropped for subsequent analyses, as it did not meet the needed minimum counts per binary category (Backhaus et al, 1997; Hair et al, 1998). It is nevertheless surprising that only 5 websites offered on-line ordering, considering the related survey data (ECOMMER2; see above). In the survey 75% of the STBFs stated that they have conducted e-commerce (on-line selling) in the past. The fact that this was not reflected in the website design, might indicate that either e-commerce (on-line selling) was conducted over other services of the Internet or the technical entrepreneurs regarded e-commerce (on-line selling) not as narrowly as this thesis. The post-survey interviews will explore this puzzle further.

7.3.2 Objective 5b: Cross-Method Validation

As stated in the methodology chapter, the observational analysis was not only conducted to assess the level of website implementation among STBFs but also to validate parts of the survey data. An abbreviated version of Campbell and Fiske's (1959) Multitrait, Multimethod Matrix (MTMM), a common method to assess validity (Hair et al, 1998), was used. Three items (quasi-traits) assessed with both methods were considered. First the newness of a website's information content. Both items were considered in each of the two methods (IREGIS and WPUPDATE). In the survey the website adopters rated the frequency of updating the information content on a 5-point scale and in the observational analysis this variable was objectively assessed by calculating the number of days passed since the website was last updated. The second item that was considered is the searchability of the website (IREGIS and WPSEARCH). The survey asked the website adopters to state with how many

international search engines they have registered their website and the observational analysis assessed the ease with which the website can be found using international search engines. Although both items do not strictly relate to a common trait, WPSEARCH is rather the outcome of IREGIS, it was considered acceptable to assume that the higher IREGIS the higher WPSEARCH. Thereby implying a significant convergent validity in the MTMM. The third item considered was the overall level of Internet use. The survey assessed this trait with the construct "routinised level of use" (SROUTINE), which was validated within the same method (see section 7.2.2.2). For the MTMM validation, a composite variable was formed (SWP) adding the three sub-dimensions marketspace-embeddedness (ZEMBED), information provision (ZINFOPRO) and interactivity (ZINTERS) of the observed websites. This procedure was supported by a factor analytical investigation. All three dimensions loaded significantly on one factor with factor loadings of .796, .651 and .684 respectively and the total item reliability was also acceptable with an α of 0.65. Again, although both items do not strictly relate to a common trait, SROUTINE captures a broader variety of Internet use than SWP, it was considered acceptable to assume that higher levels of Internet use should positively correlate with higher website implementation levels. Figure 7.9 shows the results of the MTMM.

Figure 7.9: MTMM: Survey and Observational Website Items



* significant at the 0.05 level, ** significant at the 0.01 level, (1-tailed significance).
Source: The author.

Following Campbell and Fiske's (1959) discussion of their matrix, the first step in the validity assessment is an inspection of the validity diagonal. Its values should be significantly different from zero. Only trait 1 and trait 3 fulfilled this requirement, thereby showing evidence of convergent validity. Trait 2 did not exhibit any significance. Even if the extreme values for IREGIS (see above) were excluded, the item convergence validity remained insignificant (*r= .14, p-value .19*). However, rather than indicating an unacceptable level of convergent validity, it indicates that the assumption for including this item as stated above does not hold. A registration with more international websites does not automatically lead to a higher level of searchability. An important finding that will be further discussed in chapter 9.

To further assess the validity of trait 1 and 3, its values in the validity diagonal should be higher than its column and row values in the heterotrait heteromethod triangles. But for one correlation that exceeded both validity diagonal values slightly, this requirement did hold. Giving a moderate support for the discriminant validity of trait 1 and 3. Furthermore, the validity diagonal values of trait 1 and 3 should be higher than the trait correlations designed to get at different traits but employing the same method (the heterotrait-monomethod triangles). As figure 7.9 shows, this requirement was not fully met. Two correlations in the lower triangle exceed the two validity diagonal correlations. Pattern similarity of the trait interrelationship in all of the heterotrait triangles is the third and last criterion for discriminant validity. It was clearly not met as figure 7.9 shows.

Overall, the MTMM analysis showed that a moderate convergent validity for two of the three analysed items could be demonstrated, while their discriminant validity was rather low. However, it should be remembered that all of the above variables are not maximally different traits, but related traits of organisational Internet use. Hence, the convergent validity assessment should be considered more important. Especially the (convergent) validity of this thesis' central construct "routinised level of use" is of importance, since it gave further evidence for its validity. Nevertheless, one could argue that this construct should only be validated with international websites, not with all websites. Yet a separate analysis that only considered international websites revealed a similar picture. For example, the validity diagonal value for trait 3 changed only from *r= .35* to *r= .34*.

7.3.3 Objective 5c: Experience and Website Implementation Levels

The assessment of research aim 4 has shown that in contrast to the previous research aims, a significant experiential impact could be found for experience with a website. More specifically it was found that firms with older, more established websites (or firms with more experience with their website) reported a significant reduction in international business costs, a reduction in the need to establish a foreign presence (FDI), an increase in the Internet's impact on international business investments and an increase in the importance of unsolicited Internet inquiries on their selection of foreign markets. To assess whether the reasons for this finding were due to qualitative differences (as assessed in the observational analysis) in more established websites, a correlation analysis was performed. Four significant relationships were found (see appendix 7.20).

The time that has passed since a website was first accessible significantly influenced all assessed website dimensions but customer focus and navigatability. Older websites had more external linkages, were easier to be found, they provided more information and they were more up-to-date. These findings not only give a first indication of the potential importance of these dimensions for the impact analyses that follow, but they also give an indication of the possible reasons for the previously found impacts of website experience. The high embeddedness of older websites in the marketspace could possibly explain the increased role of unsolicited inquiries over the Internet. If a firm's website is not well embedded – in a way one could say that its "virtual marketshare" or "virtual share of voice" is low – potentially interested people will be less likely to find it. This possible relationship might also explain the reduced FDI needs. Increased marketspace-embeddedness and the subsequent increases in unsolicited inquiries might lead to a "death of distance"-perception on the behalf of the firm and its technical entrepreneur. Nevertheless, the discussed potentiality of the rather projective nature of reductions in FDI needs could render such an interpretation, at least in an absolute sense, non-substantial. The post-survey interviews will have to clarify this.

The finding that older websites provide more and newer information might also explain the other significant relationship: the perceived reduction in costs and the perceived impact on international business investments. As theorised in research aim 4, an increase in information on a website might indicate an increase in media substitution. As opposed to printing (expensive) brochures, product specification sheets, white papers and other corporate documents for the public, the firm might just publish

(cheap) them on-line for customers to download. The correlations seem to indicate that firms that have used websites for a longer time did exactly that. The significant correlation with the newness of the information content supports this further, as it indicates that firms with older websites used their websites more actively.

However, despite the obvious limitations of these interpretations it can already be concluded that in contrast to levels of use in general, experiential effects did exist with regards to using and implementing a websites and its subsequent impact on international business operations.

7.3.4 Objective 5d: Websites and International Business Impacts

After the previous research aims have addressed impacts of Internet use for international business in general, this section will incorporate and assess the specifics of website implementation levels. Although the previous section showed that the three metric indicators load on one factor, it was decided not to combine them into one indicator. Since the dimensions represent different, albeit related concepts, an aggregation of data could have masked potential sub-dimension effects. It should also be noted that this analysis does not incorporate two of the three survey-based website variables. As discussed, the content validity of IREGIS (the number of search engines a firm has registered its website with) was rather questionable and therefore the more reliable observation-based outcome variable was used (WPSEARCH). With regards to the updatedness variable (IUPDATE for the survey and WPUPDATE for the observation analysis), the method validation established convergent validity, therefore both variables could be used. However, WPUPDATE is a more precise measure due to its truly metric scale. Thus, the observation-based measure was used only. Only the third survey-based measure, IINVEST, was included, which showed no significant association with the other variables. The observation-based variable WPINTERS, the summed score for the website interactivity dimension, could not be included in the analysis due to incorrigible non-normality. A dichotomisation was not feasible either, because there were too few observations to meaningfully dichotomise it (median = mode). However, a non-parametric correlation analysis with the impact variables below could be performed and are reported in the respective sub-sections. Potential group differences between software firms and the formative use group of firms were not assessed again. Their potential role was already assessed in research aim 4 and the reduction in *n* from 112 to 77 would reduce the power of the test compared to the previous assessment anyway. Before the analyses were performed, the impact variables were re-assessed. If their original distribution or the counts per group

changed due to the changes in *n*, they were again dichotomised and trichotomised (if needed) to reflect the changes in the sample.

7.3.4.1 Impacts on Attitudinal Internationalisation Dimensions

All the direct and indirect attitudinal internationalisation dimensions (for their rationale see the previous section) that were explored in the previous section were assessed for the total sample of website adopters. The results are shown in appendix 7.21.

As can be seen from appendix 7.21, one of the website implementation indicators emerged as a key influential factor in all but three models: the marketspace-embeddedness of the website. STBFs with more embedded websites perceived higher levels of international contacts due to the Internet, higher levels of unsolicited orders over the Internet, higher levels of reduced FDI needs and a higher impact of Internet-based information searches, receipts and unsolicited inquiries on their selected foreign markets. The importance of this dimension, and with it the importance of experience with a website (see previous research objective), clearly became apparent. The theoretically suggested importance of attracting visitors to a website (Hoffman et al, 1995; Kierzkowski et al, 1996) was thereby clearly supported. However, it should be noted that the marketspace-embeddedness was rather the outcome of the various marketing means (only partly addressed in this study) a firm can utilise to attract site visitors. A second, albeit much less important factor than expected was the business focus of the website. STBFs with international websites (foreign language provision) perceived higher levels of international contacts due to the Internet and STBFs with a domestic websites a decreased need for FDI. This only gave a weak indication to the relative importance of having an English website. But even more astonishingly, this effect was regardless of the information richness provided. On the one hand this finding could maybe indicate that interested parties from German speaking foreign countries like Austria and Switzerland (both countries rank high with regards to foreign market entries; see research aim 2) did often contact STBFs in Germany. On the other hand it could indicate that the pieces of information interested parties might be looking for (on the possibly information poor websites) will subsequently be exchanged via other media (see the importance of non-Internet related factors and the insignificant impacts on face-to-face meetings as noted above). But the core information they were initially looking for, like industry sector, specific products and technologies, was provided on the websites. The initially surprising finding with regards to FDI needs and STBFs with a domestic website are however explained by the significant differences STBFs with domestic websites exhibited regarding their

internationalisation. These firms were both significantly less involved in international business operations (IBINTENS: *t-value -4.00*, *p-value .00*) and exhibited a significantly lower international orientation (SIBATTI: *t-value -4.03*, *p-value .00*). This finding seems to give further support to the argument developed above that the perceived reduction in FDI need might be more of a projection than an actual behavioural experience.

The only other website implementation indicator that showed a significant impact was the frequency with which STBFs investigated who accesses their websites (IINVEST). Firms who often did so perceived a higher impact of unsolicited inquiries on their selected foreign markets. This finding needs some clarification in the post-survey interviews, because the intention of this item was to measure whether firms investigate the "hits" on their website. But this finding suggests that the item might have captured the actual subsequent responsiveness of a firm to their site visitor. Hence, possibly not so much just an analysis of site hits and the related statistics, but an analysis of website based inquiries and the subsequent responsiveness of the firm. An interpretation that would explain the above findings better.

Impacts on the need for face-to-face meetings, impacts on international business costs and impacts on international business investments were all independent of the website factors explored. While again supporting the importance of face-to-face meetings, the latter two insignificant findings were a bit surprising. During the assessment of the previous research aims it emerged that both impact variables were significantly influenced by website experience. It was then argued that this might be due to the quality of the website per se. But the insignificant findings here did not support this interpretation since no significant differences in quality-based impacts, at least with respect to the dimensions covered, could be found. Why costs were reduced and why investments were influenced needs to be explored in the post-survey interviews.

As mentioned above, the level of website interactivity could not be assessed in the logistic regressions due to its non-normality and a non-parametric correlation analysis was performed instead. Two of the potential impact variables were significantly impacted by levels of interactivity. STBFs with more interactive websites reported higher levels of unsolicited orders over the Internet (*Spearman's r = .20*; *p-value .04*) and a higher level of impacts of unsolicited inquiries on their selection of foreign markets (*Spearman's r = .23*; *p-value .02*). Although the effect was not very strong, it indicates that the implemented ease of interacting with a firm on-line had direct effects

on the actual perceived number of unsolicited inquiries. More interacting opportunities offered by the firm's website therefore led to an increase in the likelihood to a turn visitors into interactors. Hence, it increased the important conversion efficiency of a website (Berthon et al, 1996).

Website Impacts on Indirect Attitudinal Internationalisation Dimensions

Appendix 7.22 lists the results of the assessment of website implementation levels on the four indirect attitudinal internationalisation dimensions already discussed and analysed in the previous research aim.

The results show that firms with international websites reported higher levels of internal international business information, reported a stronger international orientation and a stronger internal resource-base. These results do of course raise the question of causality. Did international websites lead to the observed significant impacts or were international websites merely the result of the amount of international business information, the international orientation and the internal resource-base. The significant impact of IINVEST (the frequency of investigating who accesses ones website) on the internal resource-base of firms for international business seems to suggest the latter interpretation. The post-survey interviews will however clarify this further.

A direct impact on the subjective performance of firms was not found. This gives again support to the "strategy as a mediator to performance" literature (Cavusgil and Zou, 1994; Hoang, 1998).

7.3.4.2 Impacts on Behavioural Internationalisation Dimensions

The firm-based international business distance model that was developed for previous analyses was again used to test potential directional impacts due to different website implementation levels.

Website Impacts on the Direction of Internationalisation

Appendix 7.23 shows the results of the explored website implementation dimensions on the direction of internationalisation as measured by the five distance dimensions cultural distance, relative and absolute economic distance, geographic distance and technical distance.

Only the customer focus of the websites showed a significant impact. STBFs with an international website were on average dealing with relatively poorer, as well as more

distant foreign markets. A case-by-case analysis showed that the key influential countries in terms of distance were the USA and Asia and in terms of GDP per capita countries like Hungary, Greece and Brazil. However, since the impact of the Internet was not measured at the individual country level per firm but at the country average level, it is difficult to conclusively interpret this finding as an indication of the increased reach of firms with an international website. In addition the question of causality remains unresolved either. Did international websites lead to an increase in the distance of foreign markets served or did operations in more distant markets lead to an international website? Overall it is however again the marketspace-embeddedness of a firm's website that mattered with regards to the importance of Internet-based factors on the direction of internationalisation (see appendix 7.23). The post-survey interviews will have to further explore the directional impact at the individual country-level, including an establishment of local causality regarding the existence of an international website.

Website Impacts on the Timing of Internationalisation

Four timing related variables were examined (see previous analysis). The regression analysis revealed no significant direct impacts of website indicators on any of the timing related variables. However, the previously stated problem of different time frames has to be taken into consideration, as well as the overall high speed of internationalisation in the sample. The post-survey interview will pick-up on this issue and explore whether there were any potential timing differences in the internationalisation of STBFs due to the Internet that could not be captured in the cross-sectional investigation of the survey.

Website Impacts on Internationalisation Outcomes

The three outcome variables of the previous analysis were analysed.

With regards to the international business intensity of STBFs, a significant effect for the customer focus of the website (WPCF) could be found. STBFs with an international website were more financially involved in international business operations. Again, a causal uni-directional interpretation is problematic. An international website could lead to more international involvement, but international involvement could also lead to an international website. A crosstable investigation actually showed that the majority of firms in the formative group (74%) still have a purely domestic website. This suggests that the causal direction is rather from international exposure to the establishment of an international website, rather than the

other way round. Nevertheless, the post-survey interviews will clarify the causal direction as perceived by the selected interviewees further.

With regards to the international diversity of served markets, a significant effect for the customer focus of the website (WPCF) could again be found. STBFs with an international website were dealing with more foreign markets than firms with purely domestic websites. Again, a causal uni-directional interpretation is problematic. An international website could lead to more international diversity, but international diversity could also lead to an international website. The post-survey interviews will help clarify the causal direction.

With regards to the directness of modes used, a significant negative effect for the customer focus of the website (WPCF) could be found. STBFs with an international website were utilising less direct modes in their international business operations (*Wald statistics 5.18, significance 0.02*; *R= .21; χ^2 6.39, p-value 0.04*; *Pseudo-R^2 0.09*). This finding raises again the question of whether an International website has indeed an impact on the directness of the internationalisation modes used. A finding which is actually in opposition to the previous finding showing that with increasing use of the Internet for international business firms tended to use more direct internationalisation modes. In this case it rather seems to be an example of a spurious correlation, caused by a third variable not captured in the analysis. Since firms with an international website were more involved in international business operations, as well as dealing with more diverse markets, it might be that they increasingly go for indirect modes because of their internal resource limits and because of increasing sales volumes. Ramaseshan and Patton (1994) and Burgel and Murray (2000) could actually show that small firms switch from direct to indirect modes as they increase their international sales volume. A negative and significant correlation between international business intensity and directness (*Spearman's r = -.26, p-value .00*) in this study and a negative and significant correlation between international business diversity and directness (*Spearman's r = -.25, p-value .01*) seems to support this too. Thus, the significant correlation observed above was more likely to be a reflection of the intensity/diversity and directness relationship. Nevertheless, the post-survey interviews will further clarify this issue.

7.3.5 Synthesis Research Aim 5

The observational analysis and subsequent empirical assessment of website implementation dimensions gave some empirical support for the assessment model

developed in chapter 6. Suggested item dimensions correlated significantly and they also loaded on one factor in the method validation procedure. This procedure also established a moderate convergent validity for the level of use construct used throughout this thesis, as well as the updatedness item used in the survey. A convergent validity for the searchability sub-dimension and the IREGIS survey item could however not be established. This indicated that achieving high levels of retrievability via search engines is not just simply a matter of registering with a large number of search engines, but a rather more sophisticated and complex matter of website positioning. Chapter 9 will discuss this further.

The observational analysis also showed that the actual level of website implementation differed across the adopters, although they were on average rather low. There was little use of the more sophisticated technical possibilities of the Internet and the low marketspace-embeddedness of websites reflected the organisational smallness of the sampled STBFs. Particularly the finding of few websites with on-line transactions raised the question of how did the 75% of STBFs that stated to have conducted on-line selling in the past conduct their on-line sales? Did they use other technical services of the Internet or did they simply define on-line sales not as narrow as this thesis? The first post-survey implication of this research aim.

An interesting finding regarding the website implementation levels was the significance of website experience. In contrast to its relative unimportant role with regards to use levels and wiredness perceptions, website experience mattered. All but two website dimensions were significantly higher for older websites. This indicates that the suggested early adopter advantages for Internet use in general (Brock, 2000) seem to at least hold with the suggested information push sub-dimension of use (see chapter 4), that is the use of a website.

The actual assessment of the website implementation dimensions showed that one of the analysed website dimensions was of particular importance: the marketspace-embeddedness the website. This dimension showed significant impacts on nearly all the direct attitudinal internationalisation dimensions that exhibited a significant impactedness. The suggested importance of the reach of a website (Evans and Wurster, 1999) was therefore clearly supported. Foreign language provision of the website also showed some attitudinal, as well as behavioural impacts. However, as noted in the respective sections, a causal interpretation was difficult and a final assessment of the found impacts will have to wait until the post-survey interviews have

clarified local causality. A similar problem applies to the found significance of IINVEST (frequency of investigating website visitors) on the role of unsolicited inquires on the selection of foreign markets.

Additional determinants for perceived impacts on reduced costs and international business investments could not be found and it is thus up to the post-survey interviews to inquire into the possible causes for the stated impacts by some of the STBFs. Similarly, the need for face-to-face meeting with foreign customers and business partners was independent of website implementation levels. Hence, the reasons given previously with regards to the validity of the rational media choice models in an international context remain.

Overall, the results of the observational study clearly showed that in contrast to the other examined uses of the Internet for international business purposes, experience (length of use) mattered and that one of the outcomes of that experience, marketspace-embeddedness, played an influential role in the internationalisation of STBFs.

7.4 Summary

This chapter has presented the empirical findings of the survey and the observation stage of this thesis. Table 7.18 gives a detailed overview of all the key findings of this chapter and its post-survey implications.

Assessing the first research aim empirically has shown that STBFs already exhibited high levels of Internet use, particularly software firms. The findings have also shown that the levels of Internet use were strongly determined by use levels (degree of wiredness) at the international industry and business partner level, especially the latter. Surprisingly, experiential factors showed little or no impact on levels of Internet use. This has raised the question on why that was the case, the first direct implication of the survey findings for the post-survey interviews. Furthermore, it has emerged that the formative group of firms, firms that have started to use the Internet prior to their internationalisation, was significantly more experienced in using the Internet, despite being significantly younger than its control group. The main reason for this finding was the decreasing inception to Internet adoption time lag as firms became younger, a first indication of the possibly increasing role of the marketspace for young STBFs.

Addressing the specific research objectives of the second research aim has shown that the sampled STBFs were relatively rich in early and instant internationalisers, albeit in a seemingly opportunistic and less planned manner. Identifying the organisational manifestations of their internationalisation has shown that direct modes, particularly the export mode dominated. The use of more committing modes like FDI was rather exceptional. Examining the determinants of STBFs' internationalisation has shown that the internationalisation process was accelerating. Firms with long initial NPDs internationalised faster and younger STBFs internationalised earlier and faster. The findings have also demonstrated the importance of attitudinal, experiential and resource-related factors in the internationalisation outcomes of STBFs. They were all significant determinants. However, none of the above factors had a significant discriminating effect on STBFs' FDI. FDI could not be explained and this has raised the question of what factors and motives have determined their FDI. The post-survey interviews will have to explore this question. With regards to the examination of the determinants of STBFs' direction of internationalisation, the findings have shown that mainly economic and spatial factors were involved in a rather triad-focused internationalisation process. Cultural distance exhibited no significant role. However, it has been argued that this insignificant finding might have been due to its operationalisation rather than its theoretical validity. Again, the post-survey interviews will have to explore this further.

The assessment of the third research aim has provided support for the importance of STBFs' management, as well as the importance of the pre-state of the firm. STBFs with managers with previous experience in international business had a stronger international orientation and a stronger internal resource-base for their international operations, factors that were subsequently important in their internationalisation (see above). Moreover, previous managerial experience with the Internet – especially prevalent among software firms and the formative group – had a significant effect on levels of Internet use for international business. In contrast, exploring the role of team ventures has revealed no impacts. Team ventures were not endowed with more managerial pre-state Internet or international business experience. This gave indirect support for the more differentiated views in the literature that it is not the existence of a team venture per se, but the diversity and complementary of skills of its members that matter (Lamont, 1972; Smith and Fleck, 1987; Eisenhardt and Schoonhoven, 1990; Schoonhoven et al, 1990; Weinzimmer, 1997; Cooper, 2000). Also, no support for the stage theory of high-tech venture founding and development was found. The

proposed typical transition of the technical entrepreneur from a scientist to a manager as the STBF develops and grows was not found among the sampled STBFs.

Exploring and assessing the role of the Internet in the internationalisation process of STBFs, the fourth research aim of this thesis, has shown that although direct attitudinal impacts were considered rather low by the overall sample, especially in comparison to non-Internet related factors, when controlling for Internet use levels, several significant impacts emerged. The findings have shown that intensive Internet use for international business increased the number of international business contacts, the number of unsolicited foreign orders, it reduced the need for a foreign establishment (FDI) and it influenced international business investments. Intensive use also significantly impacted the influence of Internet information searches, receipts and unsolicited Internet inquiries on the actual selection of foreign markets. Especially the formative group exhibited significantly higher levels of an Internet impact on the role of unsolicited inquiries in the selection of foreign markets. A second indication (for the first see research aim 1 above) of the potentially increasing role of the Internet's marketspace. The findings have also indicated that intensive Internet use increased STBFs' level of international business information, it strengthened their international orientation and it strengthened their internal resource-base. In contrast, the need for face-to-face meetings in international business remained. Internet use did not substitute or reduce this need. Also, no direct impact on performance was found. At the behavioural level, the analysis has shown that little differences were observable but for the directness of internationalisation modes and the significant influence of technical distance. Nevertheless, it has been argued that besides reflecting a marketplace-marketspace equivalence with regards to internationalisation outcomes these findings reflected the rather homogeneous timing and direction of STBFs' internationalisation, potentially masking Internet effects that the assessment at the attitudinal level has shown. Overall, it has however become apparent throughout that in many cases a clear-cut directional assessment of causality was ambiguous. The assessment of research aim 4 has raised various research questions that need to be explored further in the post-survey interviews (see table 7.18).

The empirical analysis of the last research aim has revealed support for the synthesised website dimensions, it has established moderate convergent validity of the level-of-Internet-use construct and it has revealed that particularly three website implementation dimensions mattered in relation to internationalisation impacts. These were the degree of embeddedness, the provision of information in English and a high

level of interactivity. Salient website implementation dimensions that were in part significantly higher for older, more established websites. Similar to the previous research aim it has however become apparent again that in many cases a clear-cut directional assessment of causality was ambiguous, implying the need for further explorations during the post-survey interviews. Furthermore, some of the findings were difficult to interpret. In particular, the finding that few websites provided possibilities for on-line transactions has questioned the survey findings suggesting otherwise. The post-survey interviews will have to address this, too.

The reported findings have two main implications.

The first implication of the findings of the survey and observation stage relate to the overall conclusion of this thesis. Chapter 9 will synthesise the overall findings relating to the thesis of this study. This chapter will develop a model of marketspace-based and marketspace-influenced internationalisation based on the findings from this chapter. However, at this stage, the findings of this chapter are in need of some clarification. Hence, the second implication of this chapter's findings.

The second implication of the findings of the survey and observation stage relate to the discussed problems of assessing causality, explaining potentially spurious correlations and clarifying the insignificance of some of the findings. The findings have raised questions (see table 7.18) that could not be conclusively answered within the quantitative data provided in the survey and the observational analysis. Thus, post-survey interviews were conducted to capture the contextual richness of a set of pre-specified cases, according to the post-survey interview implications derived from this chapter's findings (see table 7.18).

Research Aim	Method	Research Objective	Key Findings		Post-Survey Implications*	
			What was shown?	What was not shown?	What is unclear or needs further explorations? (causality/ validity)	What STBFs to interview? (sample selection)
1. Examine the current level of Internet use for international business and its determinant among STBFs at an attitudinal level.	survey	1a. Describe the organisational level of Internet adoption and use.	• the sample of STBFs exhibited on average high levels of Internet use • binary measures of organisational Internet use are not appropriate • *e-commerce was significantly higher among software firms (Cohen's d= .81**)*	• some indicators could not discriminate well due to the Internet richness of the sample	–	–
		1b. Develop and assess a multi-dimensional, non-binary measure to scale the level of organisational Internet use for international business.	• a reliable and valid measure "routinised levels of Internet use for international business" • *use levels among software firms were significantly higher (Cohen's d= .71)*	• use sub-dimensions as discussed in chapter 4 could not be identified	–	–
		1c. Develop and assess a multi-dimensional measure to scale the perceived use at the international industry and international business peers' level (industry and peer wiredness).	• a reliable and valid multi-item measure • support for two sub-dimensions: "international peer wiredness" and "international industry wiredness" • *peer wiredness among software firms was significantly higher (Cohen's d= .41)*	• *the perceived wiredness did not significantly differ for the formative group*	–	–
		1d. Assess the relative role of industry and peer wiredness perceptions as determinants of Internet use levels.	• use levels were significantly influenced by both wiredness dimensions, with international peer wiredness exhibiting nearly 5 times as strong an impact on use levels (Cohen's f^2 = 1.59 and .34)	–	–	–
		1e. Assess the relative role of Internet experience as a determinant of organisational Internet use levels for international business. *Do experiential factors influence the perceived wiredness construct?*	• *experience with a website significantly influenced the level of perceived industry wiredness (Cohen's f^2 = .45)* • *experience with using the Internet significantly influenced the level of perceived peer wiredness (Cohen's f^2 = .38)*	• experiential factors did not significantly impact use levels, neither directly nor indirectly (moderator effects) • *the formative group was not more experienced in website use*	• Why were experiential factors unimportant determinants of use levels? • Why was industry wiredness influenced by website experience?	highly Internet experienced vs. inexperienced STBFs STBFs with high levels of wiredness perceptions vs. STBFs with low levels of wiredness perceptions

Table 7.18: Findings Synthesis and Post-Survey Interview Implications (continued)

Research Aim	Method	Research Objective	Key Findings		Post-Survey Implications*	
			What was shown?	What was not shown?	What is unclear or needs further explorations? (causality/ validity)	What STBFs to interview? (sample selection)
1. Examine the current level of Internet use for international business and its determinant among STBFs at an attitudinal level.	survey	1e. Assess the relative role of Internet experience as a determinant of organisational Internet use levels for international business. *Do experiential factors influence the perceived wiredness construct?*	• *software firms were significantly more experienced (both indicators) (Cohen's d = .49 [website use]; Cohen's d = .40 [web use])* • *the formative group was significantly more experienced with the Internet (Cohen's d = .73), despite being significantly younger (Cohen's d = .45); this was mainly due to decreasing inception to Internet adoption time lags as firms became younger (Cohen's r = .90)*		• Why was industry wiredness not influenced by experience with using the Internet? • What other factors might have influenced the wiredness perception levels?	
2. Examine the internationalisation characteristics of STBFs, their Manifestations and determinants.		2.a Develop and assess a multi-item measure to scale the international business attitude of STBFs.	• a reliable and valid multi-item measure	• *no significant group differences for software firms or the formative group*	–	–
		2.b Develop and assess a multi-item measure to scale the internal international business resource-base of STBFs.	• a reliable and valid multi-item measure	• *no significant group differences for software firms or the formative group*	–	–
		2.c Develop and assess a multi-item measure to scale the perceived level of internal international business information among STBFs.	• a reliable and valid multi-item measure • *the formative group perceived lower levels of internal international business information (Cohen's d = .51)*	• *no significant group differences for software firms*	–	–
		2.d Identify organisational manifestations of the process of STBFs' internationalisation.	• the sample of STBFs was relatively rich in early and instant internationalisers • direct modes dominated, significantly more so for service intensive STBFs (Cohen's d = .44) • the export mode dominated and FDI was low	• *no significant group differences for software firms or the formative group found with regards to the timing of internationalisation, the international business diversity, FDI or the direction of internationalisation*	–	–

Table 7.18: Findings Synthesis and Post-Survey Interview Implications (continued)

Research Aim	Method	Research Objective	Key Findings		Post-Survey Implications*	
			What was shown?	What was not shown?	What is unclear or needs further explorations? (causality/ validity)	What STBFs to interview? (sample selection)
2. Examine the internationalisation characteristics of STBFs, their manifestations and determinants.	survey	2.d Identify organisational manifestations of the process of STBFs' internationalisation.	• *international business intensity was significantly lower in the formative group (Cohen's d = .47)* • *software firms and the formative group used significantly more direct international business modes (Cohen's w = .24 [software]; Cohen's w = .23 [formative]); because both were significantly more service intensive*	• *no significant group differences for software firms with regards to international business intensity*	–	–
		2.e Examine determinants of STBFs' internationalisation.	• the timing of internationalisation was significantly earlier and faster for younger STBFs (Cohen's f^2 = .48 [earliness]; Cohen's f^2 = .44 [speed]) • the initial NPD length strongly influenced the speed of internationalisation; STBFs with long NPDs internationalised faster (Cohen's r = .32) • international business diversity was significantly higher for STBFs with a high international orientation and 60% stronger so for STBFs with more operational international experience (Cohen's f^2 = .33) • international business intensity was higher for STBFs with high levels of internal resources, high levels of an international orientation and high levels of international business experience (Cohen's f^2 = .52) • the direction of internationalisation was strongly determined by economic and spatial factors (Cohen's f^2 = 1.98); with an off-setting effect regarding spatial distance (∪-shaped effect)	• experiential and resource-related factors did not influence international business diversity • due to low levels of intra-country mode progressions no clear pattern regarding mode progressions emerged • no influential determinants of FDI could be found • psychic distance operationalised as cultural distance did not influence the direction of internationalisation	• What factors and motives determined FDI among STBFs? • What role did the Internet play with regards to these factors and motives? • Why did young STBFs internationalise earlier and faster? Due to Internet-related factors? • Explore the psychic distance construct: Differences at the technical entrepreneur level or unimportance of culture in high-tech markets?	STBFs with FDI Very young STBFs a sample of STBFs that cover a broad variety of foreign countries

Table 7.18: Findings Synthesis and Post-Survey Interview Implications (continued)

Research Aim	Method	Research Objective	Key Findings		Post-Survey Implications*	
			What was shown?	What was not shown?	What is unclear or needs further explorations? (causality/ validity)	What STBFs to interview? (sample selection)
3. Explore the role of the technical entrepreneur or venture team both in the internationalisation of STBFs and in relation to the level of Internet use for international business.	survey	3.a Assess the role of previous international business experience (pre-state and pre-joining) among STBFs' managers and team ventures on the internationalisation characteristics of STBFs.	• STBFs with previous international marketing experience had a significantly stronger internal resource-base (Cohen's d = .54) • STBFs with managers who previously worked abroad had both a significantly stronger internal resource-base (Cohen's d = .72) and a stronger international orientation (Cohen's d = .48) • *the formative group had significantly less managers who worked abroad (Cohen's w = .22)*	• the timing (earliness and speed) of internationalisation, the outcomes of internationalisation (but diversity), the direction of internationalisation and FDI were not significantly influenced by previous managerial international business experience, neither directly nor indirectly • internationalisation was not influenced by the existence of a team ventures • team ventures did not have more pre-state managerial international experience • *no significant group differences for software firms or the formative group with regards to managers with previous international marketing experience* • *software firms did not exhibit significant differences with regards to managers who worked abroad*	• What factors and motives determined FDI among STBFs? • What role did the Internet play with regards to these factors and motives?	STBFs with FDI
		3.b Assess the role of previous Internet experience and team ventures on the level of organisational Internet use.	• STBFs with managers with previous Internet experience used the Internet significantly more for international business (Cohen's d = .60) • *previous Internet experience among managers was significantly higher for software firms and the formative group (Cohen's w = .19 [software]; Cohen's w = .37 [formative])*	• Internet use was not influenced by the existence of a team ventures • team ventures did not have more pre-state managerial Internet experience	–	–

Table 7.18: Findings Synthesis and Post-Survey Interview Implications (continued)

Research Aim	Method	Research Objective	Key Findings		Post-Survey Implications*	
			What was shown?	What was not shown?	What is unclear or needs further explorations? (causality/ validity)	What STBFs to interview? (sample selection)
3. Explore the role of the technical entrepreneur or venture team both in the internationalisation of STBFs and in relation to the level of Internet use for international business.		3c. Assess the impact of the technical entrepreneur's/ venture team's managerial transition on STBFs' internationalisation and Internet use.	–	• no typical transition with regards to the business foci of STBFs over time was found	–	–
4. Explore and assess the impact of Internet use for international business on the internationalisation characteristics of STBFs.	survey	4.a Evaluate potential attitudinal impacts of Internet use for international business.	• increased levels of Internet use increased significantly the Internet's impact on: the number of international contacts (Cohen's d = 1.52), the number of foreign orders (Cohen's d = 1.25), a decrease in FDI needs (Cohen's d = .94) and an increase in international business investments (Cohen's d = 1.09) due to the Internet • STBFs with FDI saw significantly less of a reduction in FDI needs due to the Internet (Cohen's w = .28) • the selection of foreign markets due to Internet information searches (Cohen's d = 1.37), information receipts (Cohen's d = 1.63) and Internet-based unsolicited inquiries (Cohen's d = 1.55) increased with increased levels of Internet use and website experience (for unsolicited inquiries only; Cohen's d = 1.14)	• experiential Internet factors were unimportant but for the stated impacts of website experience • impacts were independent of international business experience • none of the Internet-related factors but website experience showed an influence on a cost reduction in international business due to the Internet • a reduction in the need for face-to-face meetings in international business was not observed • none of the Internet-related factors influenced the perceived performance of the STBFs' management	• Did the increased use of the Internet for international business lead to an increased international orientation or was it rather the other way round? • Did the increased use of the Internet for international business free-up internal business resources or did resource richer firms use the Internet more intensively? • Why did website experience increase the perceived reduction in international business costs and what other factors determined a reduction in international business costs due to the Internet?	STBFs with a strong international orientation Resource-rich STBFs with high levels of Internet use STBFs with high levels of perceived Internet impacts on international business investments STBFs with high levels of perceived Internet impacts on a reduced need for FDI highly Internet experienced vs. inexperienced STBFs

Table 7.18: Findings Synthesis and Post-Survey Interview Implications (continued)

Research Aim	Method	Research Objective	Key Findings		Post-Survey Implications*	
			What was shown?	What was not shown?	What is unclear or needs further explorations? (causality/ validity)	What STBFs to interview? (sample selection)
4. Explore and assess the impact of Internet use for international business on the internationalisation characteristics of STBFs.	survey	4.a Evaluate potential attitudinal impacts of Internet use for international business.	• non-Internet related information factors were more important than Internet-related factors (no substitution effect) with regards to the selection of foreign markets • experience with a website increased the perceived impact of the Internet on reducing international business costs (Cohen's d = .84), on reducing FDI needs (Cohen's d = .97) and on international business investments (Cohen's d = .60) • increased levels of Internet use increased significantly the level of international business information (Cohen's f^2 = .06) • increased levels of Internet use increased significantly the international orientation of STBFs (Cohen's f^2 = .11) • increased levels of Internet use increased the levels of internal international business resources (Cohen's f^2 = .04) • *the formative group perceived higher levels of an Internet impact on international business investments (Cohen's w = .18) and an increased role of unsolicited inquiries over the Internet (Cohen's w = .28) on selected foreign markets* • *software firms perceived higher levels of Internet impacts on reduced FDI needs (Cohen's w = .25) and on international business investments (Cohen's w = .32)*		• Why did website experience increase the perceived impact of the Internet on international business investments? Was it due to the Internet per se (enabling factors) or due to cost reductions (facilitating factor)? • Why were FDI needs reduced? • Why was use experience an unimportant determinant of attitudinal impact dimensions? • What role did non-Internet information related factors play in STBFs internationalisation, what were they and how did they relate to Internet factors?	

Table 7.18: Findings Synthesis and Post-Survey Interview Implications (continued)

Research Aim	Method	Research Objective	Key Findings		Post-Survey Implications*	
			What was shown?	What was not shown?	What is unclear or needs further explorations? (causality/ validity)	What STBFs to interview? (sample selection)
4. Explore and assess the impact of Internet use for international business on the internationalisation characteristics of STBFs.	Survey	4.b Evaluate potential behavioural impacts of Internet use for international business.	• the direction of internationalisation was significantly influenced by the technical distance of foreign markets as levels of Internet use increase (Cohen's f^2 = .12) • the directness of the international business modes did increase significantly with levels of Internet use (Cohen's d = .84) • increased levels of Internet use did significantly impact the average importance of Internet-related factors on the selection of foreign markets (Cohen's f^2 = .79)	• increased levels of Internet use did not significantly impact the manifestations of the cultural, economic and spatial distance of foreign markets entered • increased levels of Internet use did not significantly impact the timing (earliness and speed) of internationalisation • increased levels of Internet use did not significantly impact the diversity and intensity of international business operations	• Did increased Internet use for international business lead to more direct international business modes or did direct international business modes lead to higher levels of Internet use? • Why did younger STBFs internationalise faster? • Explore examples of Internet-influenced internationalisation. • Would marketspace internationalisers have internationalised at all or differently without the Internet?	STBFs with high levels of Internet use and directness in their international business operations very young STBFs STBFs with high and with low levels of Internet-based influence on the selection of foreign markets
		4.c Evaluate salient use dimensions with regards to the attitudinal and behavioural impacts.	–	• use sub-dimensions were not found, use dimensions could not be evaluated	–	–
5. Assess the levels of website implementations among website adopters at a behavioural level, investigate the role of experiential factors and explore potential internationalisation impacts.	Observation	5.a Develop a model for assessing different salient website dimensions and describe levels of web site implementation.	• synthesised and empirically supported dimensions: marketspace-embeddedness (locatability and searchability), information provision (richness, navigatability and timeliness), interactivity, customer focus (domestic/ international) and e-commerce • marketspace-embeddedness of firms was comparatively low • little use of advanced technical features like audio or video • nearly half the websites were partly in English	• despite the survey findings suggesting otherwise, e-commerce possibilities were extremely rare • *none of the website implementation dimensions differed significantly for the software firms* • *the level of website embeddedness, information provision and interactivity did not significantly differ for the formative group*	• Why were there so few websites with e-commerce features compared to the number of firms who stated to conduct e-commerce in the survey ? • Did STBFs' managers hold different on-line sales (e-commerce) definitions or did they conduct e-commerce via other Internet services?	STBFs involved in e-commerce but without a website with e-commerce

Table 7.18: Findings Synthesis and Post-Survey Interview Implications (continued)

Research Aim	Method	Research Objective	Key Findings		Post-Survey Implications*	
			What was shown?	What was not shown?	What is unclear or needs further explorations? (causality/ validity)	What STBFs to interview? (sample selection)
5. Assess the levels of website implementations among website adopters at a behavioural level, investigate the role of experiential factors and explore potential internationalisation impacts.	Observation	5.a Develop a model for assessing different salient website dimensions and describe levels of website implementation.	• *the formative group had significantly more domestic websites (Cohen's w = .33)*			
		5.b Validate the levels of Internet use and levels of website implementation across the survey and observation method.	• moderate convergent validity for the construct "routinised levels of Internet use for international business" and the updatedness survey indicator	• more registrations with search engines did not lead to higher levels of searchability • no discriminant validity for the indicators	–	–
		5.c Assess the role of experience with a website on STBF's website implementation levels.	• STBFs with more website experience had websites with more external links (Cohen's r = .49), websites that were easier to be found (Cohen's r = .25), that were information richer (Cohen's r = .22) and websites that were more up-to-date (Cohen's r = .25)	• neither the customer focus of the website (national/ international) nor its navigatability was affected by experiential factors	–	–
		5.d Evaluate levels of website implementation on the internationalisation of STBFs.	• STBFs with an international website reported more international contacts due to the Internet (Cohen's w = .33), more international business information (Cohen's d = .43), higher levels of an international orientation (Cohen's d = .94), a richer internal resource-base (Cohen's d = .61), more geographically distant (Cohen's d = .75) and relatively poorer foreign markets (Cohen's d = .59), higher levels of international business intensity (Cohen's d = .99) and a higher international business diversity (Cohen's d = .63) • STBFs with a domestic website reported higher reductions in FDI needs due to the Internet (Cohen's w = .15) and more direct international business modes (Cohen's w = .29)	• effects of e-commerce enabled websites was not assessed due to the very low number of e-commerce ready sites • website implementation levels had no impact on the timing of internationalisation (earliness and speed)	• Why did STBFs who frequently analyse who accesses their website perceive an increase in the importance of Internet-based unsolicited inquiries on their selection of foreign markets? Was this due to the analysis frequency per se or rather due to their responsiveness to marketspace-based inquiries (assess content validity of the survey item)?	STBFs with a high frequency of investigating who accessed their website STBFs with highly embedded websites STBFs with an international website

Table 7.18: Findings Synthesis and Post-Survey Interview Implications (continued)

Research Aim	Method	Research Objective	Key Findings: What was shown?	Key Findings: What was not shown?	Post-Survey Implications*: What is unclear or needs further explorations? (causality/ validity)	Post-Survey Implications*: What STBFs to interview? (sample selection)
5. Assess the levels of website implementations among website adopters at a behavioural level, investigate the role of experiential factors and explore potential internationalisation impacts.	Observation	5.d Evaluate levels of web site implementation on the internationalisation of STBFs.	• high marketspace-embeddedness increased the number of international contacts (Cohen's d = .71), increased the number of unsolicited foreign orders (Cohen's d = .54), reduced FDI needs (Cohen's d = .67) and increased the importance of Internet information searches (Cohen's d = .89), receipts (Cohen's d = 1.05) and unsolicited inquiries (Cohen's d = 1.05) on the selection of foreign markets • STBFs who frequently analysed who accesses their websites, perceived stronger impacts of Internet-based unsolicited inquiries on their selection of foreign markets (Cohen's d = .71) • STBFs with more interactive websites reported higher levels of unsolicited foreign orders over the Internet (Cohen's w = .18) and an increase in the role of unsolicited inquiries on their selection of foreign markets (Cohen's w = .28)	• website implementation levels had no impact on the timing of internationalisation (earliness and speed) • website implementation levels had no impact on reduced needs for face-to-face meetings, a reduction in perceived international business costs and investments • website implementation levels had no impact on the perceived performance of the firm	• Why did more embedded websites, regardless of their national or international focus lead to an increase in marketspace-based unsolicited inquiries? Did the inquiries come from German speaking foreign countries? • Did international websites lead to less direct modes, increases in the spatial distance and relative poorness of markets served, to increases in international business intensity, diversity, an international orientation and internal resources or was it rather the other way round?	

* Findings that are not further addressed in the post-survey interviews are discussed in chapter 9.

** An indication of the magnitude of the effect in the sample (effect size in the population) using Cohen's effect size indicators:

Indicator	Effect Size	Indicator	Effect Size	Indicator	Effect Size	Indicator	Effect Size
d	.8 = large	f^2	.35 = large	w	.5 = large	r	.5 = large
d	.5 = medium	f^2	.15 = medium	w	.3 = medium	r	.3 = medium
d	.2 = small	f^2	.02 = small	w	.1 = small	r	.1 = small

Italic characters indicate research questions that emerged during the empirical analysis.

Chapter 8: Post-Survey Interviews – Interview Guide, Case Selection and Findings

8.1 Introduction

The previous chapter has presented the empirical findings relating to the research aims of this thesis. As noted in the summary there, some of the key findings have raised questions that could not be conclusively answered within the quantitative data provided in the survey and the observational analysis. The goal of this chapter is to address and answer these questions. Unstructured personal interviews with technical entrepreneurs of selected STBFs that were conducted after the survey and observation data were analysed form the basis for this.

This chapter is structured as follows.

Section 8.2 presents the interview guide and the selection of the cases for the interviews. The interview guide and the selection of cases is based upon the implications table (table 7.18) of the previous chapter. The subsequent sections follow the logical structure of this interview guide.

Section 8.3 addresses the role of experiential factors, section 8.4 the internationalisation process, section 8.5 the organisational use of the Internet for international business and section 8.6 the impact of Internet use on STBFs' internationalisation process. The last two sections (sections 8.7 and 8.8) finally address the role of non-Internet related factors by exploring and clarifying the relationship between Internet and non-Internet factors (section 8.7), as well as by exposing the technical entrepreneurs to a scenario of an internationalisation process without the Internet (section 8.8).

A summary of this chapter's main findings concludes this chapter.

8.2 The Interview Guide and Case Selection

Appendix 8.1 presents the interview guide for the post-survey interviews. The development of the interview guide followed the implications for the post-survey interviews as listed in table 7.18 of the previous chapter. In order to facilitate the logical flow of the interviews, post-survey implications were grouped into thematically

similar sections. The next paragraphs will discuss and present each of the four main sections. The case selection procedure will be presented subsequently.

Section I: The Role of Experiential Factors

The first section addresses the role of experience related factors. The previous chapter has found comparatively little impact of experience on Internet use and wiredness perceptions. Only past managerial experience, managers joined or founded the firms with previous Internet use experience, showed a small effect. Likewise, international business experience exhibited no significant relationship with the explored Internet impact dimensions, despite its significant role in internationalisation outcomes. As argued in chapter 7, these insignificant or "low magnitude" findings might be due to the operationalisation of both experience measures. Both measures followed the view of experience as a stock of gained experience over time (Reuber and Fischer, 1999) and were rather quantitative. The post-survey interviews will therefore try to explore whether the more qualitative view of experience as a stream of particular experiences (Reuber and Fischer, 1999) will help to explain and clarify the role of experience with regards to Internet use, wiredness perceptions and impacts. In addition, the operationalisation of Internet experience did only cover one dimension of computer experience. Smith et al (1999) argue for example, that computer experience is essentially a bi-dimensional construct consisting of objective (direct and indirect) and subjective computer experience. Only the direct objective element of experience – which the authors view as "... the totality of observable... human-computer interactions with transpire across time." – with regards to Internet experience was captured in the survey. Therefore, subjective Internet experience, seen as "... a private psychological state reflecting the thoughts and feelings a person ascribes to some existing computer event." or indirect objective experience – information or knowledge about the Internet acquired through other media – might play a more important role in the investigated relationships. It should of course also be remembered that the experience measure related to Internet experience in general, while the use measure did not relate to use in general but to international use in specific. Despite its global nature, firms might not necessarily have used it for international purposes since adoption. However, it was also argued that the significant pre-state of the firms might have endowed firms already with such high levels of Internet experience that post inception experiential effects might not be as influential. A more qualitative investigation into the pre-state of STBFs is therefore needed to assess the validity of this interpretation. Yet another possible interpretation given in the previous chapter relates to the possibility that the Internet is a rather easy to use medium for STBFs in general. Although

contradicting the previous literature (see for example Poon and Swatman, 1997; Sillince et al, 1998; Carlson and Zmud, 1999), factors like perceived usefulness and ease of use (Davis, 1989; Taylor and Todd, 1995; Karahanna and Straub, 1999) might thus be more important determinants of use, wiredness and impacts. Finally, this section will try to uncover reasons for the significant, albeit small, relationship of experience with a website on perceived levels of industry wiredness, as well as the relationship of Internet use experience with perceived levels of peer wiredness. Question 1 of this section addresses the role of experience with regards to levels of use, question 2 addresses the role of experience with regards to perceived wiredness levels and question 3 explores the role of Internet experience and international business experience with regards to the perceived impacts of the Internet of international business operations.

Section II: The Internationalisation Process of STBFs

The second section explores unresolved issues relating to the internationalisation of STBFs. The first two questions of this section investigate the motives and factors that played a role in the firm's decision to invest abroad (FDI). As reported in the previous chapter, FDI among STBFs could not be explained by the survey variables. It was argued there that this might have been due to the non-assessed motives for their FDI (market-seeking vs. resource-seeking), the actual nature of their FDI investment (low committing FDI vs. high committing FDI) or due to a reversed causal directionality following Bonaccorsi's (1992) argument. Question 3 tries to uncover reasons for why younger STBFs internationalised earlier and faster than older STBFs, a finding which was independent of Internet-related factors. The last question of this section, question 4, addresses the question of determinants of the direction of STBFs' internationalisation. The previous chapter has shown that mainly economic and spatial factors significantly influenced the direction of internationalisation and that psychic distance, operationalised as cultural distance, displayed no significant relationship with the selected foreign markets at all. Chapter 7 argued that the insignificant findings might be due to its operationalisation at the national level. Various authors (see for example O'Farrell et al, 1995; O'Grady and Lane, 1996; Petersen and Pedersen, 1997) have argued that an operationalisation at the firm or managerial level is a more appropriate reflection of the psychic distance construct. Significant findings by Nordström (1991) and Dow (2000) – although not strictly measured at the managerial level of the firms that were sampled – seem to support this argument. Thus, question 4 asks the technical entrepreneurs for their perception of the cultural closeness/ distance

of their entered foreign markets and whether using the Internet had any effects on their distance perceptions.

Section III: Organisational Internet Use

The third section focuses on clarifying Internet use related findings. The first question addresses the seemingly incongruous finding in the observational analysis of few websites with transaction (e-commerce) possibilities, despite 75% of STBFs in the survey stating to have conducted on-line sales in the past. Chapter 7 made the point that this incongruity could either relate to STBFs' manager holding different views on what constitutes an on-line sale and/ or that the sampled STBFs use Internet services other than a website. The answers to this question should help clarify the validity of each interpretation. The second question of this interview guide section addresses the finding that firms who frequently analyse who accesses their website (IINVEST) perceived a higher increase in the importance of Internet-based unsolicited inquiries on their selection of foreign markets. It was argued in chapter 7, that this finding might be better explained by considering a potentially excluded third variable: responsiveness. Firms that often analyse their websites "hits" might react more quickly to Internet-based unsolicited foreign inquiries. Such an interpretation would explain the significant role of IINVEST more convincingly. Hence, question 2 tries to uncover any potential link between IINVEST, the responsiveness of firms or any new explanatory variable that might emerge. The final question of this section looks into the significant role of highly embedded websites with regards to unsolicited inquiries and orders, regardless of their domestic or international content. The goal is to explore whether this significant relationship might be due to inquiries and orders coming from German speaking foreign countries, rendering an international content less important.

Section IV: Internet Use Impacts on the Internationalisation Process

The fourth and final section is concerned with the various impacts of the Internet on the explored internationalisation dimensions. As discussed in chapter 7, most of the questions in this section relate to assessing the direction of causality. Is Internet use the cause for the investigated impact variables or is it the outcome of some of the internationalisation dimensions investigates? Questions 1, 3, 4 and 9 mainly relate to assessing this. On the other hand, questions 5 to 8 focus more on uncovering additional explanatory variables and explaining potentially spurious relationships. Question 5 tries to uncover additional determinants for a perceived reduction in international business costs, as well as uncovering reasons for the found significant relationship with website experience. Question 6 explores further the role of

non-Internet related factors, which showed a higher average importance than the Internet-related factors in chapter 7. The perceived relationships between the two will be of particular interest, since this helps judging the overall importance of the Internet on STBFs' internationalisation. Question 7 and 8 also relate to uncovering additional explanatory variables. Particularly question 7 will clarify whether the perceived reduction in FDI needs was of a rather projective than experiential nature as argued in the previous chapter. In contrast to the previous interview questions, question 2 focuses on a specific non-significant finding that could have been masked by the homogeneous timing of internationalisation of the sampled STBFs. As reported in chapter 7, the insignificant role of Internet use factors on the timing of internationalisation – if a significant one exists – could have been an artefact of the overall high earliness of internationalisation among the sample, masking timing impacts. The answers to the last questions of this final section, question 10 and 11, will be used for illustrative purposes. The marketspace internationalisation examples given in question 10 will be used for illustrative purposes throughout this chapter and the non-Internet yet scenario examples will be presented in the final section of this chapter. These examples should help to understand in more qualitative terms the specifics of marketspace-influenced internationalisation. These examples should also help developing the overall information synthesis and the model of marketspace-influenced internationalisation that will be presented in the next chapter. Particularly the answers given to question 11 will facilitate assessing the overall role of the Internet for the internationalisation of STBFs.

Case Selection

Table 7.18 in the previous chapter also lists the sample selection implications based on the research questions for the post-survey interviews. These sample selection criteria were used to select suitable cases using a set of case filter procedures within SPSS. When the sample selection criteria related to relative characteristics of cases – that is criteria relating to the average observed value (the sample mean) for the variable of interest – like for example "very young STBFs" or "highly Internet experienced vs. inexperienced STBFs", cases were selected based on their deviation from the observed sample mean (within ± 2x the standard deviation if the variable in question was not significantly non-normal).

This filter process yielded 14 firms, with a minimum of 2 contrasting cases per interview guide question. Since this number of firms was considered manageable, firms were not randomly selected for the post-survey interviews based on this

pre-specified group of firms, they were rather all contacted. However, due to mainly timing difficulties (a firm moved to another location, another firm did prepare for a major trade-show) and one negative response (the manager refused to co-operate), only 10 firms out of the 14 firms could be interviewed.

8.3 The Role of Experiential Factors

The first area investigated in the post-survey interviews was the role of experiential factors in relation to Internet use levels, wiredness perceptions and perceived impacts.

8.3.1 Experience and Levels of Use

In the survey, pre-state experience was the only significant experiential factor with regards to Internet use levels. It was argued that the pre-state of STBFs might have endowed them already with so high levels of Internet experience that post-inception/ post-joining effects might be negligible, thereby explaining the observed little role of post-inception experience. Pre-state experience was thus the first variable to be explored.

The Role of Pre-State Experience

The post-survey interviews gave only little support for this explanation. Two cases, both of which reported very low Internet use levels in the survey, stated that pre-state effects *"...played no role."* (despite the existence of it!) or that after inception *"... we have started all over again with the Internet."*. On the other hand, 7 cases stated either directly or indirectly that their pre-state experience was important in relation to their post-inception use. "...[pre-state] *sure, that is where the know-how came from."*, *"... the knowledge about the Internet was there before* [before founding this firm]... *Of course, had I not used it that intensively at the University... "* and *"... I had my first contact with the Internet in 1982 when I started studying information science."* were some of the more explicit statements made, underlining the importance of pre-state experience on use.

Pre-state experience also seemed to have a positive effect on perceptual adoption and use barriers. The only case without pre-state experience was also the only case where the technical entrepreneur reported about his initial *"prejudices"* and *"fear"* that a company-wide use of the Internet might actually increase costs, lead to the *"use of dubious* [sex related] *offers"* and a loss of control. A fear which did not materialise

later. This example clearly shows the fruitfulness of viewing experience as a stream of particular experiences (Reuber and Fischer, 1999).

The Role of Experiential Learning

However, despite the important role of pre-state experience, merely validating the survey results, learning effects and increased levels of use independent of whether pre-state experience existed within a firm was also reported. Statements like *"... you learn how to use it* [the Internet] *more efficiently..."* and *"...we use it* [the Internet] *much, much more* [now]." supported this observation. Moreover, these statements were made regardless of the common technical entrepreneurs' view that the Internet is a relatively easy to use medium (*"...it* [the Internet] *is relatively easy."*), with short initial learning phases (*"...this* [the initial learning phase] *is relatively short..."*). Hence, the initial interpretation that pre-state experience might have endowed firms with such high levels of Internet experience that post-inception experience does not matter that much anymore found no support. The interpretation that the Internet might be so ease to use that experiential learning effects on use levels do not matter anymore was also not supported. Despite its relative ease, experiential learning mattered.

The Role of Other Experience Dimensions

The argument made that other dimensions of Internet experience (Smith et al, 1999), dimensions not covered in the survey, might impact use levels more strongly also found little support. While subjective Internet experience was high and positive for both low level users and high level users, indirect objective Internet experience was rated as *"... I think I grew with the Internet, yes, one or two booklets, but primarily via use."*, *"We don't do that at all* [using outside media].", or *"...books* [about the Internet and its use]... *who has time for something like that?"* throughout the interviews. One firm's technical entrepreneur even said that "...[indirect objective experience gained via information from other media is] *less and less important... its importance is reduced constantly, because the offers on the Internet grow and grow. 3-4 years ago you had to utilise other sources like books and magazines, but even the magazines offer more and more content on-line."* This clearly showed the predominant importance of experience gained in a "learning by using" fashion with regards to the Internet. It does, however, not yet explain the empirical findings of the survey.

The interpretation that the possible difference in variable domains between the use construct (international use) and the experience indicators (use in general) might explain the survey findings also found no support. The views expressed were all

similar to the following exemplary quotations: *"...that is the same, I hardly use it for national business."* and *"That doesn't matter, it depends on what I am looking for."*

In summary, none of the interpretations given in the previous chapter found support in the post-survey interviews. Experience is important, but it does not determine use levels in a strong way. However, as expected, the post-survey interviews uncovered additional factors and determinants that played a role in the experience-use-relationship among STBFs.

While numerous additional themes and sub-themes like the role of active externalities and legal issues were uncovered, the cross-case displays and the link to the survey data revealed one theme that seem to explain the survey findings: the role the chosen business model.

STBFs' Business Model as a Determinant of Use

As one of the interviewees observed:

"The Internet helps businesses, depending on what they do. And if you don't have a business model that is Internet-focused or a business model where the Internet can be used as a distribution channel or something else in the overall business model is massively influenced by the Internet, ... that means that [firms] *that have a lot of experience know probably already that for their business the Internet is solely a communication channel.* [Use level are] *surely independent of the length of the experience. We have started to use it more intensively, because we have re-aligned our business model to the Internet."*

This statement seems to suggest that the adopted business model of the firm with regards to the Internet acted as an upper use threshold. Even if the firm has used the Internet for a very long time, product and service related factors might impose a limit on the maximum level of Internet use. One could use the Internet to sell and distribute ones software, but it is not possible to do the same in the case of custom-made, expensive and complex industrial goods. The response of another interviewee with below average Internet use levels but with Internet experience dating back to the 80s supported this interpretation further: *"... you have to answer this in a product specific fashion. What you have here is a particular situation, we have large industrial* [medical] *goods... there you have given* [industrial] *structures... this has nothing to do with the Internet. It is supportive, but not decisive."*

It can therefore be concluded that:

a.) experience mattered, even post-inception experience, but that

b.) there did exist a set of limiting factors with regards to the experience-level-of-use relationship.

The adopted business model (Internet-centric vs. Internet-supported), including product and service specifics, determine the maximally achievable level of use. The survey findings, showing that software firms significantly use the Internet more for their international business operations, supports this interpretation further. In contrast, the analysis of interpretations given in the previous chapter, besides supporting for the view of experience as a stream, exhibited little validity.

8.3.2 Experience and Perceived Levels of Wiredness

In contrast to the previous section, only weak indications for experiential effects in relation to perceived levels of wiredness, both industry and peer wiredness, could be detected. Managers noted, mostly implicitly, throughout the interviews that "...[the wiredness perception] *grew experientially.*" and that it was not just a pure projection of what might be found on the Internet or how international business partners might use the Internet. But when explicitly asked whether their wiredness perceptions have changed since a website was adopted, firms could not see a relationship ("... *that is independent of each other.*"). The only major change that was seen throughout the interviews related to experience-independent externalities like the "*strong increase*" in users and pieces of information available and that "... *it* [the Internet] *has become more and more user friendly.*" due to various technical innovations that were introduced over time.

A further analysis based on one of the respondents remarks: *"The website was only the initiator for actually using the Internet."*, which could have indicated that adopting a website could be viewed as an initiating event for more active use of the Internet, also revealed little additional insights. This specific case started to use the Internet and a website at the same time and an analysis of the other cases did not reveal a potential initiating event link either.

However, one technical entrepreneur noted that *"I think I can't really answer this question, because in the past, I have not used it* [the Internet] *in the way I use it now and in the past, the type of information I am interested in now didn't interest me at all."*

This statement suggests that there might be an alteration in the wiredness perception dependent upon the changed information needs of the firm and independent of its experience with the Internet per se. Since the wiredness items all relate to international business related issues, it might be that the changing international business involvement of the firm over time and with it its changed information needs, which are impossible to be captured in the cross-sectual survey, might impact perceived wiredness levels for those firms who resort mainly to the Internet to supply them with information.

Additional determinants of wiredness perceptions could not be uncovered either and a lucid explanation with regards to the significant impact of website experience on industry wiredness and general Internet experience on peer wiredness remains elusive.

8.3.3 Experience and Internationalisation Impacts

A number of firms stated that they would now, at the time the interview took place, rate the various impact variables higher as at the time of the survey. But this perception was again relatively independent of experiential factors. Just like the previous sub-section, external factors emerged as more influential factors than use experience. Particularly the increasing awareness of the market about the firm and its products – it has to be remembered that the majority of firms was very young, suffering from liabilities of newness (Stinchcombe, 1965) – was often mentioned as an influential factor, as the following exemplary statement shows: "...[the impacts] *have increased, well, we have become more noted, the market is now more aware of us.*"

8.4 The Internationalisation Process

The second set of questions in the post-survey interviews relates to unresolved issues with regards to the internationalisation process of the sampled STBFs. Three areas were explored further: FDI among STBFs, the timing of the internationalisation process and the role of cultural distance in the internationalisation process.

8.4.1 FDI among STBFs: Factors, Motives and the Role of the Internet

Chapter 7 investigated the determinants of FDI among STBFs, but traditional indicators like organisational age and size did not show significant relationships with FDI. Based on the survey data, FDI could not be explained. Various possible interpretations for this finding were put forward. The following sub-sections present

the synthesised evidence from the post-survey interviews, including an assessment whether the Internet played a role in the STBFs' FDI.

The outcome of the interview analysis revealed support for several of the arguments put forward in chapter 7. Support was found for the interpretation of a rather unplanned, stochastic FDI, although only in the case of one of the FDI STBFs. This firm stated that their FDI happened by accident, as a reaction (reactive FDI) to an unsolicited inquiry from a Dutch business man operating in their area of expertise (physiotherapy technologies). The main reason for setting-up the subsidiary was to *"... gain some experience. That was the main reason."*, although market seeking was also stated as a motive. Overall, this firm regarded their FDI investment, an investment that was already cancelled and superseded by an agent agreement at the time the interview was conducted, as rather experimental (experimental FDI). So much for deterministic stage models!

FDI Commitment Levels

This case also seemed to support the argument made in the previous chapter that the very nature of STBFs' FDI might be of a rather low committing nature. Indeed all the FDI operations by the interviewed STBFs exhibited a low financial involvement. Statements like *"...in our subsidiary in the USA, we more or less only have a PC."* or *"The budget for the whole activity* [FDI in the USA] *was around 25kDM* [£8,300]." clearly showed that their FDI was of a rather low committing nature. This supports Bonaccorsi's (1992) argument that small firms usually prefer high levels of country mobility to reduce risk, thereby avoiding highly committing internationalisation modes with costly exit barriers. But nevertheless it was surprising that this argument also applied to the FDI mode, traditionally seen as a high committing mode (Johanson and Vahlne, 1977; Johanson and Vahlne, 1990).

FDI Motives

Support for the argument that different FDI motives, a factor not considered in the survey, might also explain the nature of FDI among STBFs also found support. Besides traditional market-seeking and cost-reducing motives, resource-seeking motives were also found to be an FDI motive for STBFs. One firm, only 1.5 years old, for example stated to undertake R&D in 4 different countries, one of which was India. The main reasons for what the technical entrepreneur called *"lean international R&D"* (*"... you 'just' give them a PC."*) were expertise and cost. He said that programmers are much cheaper there, without any sacrifices regarding their skills.

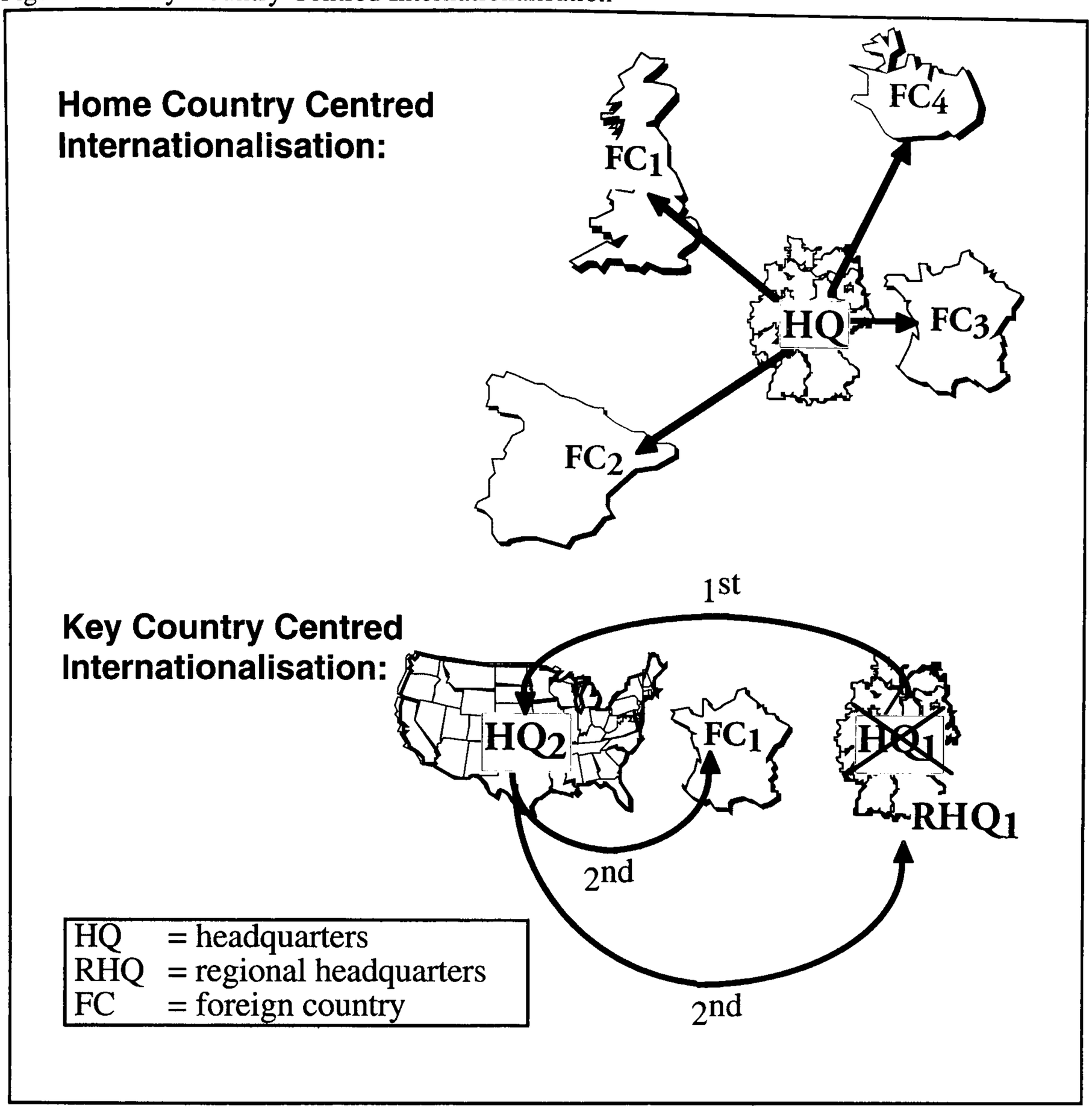
This type of FDI, home base augmenting FDI (Kuemmerle, 1999), also appeared to be more of a non-permanent nature, with low exit barriers. Probably closer to a temporary internationalisation mode as discussed in chapter 3 (see figure 3.10 there). It actually reminded the researcher of what Malone and Laubacher (1998) have termed "The Dawn of the E-Lance Economy", because the Internet played a key role in their FDI as will be discussed further later in this section.

Yet another FDI motive, related to resource-seeking motives, emerged from the interviews. This motive, which the researcher coined as "image seeking FDI" is best explained by the interviewee himself:

"One of the major market deficits as a German software firm with a standard software product... as a German supplier from Dortmund [a German city in the Ruhr-Valley] *is that you have to compete with American firms... mostly ... and you will lose! Because independent of what you offer, software in this areas comes typically from the Silicon Valley, not from Germany. The Internet has now offered us the possibility to reverse the whole business approach: we have now moved the headquarter of our operations to the USA, to Mountain View... in principle only a virtual office. With this we have reversed the market premises. Today we are no longer a German software firm from Dortmund, but the European headquarter of an international headquarter in Mountain View, USA."*

The technical entrepreneur referred to this as exploiting the *"Senatra effect"*, *"... if you can make it there* [in the USA], *you can make it everywhere."* He went on to elaborate that ever since they have made this "image seeking FDI": *"The impact on our business was dramatic! We have increased our turnover sixfold within 2 quarters... all of a sudden you can sell in Frankfurt* [a major bank as a customer], *because now we met the expectations of the customer."*. In addition, international sales also increased due to their FDI. As stated by the manager: *"Our way to France can only take place via the USA... we are not in a position to export software* [directly] *from Germany to France, ... but from the USA to France."* This internationalisation path (see figure 8.1) is an extreme form of the bridgehead internationalisation strategy commonly found in the industrial marketing area (Backhaus, 1997).

Figure 8.1: Key Country Centred Internationalisation



Source: The author.

FDI and the Role of the Internet

With regards to the role of the Internet in their FDI decision, most firms noted that their FDI was independent of the Internet, although they acknowledged that it supported their communication with and integration of their overseas staff. However, as already indicated above, two firms remarked that *"The Internet has enabled us to do* [FDI]. *10 years ago that would have been unthinkable."* In other words, without the Internet they would not have invested abroad.

Overall, it can be concluded that STBFs' FDI was characterised by low investment levels with high levels of exit flexibility, pluralistic motives and a tendency to utilise it as a means to grow and accumulate otherwise unavailable resources rather than a way to solely expand by exploiting home-grown advantages. This finding supports Bonaccorsi's view of small firm internationalisation and which is in direct contrast to the theoretical assumptions of internationalisation theory.

8.4.2 The Timing of the Internationalisation Process

Chapter 7 found that young STBFs internationalised significantly earlier and faster than older STBFs, apparently independent of Internet-related factors. The goal of the analysis of the post-survey interview was therefore to uncover additional factors that might explain this finding and whether the cross-sectional nature of the survey might have masked the fact that Internet-related factor might after all have had some influence on the accelerated internationalisation of young STBFs.

The analysis revealed a long list of factors that influenced STBFs' timing of internationalisation (see table 8.1). When the influential factors were grouped by the age of the responding firms, linking their responses back to the survey data, an indicative trend seemed to emerge. The older STBFs' internationalisation was marginally more influenced by traditional factors like an initial focus on the home market and international trade shows. Younger firms, with an average to below the survey average age, put forward less traditional factors like the use of Internet portals, Internet customer searches and EU research projects.

One firms' manager was indeed not surprised with the finding of young STBFs' early and speedy internationalisation at all. According to him *"...this is due to science park and EU research projects"*, external initiatives that according to him encourage firms to internationalisation early on. Other managers also viewed changes in the environment as possible explanations. *"This is due to a thousand things... IT, ... flights have become cheaper, international calls have become cheaper... it is the sum of those factors. And then the EU was of course very important."* Another manager noted that the new *"Internet environment"* increases the chances and opportunities to engage in international business.

Table 8.1: Timing Factors in STBFs' Internationalisation

Internal Factors	External Factors
• product USP • direct marketing • Internet website • strategic internationalisation • Internet customer search • home market focus	• trade shows • unsolicited inquiries/ orders • science park initiatives • EU/ EU research projects • scientific congresses • proxy internationalisation • internationalisation reciprocity • WOM • international reference projects • Internet portal

Source: The author.

Hence, it was a combination of environmental (political) and technological changes in recent years that seem to explain the accelerated internationalisation of STBFs. The globalisation of the world economy (see chapter 3) thus operated as a facilitator to the internationalisation of small firms, with the Internet being one of the influential factors of this process. The specifics of Internet influences on the timing of internationalisation will be further discussed below (section 8.6.2).

8.4.3 Psychic Distance at the Managerial Level and the Role of the Internet

Psychic distance, operationalised as cultural distance, showed to be an insignificant determinant of STBFs' internationalisation. Since various authors (see for example O'Farrell et al, 1995; O'Grady and Lane, 1996; Petersen and Pedersen, 1997) have argued that an operationalisation at the firm or managerial level might be a more appropriate reflection of the psychic distance construct, interviewees were asked to rank their personal distance perception of the markets entered.

However, the interviewees were very much reluctant to assign distance values to the foreign markets they have entered. Statements like *"This is a difficult question, one of the most difficult questions one could possibly ask."*, "[such an assessment]... *is difficult."* or *"I don't like to assign a 'number'."* were commonly made. Furthermore, when distance ratings were actually made on the 10-point scale, they did seem to merely reflect the operational ease of conducting business in the respective foreign markets. If the distance perception was low, managers noted that they have not had any problems in that particular market. An observation that seem to reflect Dow's recent critique that self-reported distance perceptions administered post hoc might only reflect post-decision experiences rather than true distance perceptions at the time the decision to enter a foreign market was actually made (Dow, 2000). But although some

common distance perceptions emerged – France for example was often viewed as quite distant (*"France has its own rules."*) – most managers noted that cultural distance did not matter in their business. The following statements from different cases underline this:

- *"Culture plays little a role."*
- *"We have a specific target segment* [academics], *culturally homogeneous, because they are highly educated. With this segment, cultural barriers do not matter that much."*
- "[Cultural distance] ... *plays absolutely no role whatsoever. The elites in the poorest of countries are medically always very well equipped."*

What mattered more were the specific characteristics of the market niche they are targeting, usually culturally insensitive to the products offered by the STBFs, and the specific personal business contacts they had in the respective foreign market. Factors that were independent of the overall country distance per se. One firm for example ranked Korea as extremely low, assigning to it a distance value of "0". When asked for the reasons for this closeness, the manager replied that their agent in Korea speaks German and that he was educated in Germany, which made the contact as culturally close as a home market contact.

One factor that seemed to be one of the key hurdles and determinants of the perceived distance between countries that emerged from the interviews was language. When asked whether culture was completely irrelevant in their businesses, managers replied that *"the problem language"* remains. One manager even explicitly noted that there are no more international borders but only *"language borders"*. The boundaries of these borders were the German speaking regions (Germany, Austria and Switzerland) and the English speaking regions, with English seen as the world language for international business regardless of countries. Moreover, countries where English or German was not widely adopted, the prime example usually stated was again France (*"...everything has to be French somehow..."*), were viewed as comparatively distant. But again linking back to the survey data, this distance did not really manifest itself in low MER values (see table 7.14 in chapter 7). France ranked as the country with the 5th highest value of market entries by STBFs. This suggests that economic factors, after all France is one of the biggest markets in the EU, and spatial factors, parts of France can be closer to a German firm than some parts inside Germany, might reduce the otherwise perhaps more limiting language barriers.

Internet's Impact on Cultural Distance Perceptions

When asked about the Internet's role regarding their distance perceptions, most managers noted a strong impact: *"It* [cultural distance] *is getting constantly closer."*, *"Well, reduced* [cultural distance] *...significantly."*. One firm's manager even went as far as stating forcefully that *"[t]he Internet kills culture."*, a process he referred to as *"Anglo-Saxification"*. Only 3 out of the 10 managers interviewed regarded the role of the Internet as irrelevant to their distance perceptions. These opposing views were independent of the observed Internet use level of the survey. Some of the firms did use the Internet at low levels, some at high levels. Further exploring the rationale of the managers for seeing such strong impacts revealed that their perception was due to mainly two factors. First, the Internet was seen as a communicator of culture. The global nature of the Internet, paired with its media richness, makes it easier for culture to be communicated, thereby reducing potential barriers due to a lack of knowledge about cultural differences. Secondly, cultural distances were reduced due to the emergence of a new culture, or in the words of one of the interviewees: *"This e-mail culture that somehow emerges. This culture is relatively similar. You do not distinguish whether you communicate with an American or an Australian."* A process seen as *"harmonising cultural differences."* and which relates to *"Anglo-Saxification"* as mentioned earlier. This finding seems to support the view of Johnston and Johal (1999) who argued that the Internet possesses a definable culture. But despite the overall strong views expressed, managers were nevertheless a bit relativistic. Statements like: *"The Internet is a bit of 'cosmetics', you don't get rid of the real life."* or *"...there are countries that are still very easy to operate in, ... or still* [despite the Internet] *difficult."* showed that the Internet's impact on culture is probably less dramatic than some of the previous statement might have suggested. In addition, it was also noted that the effect on culture was quite country sensitive. Particularly the USA and the Scandinavian countries, due to their high national Internet diffusion levels, were seen as regions were the Internet's impact on culture was more prominent. Furthermore, France was seen as resisting, or at least being less open to, this new e-culture: *"...we have not done that* [initiating international business contacts] *with the French. We were already warned that they don't like this."*

To sum up it can be concluded that psychic distance, operationalised as cultural distance, mattered little in international high-tech industries. This finding supports the related findings recently made by Wood and Robertson (2000). Despite its insignificant role, the interviews have however shown that a conceptualisation at the

managerial level is more meaningful than aggregates at the national level. Although no statistical comparison was feasible to assess differences, the cultural differences suggested by the Hofstede-based country model were not in line with the perceptions of the interviewed managers. Particularly the Netherlands and the Nordic countries, culturally relatively distant from Germany in the aggregate model, were viewed as culturally close by all the interviewees. But caution has to be exercised with regards to these conclusions. All of the interviewed cases, as is the case for the whole survey sample, were at a relatively early stage of their internationalisation. At later stages, when more committing internationalisation modes (for example production subsidiaries abroad) are employed and new challenges like international human resource management arise, barriers due to cultural distance might start to matter more. Furthermore, despite the managers' views that the Internet reduces the already low levels of importance of culture even further by facilitating the communication of culture and by superimposing a global marketspace culture on the culturally heterogeneous marketplaces, it still exists in the marketplace. As one of the managers, the one who also claimed that the Internet would kill cultures, stressed: *"Cultural distances still exists. You cannot show up in the USA without any knowledge about baseball!"*

8.5 Organisational Internet Use

The last but final section of the post-survey interviews, section 3, focuses on issues relating to Internet use dimensions. Three equivocal areas were investigated for clarification purposes: managerial views and uses of on-line sales (e-commerce), the item content of the survey variable IINVEST (the frequency of website hit analyses) and the marketspace-embeddedness of websites and the direction of Internet-based foreign inquiries and orders.

8.5.1 On-line Sales: Managerial Definitions and Services Used

Chapter 7 discovered incongruous findings. In the observational analysis very few websites with transaction (e-commerce) possibilities were found, despite 75% of STBFs in the survey stating to have conducted on-line sales in the past. The analysis of the post-survey interviews tried to uncover whether this incongruous related to STBFs' manager holding different views on what constitutes an on-line sale, whether the sampled STBFs use Internet services other than a website or whether any other explanatory variable might be identified.

The analysis of the extended interview text unveiled two themes that mainly resulted in the found inconsistencies.

First, as already suspected in the previous chapter, definitions of what is an on-line sale and via what Internet services it is (if at all) confined to differed by some degree. Sometimes managers' definitions even exhibiting internal inconsistencies (see the textual examples in table 8.2). Managers found it not very easy to clearly define what constitutes an on-line sale (*"...difficult...difficult, I lack an answer."*). Sometimes their definitions also differed to the ones applied when replying to the survey. Based on these differences in defining an on-line sale, some firms even changed their survey ratings when confronted with definitions that did not match their initial views. A finding which obviously questions the content validity of two of the five "routinised levels of Internet use for international business"-scale items. However, the second theme that emerged suggested a source of error in the observational on-line sales assessment that is in contrast supportive of the content validity of the level of on-line sales assessment in the survey.

Table 8.2: On-line Sales (E-commerce) Definitions by STBFs' Managers

- " On-line sales mean ordering from a website via an on-line form. I have never done that, if at all, I would do it via e-mail, but for me this is not really Internet."
- " Of course I have to offer wares [via a website]... I would say when our software, when we put a catalogue on [the website], where one can say: there is this and that, and he clicks on it and what do I know payment-wise, if one operates it via a card number or however you deal with that... he paid in advance and then downloads it, that would be e-commerce. ...e-mail I would also see as e-commerce, but I have to have the on-line offer [on the Internet] first."
- " E-mail... I would not regard as on-line sales."
- " [An on-line sales is] the signing of a legally binding purchasing act via a legally binding order. The offer has to be on the web and one must be able to sign a contract or parts of the contract there."
- " E-mail is analogue to fax and the telephone. [It is not an on-line-sale.]"
- " On-line sales for me is when the customer is able to place an order, basically without any [direct] contact with us, via the Internet and this relates to on-line delivery. The customer is in principle in a position to do his business with us without any physical contact. All via our website. If I am not able to integrate my internal operational systems externally, the handling that is otherwise done by someone, integrating it with the Internet, then for me this is only half the way."
- " I only talk of e-commerce when the Internet is the only medium that leads to the signing of a sales contract. ...that is why in the b2b area e-commerce really does not yet exist. This can only work based on intranet solutions or in the supplier business, where contractual agreement already existed."

Source: The author.

This second factor that emerged relates to private websites for customer that are not externally visible and accessible. Therefore beyond the analytical reach of the observational analysis. For 4 of the 6 firms that have stated in the survey to have conducted on-line sales in the past, but which according to the observational study have not had a website with transaction possibilities, this was the case. Although the observational analysis categorised their websites as lacking transaction possibilities, they did actually have transaction possibilities, but these were not visible to the general public. Simply extrapolating from these cases and taking the definition difficulties into consideration seems to explain the incongruent findings quite well.

8.5.2 Analysis of Website Hits: Frequency as an Indicator of Responsiveness?

The observational analysis of the previous chapter found that firms who frequently analyse who accesses their website (IINVEST) perceived a higher increase in the importance of Internet-based unsolicited inquiries on their selection of foreign markets. To find out whether this finding was due to the responsiveness of firms rather than the frequency of analysing digital fingerprints per se – the interpretation put forward in the previous chapter – firms were asked how they analyse their website hits and to what activities this analysis usually leads.

The responses of the technical entrepreneurs revealed that the responsiveness interpretation clearly does not hold. Regardless of firm's analysis frequencies little direct activities but website design optimisation followed.

- *"Direct activities do not follow, I think."*,
- *"...that we then actively contact people, no, this is not really the case."* and
- *"What we don't do, if there are for example a lot of hits from Italy, is focusing on these and addressing them... this is not really considered."*

are some of the statements made. Only two firms, both with above average analysis frequencies, mentioned that they try to response to the site hits if they could identify the *"surfer"*. But this did not translate into high values for the significant survey impact variable IMPUINQ for both cases. One case rated its level as low ("1") and the other case as above average ("5"). Clearly the responsiveness interpretation does not hold.

Since the interviews did not reveal any other potential explanation for the significant relationship found in the survey, the survey data was again re-scanned to search for methodological artefacts that might explain the significant findings. This relates to the presence of common method variance (Campbell and Fiske, 1959) rather than item variance alone. The item IINVEST correlated significantly with the level of Internet use (*Spearman's r = .24, p-value 0.02*) and the updatedness of the website (*Spearman's r = .46, p-value 0.00*) and not with the updatedness of the website as established in the observational analysis (*Pearson's r = -.02, p-value 0.45*). This does indeed suggest some level of common method variance. The significant survey findings might thus be more appropriately interpreted as an artefact of the respondents' response to the survey. STBFs with high levels of Internet use also stated higher levels of IINVEST, and, since levels of use were also significant with regards to the impact variable IMPUINQ, the significance of IINVEST can be explained by this. Therefore it was less the actual item content per se, but the correlation with levels of use that led to the significant findings. The inability to establish other causal explanations in the post-survey interviews further supports this interpretation.

8.5.3 Marketspace-Embeddedness and the Direction of Unsolicited Foreign Inquiries

Chapter 7 showed that the degree of the marketspace-embeddedness of a website emerged as a key factor with regards to internationalisation impacts. This effect was particularly pronounced with regards to increases in international contacts and orders via the Internet. However, this was mostly independent of an international content or the information richness of the site. This finding was interpreted as potentially indicating that the direction of the Internet-based interactions might come from German speaking countries.

This interpretation was only partially supported. Although firms noted that most of their Internet-based contacts and orders came from the "DACH"-region (Germany, Austria and Switzerland), firms with domestic websites also noted that they have had a lot of European inquiries from non-German speaking countries. Also, the USA and the Scandinavian countries were mentioned frequently. But probing deeper into the nature of this phenomenon uncovered three new themes that seemed to come into play: German speaking people from non-German speaking countries, the role of temporal links and search term language overlaps.

As one of the firms with a domestic website explained: "[The inquiries and orders] *came from everywhere, totally analogue to our basic business structure. That is neighbouring countries, everything that is German speaking, you also have Africa in it.*" Another firm with a domestic website also stated that around 40% of the hits they have come from foreign countries. This appears to be indicating that although the language and therefore the information content of the website mattered, it does not imply a country coverage restriction. The offer and reach of the firm is still virtually global. Only the language capabilities of potential customers matter, not the country they are living in.

A second new theme explains the content independence further: the role of temporal links and "extra homepage activities". As one of the managers with a domestic website observed: *"If you place a link in a*[n international] *trade show catalogue, then you also have an increase in inquiries from abroad."* These temporal – the electronic links only exist for the length of the trade show – and "extra marketspace activities", that is activities outside the marketspace domain like a printed trade show catalogue, not only support the importance of marketspace-embeddedness further, but they also explain the observational findings further. A domestic website can also achieve increases in international Internet-based contacts and inquiries by establishing links with international websites. Moreover, the already noted importance of marketspace-related marketing activities outside the marketspace (Kierzkowski et al, 1996) can further influence the perceived internationalisation impacts of the Internet. These factors were however beyond the scope of the observational study.

The third new theme, search term language overlaps, further supports the importance of marketspace-embeddedness, as well as the insignificance of the language of the website content that was observed in some of the impact assessments. The statement of a manager whose firm develops technology in the field of mechatronics and whose firm operates a domestic website: *"A lot of inquiries from Japan, even more than from the USA...because the people searched for 'mechatronics'"* showed that search term language overlaps, when the technical terminology in German is the same as in English, can also lead to unsolicited international foreign inquiries despite a website's domestic information content.

8.6 Internet Use Impacts on the Internationalisation Process

The final section of the post-survey interview guide was concerned with the Internet use impacts on the internationalisation process of STBFs. As stated in section 8.2, this section is mainly focusing on assessing local causalities, exploring spurious correlations and uncovering impact relationships that might have been masked by the homogeneity of the internationalisation of STBFs.

8.6.1 Internet Use and the Directness of Internationalisation Modes Used

The first question of this section was concerned with the finding that firms that use the Internet intensively for their international business operations reported the use of significantly more direct internationalisation modes. From a causation perspective it was however argued that the direction of causation can be interpreted both ways: Did the use of direct internationalisation modes cause higher levels of Internet use or did high Internet use lead to more direct internationalisation modes? The latter could also imply the potential de-intermediation of traditional mediators in international business like foreign agents or distributor. But chapter 7 argued that this is rather unlikely due to the low average age of the sampled STBFs.

The analysis of the responses showed that the nature of the internationalisation modes used, its directness, was mostly seen as relatively independent of the Internet. Only two firms' managers forcefully noted that the Internet was the main cause for the use of direct modes. The first manager stated that *"[a]ll the contacts were made on the Internet, that is why its* [the internationalisation mode] *direct; that is the Internet enabled a direct contact."* and the second remarked similarly that *"...abroad we only go direct... there, the medium* [Internet] *is basically the driver, the main contacts didn't exist before. The market entries in the product business were all made via the Internet."*

But overall, most managers acknowledged that "[maintaining direct contacts with foreign business partners] *has become easier and enhanced* [due to the Internet]." and that *"[t]he Internet increases your chances, we have more opportunities, more contacts of high quality, contacts we wouldn't have achieved* [without the Internet]." If that effect did however not lead to the use of direct modes, it was because of product and industry specifics. As one of the managers replied: *"You can only answer this in a product-specific fashion... there are given* [industrial] *structures, ... that is independent of the Internet."*

But some evidence also emerged that this directness might not necessarily be of a permanent nature:

"Well, the Internet permits for the first time to go direct by eliminating the one to two levelled sales channels ... and ... particularly for the international business this helps tremendously, because [otherwise] *you have to heavily invest in a distribution system. The smaller the firm the heavier..."*

This manager went on to explain that he also thought that the direct channel is at a disadvantage when it comes to volume and thus he regarded the Internet as a means to facilitate an entry into the high volume indirect sales channels:

"... it is a way of positioning your firm in the market and one can then enter the [indirect] *distribution systems via the direct channel, because when the retailers realise that you can sell some volume* [direct], *they see themselves forced to list you without an 'entry fee'."*

This observation again suggests that product and industry specifics – determining potential economies of scale and scope for intermediaries – will, at least in the long run, determine the channel structure and thereby the degree of directness a firm can and will use in its international business.

De-Intermediation Effects?

The results with regards to potential de-intermediation effects supported this view further. None of the firms gave an affirmative answer to such an effect. *"Nay, did not happen."* and *"Well, the mediator is not 'switched off'."* are some of the typical statements made. However, that such an effect might actually take place in the future was not ruled out if the industry structure permits such effects: *"No, not at the moment, it could however be that a contact comes down the Internet, but at the moment it is the other way round."*

Finally, it should be noted that one of the firms, the only Internet-start-up among the interviewed firms, was found to be a prime example of a special kind of mediation: re-intermediation (Economist, 1999, 2000). This firm actually set-up an Internet portal for industrial goods, mediating between suppliers and producers of heavy machinery,

directly competing with marketplace-based intermediaries like publishers. Obviously, this form of mediation would not have been possible without the Internet.

Overall, it can be concluded that international direct personal contacts led to more intensive use of the Internet for information exchange purposes rather than the other way round, but that the Internet also led to more direct contacts with international business partners abroad as it increased the opportunity horizon of the STBFs. However, whether these effects did then lead to the actual operation of more direct international modes of operation ultimately depended on product and industry specifics. A general trend, of course limited to this particular population, towards de-intermediation as suggested by Hammer and Mangurian (1987), Malone et al (1987) and Benjamin and Wigand (1995) could therefore not be supported. More differentiated views (Sarkar et al, 1995; Butler et al, 1997; Quelch and Klein, 1997; OECD, 1998; Sarkar et al, 1998; Scott, 2000; Schmitz, 2000) seem to be more applicable in the context of STBFs' marketspace-influenced internationalisation.

8.6.2 Internet Use and the Timing of Internationalisation

Section 8.4.2 showed that the significant finding of earlier and faster internationalisation among young STBFs was primarily caused by environmental and technological factors. The Internet emerged as one of these technological factors. This already gave some indication to the potential validity of the argument put forward in chapter 7 that the finding of insignificant impacts of the Internet on the timing of internationalisation might have been caused by the homogeneous internationalisation of STBFs. Thereby masking its impact.

The answers of the technical entrepreneurs to the specific question in how far the Internet, if at all, has had an effect on their timing of internationalisation supported this "masking thesis". Although mixed replies were obtained ranging from *"no impact at all"* to *"in parts"* to *"a strong impact"*, with a nearly even spread of cases across the three categories, linking these statements back to the survey data revealed that with increasing levels of use the Internet's timing impact increased. Only one firm's manager stated to not have experienced such an impact, despite its firm's high levels of use. This finding was further substantiated by the significant and strong relationship of levels of Internet use and the average importance of Internet factors on the selection of foreign market (*adjusted* R^2 *.44, Beta .67*; see chapter 7). As one manager replied: *"...because of the Internet everything speeds-up."*, which according to another manager changed the source of competitive advantage in his industry, the software

industry. He summed it up with the sentence: *"Speed kills size"*. A change in the competitive environment that according to him puts STBFs, or at least small software firms, at an advantage due to their flexibility. An observation that supports the view of various authors put forward in chapter 2.

But it also emerged that this effect was contingent upon the business focus of the firm. A theme that was already revealed previously (see section 8.3.1). As expressed by one manager: *"It* [the Internet's impact on the timing of internationalisation] *rather depends on how one* [the firm] *is able to moderate all the* [information] *channels, the firm's focus is decisive, you cannot do 10 things at the same time"*.

Finally, it has to be mentioned that in parts managers were a bit cautious about the absolute truth of their impact perceptions. This observation seemed to relate to what might be called "media indeterminacy". Especially for firms where the managers saw a partial impact of the Internet, estimating the absolute effect of the Internet only on the timing of internationalisation was viewed as difficult, because other media (trade shows, personal visits, advertising) came into play as well. This clearly suggested that STBFs' international business was usually not a "one medium only affair". Overall it became however also clear that the medium Internet can play a very influential role in the timing of the internationalisation of some of the interviewed STBFs.

8.6.3 Internet Use and the International Orientation of Firms

In 1997 Hamill suggested that using the Internet might lead to a general psychological increase in international awareness, confidence and subsequently commitment of firms. The empirical findings in chapter 7 supported the Hamill thesis. This was surprising taking the already high levels of international orientation among STBFs into consideration. Yet, it was argued in chapter 7 that the causal direction of this finding is not clear-cut. Did Internet use increase the international orientation of firms or did a strong international orientation lead to higher levels of Internet use?

The textual analysis of the managers' replies suggested that the Internet could be best conceptualised as an amplifier, less as a generator. This conceptualisation gives further support to Hamill's thesis. Most firms (8), regardless of their use levels or their formative/ supportive group membership, stated that an international orientation existed prior to founding the firm, sometimes also prior to using the Internet. However, Internet use was seen as amplifying this orientation, which in turn amplified Internet use (*"That interacts, swinging upwards."*). This reciprocal, bi-directional relationship

between Internet use and an international orientation was further fuelled by an important externality: competition. This effect was best described by one manager who said that:

"[t]oday you have the possibility to generate an awareness without 'taking a lot of money in your hands'...[and]... *without acting big in a spatial sense: e.g. a small 'garage', wherever it actually is, can present a super idea world-wide via the Internet... This implies that we have to see our competition internationally. ... If we don't do that we will hear the chime of the 'beginning-of-the-end bell' soon."*

This statement shows that was not only the use of the global medium Internet per se that led to an increase in international awareness, but it was also the awareness that others, the competition for example, also use or can use this global medium. This alertness to the behaviour of significant others also pushed firms to exploit the new possibilities offered by this new global medium (see also the duality of the Internet as noted by a manager during the exploratory interviews).

8.6.4 Internet Use and the Internal Resource-Base of Firms

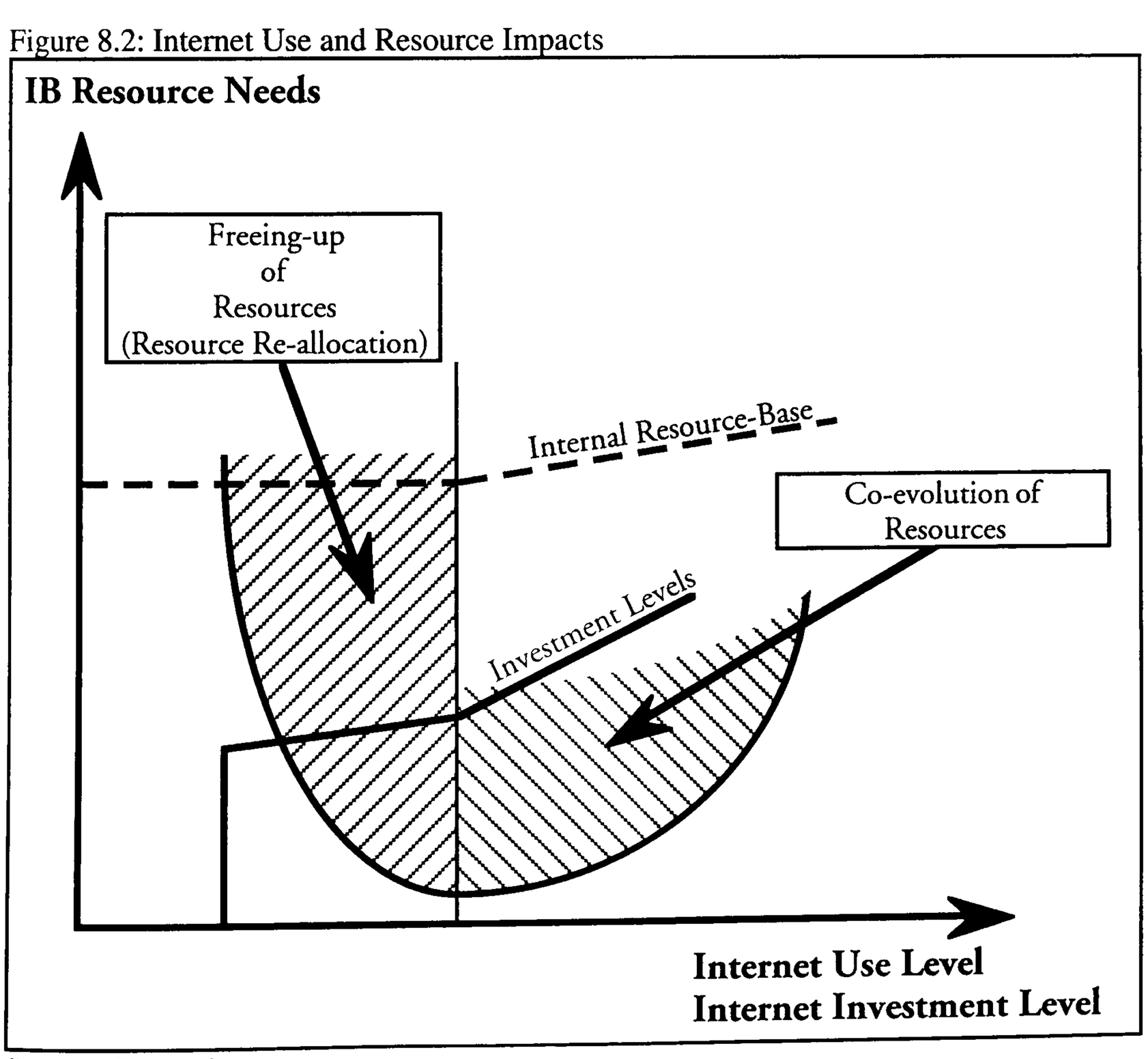
Similar to the previous question, assessing the direction of causation was also the main goal of exploring the significant effects of Internet use on the resource-base of the firm further. Chapter 7 has shown that with increasing Internet use for international business, firms have increasingly stronger international resources for their international business operations. It was argued there that this finding could be interpreted in two ways. Either using the Internet with its cost reducing properties reduced the resource poverty of firms by freeing-up resources or resource-rich firms use the Internet more intensively.

The first interesting outcome of the interviews was that some of the firm's managers were a bit confused with the business resources concept. When the question was asked, they hesitated to give an answer, because they were not too sure what the researcher meant by the term "internal resources". Thus, there was a need to explain the concept and the instrument that was used to measure it.

Once all managers were familiarised with the firm resources concept, their responses revealed strong support for the "freeing-up thesis". Firms' manager stressed that Internet use reduced costs, reduced time constraints and increased opportunities. This joint effect led managers to believe that "... *it* [the Internet] *frees-up resources and it*

also offers the possibility to gather information cheaply. Well, I do preserve the internal resource-base; this by all means." This implies, as in parts already argued in chapter 7, that using the Internet with its cost-reducing properties does not directly lead to an increase in a given resource-base (Internet as a resource generator), but that a given resource-base can be employed to render more services (resource re-allocation) in the Penrosian sense (Penrose, 1959); new services that were previously or otherwise not possible. While most firms shared or expressed this view, it also emerged that this effect was not long lasting. As one firm's technical entrepreneur explained: "... *it* [the Internet] *is resource preserving, efficiency increasing, but the quality expectations increase, this actually eats the resource advantages completely."* He went on to explain that with this increase in quality expectations – he mainly related this trend to the need for higher levels of website implementation levels with regards to design, concepts and technological know-how in order to stay competitive – *"[t]he firm [co-]develops with the technology... resulting in new resource-allocations."* This suggests that the initial effect of freeing-up resources will transform itself into a co-evolution of resources and Internet use levels, where resource levels have to increase in order to support increased Internet use and investment levels. Figure 8.2 tries to illustrate this relationship.

Figure 8.2: Internet Use and Resource Impacts



Source: The author.

Thus, as already argued in chapter 4, depending on a firm's degree of media substitution, different impacts will be observable. While offering an initial effect of freeing-up resources, non-trivial investments – a factor not assessed in the survey – have to be made and additional resources have to be accumulated to operate higher levels of Internet activities. As stated in chapter 4, Internet maintenance costs are estimated to be 2-4 times the initial set-up costs (Quelch and Klein, 1996). Cost increases were also reported in Soh et al's (1997) study. Nevertheless, compared to other means of operation, the absolute level of investments and resources needed can be considered to be much lower. As stressed by the manager who expressed the reversal in resource impacts: *"I do not think that we would have been as international as we are today* [without the Internet]." (see also the "no-Internet yet"-scenarios in section 8.7)

8.6.5 Determinants of Impacts on International Business Costs

Despite the Internet's impact on resources as further discussed above, impacts on a reduction of international business costs were only observed with increasing website experience of firms. While the insignificant finding of levels of use could be explained by the observations presented in the previous section, a logical explanation that corresponds with the survey data for the role of website experience could not be given.

The analysis of the extended text of the transcribed interviews could not establish a logical link either. Linking the responses of managers' back to the website experience of their firm did not exhibit any pattern or difference that might help explain the found relationship. This implies that an explanation for the observed significant relationship in the survey remains missing.

However, an additional determinant of an impact on perceived international business costs emerged during the interviews: the existence of an established Internet portal. Note that another determinant, a perceived reduction in FDI needs (in the survey both impact variables did also correlate significantly: *Spearman's r = .43*; *p-value .00*), was also found. But since this impact dimension will be further discussed below (see section 8.6.7) it is not discussed here.

One firm mentioned the existence of an established Internet portal. This portal, a portal for the rapid prototyping business community, was actively used by the firm to market

its products, or rather the portal marketed the products for the firm. As the manager expressed:

"... there are also customers to whom we have not yet talked to... well, we have a rather good communication platform [the portal] *...international marketers of data; data that is send back and forth and these are ordered by someone in South Africa, as well as by someone in Germany."*

In other words, the cost impact of the Internet on international business operations cannot only be independent of levels of use due to the factors discussed in the previous section (see also the role of the adopted business model in section 8.3.1), but the impact can also be caused by the existence (and use) of "cybermediaries" (Sarkar et al, 1995; Sarkar et al, 1998). Obviously it could now be argued that firms who have operated a website for a long time were more aware of the existence of such mediators and that they consequently used them more often. But such an argument seems rather speculative. Not only was this effect only mentioned by one case, but it is also unlikely that for all the other firms with above average website experience there did actually exist a cybermediary focused on their specific business. Furthermore, it is unlikely that they all, or at least a significant number of them, used a cybermediary for their international business operations. It also has to be remembered (see chapter 2) that STBFs do usually operate in very specific market niches and it is therefore even more unlikely that – at least at this early moment in time – there exists a cybermediary focused enough to be of specific value to the majority of firms that reported to go mostly direct anyway (see chapter 7). It therefore remains to be seen whether future research will also find a significant relationship between cost impacts and website experience. It might after all have been a spurious relationship with no hidden explanatory third variable.

8.6.6 Determinants of a Reduction in FDI Needs

Chapter 7 found that intensive Internet use for international business, the embeddedness of a website, its domestic (German) information content, as well as experience with a website both had a significant impact on a perceived reduced need for FDI due to the Internet. On the other hand, chapter 7 also established that firms who have already conducted FDI in the past more or less did not see any impact. It was therefore argued that the perceived reduced need in FDI might have been a rather projective answer, not an experience-based answer by the technical entrepreneurs. This was supported by the finding that firms with domestic websites – firms that have

reported higher level of reduced FDI needs – were less internationally active. An interpretation of why website experience showed a significant impact could not be put forward.

Initially it seemed that the projection interpretation did not hold, not only with regard to the answers to this question, but also with regards to the question of costs reductions (see above). It seemed that Internet use reduced FDI needs. *"...you don't have to be present* [anymore]... *no need for a subsidiary."* is an example of a typical statement by a manager who ranked FDI substitution as high. However, besides the influential fact that his products were highly information intensive – although not a software firm – he later on conceded that *"...yes, we think about it* [FDI]." In a similar way, another firm's manager also noted a change in his perception that supports the projection interpretation put forward previously. *"Well, this has significantly changed in the meantime. I do now rather tend to see it the other way round."* When asked why that was the case, he went on to report of a critical incident in which his firm did not get a large contract with a large Detroit based car manufacturer because of their lack of a subsidiary in the USA. While he was not absolutely sure whether this was the only reason, remarks of two other managers seem to support his experience further: *"...above all, it* [FDI] *is important in the USA"*; *"... for the Americans, I have experienced it myself, the American address [of a firm] is important."*

Synthesising these statements seems to suggest that reduced FDI needs were rather temporary, projective and country sensitive. The statements of yet another manager support this interpretation further:

"The nice thing about the Internet is that you can offer internationally, centrally, really a global offer, especially in the case of services. But you have to do local marketing. And that is why you have to be present locally, but maybe not to the extent one would have to be without the Internet... there are national markets you can manage centrally."

But this statement also gave another and related rationale for the observed significant impact of Internet use levels on reductions in FDI needs. The increased reach of firms due to the Internet – note the found importance of marketspace-embeddedness with could be seen as a proxy for reach – possibly reduced the need for FDI not in an absolute sense, but in a relative and again country sensitive sense. As noted by another manager, a manager of a software firm that also planned an FDI in the near future despite his firm's extensive use of the virtual mode of international operations, *"...the*

Internet has practically opened the access to the markets... because the distributional limits and everything else that is typically a limiting factor doesn't exist [anymore]."

Hence, FDI still seems to play an important role for STBFs in the marketspace age, even for software firms or firms with information intensive products. But the extent of it, the number of country FDI per firm not the investment levels per se and the earliness of it happening might be less and later in the marketspace age due to an increased reach of firms, as well as the new mode of internationalisation. Additional indications why website experience mattered, beyond its significant correlation with marketspace-embeddedness, which in turn was significant, were not found.

8.6.7 Determinants of Impacts on International Business Investments

Chapter 7 found that mainly STBFs with intensive Internet use, software firms and the formative group of firms reported that the Internet impacted their international business investments. Establishing whether this reported impacted was due to the Internet per se (Internet start-ups), which would reduce the generalisability of the findings to other STBFs, or whether this was due to the facilitating and enabling characteristics of the Internet for firms' internationalisation was the main goal of this post-survey interview question.

As already noted above (8.6.1) only one firm was founded based on an Internet business model: establishing a portal for industrial goods. Obviously, without the Internet this firm would not have been founded in the first place. It was thus not surprising that this firm's response to the survey question was a "7". All the other firms were not Internet start-ups.

For them, the Internet impacted their international business investments in mainly two ways: it facilitated their international business dealings and, in a few cases, it even enabled their international business dealings. The two cases of marketspace-enabled FDI that were reported in section 8.4.1 were the best examples of this effect. For the majority of firms the facilitating effects (see also the no Internet yet scenarios in section 8.7 below) stood out. The explanation of one of the managers serves as a good example of this effect:

"...had we not had the Internet, that goes without saying, we would have a.) made this entry into foreign markets much later and b.) how would we have done it abroad? Only, definitely only, via print media and tradeshows and that would have been

manifold more expensive ... and you also would have to have the necessary personnel; immediately developing a 'crazy apparatus' of things you would have to build up..."

Reflecting on this and similar statements made – statements also made in response to some of the other cost and resource related questions – suggests that besides the two enabling cases, impacts on international business investments were seen as purely technology related. Their investments into ICT technology, allowing them to use and exploit the Internet, was seen as their international business investments. The above example of media substitution supports this interpretation, as do the no-Internet yet scenarios reported below.

8.6.8 International Websites: Outcome or Determinant of Internationalisation

Besides the marketspace-embeddedness of websites, international websites – websites with English information – showed significant differences for various explored attitudinal and behavioural impact variables. However, the interpretation of the causal direction was, again, not straightforward. Did the existence of an international website determine the internationalisation or did the internationalisation determine the existence of an international website?

The result of the textual analysis revealed that overall managers viewed the suggested relationships as *"largely independent"*, at least with regards to the behavioural impact relationships. These were seen as determined by the given market structure (*"...the market determines that."*). Overall the existence of an international website was seen as a result of a firms international involvement, either triggered internally or externally. The example of one firm is a good example of external pressures, or, to put it more positively, active externalities: *"Well, for example in Singapore, he* [their business partner there] *was incredibly keen, he has been pressuring us hard to put the information on a website."* But nevertheless it was also acknowledged by firms that despite their view of rejecting determining impacts, in the future these impacts might indeed take place as they viewed an international website as *"... increasing... business potential[s]."*.

Despite the views expressed by the manager, it should be remembered that the previously observed problem of "media indeterminacy" (see section 8.6.2) might question the actual face value of the managers' views. International websites might

indeed have caused the observed impacts, at least for some of the firms. But due to "media indeterminacy" managers might not necessarily be aware of that effect.

8.7 The Role of Non-Internet Related Factors

All sub-sections in the previous section dealt with impact of the Internet on the internationalisation of STBFs. But as chapter 7 has shown, non-Internet related factors were also important. With regards to the selection of foreign markets, they were significantly ranked higher than Internet related factors and their mean value was the highest of all impact variables.

In order to put the role of the Internet more into perspective, the post-survey interviews explored further on the nature and impact of non-Internet-related factors and, more importantly, how they related to Internet factors and their impact on internationalisation dimensions.

The non-Internet-related factors listed and explained by the managers mirrored more or less the list of internal and external factors that influenced their timing of internationalisation (see table 8.1 above). Marketing activities, PR, market structures and customer expectations, visits abroad and particularly tradeshows were stated as crucial non-Internet related factors. When trying to probe further into the nature of these factors and their importance for the international business operations, a common theme emerged: the importance of personal contacts. As one manager noted: "... *it doesn't work without a personal meeting.*" The remarks of another manager explains this further:

"*Actually these* [the non-Internet factors] *are more the contacts you make. Well, because you have to develop trust with the one you want to do business with... these contacts have always been the most important.*"

This clearly relates to the found continued importance of face-to-face meetings reported in chapter 7. This supports the view of authors who argue that trust building in marketspace has to be supported and complimented by marketplace-based relationships and meetings (Nohria and Eccles, 1992; Benson-Armer and Hsieh, 1997; Kraut et al, 1998). Interestingly enough, even the manager of the Internet start-up shared this view:

"... what is always important: the personal contact... and I do not think that the Internet is the final answer. After all, contracts are only signed when you know each others 'nose'; unless the goods are generic."

But nevertheless it should be noted that the researcher encountered one example of pure marketspace-based interaction in a non-generic business transaction:

One of the firms, a software firm, proactively contacted (via e-mail) an American firm (which they found searching the Internet), producing complementary computer source codes, and asked them whether they would be interested in a joint project. After some e-mails were sent back and forth, the project started and as the manager noted:

"...it was all e-mail... until I first talked to him [the managing director of the US firm] *on the phone, that took really quite some time... Yes, in the meantime I have seen him.* [after the project was already over]"

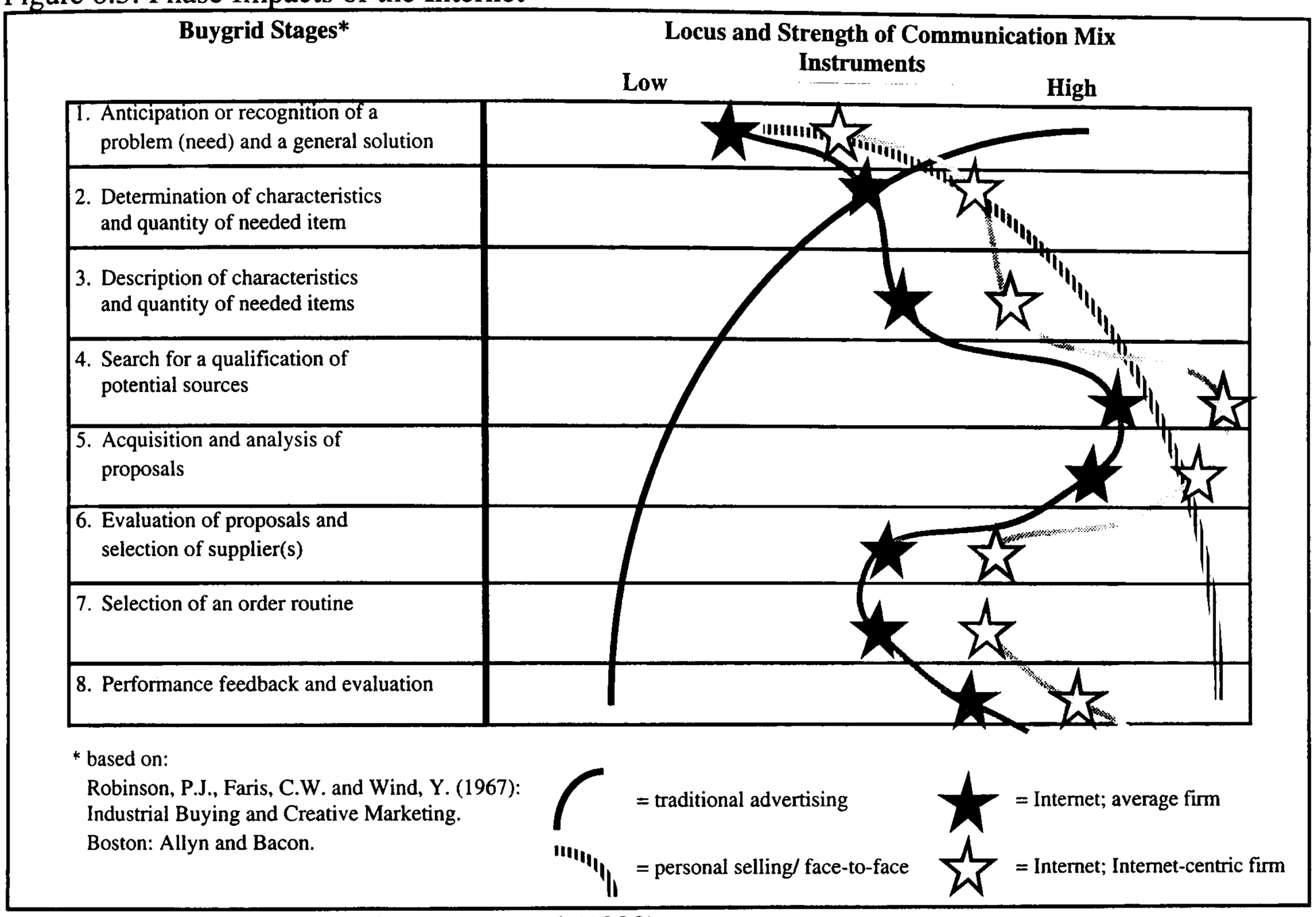
Overall it can be seen that one of the key underlying themes regarding the importance of non-Internet related factors is the importance of personal contacts. Contacts made and maintained through face-to-face meetings at tradeshows, congresses and through personal visits abroad; with the Internet playing a subordinate role. This finding gives further support to traditional media richness theories (Daft and Lengel, 1986; Trevino et al, 1990), as well as giving support to previous studies that already reported of the importance of personal contacts as sources of information in small firms (Specht, 1987; Smeltzer et al, 1988; Julien, 1995; Walters, 1996; Pineda et al, 1998; Nijssen et al, 1999).

When asked how the non-Internet factors related to the Internet factors in international operations, another factor emerged: the phase locus of the Internet's impact.

Particularly for those firms that could only use the Internet as an additional communication and marketing platform (see the role of the firm's business model in section 8.3.1), it was noted by the managers that the Internet was supportive mainly in the pre-sales and pre-contract stages. *"...Internet increases the chances, but it does not eliminate ones work... it does not substitute the sales work"*, *"... very important for the acquisition phase"* are two of the typical statements made stressing the Internet's importance in increasing the opportunity horizon of firms, particularly early on in a business transaction process. A finding which supports a related framework (see

figure 8.3) developed by Lane et al (1998). Obviously, these views were not shared by managers of more Internet-centric firms, especially some of the software firms. Adopted business models, as well as product specifics therefore seem to determine the breadth of the link between non-Internet and Internet factors with regards to the business transaction process, with face-to-face meetings and personal contacts being of importance throughout.

Figure 8.3: Phase Impacts of the Internet



Source: The author, adopted from Lane et al (1998).

8.8 "No Internet yet"-Scenarios

The previous section has investigated the underlying nature of the non-Internet-related factors that STBFs have rated as significantly higher than Internet-related factors with regards to their foreign market selection. Despite the various impacts of the Internet on the internationalisation of STBFs, these factors remained important. But what still remains a bit unclear is what would Internet-using firms have done differently had the Internet not existed since the inception of their firms. Would they just face higher barriers as the reported Internet impacts on internationalisation would not exist anymore, but internationalisation would still be pursued? Or, would firms no longer pursue internationalisation without the Internet's enabling technological infrastructure? In order to assess this question, the technical entrepreneurs were exposed to a "no

Internet yet"-scenario. They were asked what would have been different in their internationalisation without the Internet.

Not surprisingly, most firms said that they would still have operated internationally, supporting the previously reported importance of international business for STBFs. But this marketplace only internationalisation would have been different according to nearly all the managers. Besides logical media substitution effects (*"I would have focused more on traditional media... especially tradeshows."* or *"...one would have to deal more with the mail... with the phone..."*) and previously noted cost effects, they noted that particularly the contact phase would have been more difficult and slower, because *"...we* [the firm] *would be much more encapsulated..."* and because the business opportunity increase of the Internet (*"...the Internet increases our chances..."*) would not have happened. One firm's manager went even as far as stating that *"...it* [the Internet] *also gave* [us] *the opportunity to diversify a bit; otherwise* [without the Internet] *we most likely would have been 'glued' to one customer."*

Three of the managers were a bit more sceptical about whether they would have started internationally without the Internet. The comments ranged from mild scepticism:

"I do not think that it would have worked without the Internet... it [the internationalisation] *would have been extremely expensive and I would have thought about whether I should do it* [the internationalisation] *at all very carefully."*

to a straightforward rejection:

"...without the Internet... I cannot imagine."; *"I think we would not have had even one international partner, that wouldn't be just luck, but luck 'to the power of 10'... no chance. I think no chance!"*

Another firm's reply, the Internet start-up, was naturally even stronger: *"...without the Internet this firm wouldn't exist!"*

When these two groups were compared by linking them to their survey responses it became evident that industry and product specifics – and with it the observed differences in wiredness perceptions – could explain their differences. The majority of the firms that were sceptical about whether they would conduct international business without the Internet were software firms. Indeed only one of the four software firms in

the selected firms stated that they would still have conducted international operations. But since "...[their] *competition would lack the same mechanisms...*" this firm's manager noted that *"I think that we would not be as international as we are today."*

This picture reflects the overall rather facilitating than enabling nature of the Internet for international business operations, at least for the non-software STBFs. But it also highlights the reciprocal nature of the Internet's effect on international operations. *"[C]ompetition would lack the same mechanisms"* as one of the managers replied. Moreover, this reciprocity, paired with the various significant impact dimensions explored previously, drives firms in the marketspace age, at least in the high-technology field, to:

- develop their awareness of the direct and indirect influence of international transactions on its future ***earlier and further*** and
- to adapt their involvement and commitment to international input and output markets, as well as to international competition ***faster***
- by adjusting their portfolio of international exchange transaction modalities ***to the new realities and possibilities of the marketspace age***.

(Derived from the definition of internationalisation developed in chapter 3)

But despite this new internationalisation driver, the internationalisation process of firms per se seemed to remain a gradual and dynamic process as defined in chapter 3, regardless of possible differences in its timing, degree and modes.

8.9 Summary

This chapter has presented the findings of the final empirical stage of this thesis, the post-survey interviews. The goal of these interviews has been to assess causality, explain potential spurious correlations and clarify the insignificance of some of the findings in the survey and observational stage presented in the previous chapter.

Analysing the contextual richness of a set of pre-specified cases – selected according to the post-survey interview implications derived from the previous chapter (see table 7.18 there) – has helped to answer most of the questions raised in chapter 7. Table 8.3 summarises these.

With regards to the first theme that was explored, the role of experiential factors, it has emerged that Internet experience gained in a learning-by-using fashion, pre and post-inception, mattered. This experience did however not directly translate into higher levels of use because of the found mediator variable "business model of the STBF" (Internet-centric vs. Internet-supportive), which was itself influenced by industry and product specifics. Variables not captured in the survey also influenced the two other variables that were investigated: wiredness perceptions and perceived internationalisation impacts. Externalities like the Internet's growth in user and content and its increasingly user friendly interface influenced the former, while reductions in STBFs' liabilities of newness influenced the latter.

The second theme that was further explored was the internationalisation process of STBFs. With regards to FDI among STBFs a broad set of motives have been found. However, a common denominator that has emerged was the rather low involvement nature of STBFs' FDI and a tendency to utilise FDI as a means to grow rather than to exploit home-grown advantages. The Internet's role in STBFs' FDI has been found to be mostly of a supportive nature. The finding in chapter 7 that younger firms internationalised earlier and faster has been found to be due to recent environmental changes, mainly political and technological. These changes have facilitated STBFs' internationalisation. Finally, the role of psychic distance, with a focus on cultural distance, has been further explored. Although it has been shown that this distance measure is more meaningful if applied at the managerial level, it has been also shown that cultural distance was not too important in the internationalisation process of the interviewed STBFs. The Internet was seen as a further technological source of reducing this potential internationalisation barrier, albeit being quite country-sensitive.

The third theme that has been further explored, organisational Internet use, showed that the inconsistent findings of chapter 7 mainly related to definition differences (e-commerce) and to potential common method variance issues (analysis of website hits). Moreover, the importance of a website's marketspace-embeddedness, regardless of its international information content, has been found to be due to German speaking people from non-German speaking foreign countries, temporal website links and search term language overlaps.

The last theme that has been further explored related to the Internet's impact on STBFs' internationalisation process. Its main findings have been that internationalisation modes were rather influenced by industry and products specifics

than by the Internet – although it increased the chances of unmediated contacts –, that the Internet amplified the international orientation of STBFs, that the Internet's effect on a firm's internal resource-base was an initial freeing-up of resources with a subsequent co-development of resource investments and increasing use levels and that reduced FDI needs were of a rather projective than experiential nature. Although it has emerged that reduced FDI needs were country sensitive and that the overall level of FDI, as measured in the number of countries served via the FDI mode, might be reduced due to an increased reach via the Internet's global infrastructure, FDI still mattered. This importance of the marketplace has been also been reflected in the finding that a key non-Internet factor in STBF's internationalisation was the importance of personal contacts, particularly so in pre and post-contract business interaction stages. In contrast, the found significance of website experience on international business costs and reduced FDI needs could not have been clarified.

The findings of this chapter, together with the findings of the previous chapter, will form the basis for the concluding chapter that follows. The findings of all the empirical stages of this thesis – from the informatory and exploratory interviews, to the survey and observational study and, finally, to the post-survey interviews – will be synthesised there in order to develop a model of marketspace-influenced internationalisation among STBFs.

Table 8.3: Findings Synthesis

Post-Survey Analysis		Interview Key Findings	
What was unclear or needed further explorations? (causality/ validity; explorations)		What was shown?	What was not shown?
1. The Role of Experiential Factors:	a.) Experience and Internet Use Levels	• pre- and post-inception experience mattered (learning by using) • the business model of the STBF (Internet-centric vs. Internet-supported), influenced by industry and product specifics operated as an upper use threshold regardless of experience • the fruitfulness to view experience as a stream of particular experiences	• pre-state experience did not endow firms with such high levels of Internet experience that post-inception experience did not matter anymore • despite the Internet being easy to use experiential learning effect were not non-existent • other dimensions of Internet experience (subjective Internet experience and indirect objective Internet experience) did not matter • no difference in the variable domains (experience of Internet use in general vs. using the Internet for international business purposes) was found
	b.) Experience and Wiredness Perceptions	• experience independent externalities (user and content growth; increasing user friendliness) determined wiredness perceptions • wiredness perceptions changed as the firms information needs change as it grows and develops	• viewing adopting a website as an initiating event for more active Internet use did not hold • a lucid explanation why website experience related to industry wiredness remains missing • a lucid explanation why Internet experience related to peer wiredness remains missing
	c.) Experience and Internationalisation Impacts	• impacts increased due to an increasing awareness of the market about the firm and its products (reduced liabilities of newness)	–
2. The internationalisation process:	a.) FDI among STBFs	• pluralistic FDI motives (reactive, experimental, market-seeking, cost reducing, resource-seeking and "image seeking" FDI) • all FDI was of a low involvement nature • some temporary FDI • the Internet facilitated the integration of overseas staff • two cases of Internet enabled FDI • FDI as a means to grow rather than a way to exploit home-grown advantages	–
	b.) Timing of internationalisation	• older STBFs were more influenced by traditional factors (e.g. tradeshows) • a combination of environmental (political) and technological changes operated as internationalisation facilitators	–
	c.) Psychic Distance	• managers were reluctant to assign specific distance values to their foreign markets • high-tech markets were seen as relatively culture insensitive • distance perceptions more based on their foreign business	• statistical differences between the country model and the managerial perceptions could not be established • the unimportance of cultural distance might be due to the early stage of the STBFs' internationalisation

Post-Survey Analysis		Interview Key Findings	
What was unclear or needed further explorations? (causality/ validity; explorations)		What was shown?	What was not shown?
		partners and the ease of operations, not the market • operationalising psychic distance at the managerial level is more meaningful • the key culture related barrier was language • the Internet can reduce cultural distance by communicating culture • the Internet's impact on culture was country sensitive • the Internet superimposes a global marketspace culture on the culturally heterogeneous marketplaces	
3. Organisational Internet Use:	a.) On-line Sales: Definitions and Services Used	• definitions of what constitutes an on-line sale and what Internet services are to be used differed • private websites could not be assessed by the observational analysis	–
	b.) Analysis of Website Hits	• common method variance might explain the findings of the observational analysis	• the responsiveness interpretation did not hold
	c.) Marketspace-Embeddedness and the Direction of Unsolicited Inquiries	• German speaking people from non-German speaking countries, temporal links to international sites and search term language overlaps explained why website embeddedness was important with regards to increases in international contacts due to the Internet, regardless of an international website content	• the interpretation that Internet-based interactions came mostly from German speaking countries was only partially supported
4. Internet Use Impacts on the Internationalisation Process:	a.) The directness of the internationalisation mode	• the nature of the internationalisation mode used was relatively independent of the Internet, more dependent on the industry and product specifics • the use of direct modes led to more use of the Internet • the Internet facilitated direct contacts • one firm used a direct Internet mode to subsequently facilitate entry into an indirect mode • 1 example of re-intermediation	• de-intermediation effects were not found
	b.) The Timing of Internationalisation	• with increasing use levels the Internet's timing impacts increased contingent upon the business focus of the firm • "media indeterminacy" rendered exact impact perceptions difficult	–
	c.) The International Orientation of Firms	• the Internet was an amplifier not a generator of international awareness and orientation • The Internet use and international orientation relationship was reciprocal,	–

Post-Survey Analysis		Interview Key Findings	
What was unclear or needed further explorations? (causality/ validity; explorations)		What was shown?	What was not shown?
		fuelled by the behaviour of the competition	
	d.) The Internal Resource-Base of Firms	• managers were not very familiar with the business resources concept • Internet use freed-up resources temporarily • the initial effect of freeing-up resources transformed itself into a co-evolution of increasing resources and Internet use levels	–
	e.) Impacts on International Business Costs	• the existence and use of an established Internet portal ("cybermediaries") reduced costs	• no explanation why website experience has shown a significant relationship with perceived Internet impacts on international business costs was found
	f.) Determinants of Reduced FDI Needs	• the perception of reduced FDI needs was rather temporary and projective, not based on behavioural experience • perceived reductions in FDI needs were country sensitive • overall, FDI remains important for STBFs but its earliness and its extent might be reduced due to the increased reach of firms in the marketspace	• no explanation why website experience has shown a significant relationship with perceived reductions in FDI was found
	g.) Determinants of International Business Investments	• the investments made in ICT were seen as the international business investment	• but for one case, the impacts on international business investments made were not due to the Internet per se (Internet start-ups)
	h.) International Websites: Outcome or Determinant of Internationalisation?	• the existence of an international website was seen as the outcome of a firm's internationalisation, either triggered internally or externally	• media indeterminacy might mask some impacts that are due to the existence of an international website
4. The Role of Non-Internet Relate Factors:		• various non-Internet related factors with a common underlying theme: the importance of personal contacts • the Internet's impact in relation to non-Internet related factors was particularly supportive in pre-sales and pre-contract stages (phase sensitivity of Internet's impact)	–
5. No Internet Yet Scenarios:		• most firms would still operate internationally, only software firms were less sure • marketplace only internationalisation would utilise other media more (media substitution) • the contact phase would be more difficult and slower (less business opportunities)	–

Source: The author.

Chapter 9: Conclusion – Key Findings Synthesis, Implications, Limitations and Directions for Future Research

9.1 Introduction

In the introduction to this thesis it was argued that since firms are often conceptualised as consumers, producers, managers and distributors of information, recent developments in information and communication technology (ICT) – potentially impacting these core processes – might lead to profound changes in the way firms operate and interact. Since at the core of internationalisation theory is lack of knowledge and subsequently uncertainty about markets abroad due to a lack of location-sensitive market information (Johanson and Vahlne, 1977, 1990), the recent emergence of a location-insensitive, global and universally accessible marketspace could therefore also impact the nature and process of the internationalisation of firms. Ease of communication is no longer a function of geographical proximity as suggested by Vernon (1966) and producers are no longer only aware of local innovations and markets. Due to this global marketspace, the "global scanner" (Vernon, 1979) is not necessarily confined to MNEs only, because the location specificity of knowledge (von Hayek, 1945) becomes more and more location independent on the marketspace. Hence, small firms are also increasingly in a position to disseminate and scan for needed information on a global scale, if they utilise this marketspace. A previously unavailable option that might not only impact their internationalisation process but it might also challenge traditional marketplace-based theories of the internationalisation process of firms.

The previous two chapters of this thesis have attempted to investigate the validity of this argument empirically by addressing this thesis' research aims and its specific research objectives.

This chapter will synthesise the main findings and their potential logical and theoretical relationships across all the investigated research aims and across all the empirical research stages, as well as discussing its implications for theory, policy and practitioners. A discussion of this study's limitations and suggestions for future research will close this chapter.

To reflect this, the chapter is structured as follows:

First, section 9.2 briefly presents the synthesised key findings in relation to this thesis' research aims, based on all three empirical methods used (the survey, the observation and the post-survey interviews). Section 9.3 then proceeds to develop a model of marketspace-influenced internationalisation based on this synthesis. The third section, section 9.4, discusses its implications and contributions for theory, policy and practitioners. The limitations of this study will be discussed in section 9.5 and the final section, section 9.6, will then proceed to suggest directions for future research. A brief summary in section 9.7 closes this chapter and this thesis.

9.2 Synthesis of Key Findings

In the introduction to this thesis five research aims were put forward. After reviewing the literature and conducting two sets of exploratory interviews, these research aims were further specified by developing specific research objectives for each research aim. A survey, an observational analysis of websites and post-survey interviews addressed these. The following sub-sections present a brief synthesis of the key findings of each research aim. This synthesis will form the basis for developing the model of marketspace-influenced STBFs' internationalisation that will be presented in section 9.3

9.2.1 Research Aim 1

The goal of research aim 1 was to examine the current level of Internet use for international business and its determinant among STBFs at an attitudinal level.

The empirical investigation of its research objectives revealed that STBFs' perceived level of Internet use within its industry and among its business peers (international wiredness perception) significantly, and strongly, determined organisational Internet use for international business. Peer wiredness perceptions especially determined use levels, nearly five times as strong as wiredness perceptions at the industry level. This was mainly due to the high use of the Internet for personal business communication purposes. A use dimension – interaction – of the Internet that needs a critical mass of users to become a useful communication channel. Although it should be noted that there was no empirical support for this notion of Internet use sub-dimensions.

The wiredness perception itself, despite the small and still unclear effect of website experience and Internet experience on its perceived levels, was found to be mainly

influenced by experience independent externalities like the Internet's user and content growth, as well as the increasingly easier to use interface of the Internet itself.

Although it seemed that gained experience with the medium Internet did not seem to matter according to the survey data, it was found in the post-survey interviews that it did (learning by using effects). Besides the fruitfulness of viewing experience as a stream of salient experiences (Reuber and Fischer, 1999), it could be established that the investigated direct link between experience and organisational use levels was mediated by the adopted business model of the STBF. The adopted business model of the STBF, Internet-centric vs. Internet-supportive, acted as an upper threshold regarding use levels. Only when STBFs considered their business model to be Internet-centric did experience lead to higher levels of use. In the case of Internet-supportive firms, more experience with the medium did not translate into higher level of use, because its product and industry sensitive business model did not permit higher levels of use (for example with regards to on-line sales or on-line distribution).

This importance was also reflected in the various significant differences that did emerge for software firms (see table 9.1). Software firms exhibited significantly higher levels of Internet use for international business, they were significantly more experienced with the medium, they perceived higher levels of Internet use among their business peers and their level of e-commerce was also significantly higher. Clearly, the product specifics of software firms, mainly that their products can be distributed over the Internet, were the main factor for these findings, further hinting at the product and industry sensitive impacts of the Internet's marketspace on firms' internationalisation process.

Besides software specifics, an indication of an overall shift to more marketspace-based internationalisation activities was also found. The formative group of firms, although significantly younger, exhibited significantly higher levels of Internet experience. This could indicate that younger firms tend to rather first – or at least more often – utilise the marketspace than the marketplace in their initial internationalisation phases. The finding of decreasing inception to Internet adoption time lags might support this further.

9.2.2 Research Aim 2

Research aim 2 examined the internationalisation characteristics of STBFs, their manifestations and determinants.

The empirical findings showed that STBFs' internationalisation was dominated by using direct modes, mainly exporting, to spatially and economically close triad countries. Especially service intensive STBFs, including the more service intensive software firms and the formative group, utilised more direct modes. This underlined the importance of controlling for service intensity if STBFs' internationalisation is to be investigated.

With regards to their internationalisation process, particularly the younger the STBFs were the earlier and faster did they internationalise. A significant number of instant internationalisers were found. Although it was found that the Internet might have played a minor role in this overall acceleration effect, it was shown that a broader set of interrelated political and technological factors were responsible for this effect. These factors have significantly altered the environment STBFs operate in, facilitating earlier and faster internationalisation processes by reducing environmental barriers. However, it was also shown that STBFs' technological-base, their liabilities of innovativeness (see chapter 2), was influential in this process. Their initial NPD significantly impacted the timing of their internationalisation process. The longer the NPD was the later their internationalisation started, albeit at a subsequently faster pace. Hence, the overall found process of an accelerated internationalisation has to be seen in relation to STBFs' initial NPD process.

Three key internationalisation outcome determinants could be identified: the level of international business attitudes, the level of internal resources for international business and gained operational experience in international business. Particularly the importance of the internal resource-base of STBFs, independent of their age and size, gave support for the argument made in chapter 3 that resources other than knowledge and experience are important in the internationalisation of the firm. It also showed that the age and the size of a firm are only crude and misleading indicators of a firm's resource strength.

But in contrast to the significant determinants of internationalisation outcomes like international business diversity and intensity, FDI among STBFs could not be explained by these variables. It was rather found that due to pluralistic FDI motives, particularly resource-seeking motives, and due to the low involvement nature of FDI traditional organisational determinants of FDI did not yet manifest themselves. FDI was often seen as a means to grow a firm, not mainly as a means to exploit home-

grown firm advantages that were accumulated via domestic market expansions. The Internet's marketspace further facilitated, in some cases even enabled, STBFs engagement in FDI by reducing costs and making subsidiary integration (information sharing and communication) easier. This also contributed to the less significant role of traditional organisational variables like size.

The final key finding relating to research aim 2 is the relatively unimportant role of psychic distance in the form of cultural distance in high-tech markets. Although it became clear that operationalisation at the managerial level is more meaningful, cultural distance was seen as a rather unimportant factor in STBFs' direction of internationalisation. This showed that this concept is probably quite industry sensitive.

9.2.3 Research Aim 3

Research aim 3 explored the role of the technical entrepreneur or venture team both in the internationalisation of STBFs and in relation to the level of Internet use for international business.

The empirical results of research aim 3 gave clear and strong support for the important influence of STBFs' management and the pre-state of the firm as argued in chapter 2 and 3. Although previous managerial international business experience had no direct effects on the internationalisation of STBFs – thereby supporting the argument that a STBF has to first develop a viable product or service proposition (see also the noted importance of the initial NPD above) – it exhibited important indirect effects. Both, the internal resource-base of STBFs and the international business attitude of STBFs, each significant influential factors on STBFs internationalisation (see research aim 2 above), were significantly influenced by previous managerial international business experience. Firms with pre-state and pre-joining managerial experience had a stronger internal resource-base and a stronger international orientation.

This effect was also influential in relation to levels of organisational Internet use. Firms whose managers have had Internet use experience prior to founding or joining the firm, used the Internet more intensively for their international business operations.

It was also shown that these effects at the managerial level were independent of the existence of a team venture. Team ventures did not have more managers with previous Internet or international business experience. This finding supports the argument made in chapter 2 that it is not the mere existence of a team venture, but rather the quality of

it, like for example the complementarity of managerial skills within a team venture, that matters.

Finally, no support for the argument of the characteristic managerial transition of the STBF's technical entrepreneur could be found. Although it was argued that this might be due to the used instrument or the specific population, support for rather less deterministic views emerged throughout this study. Particularly the findings of research aim 2 showed that STBFs' internationalisation, focusing on its organisational mode manifestations, did not seem to follow any particularly deterministic path. It thus seems that STBFs' overall development is rather contingent upon managerial pre and post-state aspects. Although a managerial transition of the technical entrepreneur might take place, it is not a *necessary* element in STBFs' development.

9.2.4 Research Aim 4

Assessing the impact of Internet use for international business on the internationalisation characteristics of STBFs was the overall goal of research aim 4.

Several impacts on the internationalisation of STBFs were found as STBFs increased their organisational level of Internet use for international business: an increase in international business contacts, especially so for the more marketspace-influenced formative group, an increase in unsolicited foreign orders, influences on the actual selection of foreign markets, amplifying the international orientation of STBFs, increasing the amount of internal international information and an initial effect of freeing-up crucial internal resources were the key impacts found. Also, the direction of internationalisation was impacted with regards to a foreign country's Internet diffusion level. The higher this national level of diffusion was, the more likely it was for STBFs intensively utilising the marketspace for their internationalisation to do business there.

However, as will be further discussed below (see section 9.3.2) the marketplace still mattered. FDI remained important – although less for software firms – and it was not substituted by the new virtual mode of international operations. Furthermore, non-Internet factors like personal face-to-face contacts – also not substituted by the Internet's communication services – were more important than Internet factors in the selection of foreign markets. But it also emerged that both sets of factors were complementary rather than substituting each other, as well as transaction phase sensitive. The Internet's marketspace was particularly useful in the pre-sales phases of

business transactions, while non-Internet factors were more important in the contractual phases.

However, despite the found impacts on the internationalisation of STBFs, no direct impact on the perceived performance of STBFs was found. This gave support to the view that the unexplored adopted internationalisation strategy of STBFs might act as a mediating variable that is directly impacted by Internet-related factors and that subsequently directly impacts performance (Cavusgil and Zou, 1994; Hoang, 1998).

9.2.5 Research Aim 5

The final research aim of this thesis assessed the levels of website implementations among website adopters at a behavioural level, investigated the role of experiential factors and explored potential internationalisation impacts.

Besides uncovered differences with regards to defining e-commerce and the overall little use of advanced technology in providing information of a website, it was clearly shown that higher levels of website implementation mattered. Particularly the website dimensions experience with a website (age of the website), embeddedness of a website, international language provision and the degree of interactivity exhibited significant impacts on STBFs' internationalisation. Especially the website's level of marketspace-embeddedness, which facilitates finding a firms website, as well as strengthening a potential customers trust in a website according to Palmer et al (2000) and which was found to be higher for older websites, emerged as a key dimension. It was also interesting to see that achieving high levels of marketspace-embeddedness was independent of the number of search engines a firm registered with. This is a finding that has an important implication for STBFs' managers (see section 9.4.3.2).

Table 9.1 summarises the discussed key findings per research aim. These findings will now be used in the following section to develop and present a model of marketspace-influenced STBFs' internationalisation that is based on a synthesis of the key findings briefly presented here.

Table 9.1: Key Findings of Research Aims

	Key Findings	
Research Aim	What was shown?	What was not shown?
1. Examine the current level of Internet use for international business and its determinant among STBFs at an attitudinal level.	<u>determinants of use level:</u> • use levels were significantly influenced by both wiredness dimensions, with international peer wiredness exhibiting nearly five times as strong an impact on use levels • experiential factors (pre and post-inception) impacted use levels (learning by using effects), but their effect on levels of use was mediated by the adopted business model of the STBF (Internet-centric vs. Internet-supportive) <u>determinants of wiredness perceptions:</u> • experience independent externalities like the Internet's growth in users and content, as well as its increasingly user friendlier interfaces determined wiredness perceptions <u>software firm specifics:</u> • *e-commerce was significantly higher among software firms* • *use levels among software firms were significantly higher* • *peer wiredness among software firms was significantly higher* • *software firms were significantly more experienced (both indicators)* <u>formative group specifics:</u> • *the formative group was significantly more experienced in using the Internet, despite being significantly younger; effect of decreasing inception to adoption time lags as firms became younger*	• use sub-dimensions as discussed in chapter 4 could not be identified • it remains unclear why website experience and Internet experience significantly influenced industry and peer wiredness respectively
2. Examine the internationalisation characteristics of STBFs, their manifestations and determinants.	• direct modes were dominant, significantly more so for service intensive STBFs • the export mode dominated and the FDI share was low • the timing of internationalisation (earliness and speed) was significantly earlier and faster the younger the STBF; this effect was mainly due to political and technological changes in the environment in recent years that have facilitated STBFs' internationalisation • the length of the initial NPD strongly influenced the speed of internationalisation; firms with long NPDs internationalised faster • the international business diversity was significantly higher for STBFs with a high international orientation and, nearly twice as strong, for STBFs with a long operational international business experience • the international business intensity was higher for STBFs with high levels of internal resources, high levels of an international orientation and high levels of international business experience; and independent of their age and size • the "triad-focused" direction of internationalisation was strongly determined by economic and spatial factors	• no influential determinants of FDI could be found; FDI motives were pluralistic and FDI was rather seen as a means to grow than as a means to exploit home-grown advantages only; the Internet mostly facilitated STBFs' FDI • psychic distance operationalised as cultural distance did not influence the direction of internationalisation; it was seen as rather unimportant in high-technology markets; nevertheless, operationalising the distance construct at the managerial level emerged as more meaningful.

	Key Findings	
Research Aim	What was shown?	What was not shown?
	<u>software firm specifics:</u> • *software firms used significantly more direct international business modes* <u>formative group specifics:</u> • *the formative group used significantly more direct international business modes* • *the formative group perceived lower levels of internal international business information* • *international business intensity was significantly lower among the formative group*	
3. Explore the role of the technical entrepreneur or venture team both in the internationalisation of STBFs and in relation to the level of Internet use for international business.	• STBFs with previous international marketing experience had a significantly larger internal resource-base • STBFs with managers who previously worked abroad had both a significantly larger internal resource-base and a stronger international orientation • STBFs with managers with previous Internet experience used the Internet significantly more for international business <u>software firm specifics:</u> • *previous Internet experience among managers was significantly higher for software firms* <u>formative group specifics:</u> • *the formative group had significantly less managers who worked abroad* • *previous Internet experience among managers was significantly higher for the formative group*	• internationalisation manifestations were not significantly influenced by previous managerial international business experience, neither directly nor indirectly • the role of team ventures was insignificant with regards to internationalisation influences, Internet use or previous managerial international business and Internet experience • no typical managerial transition with regards to the business foci of STBFs over time was found
4. Explore and assess the impact of Internet use for international business on the internationalisation characteristics of STBFs	• increased levels of Internet use increased significantly the Internet's impact on: – the number of international contacts and – the number of foreign orders • the Internet's influence on the selection of foreign markets increased mainly with increased levels of Internet use • FDI remained important, but due to an Internet-induced increased reach the extent of FDI (in country totals) might be reduced • face-to-face meetings and personal contacts in international business remained key non-Internet factors • non-Internet related information factors were more important on average than Internet-related factors (no substitution effect) with regards to the selection of foreign markets • the Internet's impact in relation to non-Internet related factors was particularly supportive in pre-sales and pre-contract phases • increased levels of Internet use increased significantly, although not strongly, the level of international business information • increased levels of Internet use amplified significantly the international orientation of STBFs	• none of the Internet-related factors directly influenced the perceived performance of the STBFs' management • use sub-dimensions were not found, salient use sub-dimensions could not be evaluated

	Key Findings	
Research Aim	What was shown?	What was not shown?
	• increased levels of Internet use increased the levels of internal international business resources by initially freeing-up resources; however, this initial effect transformed itself into a co-evolution of increasing internal resources and increasing Internet use levels • the direction of internationalisation was significantly influenced by the technical distance of foreign markets as levels of Internet use increase • the Internet facilitated direct contacts, but the directness of the adopted internationalisation mode depended on industry and product specifics (no de-intermediation support) software firm specifics: • *software firms perceived higher levels of Internet impacts on reduced FDI needs and higher levels of impacts on international business investments* formative group specifics: • *the formative group perceived higher levels of an Internet impact on international business investments and an increased role of unsolicited inquiries over the Internet on selected foreign markets*	
5. Assess the levels of website implementations among website adopters at a behavioural level, investigate the role of experiential factors and explore potential internationalisation impacts	• e-commerce possibilities on websites were extremely rare, but managers employed different definitions of what constitutes e-commerce; e-commerce was also conducted via private websites that were beyond the observational analysis • little use of advanced technical features like audio or video (multi-media) • STBFs with longer website experience had websites with more external links, websites that were easier to be found, websites that were information richer and websites that were more up-to-date • STBFs with an international website reported more international contacts due to the Internet; its existence being rather the outcome of their internationalisation than a determinant • high marketspace-embeddedness increased the number of international contacts, increased the number of unsolicited foreign orders and the importance of Internet information receipts and unsolicited inquiries on the selection of foreign markets • STBFs with more interactive websites reported higher levels of unsolicited foreign orders over the Internet and an increase in the role of unsolicited inquiries on their selection of foreign markets formative group specifics: • *the formative group had significantly more domestic websites*	• more registrations with Internet search engines did not lead to higher levels of searchability • website implementation levels had no impact on reduced needs for face-to-face meetings, a reduction in perceived international business costs or investments

Source: The author.

9.3 Towards a Model of Marketspace-Influenced STBFs' Internationalisation

The main focus of this thesis was to explore and assess potential impacts of the marketspace on the internationalisation of STBFs. Research aims 1 to 3 prepared the ground and set the context for the assessment of potential marketspace internationalisation impacts, the focus of research aims 4 and 5.

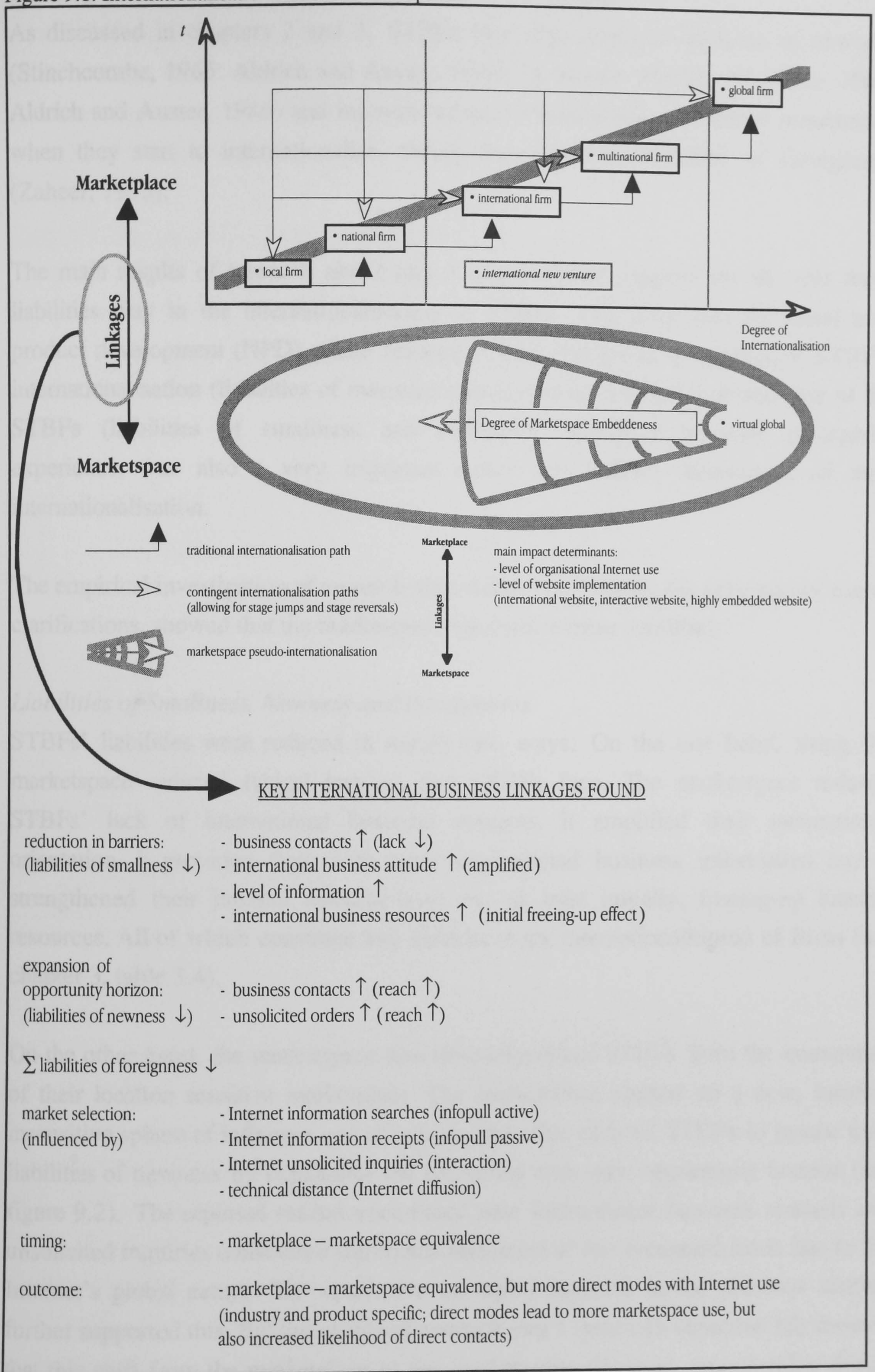
The empirical findings of this thesis have shown that several significant impacts do indeed exist (see table 9.1). In synthesis, these impacts mainly relate to the discussed liabilities of STBFs and will be discussed in sub-section 9.3.1, together with their internationalisation impacts. However, during the cause of this study it also became apparent that the Internet's marketspace is not a panacea to all the problems and barriers that STBFs face in their internationalisation. The traditional marketplace remains a very important environment for STBFs and their organisational development remains crucial too. Sections 9.3.2 and 9.3.3 will discuss these important aspects.

9.3.1 Marketspace and STBFs' Internationalisation

Synthesising the key findings of research aims 4 and 5 (se table 9.1) reveals that STBFs' utilisation of the marketspace had two main impacts: it reduced their organisational liabilities and it influenced their internationalisation (see figure 9.1). These impacts can be regarded as rather important, since the results of research aim 2 in particular have clearly supported previous research findings in that STBFs tend to internationalise early on, particularly younger STBFs.

The effects of the marketspace on STBFs internationalisation were mainly achieved with increasing levels of organisational Internet use and with international, more interactive and more embedded websites. Particularly the latter finding is very interesting, because it falsifies the argument of the author put forward in chapter 4 that: "... in marketspace there are no internationalisation stages and there exists no internationalisation process." This study could demonstrate that even in marketspace there is a special kind of internationalisation process taking place as websites become more and more globally embedded in the marketspace network. This "pseudo-internationalisation" process was also shown to be a significant determinant of internationalisation impacts on the marketspace (see figure 9.1).

Figure 9.1: Internationalisation and the Marketspace



Source: The author.

9.3.1.1 Marketspace and the Liabilities of STBFs

As discussed in chapters 2 and 3, STBFs face organisational liabilities of newness (Stinchcombe, 1965; Aldrich and Auster, 1986), smallness (Welsh and White, 1981; Aldrich and Auster, 1986) and innovativeness. Liabilities that are further pronounced when they start to internationalise, facing the additional liabilities of foreignness (Zaheer, 1995).

The main results of research aim 2 and 3 clearly found support for the role these liabilities play in the internationalisation of STBFs. Not only was the initial new product development (NPD) phase influential with regards to the timing of STBFs' internationalisation (liabilities of innovativeness), but the internal resource-base of the STBFs (liabilities of smallness and newness), including pre-state managerial experience, was also a very important direct and indirect determinant of their internationalisation.

The empirical investigation of research aims 4 and 5, as well as the post-survey causal clarifications, showed that the marketspace can reduce these liabilities.

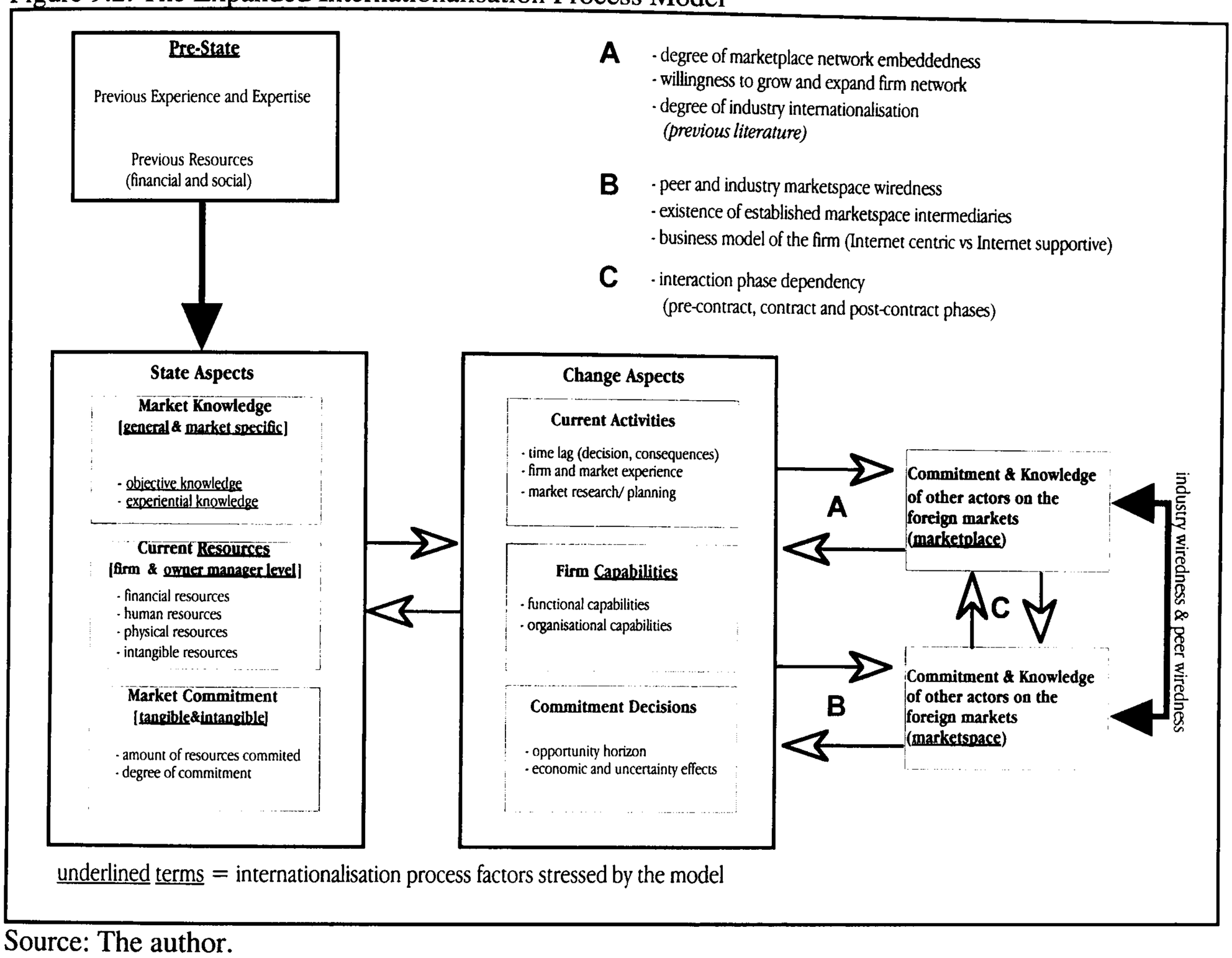
Liabilities of Smallness, Newness and Foreignness

STBFs' liabilities were reduced in mainly two ways. On the one hand, using the marketspace reduced typical barriers that STBFs face. The marketspace reduced STBFs' lack of international business contacts, it amplified their international orientation, it provided them with more international business information and it strengthened their internal resource-base by, at least initially, freeing-up internal resources. All of which constitute key barriers in the internationalisation of firms (see chapter 3, table 3.4).

On the other hand, the marketspace also de-encapsulated STBFs from the constraints of their location sensitive marketplace. The marketspace opened up a new, location insensitive sphere of influence and of opportunities that allowed STBFs to reduce their liabilities of newness by expanding and exploiting their new opportunity horizon (see figure 9.2). The reported marketspace-based new international business contacts and unsolicited inquiries constituted significant indicators of this increased reach due to the Internet's global nature. The qualitative examples reported in the previous chapter further supported this. But the results of research aim 1 (research objective 1d) showed that this shift from the marketplace to the marketspace depends, among other things (see figure 9.2), mainly on the degree of peer and industry use of the marketspace

(wiredness); particularly on the use of business peers. The less the business network of a STBF and its industry uses the marketspace, the less useful it becomes for the STBF itself to use it intensively. The various significant group differences found for software firms underpin this further, while also indicating the important but unexplored role product characteristics play in marketspace.

Figure 9.2: The Expanded Internationalisation Process Model



Source: The author.

But besides the specifics of the software industry, a more general marketplace to marketspace shift, albeit interaction phase sensitive (see link C in figure 9.2), became also apparent. Chapter 7 showed that the significantly younger formative group of STBFs was more experienced in using the Internet and this was mainly due to a general trend of decreasing inception to Internet adoption time-lags across the age of all firms. This strongly suggests that the younger the STBFs were, the earlier they started to use the Internet, with the inception to adoption time lag approaching 0 (instant Internet adoption). The finding that the role of Internet-based unsolicited orders was also significantly higher for the formative group of firms and the finding that there were more managers with previous Internet experience among the formative group

seem to give further evidence for a potential marketplace to marketspace shift for new firms' initial internationalisation steps.

This more general shift, fuelled by the reported importance of externalities like the increase in users and user friendliness of the Internet, did however not always directly translate into a marketplace to marketspace impact shift. Not only were use levels and most impact levels not higher for the formative group, but the post-survey interviews have also shown that the product and industry sensitive business model of the STBFs (Internet centric vs. Internet supportive) was a key determinant of the strength of the "B-link" in figure 9.2. However, this clearly shows that the marketspace is becoming more and more of a standard and more influential tool for new STBFs, while older STBFs (the supportive group) relied more on the marketplace to develop their international business.

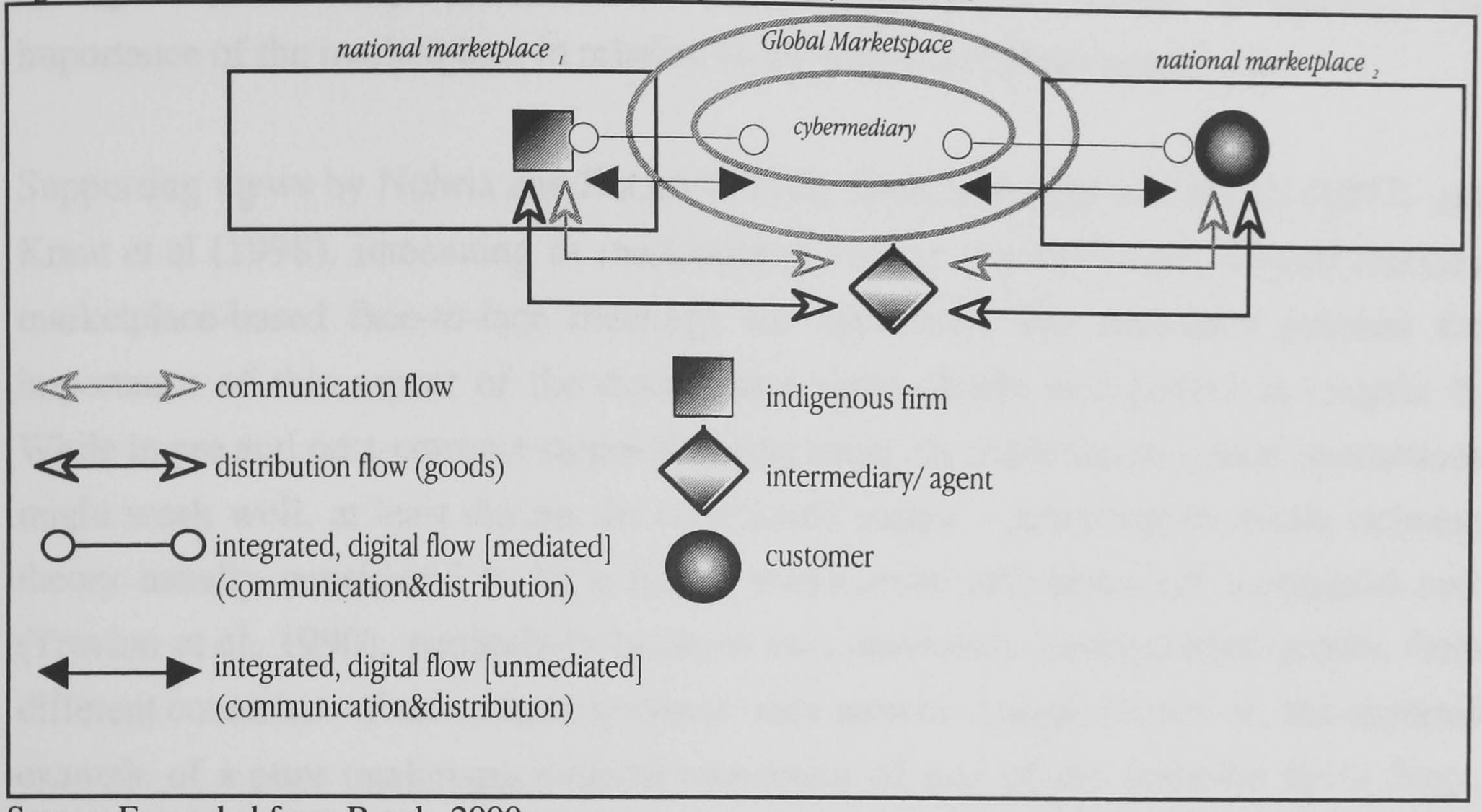
9.3.1.2 Marketspace and STBFs' Internationalisation

The marketspace impacts on the liabilities of STBFs also manifested themselves in the actual internationalisation pattern of STBFs (see figure 9.1), as revealed in the assessment of research objectives 4b and 5d and the post-survey interviews. Although most of the behavioural internationalisation dimensions showed no direct impact due to the rather homogeneous internationalisation pattern of the sampled STBFs, the marketspace did influence the selection of foreign markets. Internet information searches, Internet information receipts, unsolicited Internet inquiries and the technical distance of the foreign markets (the higher the national Internet diffusion level of a country, the higher the likelihood for marketspace-focused STBFs to do business with firms that country) all influenced the actual selection of foreign markets. Even the timing, that is the earliness and speed of internationalisation, was influenced by the marketspace as stated by respondents during the post-survey interviews. However, similar to the observed actual outcomes of their internationalisation, marketplace marketspace equivalence – firms relying more on the marketspace did not internationalise earlier or faster than their more marketplace focused counterparts – could be observed.

Overall, the assessment of research aims 4 and 5 revealed that attitudinal and behavioural impacts were found for STBFs with high use and website implementation levels. The international business operations of STBFs were mostly facilitated, sometimes even enabled, by utilising the potentials of the marketspace. But despite its various linkages and impacts and despite the emergence of a new mode of

internationalisation (see figure 4.8 in chapter 4 and figure 9.3 below for a related mode uncovered in the post-survey interviews), the gradual nature of the internationalisation process per se, even in marketspace (see figure 9.1), remained unchanged.

Figure 9.3: The Virtual Mode of International Operations, Variant I



Source: Expanded from Brock, 2000.

9.3.2 The Importance of the Marketplace: Personal Contacts and Face-to-Face Interactions

Despite the various linkages and impacts found, this study clearly showed that the traditional, location-sensitive marketplace remains very important. Assessing research aim 4 showed that non-Internet related factors had the highest mean of all direct attitudinal impact variables and the post-survey interviews further substantiated the importance of non-Internet related factors over Internet-related factors. For a model of marketspace-influenced internationalisation it is therefore important to acknowledge the importance of the marketplace and the marketspace's main loci of impact in the internationalisation of STBFs.

The analysis of research aim 4 (research objective 4a) revealed that the strongest attitudinal impact of the marketspace on STBFs internationalisation was an increase in international business contacts (*Cohen's d = 1.52*; see table 7.18 in chapter 7). But it was also shown that the need for face-to-face meetings with international business partners was not reduced, or otherwise impacted, at all. In addition, the analysis also demonstrated that using the Internet for personal business communication purposes (for example e-mail) showed the highest average level of use across all firms. Also, the empirical results relating to research aim 1 established that Internet use among

international business partners (peer wiredness) was a much stronger determinant of Internet use levels than Internet use at the industry level. But it was shown, too, that e-commerce, either on-line ordering or on-line selling, exhibited the lowest average use levels across all firms. The main explanatory link between those findings emerged during the post-survey interviews and is illustrated in the "C-link" in figure 2: the importance of the marketplace in relation to its interaction phase sensitivity.

Supporting views by Nohria and Eccles (1992), Benson-Armer and Hsieh (1997) and Kraut et al (1998), interacting in marketspace only is not sufficient. Complementary marketplace-based face-to-face meetings are necessary. The managers stressed the importance of this aspect of the marketplace quite clearly as reported in chapter 8. While in pre and post-contract stages focusing more on marketspace-based interactions might work well, at least during the contractual stages – according to media richness theory usually considered to be a highly non-routine and equivocal managerial task (Trevino et al, 1990), particularly between two previously unacquainted parties from different countries – face-to-face meetings were seen as crucial. However, the reported example of a pure marketspace-based interaction of one of the software firms hints, again, at the product sensitivity of marketplace importance. But still, the products of most STBFs are highly complex, non-digitisable and little standardised, which naturally implies the need for more customer-producer interactions. The prevalence of direct internationalisation modes, especially for more service intensive STBFs, as found during the assessment of research aim 2, and the rather small overall informational effect of the Internet (*Cohen's* $f^2 = .06$) supports this further. Adding the liabilities of newness of STBFs, which increases the risk perception of potential buyers, and it becomes apparent why the marketplace remained so important for STBFs' internationalisation. But once contractual agreements are signed, once trust has been built among the interacting parties and once the STBF has overcome – or at least reduced – its liabilities of newness by establishing a reputation in the market, interactions might again shift back – although not completely – to the marketspace.

The importance of the marketplace became also evident with regards to the perceived need of STBFs for FDI. Although the assessment of research aim 4 showed a strong effect (*Cohen's* $d = .94$) of the marketspace on reduced FDI needs, the post-survey interviews revealed that this effect was rather projective, temporary and country sensitive than absolute, even for software firms. The new location-insensitive virtual mode of internationalisation (see chapter 4) and its variant (see figure 9.3) does therefore not completely replace the location-sensitive FDI mode of international

operations. It was rather the other way round. It facilitated and in two cases even enabled the FDI among STBFs. But still it should be noted that due to the increased reach and opportunity horizon of STBFs (see section 9.2.1 and figure 9.1), the overall extent of FDI per STBFs might be reduced due to the Internet's marketspace, with unmediated personal contacts remaining a crucial element in STBFs' internationalisation.

9.3.3 The Importance of the Firm's Resources: Experience and the Internal Resource-Base

Besides the importance of the marketplace, the resource-base of the firm also emerged as an important factor in the marketspace-influenced internationalisation of STBFs. This was evident throughout the assessment of all the research aims. As stated in the introductory remarks of this section, the Internet's potential to support internationalisation does not constitute a panacea in itself. STBFs not only need to develop a competitive product/ service proposition (liabilities of innovativeness), they also need to develop and accumulate crucial internal resources for their international business operations and for their effective utilisation of the marketspace. This includes gaining experience in and thereby knowledge of operating internationally, as well as using the marketspace for international organisational purposes.

9.3.3.1 Resources and Experience in the Internationalisation Process

The empirical examination of research aim 2 clearly demonstrated the importance of the internal resource-base of STBFs. Independent of their age and size, the internal resources-base of STBFs, particularly their human resources, was a strong determinant of STBFs' internationalisation. Even a stronger determinant than operational international business experience (*Beta-value .33 vs. .23*), which is at the heart of traditional internationalisation theory (Johanson and Vahlne, 1977; Johanson and Vahlne, 1990). This finding is congruent with similar findings by Pedersen and Petersen (1998), thereby stressing the importance of resources other than information and knowledge in the internationalisation of firms.

The importance of internal resources was also supported by the results of assessing research aim 3. As indicated there, pre-state aspects of STBFs (liabilities of adolescence; see chapter 2) significantly influenced the internal resource-base of STBFs. Pre-state managerial international business experience significantly impacted the levels of internal resources. Firms with managers who previously worked abroad and/ or firms with managers with previous international marketing experience have had

significantly higher levels of internal resources for their international business operations and these resources were in turn crucial for post-inception internationalisation processes.

9.3.3.2 Resources and Experience and the Marketspace

The importance of developing an internal resource-base and the importance of experiential factors were also apparent in relation to STBFs' utilisation of the marketspace to facilitate and support international business operations.

Although research aim 1 could not demonstrate a direct effect of (post-inception) experience on levels of use, the post-survey interviews could clearly establish the existence of (post-inception) experiential learning by using effects, with the adopted business model of STBFs (Internet-centric vs. Internet supportive) acting as a delimiting variable. In addition, the importance of experience was further supported by the significant role of pre-state managerial experience on use levels (research aim 3) and the significant role of website experience on website implementation levels (research aim 5).

More importantly, a U-shaped relationship with regards to resource effects was found. While utilising the marketspace led to an initial effect of freeing-up resources – thereby reducing the liabilities of smallness of STBFs as reported in the previous section (section 9.3.1.1) – the post-survey explorations of the marketspace-use resources relationship also revealed the importance of developing a resource-base that can support higher levels of marketspace use. This finding clearly supports the view that it is not the existence of the technology per se that matters (Cecil and Goldstein, 1990; Mata et al, 1995), but the existence of managerial ICT skills within the firm that are key (Mata et al, 1995). Apart from the above discussed product, industry and business model contingencies, actual Internet use *levels* and website implementation *levels* mattered, not simply Internet adoption. Moreover, these two key impact determinants were both strongly intertwined with STBFs' experience with the marketspace and its resource-base to support its use.

This lucidly demonstrated the importance of and need for developing resources and committing resources to the Internet in order to effectively exploit the potentials of the marketspace. But although the study has shown that there existed an interplay between the marketspace's potential to reduce the resource related liabilities of STBFs and the need for resources to take advantage of the marketspace, simply using the marketspace

cannot directly generate resources. This is especially the case in relation to the observed important resource category human resources. Internal resources have to be developed at least in parallel with using the marketspace in order to more effectively and efficiently exploit them. This resource development relates to the general development of the business and its products (liabilities of innovativeness), as well as to the development of managerial international business and ICT skills, needed to internationally exploit the technological-base of the STBF in the marketplace and the marketspace.

9.4 Implications and Contributions

The above synthesis of the key findings has several implications. This section addresses the direct, findings-based contributions of this study.

First, theory and research implications are discussed, second, implications for policy makers are discussed and third, this study's implications for practitioners are discussed.

9.4.1 Theory and Research Implications

The contribution of this study has mainly methodological and theoretical implications for research. Each of which is also important for future research (see section 9.6).

9.4.1.1 Methodological Contributions

As stated in chapter 6, it was noted recently that researchers empirically investigating STBFs must be aware of their potential research fatigue and consequently low response rates due to a massive increase in studies on STBFs in general (Cooper, 2000). This problem is further compounded in the case of STBFs located in science parks (Cooper, 2000). The exploratory stages of this study clearly supported this. German STBFs located in science parks in Northrhine-Westphalia were also suffering from "research overload".

This rather challenging research environment led to the use of a less mainstream survey implementation procedure: the drop and collect survey. Although to the best of the author's knowledge little is known about its effectiveness among industrial population, a study among retailers has shown its effectiveness (Brown, 1987).

The high response rate of this study (total response rate 79%, net response rate 40%) clearly demonstrated its effectiveness also among problematic industrial populations. Furthermore, although it was not further statistically assessed, a firm's co-operation in the study was more likely if the researcher could establish a direct contact with the owner manager, not an indirect contact via an assistant or any other employee in the firm. Achieving this was particularly difficult for the larger STBFs. The outcome of the drop and collect survey is an important contribution to future methodological considerations of researchers facing similarly challenging research environments. However, it needs to be remembered that the value of this research tool decreases as the population of interest is increasingly spatially scattered.

The second methodological contribution relates to the applied multi-method approach. As recently stated in a review of export related studies by Leonidou (1998), multi-method approaches are unfortunately the exception in international business research. He endorses their use in order to overcome the various weaknesses of past studies (see also a similar recommendation by Coviello and McAuley, 1999).

The results of the application of a multi-method research design (see chapter 6) in this study gave strong support for its strength. Without the observational study a validity assessment and a common method variance assessment would not have been possible, both of which strengthened the overall validity of this study's findings. The post-survey interviews were not less fruitful. Besides allowing to further explore and clarify ambiguous findings from the previous research stages, it allowed for the important assessment of causal directionality. A lot of key relationships in this study would have remained unclear, were it not for the post-survey qualitative research stage to qualify their nature and determinants further. But despite its merits, post-survey qualitative research stages are rather the exception than the rule, with pre-survey qualitative interviews only being a more common research method. Particularly for exploratory research, like this study, where strong theoretical frameworks do not yet exist and determining causal directionality is therefore more difficult, such a research design can only be highly recommended. This study contributed to demonstrating its usefulness.

The third and last methodological contribution relates to this study's interdisciplinary approach. By drawing on diffusion of innovation theory and ICT theories, integrating and exploring them in the international business context, this study addressed persistent calls for more interdisciplinary research among international business

researchers (Dunning, 1989; Buckley, 1991; Buckley and Chapman, 1996). The results of this study showed the fruitfulness of this approach. It helped developing the research framework and its research objectives, it allowed for the empirical assessment of the objectives by supporting the development of constructs and it theoretically guided the assessment and interpretation of relationships.

9.4.1.2 Internationalisation Theory

In addition to methodological implications, this study has important implications for theory. Its conceptualisation and its findings contribute to several aspects of internationalisation theory, the key theoretical framework of this study.

As reviewed in chapter 3, the updated Uppsala internationalisation model (UIM) remains the key theoretical framework with regards to explaining the *process* of internationalisation, despite the various criticisms discussed. This thesis contributed to internationalisation theory by conceptually expanding its theoretical framework, de-emphasising and newly emphasising some of its process forces (see chapter 3 and figure 9.2) and exploring parts of this expanded framework empirically. The results gave exploratory support for the validity of this expanded framework. Each aspect will be discussed further below.

Assumptions

As reviewed in chapter 3, UIM essentially assumes that growth-seeking and risk minimising firms gradually increase their international operations as their domestically accumulated internal resource-base expands, their external resource-base (the firm's business network) expands and their information and consequently knowledge about foreign markets increases.

This thesis has shown that parts of this assumption no longer hold, at least in the case of STBFs. The first aspect of this assumption that needs to be expanded is the assumption of mainly growth seeking firms. While growth seeking (market seeking) motives of internationalisation were also discovered during the course of the empirical inquiry, other motives emerged as well, mainly resource-seeking motives. Motives that stress the rather generative and developmental aspect of internationalisation rather than the purely exploitative aspect. This aspect directly leads to the second major adjustment to UIM's assumptions: the view that firms increase their international operations as their domestically accumulated resource-base expands. While mostly true in the less globalised environment of the 1970s, at the end of the last millennium this assumption

clearly no longer holds. Supporting related theoretical views by Casson (1993) and Oviat and McDougall (1994), this study has shown that even the youngest and smallest of firms no longer accumulate resources purely domestically. Besides their ability to globally internalise information from the marketspace, the uncovered resource-seeking FDI motives like image-seeking FDI clearly demonstrated their willingness and ability to accumulate resources internationally, not just domestically. Despite UIM's theoretical roots in the resource-based view of the firm, this finding stresses further the need to make its link much more explicit. As conceptualised in the expanded internationalisation model, assuming exploitable home-grown resources and capabilities as a given prior to firm's internationalisation – an assumption which naturally led UIM's authors to focus more on experiential learning rather than resource accumulation – no longer holds for an increasing number of firms. The globalising environment, including the marketspace as a key factor, de-encapsulates firms from their previously isolated and "protected" home markets. Hence, the implicit assumption that a firm has already fully developed domestically before it starts to internationalise into an unknown and different international environment does apply less and less. This change in the assumption of how a firm typically develops and grows has obviously direct implications for the key underlying process forces of the internationalisation process.

The Process

This study also contributed to the expanded conceptualisation of the basic underlying mechanisms of the internationalisation process (see figure 9.2). Although not all its aspects were explored, three key implications stand out: the importance of the pre-state, the importance of resources other than information and knowledge and the opportunity-expanding and barrier-reducing marketspace. Implications, it should be stressed again, that do not challenge the general gradual nature of the internationalisation process.

Internationalisation theory focuses on the firm level rather than on the managerial level and therefore rather on post-inception aspects (Madsen and Servais, 1997). This study clearly contributed to the view that purely post-inception firm level assessments cannot capture essential internationalisation process variables. It was shown that traditional (post-inception) firm level variables like age and size were rather irrelevant in the STBF context and that human resources (including managerial resources) are more crucial aspects for STBFs' internationalisation. More importantly, the pre-state of the firms mattered. It significantly impacted both, their international business and Internet

use resources, as well as their international orientation. Although no direct link with regards to their timing of internationalisation was found, the significant resource-internationalisation-outcome link clearly supports the explanatory power of considering the influential pre-state of firms when analysing internationalisation. The internationalisation process model thus needs to conceptually incorporate pre-state aspects.

The second key implication for internationalisation theory with regards to process forces relates to the importance of resources other than information and knowledge. As already expressed in section 9.3.3 this study found support for the resource-based view of the firm and its importance in the internationalisation process. The expanded internationalisation process model (see figure 9.2), extended both the state aspects and the change aspects of the model by strengthening the rather implicit focus on resource accumulation and capability development in addition to knowledge development via experiential learning. As discussed above, the need for a more explicit focus on the on resource accumulation process is due to a needed change in the model's assumptions. The old assumption that most firms have already developed and grown domestically prior to their internationalisation does no longer hold. The experiential learning process and the network forces of the updated UIM alone can therefore no longer properly characterise the internationalisation process. The internationalisation process also needs to incorporate the resource accumulation and capability development process. The empirical results supported the validity of this conceptual extension, giving support for related emerging arguments made previously in the literature (see for example Bell et al, 1998b).

The final key implication for internationalisation theory with regards to process forces relates to the main focus of this thesis: the marketplace-marketspace link (see figure 9.2, links B and C), which was discussed at some length in the previous section. Without too much repetition, suffice it to say that this link emerged as a rather important and influential link. However, from a theoretical point of view it is important to stress again that this new sphere of influence and opportunity lies outside the traditional theoretical domains of international business research. The fruitfulness of this study's interdisciplinary approach (see section 9.4.1.1) clearly implies a need for internationalisation theory to embrace additional theoretical frameworks like the behavioural theory of ICT use (Seddon, 1997) and media choice theories (Daft and Lengel, 1986; Fulk et al, 1990; Carlson and Zmud, 1999) to fully understand the new realities of internationalisation mechanisms in a marketspace-age.

Manifestations

At first sight this study's findings clearly contribute to previous studies that have challenged, even refuted, the validity of the suggested sequence of internationalisation stages of UIM. STBFs did not start their internationalisation according to the prescribed stages. However, as expressed by Madsen and Servais (1997), "[a] falsification of the surface manifestations is ... not necessarily the same thing as a falsification of the reasoning behind the traditional models." The main reasoning behind the postulated manifestations is that firms adapt their international resource commitment in a gradually increasing fashion. Besides UIM's neglect of potentially non-increasing adaptations, for example de-investments, that were discussed in chapter 3, this study clearly found support for this reasoning. None of the STBFs was involved in highly resource committing international business operations. No production abroad and no complex product offerings abroad in the Luostarinen sense (see chapter 3) were found, reflecting their limited resources (liabilities of smallness). What was rather shown is a theoretical mismatch between internationalisation mode taxonomies and levels of committed resources. UIM assumes, as do most mode taxonomies, that FDI is a highly resource committing internationalisation mode, much more so than exporting or other modes. This study could clearly demonstrate that this is not necessarily the case. FDI among STBFs was of a low involvement nature, sometimes even temporary, experimental and reactive rather than planned. This finding also explained the inability of the survey stage in identifying FDI determinants using traditional resource and experience related organisational variables. Obviously, this has important theoretical implications in that it questions the validity of traditional internationalisation mode taxonomies that relate their modes to levels of resource commitments. Rather than viewing exporting as less involving compared to FDI, each mode can encapsulate a broad range of resource commitment and involvement levels, with some exporting modes of firms easily exceeding the committed resource levels of other firms' FDI. A view that expands upon the theoretical arguments made by Benito and Welch (1994) that stages of internationalisation might mask differences in commitment. Finally, it goes without further explanations that the conceptualised and empirically supported new mode of internationalisation (see figure 9.3) also needs to be added to future internationalisation mode taxonomies.

The second and last aspect with regards to the manifestation of firms' internationalisation relates to the direction of internationalisation. UIM projects a correlation between firms' international activities and the home host country distance. The more distant the less likely the activity. This study's implications are not

straightforward, because UIM's distance concept, psychic distance, is not clearly defined. In a broad sense UIM's distance concept was supported. STBFs mainly operated in neighbouring, geographically close and otherwise similar Western triad countries. However, with regards to the distance sub-dimension culture – unfortunately usually considered as *the* way to operationalise psychic distance (see for example Fletcher and Bohn, 1998) – little support was found. Although it could be demonstrated that this was in parts due to the way it was operationalised, it emerged that at least for high-tech markets cultural distance did not matter that much. This implies that the distance concept within internationalisation theory is clearly in need of a more thorough theoretical conceptualisation. It needs to specify its elements and its level of analysis more clearly and it also needs to consider industry and product contingencies. Furthermore, it needs to consider a new distance measure particularly relevant in marketspace. The technological distance of countries, measured at the level of national Internet diffusion or at the industry level (industry wiredness). Overall, this study gives some exploratory support that such adjustments and clarifications might lead to a more consistent support for the theoretical validity of the distance concept in international business.

Taking together, this thesis has contributed to several aspects of theory and research and its implications opened the field for future research. Directions of which will be discussed in the next chapter. Besides its theory and research implications, this study has however also implications for policy maker. The next section discusses these.

9.4.2 Policy Implications

The policy implications of this study are mainly twofold. On the one hand relating to the provision of an efficient marketspace infrastructure and on the other hand relating to governmental international business assistance programmes. Each aspect will be discussed in more details below.

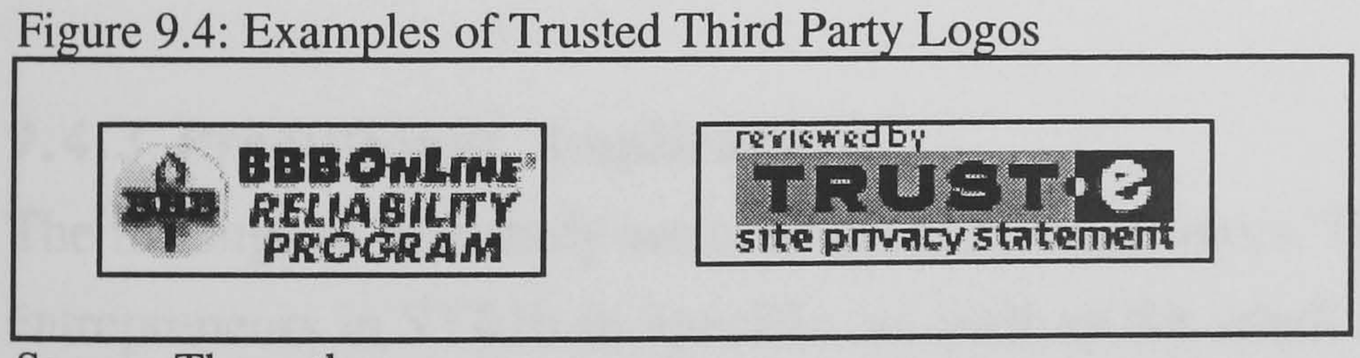
9.4.2.1 Infrastructure Provision: Technology, Legal Frameworks and Skills

This study has shown that the technical distance of a country, its level of Internet diffusion, is influential in the internationalisation direction of marketspace-active STBFs: the higher the diffusion, the lower the technical distance and the higher the likelihood of international firm interaction over the Internet's marketspace. This effect clearly underlines the importance for policy makers to provide or support the needed

national technical infrastructure and to promote its use. Especially so for otherwise more remote countries and countries with low levels of Internet diffusion.

This institutional support should however not only focus on technological factors; factors that are currently high on the political agenda in almost any industrialised country anyway (Brock, 2000). More importantly, legal aspects should be considered. This study has shown that face-to-face meetings were very important for STBFs. One of the reasons related to this finding was the need to develop trust. Currently, legal aspects and related security aspects on the Internet are far from clear, particularly when interactions between firms cross borders. This clearly impedes trust building on marketspace. The views expressed by managers with regards to defining on-line sales support the importance of legal aspects further. Aspects that were also mentioned with regards to their levels of Internet use. Obviously, if supportive institutional frameworks can be developed and implemented for the marketspace, e-commerce and other more trust sensitive interactions on the marketspace might diffuse more widely. Governments – due to its global nature single governmental programmes are only of limited usefulness – are clearly among the most powerful of institutional forces (King et al, 1994) to introduce and more importantly to enforce such legal frameworks. The current solutions that emerge from within marketspace – the use of trusted third parties and privacy statements (Palmer et al, 2000; see figure 9.4) – are valuable first steps, but only of limited value if not integrated in a wider legal framework.

Figure 9.4: Examples of Trusted Third Party Logos



Source: The author.

A second potential focus of support for policy-makers relates to the found importance of managerial ICT skills within firms. Offering support programmes that enhance managerial ICT skill development among firms, particularly small firms, and providing financial support schemes to help firms, particularly small firms, invest in ICT is therefore another important aspect policy-makers should consider. While such support programmes might be less needed in the case of STBFs, less technology-focused small firms with their low levels of ICT and Internet adoption (see chapter 4) might benefit greatly from such programmes. The fact that current ICT policies reach only few small firms (LaRovere, 1998), stress the importance of this aspect further.

9.4.2.2 A Note on Governmental International Business Assistance

Besides infrastructural aspects and managerial ICT skill support, it is worth mentioning the potentially fruitful link between marketspace and traditional governmental international business assistance programmes.

This study has provided empirical evidence to the thesis that the marketspace has the potential to support small firms' internationalisation. Supporting small firms internationalisation is also at the heart of governmental international business assistance programmes, with information assistance playing a central role (Reid, 1984; Seringhaus, 1986). Yet empirical findings suggest that levels of awareness, usage and satisfaction among the targeted firms are often rather low (Ibeh, 2000).

Marketspace-based support, in the form of an international business portal for example (see www.sevc.com for the Scottish exporters community), might be more effective. Not only is it far easier and cheaper to interact with firms, but providing information and contacts is also less restrictive on marketspace. It remains to be seen how such support programmes will compare with more traditional support programmes.

In addition to this thesis' implications for research and policy, its findings has also implications for practitioners, namely technical entrepreneurs of STBFs and, more generally, small firm managers in general. Section 9.4.3 discusses these.

9.4.3 Practitioner Implications

The findings of this study are of value for practitioners. They are of value for technical entrepreneurs in STBFs in specific, as well as for small firm managers in general. Its main value derives from the outcome of the empirical investigation. Up to now, most of the knowledge regarding the Internet's value for firms' internationalisation was based on descriptive and anecdotal evidence only. This study empirically explored the potential linkages of the Internet's marketspace and the results imply that managers of small firms should be aware of them and their potential value. The next section discusses these in more detail.

9.4.3.1 Marketspace Awareness and Internal ICT Skills

First of all there is a clear and unequivocal message to managers in small firms: intensively using the Internet's marketspace can support a small firm's internationalisation. It sometimes can even enable specific internationalisation

processes. The key findings synthesis of the previous main section has clearly demonstrated the marketspace's value in reducing the liabilities of foreignness that STBFs face in their internationalisation. Managers should be made aware of this, particularly non-adopters. The importance of this is especially pronounced for STBFs. Supporting previous studies, it was shown that they tend to internationalise early on. The marketspace can support this strong international drive.

Most importantly however, managers should be aware of the fact that the Internet is not a panacea. This study has shown that the marketplace still matters a lot. Interaction sensitive face-to-face meetings to develop trust and reduce liabilities of newness, the marketplace-marketspace equivalence with regards to internationalisation timings and outcomes, other sources of information than the Internet and the continuing importance of FDI all indicated this quite clearly.

In addition, the importance of developing a competitive internal resource-base needs to be considered by managers. The importance of the resource-base became clear at three different levels. At the product development level (liabilities of innovativeness), at the Internet use level (pre and post state experience) and at the international business level (pre and post state experience, attitudes and resources). Particularly with regards to Internet use, managers should know that when moving to more complex uses (for example outward-bound e-commerce), additional internal resources are needed to support its implementation and on-going operation. Furthermore, these skills become increasingly more important. As adoption and use levels increase among firms, mere adoption and Internet use at low levels will no longer constitute a potential competitive advantage but a mere competitive necessity. A necessity further fuelled by the various externalities found. But since small firms are limited in their resources, managers need to focus on those channels that are the most appropriate to their industry and their product. The found specifics for software firms and the importance of the adopted business model (Internet-centric vs. Internet-supportive) demonstrated that rather nicely.

The next section presents a short findings-based managerial guide on how to translate the marketspace's potential into potential international business advantages.

9.4.3.2 A Short Managerial Guide: How to More Effectively Utilise Marketspace

Several important aspects were uncovered that managers should consider when planning to utilise the marketspace for their international operations. While the importance of industry and product specifics, as well as resources and the business model were discussed above, this section focuses on implementation and use specifics.

First, managers need to know that merely adopting the Internet to exploit the marketspace's potential is not enough. All impacts found were sensitive to organisational Internet use levels. Use levels that were in turn sensitive to managerial Internet experience. Often, internationalisation impacts will therefore not be instantaneous, but emerging as firms increase their level of use and levels of experience. Although use sub-dimensions were not uncovered, managers should be aware that Internet use for international business usually involves a broad range of activities. Activities ranging from e-mail communication to active and passive information searches to establishing a website and electronic links to conducting inward and outward-bound e-commerce. While the effectiveness of these use dimensions could not be assessed, salient implementation features regarding websites were found.

Important Website Characteristics

First and foremost managers need to know that the results of this study clearly imply the need to establish a website. The sooner the better, because this study found that older, more established websites were more embedded in the marketspace. They were easier to find and they had more external links pointed to them. Overall, the degree of marketspace-embeddedness was the most important feature of website with regards to internationalisation impacts. In relation to that it is important to stress the related importance of an English website and the irrelevance of "blind" search engine registrations. Particularly the latter is an important aspect for managers wanting to achieve higher levels of marketspace-embeddedness. The sheer number of registrations to search engines did not matter, it is the way firms register their website. A manager should ask himself what are the typical search terms potential stakeholder of the firm (customers, business partners, employees, suppliers and so on) might use. He should then ensure that he registers his website with all of these search terms with a variety of international search engines, as well as adding these search terms to his website to allow search engines automatically indexing websites to classify his website correctly. Reciprocal e-links with business partners and customers, as well as e-links on relevant

portals, should further help to increase the marketspace-embeddedness of a website, while also decreasing the liabilities of newness.

A second important aspect was the interactivity of the website. Managers should try to make their website as interactive as possible in order to turn surfers into interactors. Only interactors are potential revenue generators. The possibility to individually interact with the firm and its employees was influential as it increased the likelihood of unsolicited inquiries over the Internet. However, managers should also be aware of the problem of overexposure (Brock, 2000). As was mentioned by one of the manager during the exploratory interviews, intensive Internet use can lead to an immense increase in unsolicited inquiries, an increase that can be beyond the capacity of a small firm. If significant response delays occur, negative impacts might follow. Managers are therefore advised to balance their marketspace-exposure with their internal capacities to handle such exposures.

Thirdly, managers should be alerted to the currently unexploited technological possibilities of the marketspace. As was shown in chapter 7, most websites exhibited rather limited uses of multi-media. The use of media rich websites, incorporating for example three dimensional, interactive product information, can therefore constitute a powerful way to differentiate ones website from those of the competition.

Finally, although not further explored in this thesis, managers should recognise the importance of marketplace-based website promotions. As reported in chapter 6, website promotion is critical and it cannot be solely based on marketspace-based activities, at least for the moment. The importance of the marketplace that was reported in section 9.3 also applies to promoting a website. The recent emergence of TV advertisements, even by Internet start-ups like Lycos or Yahoo, stress this importance further.

After discussing the implications of this research, the next section proceeds to discuss its limitations.

9.5 Limitations

Just like any scientific inquiry has its limitations, the present study has limitations, too. Although its multi-method, multi-stage approach reduced some of the inherent limitations of each research instrument, methodological limitations nevertheless still

apply. Being aware of these limitations is important, because not only do they open up the field for future research (see section 9.6), but they also help to better evaluate the findings and their applicability to other contexts.

This study is limited in mainly two ways. It has its limitations due to its applied methodology and it is limited by its empirical base, that is its sample of firms. Each aspect will be discussed below.

Methodological Limitations

The first methodological limitation that needs to be mentioned is the rather exploratory status of this study. Due to a lack of a sound theory of marketspace-influenced internationalisation, this study drew on potentially applicable theories and reasoned by analogy from concepts outside international business research to develop and explore a research framework that might have missed out additional valuable concepts and theories. It is important to keep that in mind. The model presented here might only picture a fraction of the relatively unexplored role of the marketspace for international business. The found low explanatory values for some of the explored relationships (for example the adjusted R^2 values in some of the regression analyses) underline this.

Related to this, a final statement regarding the exploratory status of this study needs to be made in relation to the website analysis. As stated in chapter 6, a comprehensive model, let alone a strong theory, for systematically assessing websites does currently not exist. Therefore, this study's approach focused on extracting a set of objectively assessable meta-criteria from the current state of the literature in order to develop and explore an assessment model relevant to the study. Despite its merits, this model has its limitations. Not only did the adopted focus on objective criteria prevent the qualitative assessment of website content (more information on a website does not necessarily mean better information) and not only did it also prevented an assessment from the perspectives of different stakeholders (customers might look for different information than potential business partners or venture capitalists), but it also lacks a clear theoretical framework. Hence, the insignificant findings regarding for example the level of information provided on a website might be a reflection of its limited exploratory status rather than an indication of the anyway counter-intuitive suggestion of the irrelevance of information provided on a website.

The chosen level of the analysis constitutes a second limitation of this study. This study's inquiry mainly focused on the firm and management level, only touching upon

country, industry and product/ technology specifics. Therefore it is hard to determine the importance of each of these aspects and the existence and magnitude of their interrelationships beyond the aspects touched upon in the empirical analysis. This focus also relates to the use of aggregated country models in the study. The qualitative findings of country specific Internet impacts give an indication of the limits of this study's focus. Moreover, the focus on the firm and management level might also have led to the insignificant findings with regards to channel expansion theory (Carlson and Zmud, 1999). The channel expansion effect is argued to only take place between two specific parties, in relation to a specific topic over time. At a dyadic level this effect might have indeed taken place. But at the aggregated level of analysis, across all external international relationships of a firm, this effect might have been masked by the heterogeneity of relationships. A more holistic and complete model of marketspace-influenced internationalisation needs to address and explore these additional levels of analysis more extensively.

The third main methodological limitation of this study relates to its cross-sectional nature. Although time related aspects where addressed in the survey and the interviews, an analysis of the nature of the various processes per se was unobtainable in such a cross-sectional design. The related recall problems respondents might have faced, although it was tried to minimise such effects, add to the limitations of the adopted cross-sectional research design. Hence caution needs to be exercised when interpreting the more process related findings, especially since some of them are based on the qualitative findings of the post-survey interviews only. The insignificant findings regarding channel expansion theory (Carlson and Zmud, 1999), which was proposed based on longitudinal data, adds to this. Furthermore, it has to be remembered that this study addressed a highly dynamic and new environment. Yesterday's marketspace is not the marketspace of today and tomorrow's is again different. A single cross-sectional analysis cannot capture this and future technological developments on the marketspace might therefore challenge some of its findings.

The post-survey interview findings constitute the fourth main limitation of the study, despite their value in reducing the survey and observation-based limitations. This limitation mainly relates to the traditional problem of generalising from qualitative data that is only based upon a few cases. Although the survey-based selection of cases allowed to reduce the problem of representability by excluding non-representative firms (firms with values for variables of interest outside the ± 2x standard deviation interval), it is nevertheless not necessarily clear – particularly so for the new themes

that did emerge – whether these findings are representative of the whole survey sample. The common problems of "objectively" interpreting qualitative data, particularly when translations from one language into another are involved, further limit the qualitative findings.

Limitations of the Empirical Base

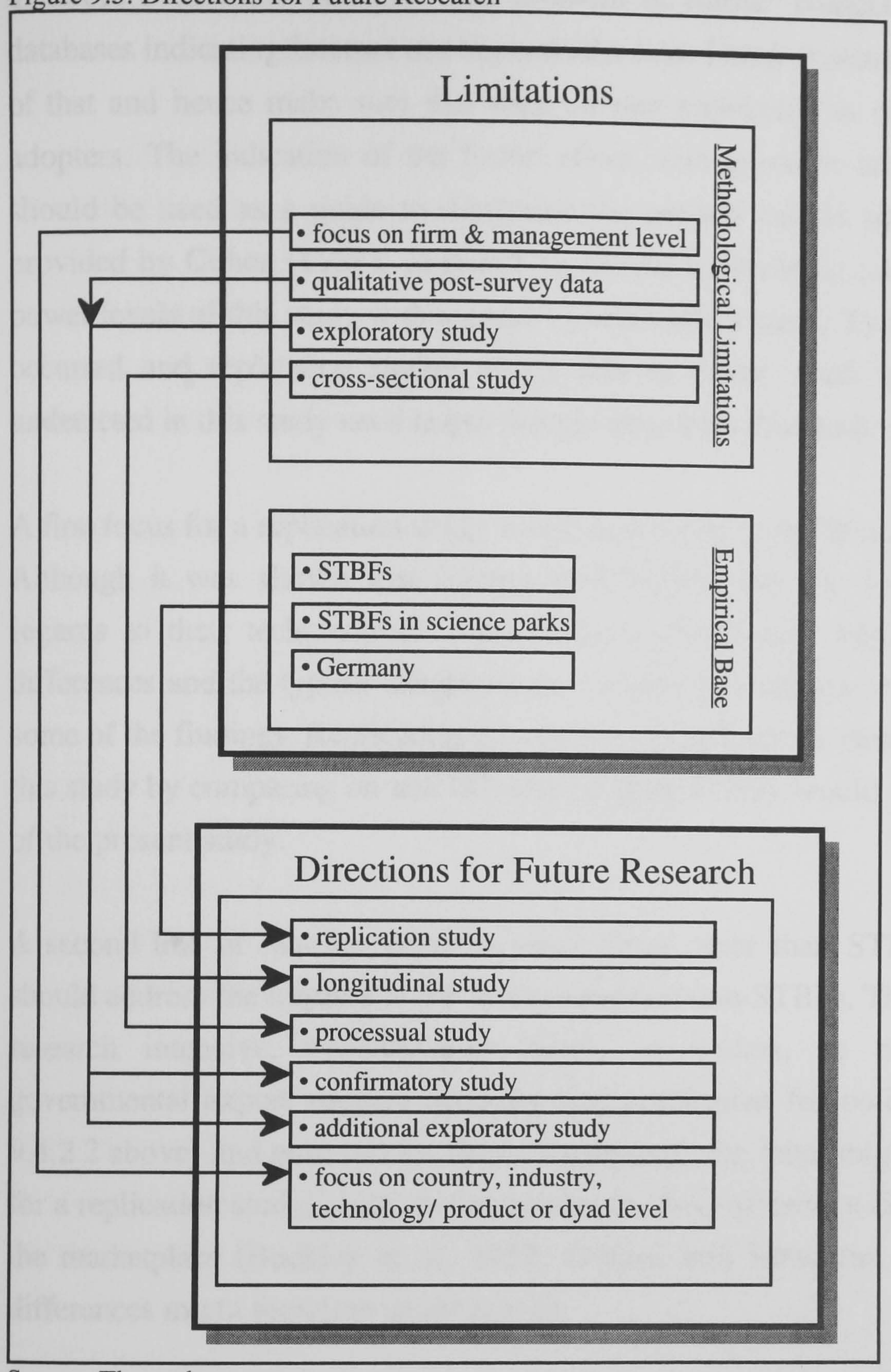
In addition to the methodological limitations, its empirical base also limits this study's findings. This study focused on a very specific population: STBFs located in science parks in the federal state of Northrhine-Westphalia, Germany; for reasons discussed in chapter 6. The discussed specificity of this population potentially limits generalising from this study's findings. Although this study's sample findings can be seen as representative of the population of STBFs in science parks in the federal state of Northrhine-Westphalia – following the remarks made by Mr. Baranowski the president of the German Association of Technology Centres (see chapter 7) it can even be seen as representative of the population of STBFs in science parks across Germany – its relatability to STBFs outside science parks (potentially more adoption barriers; potentially older), to small firms in general (potentially less internationally oriented and less ICT literate) and small firms in other countries becomes increasingly weaker and caution needs to be exercised in doing so. Bennett's (1998) study has for example shown that there are national differences in Internet use for international business.

The discussed limitations of this study open up the field for future research addressing these limitations. Limitation-based suggestions for future research, adding to the synthesised findings and its implications discussed in section 9.3 and 9.4, will be presented in the following, final section.

9.6 Directions for Future Research

In the light of the above discussed limitations, a number of suggestions for future research emerge (see figure 9.5).

Figure 9.5: Directions for Future Research



Source: The author.

Replication Studies

Due to its specific sample of firms, a straightforward direction for future research is a replication study using a different empirical base, in order to validate or falsify this study's findings and assess its relatability to other research contexts. However, before proceeding to suggest various potentially fruitful routes for future research, a note of caution is in order. The population of this study was purposely chosen due to its known strong international orientation and due to its potential richness in Internet adopters. Internet adoption among small firms in general is still not high and needed non-trivial differences in post-implementation levels for an impact assessment are

therefore even more unlikely. The problem is further compounded by the lack of databases indicating Internet use beyond adoption. Future researchers need to be aware of that and hence make sure that their chosen population is rich enough in Internet adopters. The indication of the found effect sizes given in table 7.18 of chapter 7 should be used as a guide to determine the needed sample size using power tables provided by Cohen (1988). Researchers should however be aware of the rather low power levels of this study with regards to small effect sizes. Type-2 errors might have occurred and replication studies being able to detect small effect sizes that went undetected in this study need larger sample sizes than this study's.

A first focus for a replication study would be a study of STBFs outside science parks. Although it was shown that science park STBFs do not significantly differ with regards to their technological characteristics (Westhead, 1997), the organisational differences and the typical infrastructure support (see chapter 6) might have effected some of the findings. Replicating this study with off-science park STBFs or replicating this study by comparing on and off-science park STBFs would address this limitation of the present study.

A second line of inquiry relates to small firms other than STBFs. Future research should address the impacts of the marketspace on non-STBFs. This could relate to less research intensive, manufacturing firms, to traders, to non-profit firms like governmental export support agencies (see implication for policy makers in section 9.4.2.2 above) and pure service firms. Particularly the latter might be a fruitful design for a replication study, since the internationalisation of service firms usually differs in the marketplace (Buckley et al, 1992; Chadee and Mattsson, (1998). Marketspace differences might therefore apply as well.

Obviously it goes without saying that replicating this study outside the small firm domain, an analysis of the marketspace's impact on MNEs for example, is yet another possible research route for future investigations.

A final aspect with regards to replicating this study relates to the limitations of the empirical base due to the chosen country. The limited research that does exist (see for example: McDonald, 1996; Bennett, 1998) suggests that there are national differences in Internet use. Replicating this study in a different country, or employing a comparative *n*-country study, is therefore another direction for future research.

Targeting larger countries like the USA, targeting smaller countries like the Nordic countries or targeting remote (outside triad) countries might be particularly fruitful.

Longitudinal and Processual Studies

This study's cross-sectional nature did not allow for an assessment of developments over time or for an examination of processes per se. Therefore there exists a clear need for longitudinal and processual studies, particularly taking into consideration their scarcity in past research in general (see chapter 6). An analysis of up to four developments and processes can be thought of reflecting on this study's findings:

- the marketspace-enabled internationalisation process (for example impacts unfolding over time and their relationships),
- the STBFs' development process (for example assessing the validity of the stochastic view of STBFs development vs. the deterministic stage views),
- the resource-accumulation-capability-development process (for example analysing their relationship and link to the internationalisation process) and
- the knowledge-building-experience-gaining process (for example the relationship of each with regards to general vs. market specific knowledge and objective vs. experiential knowledge).

An examination of these developments and processes might however only be possible if the researcher adopts a more emic perspective (Morey and Luthans, 1984). Action research with a set of firms over an extended period of time might be a fruitful research design to assess the suggested developments and processes.

Confirmatory Studies

Although there remains a lot to be explored, a rather confirmatory research design could also be employed in the future. Besides utilising a more formal approach of hypothesis testing by taking this study's findings into consideration, a confirmatory study would enable a more thorough assessment of the constructs used. Most of this study's findings are based on constructs of an exploratory status. Although their reliability and validity was acceptable in all cases, uni-dimensionality could only be assumed, not tested. Future confirmatory studies should therefore employ stricter construct assessments like confirmatory factor analysis to assess the uni-dimensionality of measures (Gerbing and Anderson, 1988).

Furthermore, some of the qualitative findings of the post-survey interviews are in need of confirmation in a more quantitative setting. Assessing the role of (pre-state and post-inception) experience as a stream (Reuber and Fischer, 1999), assessing the role of the Internet at different interaction phases, assessing intra-mode commitment levels and assessing impacts differences by utilising non-aggregate country models are some of the possible aspects that future confirmatory studies could focus on.

Additional Exploratory Studies

As noted in the previous sub-section, there still remains a lot to be explored. Apart from the unexplored aspects of the expanded internationalisation model like for example the relationship of tangible vs. intangible commitments in international business (see figure 9.2), the role of the marketspace for international business, the focus of this study, constitutes a virtually untouched research area. Without doubt, there are more unexplored than explored areas in marketspace. Therefore, the following suggestions for future marketspace explorations need to be seen as limited by the current state of knowledge in this field. Particularly the speed of innovation currently taking place on the marketspace will, with certainty, open up new area worth inquiring. Research areas that are at present beyond the imagination of any researcher. Nevertheless, the following suggestions can be made.

One related area worth exploring in a marketspace context relates to recent works by Souchon and Diamantopolous (Diamantopolous and Souchon, 1999; Souchon and Diamantopolous, 1999). In their analysis of the role of export information, they distinguish between instrumental, conceptual and symbolic use of information. This framework could be explored by future research in a marketspace setting. Is the use of Internet information for international business instrumental, conceptual or symbolic? Furthermore, how does its information use characteristics compare to other media? In exploring these research questions it is however important to address the encountered problems of media indeterminacy of this study.

A second important area in need of attention is an exploration of the unexplored marketspace-strategy link. This study's findings supported the "strategy as a mediator to performance" literature (Cavusgil and Zou, 1994; Hoang, 1998) by finding no significant direct link between Internet use and performance. Therefore, an important research question needs to be addressed: Does utilising the marketspace impact the international business strategies employed by firms? If so, in what way are these

strategies impacted? What type of marketplace-marketspace strategies lead to higher levels of performance?

Furthermore, future studies could explore the linkages and impacts of the Internet's marketspace on the inward dimension of the internationalisation of the firm at more depth. Although this study did not incorporate explicitly the inward dimension of internationalisation due to reasons given in chapter 6, it was nevertheless shown that for example the inward dimension in relation to e-commerce was on average utilised more often than the outward dimension of e-commerce. This finding could be further explored by analysing the potential subsequent effects of these marketspace-based inward internationalisation activities on firms' co-operative and outward internationalisation activities.

From a more theoretical perspective, future studies could explore the applicability of institutional theory (DiMaggio and Powell, 1983) to marketspace settings. Instead of expecting linear relationships between variables – as was done during most of the impact assessment – one might also argue, following institutional logic, that firms' average behaviour in their organisational field is optimal and that deviation from group norms in any direction yield inferior results. Too much a reliance on the marketspace, in comparison to other economic actors in the firms' business environment, might therefore be sub-optimal. However, as norms regarding organisational Internet use are currently only starting to emerge, the feasibility of such a study might still be a few years off.

Studies at Different Analytical Levels

Finally, future studies could employ a different analytical focus. This study mainly focused on the firm and management level. Future research could be conducted at different levels.

Future research could for example be conducted with a focusing on the technology/ product level. This study showed that software firms differed in many respects with regards to utilising the marketspace for their international business. Future research could expand on these insights by focusing on technology/ product specifics like the technology transfer types introduced in chapter 3 (see figure 3.11 in that chapter) or by assessing impacts across a range of technologies/ products identified by their information intensiveness using Glazer's (1991) framework. Since the marketspace is essentially about information and communication on a global scale, it could be argued

that its impact is stronger for firms marketing an information intensive product. A study designed with a product-level focus could clarify this potential relationship.

A final suggestion for a study at a different level of research inquiry relates to the previously mentioned inability of this study in detecting effects at a dyadic level. Trust building in marketspace and channel expansion effects in international business settings are more likely to take place – if at all – at a dyadic level. The dyad level of analysis channel expansion theory is based upon (Carlson and Zmud, 1999) and the exploratory interviews with STBFs' managers seemed to suggest, in the light of the insignificant findings at the aggregate level, that focusing less on an aggregated level might reveal that such an effect also exists in an international business setting. Future research needs to clarify that argument.

9.7 Summary

This chapter has presented and synthesised the key findings of this study's research aims and their logical and theoretical relationships were used to develop a model of STBFs' marketspace-influenced internationalisation. It has been shown that several significant linkages between the marketplace and the marketspace exist. Barriers were reduced and the opportunity horizon of firms expanded. However, it has also been shown that the marketplace remains of very high importance and that the STBFs' resources play a critical role in both the internationalisation process and the influence the marketspace can have on this process. Clearly, the Internet's marketspace is not a panacea to all the problems STBFs face in their internationalisation. Neither did the marketspace challenge the overall gradual nature of this process.

These findings have contributed to the state of knowledge in research, policy making and management and its implications were discussed for each audience.

However, caution needs to be exercised. This study constitutes only a drop in the ocean of the unexplored marketspace. As an exploratory rather than confirmatory study it has several limitations. These limitations have been discussed and directions for future research, in addition to this study's implication for theory and research, have been suggested.

Overall, it is hoped that reading this thesis encourages many researchers to also embark on the new research mission: "Marketspace and International Business".

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Appendix

Appendix 4.1: Internet Timeline – Key Events

derived from Leiner et al (1997), Berghel (1998) and Hobbes' Internet Timeline (http://info.isoc.org/guest/zakon/Internet/History/HIT.html)

1957
USSR launches Sputnik, first artificial earth satellite. In response, US forms the Advanced Research Projects Agency (ARPA) within the Department of Defense (DoD).

1961
L. Kleinrock to publish first paper on packet switching theory.

1962
Paul Baran, RAND: "On Distributed Communications Networks".
J.C.R. Licklider on "Galactic Networks".

1965
TX-2 at MIT Lincoln Lab and Q-32 at System Development Corporation (Santa Monica, CA) are directly linked through a low-speed telephone-line.

1967
First design paper on ARPANET published by Lawrence G. Roberts.

1969
ARPANET commissioned by DoD for research into networking.
First node at UCLA and soon after at:
- Stanford Research Institute (SRI)
- UCSB
- University of Utah

1970
ARPANET hosts start using Network Control Protocol (NCP).

1971
Ray Tomlinson of BBN invents email program to send messages across a distributed network.

1972
International Conference on Computer Communications with demonstration of ARPANET between 40 machines and the Terminal Interface Processor (TIP).

InterNetworking Working Group (INWG) created to address need for establishing agreed upon protocols.

Telnet specification (RFC 318)

1973
First international connections to the ARPANET: University College of London (England) and Royal Radar Establishment (Norway).

File Transfer specification (RFC 454)

1974
Vint Cerf and Bob Kahn publish "A Protocol for Packet Network Intercommunication" which specified in detail the design of a Transmission Control Program (TCP).

BBN opens Telenet, the first public packet data service (a commercial version of ARPANET).

1976
Elizabeth II, Queen of the United Kingdom sends out an e-mail

1977
Mail specification (RFC 733)

1979
First MUD (Multi User Dungeon/ Domain), MUD1, by Richard Bartle and Roy Trubshaw at University of Essex.

ARPA establishes the Internet Configuration Control Board (ICCB).

1981
BITNET, the "Because It's Time NETwork" (started as a cooperative network at the City University of New York, with the first connection to Yale)

Minitel (Teletel) is deployed across France by France Telecom.

1982
DCA and ARPA establish the Transmission Control Protocol (TCP) and Internet Protocol (IP), commonly known as TCP/IP, for ARPANET. This leads to one of the first definitions of an "internet" as a connected set of networks and "Internet" as connected TCP/IP internets.

DoD declares TCP/IP suite to be standard for DoD

EUnet (European UNIX Network) is created by EUUG to provide email and USENET services. Original connections between the Netherlands, Denmark, Sweden, and UK.

External Gateway Protocol (RFC 827) specification.

1983
Name server developed at University of Wisconsin, no longer requiring users to know the exact path to other systems.

Internet Activities Board (IAB) established, replacing ICCB

EARN (European Academic and Research Network) established.

FidoNet developed by Tom Jennings.

1984
Domain Name Server (DNS) introduced.

# of hosts breaks 1,000

JUNET (Japan Unix Network) established using UUCP.

Moderated newsgroups introduced on USENET

1985
Whole Earth 'Lectronic Link (WELL) started

1986
NSFNET created (backbone speed of 56Kbps)

Network News Transfer Protocol (NNTP) designed to enhance Usenet news performance over TCP/IP.

Mail Exchanger (MX) records developed by Craig Partridge allow non-IP network hosts to have domain addresses.

1987
UUNET is founded

Email link established between Germany and China using CSNET protocols

# of hosts breaks 10,000

# of BITNET hosts breaks 1,000

1988
NSFNET backbone upgraded to T1 (1.544Mbps)

CERFnet (California Education and Research Federation network) founded

Internet Relay Chat (IRC) developed by Jarkko Oikarinen

FidoNet gets connected to the Net, enabling the exchange of e-mail and news.

Countries connecting to NSFNET: Canada, Denmark, Finland, France, Iceland, Norway, Sweden.

1989
# of hosts breaks 100,000

First relays between a commercial electronic mail carrier and the Internet: MCI Mail through the Corporation for the National Research Initiative (CNRI), and Compuserve through Ohio State University.

Internet Engineering Task Force (IETF) and Internet Research Task Force (IRTF) comes into existence under the IAB.

AARNET - Australian Academic Research Network - set up by AVCC and CSIRO; introduced into service the following year.

The web is first conceived by Tim Berners-Lee at CERN

Countries connecting to NSFNET: Australia, Germany, Israel, Italy, Japan, Mexico, Netherlands, New Zealand, Puerto Rico, UK.

1990
ARPANET ceases to exist.

The World comes on-line (world.std.com), becoming the first commercial provider of Internet dial-up access.

First client browser, for the Next platform

The first remotely operated machine to be hooked up to the Internet, the Internet Toaster, (controlled via SNMP) makes its debut at Interop.

Countries connecting to NSFNET: Argentina, Austria, Belgium, Brazil, Chile, Greece, India, Ireland, South Korea, Spain, Switzerland.

1991
Wide Area Information Servers (WAIS), invented by Brewster Kahle, released by Thinking Machines Corporation.

Gopher released by Paul Lindner and Mark P. McCahill from the University of Minnesota.

World-Wide Web (WWW) released by CERN.

First cross-platform browser

PGP (Pretty Good Privacy) released by Philip Zimmerman.

NSFNET backbone upgraded to T3 (44.736Mbps).

Start of JANET IP Service (JIPS) which signalled the changeover from Coloured Book software to TCP/IP within the UK academic network.

Countries connecting to NSFNET: Croatia, Czech Repulic, Hong Kong, Hungary, Poland, Portugal, Singapore, South Africa, Taiwan, Tunisia.

1992
Internet Society (ISOC) is chartered.

# of hosts breaks 1,000,000.

First MBONE audio multicast and video multicast.

IAB reconstituted as the Internet Architecture Board and becomes part of the Internet Society.

Veronica, a gopher space search tool, is released.

World Bank comes on-line.

Japan's first ISP, Internet Initiative Japan (IIJ), is formed.

Countries connecting to NSFNET: Cameroon, Cyprus, Ecuador, Estonia, Kuwait, Latvia, Luxembourg, Malaysia, Slovakia, Slovenia, Thailand, Venezuela.

1993
US White House comes on-line (http://www.whitehouse.gov/).

Internet Talk Radio begins broadcasting.

United Nations (UN) come on-line.

US National Information Infrastructure Act.

Businesses and media really take notice of the Internet.

The browser Mosaic written by Marc Andreessen at NCSA takes the Internet by storm.

WWW proliferates at a 341,634% annual growth rate of service traffic.

Gopher's growth is 997%.

Countries connecting to NSFNET: Bulgaria, Costa Rica, Egypt, Fiji, Ghana, Guam, Indonesia, Kazakhstan, Kenya, Liechtenstein, Peru, Romania, Russian Federation, Turkey, Ukraine, UAE, Virgin Islands.

1994
Communities begin to be wired up directly to the Internet (Lexington and Cambridge, Mass., USA).

First cyberstation, RT-FM, broadcasts from Interop in Las Vegas.

Arizona law firm of Canter & Siegel "spams" the Internet with email advertising green card lottery services; Net citizens flame back.

You can now order pizza from the Hut online.

WWW edges out telnet to become 2nd most popular service on the Net (behind ftp-data) based on % of packets and bytes traffic distribution on NSFNET.

First Virtual, the first cyberbank, opens up for business.

Countries connecting to NSFNET: Algeria, Armenia, Bermuda, Burkina Faso, China, Colombia, French Polynesia, Jamaica, Lebanon, Lithuania, Macau, Morocco, New Caledonia, Nicaragua, Niger, Panama, Philippines, Senegal, Sri Lanka, Swaziland, Uruguay, Uzbekistan.

1995

Hong Kong police disconnect all but 1 of the colony's Internet providers in search of a hacker. 10,000 people are left without Net access.

RealAudio, an audio streaming technology, lets the Net hear in near real-time.

Radio HK, the first 24 hr., Internet-only radio station starts broadcasting.

WWW surpasses ftp-data in March as the service with greatest traffic on NSFNet based on packet count, and in April based on byte count.

Traditional online dial-up systems (Compuserve, America Online, Prodigy) begin to provide Internet access.

A number of Net related companies go public, with Netscape leading the pack with the 3rd largest ever NASDAQ IPO share value.

Registration of domain names is no longer free. Beginning 14 September, a $50 annual fee has been imposed, which up until now was subsidized by NSF. NSF continues to pay for .edu registration, and on an interim basis for .gov.

The Vatican comes on-line (http://www.vatican.va/).

Country domains registered: Ethiopia (ET), Cote d'Ivoire (CI), Cook Islands (CK) Cayman Islands (KY), Anguilla (AI), Gibraltar (GI), Vatican (VA), Kiribati (KI), Kyrgyzstan (KG), Madagascar (MG), Mauritius (MU), Micronesia (FM), Monaco (MC), Mongolia (MN), Nepal (NP), Nigeria (NG), Western Samoa (WS), San Marino (SM), Tanzania (TZ), Tonga (TO), Uganda (UG), Vanuatu (VU).

1996

Restrictions on Internet use around the world:

China: requires users and ISPs to register with the police
Germany: cuts off access to some newsgroups carried on Compuserve
Saudi Arabia: confines Internet access to universities and hospitals
Singapore: requires political and religious content providers to register with the state
New Zealand: classifies computer disks as "publications" that can be censored and seized

Country domains registered: Qatar (QA), Vientiane (LA), Djibouti (DJ), Niger (NE), Central African Republic (CF), Mauretania (MF), Oman (OM), Norfolk Island (NF), Tuvalu (TV), French Polynesia (PF), Syria (SY), Aruba (AW), Cambodia (KH), French Guiana (GF), Eritrea (ER), Cape Verde (CV), Burundi (BI), Benin (BJ) Bosnia-Hercegovina (BA), Andorra (AD), Guadeloupe (GP), Guernsey (GG), Isle of Man (IM), Jersey (JE), Lao (LA), Maldives (MV), Marshall Islands (MH), Mauritania (MR), Northern Mariana Islands (MP), Rwanda (RW), Togo (TG), Yemen (YE), Zaire (ZR).

1997
Country domains registered: Falkland Islands (FK), East Timor (TP), Congo (CG), Christmas Island (CX), Gambia (GM), Guinea-Bissau (GW), Haiti (HT), Iraq (IQ), Lybia (LY), Malawi (MW), Martinique (MQ), Montserrat (MS), Myanmar (MM), French Reunion Island (RE), Seychelles (SC), Sierra Leone (SL), Sudan (SD), Turkmenistan (TM), Turks and Caicos Islands (TC).

1998
Network Solutions registers its 2 millionth domain on 4 May

Electronic postal stamps become a reality, with the US Postal Service allowing stamps to be purchased and downloaded for printing from the Web.

Top 10 Domains by Host #: com, net, edu, mil, jp, us, uk, de, ca, au

1999
Abilene, the Internet2 network, reaches across the Atlantic and connects to NORDUnet and SURFnet

.ps is registered to Palestine (11 Oct)

2000
Web size estimates by NEC-R1 and Inktomi surpass 1 billion indexable pages

...

Appendix 6.1: Informatory Interview Guide, page 1

(an outline of the project and the overall nature of the discussion will be communicated to the interviewee *prior* to the interview; the actual "discussion plan" below will not be communicated or shown to the interviewee.)

I. Background Details

Date of Interview : _____

Place of Interview : _____

Name of Company : _____

Address of Company : _____

Name of Respondent : _____

Title of Respondent : _____

Function of Respondent : _____

II. Infrastructure of Innovation-Centre

1.) Please give a brief overview in what way *this* Innovation-Centre supports its firms.

(prompt [afterwards] for: *technical support* [IT equipment in general, Internet equipment in particular], *network support* [contact broker, network broker] and *university links*)

2.) Do you consider this support *typical* across all centres or rather *idiosyncratic* to this centre? And *why* is that so?

typical_____❑

idiosyncratic__❑

1/5

Appendix 6.1: Informatory Interview Guide, page 2

III. Nature of Firms

1.) Please give a brief description of the nature of firms in *this* Innovation-Centre.

(prompt [afterwards] for: *age, size (turnover/ employees, full time/ part time), industry sector* [technology sector], *markets* [local, national, international], *no. of firms* in the park and "*firm fluctuation*")

2.) Do you consider this constellation of firms *typical* across all centres or rather *idiosyncratic* to this centre? And *why* is that so?

typical_____❑

idiosyncratic__ ❑

Appendix 6.1: Informatory Interview Guide, page 3

IV. Policy of Innovation Centre

1.) Please give a brief description of the key policies of *this* Innovation-Centre.

(prompt [afterwards] for: type of "eligible" firms (R&D intensity, innovative service firms etc.), policies rg. firm size and age: How long can they stay?)

2.) Do you consider this policy *typical* across all centres or rather *idiosyncratic* to this centre? And *why* is that so?

typical_____❑

idiosyncratic__ ❑

3/5

Appendix 6.1: Informatory Interview Guide, page 4

V. Suggestions/ Comments

(prompt [before]: restatement of *nature*, *methodology* and *objectives* of the study)

1.) Would you like to make any comments or suggestions on our discussion and its topics

and/ or

the nature and objectives of the planned study?

(prompt [after]: helpful *contacts* for ideas and support; usefulness of *web-based questionnaire* and *e-mail communication*; access to data about firms that have left the innovation centre; response rate issues related to "University of Strathclyde" as sender?)

2.) Would you like to recommend someone else valuable I should talk to?

(prompt [after]: helpful for *ideas* and *support* (*information* or *access* to information))

Appendix 6.1: Informatory Interview Guide, page 5

VI. Additional Observations/ Notes

(ex ante)

(ex post)

Appendix 6.2: Informatory Interview Findings: Technology Sectors of Firms

Technology Sector	Stated by
information technology	Schwerin, Bremen, Osnabrück, Münster
medical technology	Schwerin, Hamburg, Münster
communication technology	Schwerin, Bremen, Münster
"green technologies"	Bremen, Osnabrück
bio-technologies	Osnabrück, Münster
micro-electronics	Hamburg
fine mechanics/ micro technologies	Hamburg
engineering consultancies	Hamburg
logistics	Hamburg
laser technology	Hamburg
services	Münster

Appendix 6.3: Exploratory Interview Guide, page 1

(a specific outline of the project will <u>not</u> be communicated to the interviewee *<u>prior</u>* to the interview, only a broad indication of the nature of the interview; the actual "discussion plan" below will not be communicated or shown to the interviewee.)

I. Background Details

Date of Interview : _____

Place of Interview : _____

Name of Company : _____

Address of Company : _____

Name of Respondent : _____

Function of Respondent : _____

Age of Firm : _____ years old.

Size of Firm : _____ full time employees
_____ part time employees
turnover: ❑less than 1mDM, ❑ 1-5m DM, ❑ more than 5m DM
___ est. % in services

R&D : _____ est. % of turnover
_____ % of full time employees in R&D

Team Venture: ❑ Yes, ❑No.

II. The Role and Status of Internationalisation

1.) What role do international activities play in the operation of your firm?

(<u>prompt</u> [afterwards] for: *status*: past, present, future (what activity/-ies, where, how (mode) and how much (intensity));*motives* (growth?) and *reasons*,*direction* (inward-outward), foreign equity stakes?)

2.) Do you consider this role as *typical* for similar firms in your industry
And *<u>why</u>* is that so?

typical_____❑

idiosyncratic__❑

Appendix 6.3: Exploratory Interview Guide, page 2

III. Nature of Internet Use

(explain [ex ante] what is meant by the Internet, following the definition used in the thesis)

1.) Please give a brief description of how your firm uses the Internet.

(prompt [afterwards] for: *reasons* for use; *frequency* of information pull, information push (incl. update), interaction and for what specific *activities* each is used; *for how long*; degree of *internalisation*; degree of *institutionalisation* (budget, dedicated person; perceived newness); degree of *internal diffusion*; level of *integration*; level of *investigation* , motivation and experience *over time*)

2.) Is the Internet of strategic importance for the present and future operations of your firm?

Follow-up Question: Why is that so?

3.) What did change or did you change due to the use of the Internet? And what did not change?

(prompt [afterwards] for: information pull, information push or interaction effects; Internet budget/ resources)

Appendix 6.3: Exploratory Interview Guide, page 3

IV. Internet and Internationalisation

If the firm did not internationalise, go to next section.

1.) Did the use of the Internet impact your international operations?

(prompt [afterwards] for: *cost reduction*, *information barrier* (suppliers, customers, partners, distributors/ agents), *contacts*, *unsolicited inquiries*, face-to-face meetings; *international awareness*)

2.) Overall, using the Internet did have the following effect/-s:

enable internationalisation_____ ❑

facilitate internationalisation_____ ❑

neutral, no effect_____ ❑

counter-productive to internationalisation___ ❑

other (please specify)_____ ❑

_____
_____
_____
_____

3/6

Appendix 6.3: Exploratory Interview Guide, page 4

V. Additionals

1.) Would you agree to participate in the pilot study of this project?

2.) Would you rather recommend the use of a postal questionnaire or the use of an electronic questionnaire, either send via e-mail or to be filled out on a web page form (or both)?

Appendix 6.3: Exploratory Interview Guide, page 5

VI. Suggestions/ Comments

(prompt [before]: exact statement of *nature*, *methodology* and *objectives* of the study)

1.) Would you like to make any comments or suggestions regarding our discussion or the nature and objectives of the planned study?

(prompt [after]: salience of project/ interest in project (response rate impacts); response rate issues, e.g. "University of Strathclyde" as sender or other sponsor?)

5/6

Appendix 6.3: Exploratory Interview Guide, page 6

VII. Additional Observations/ Notes

(ex ante)

(ex post)

Appendix 6.4: Exploratory Interview Findings: Characteristics of the STBFs

		Average	Minimum	Maximum
	Age in years	4.7	2	9
	Size in total employment (22.8% part-time employees)	13	6	25
	Service Intensity	48.97%	10%	100%*
	Research Intensity turnover share personnel share	 50.30% 47.52%	 17.5% 20.0%	 100% 67%
Annual Turnover	6 firms: <1mDM 4 firms: 1m-5mDM 0 firms: >5mDM			
Team Ventures	60%			

* Two firms, software firms, viewed their software product as a service product due to customisations of the source code for all past customers.

Source: The author.

Appendix 6.5: Survey Cover Letter

UNIVERSITY OF STRATHCLYDE

Firmname
"Title" "Name Owner Manager"
Streetname
Post Code, City
Germany

day.month 1999

Is the Internet a Strategic Weapon for the International Challenges in the High-Tech Industry?: An Exploratory Study

Dear "title" "name owner manager",

As a manager in a high-technology industry you know too well that "high-tech" often implies being aware of international developments and conducting business abroad in order to stay competitive.

The Internet can potentially facilitate meeting this international competitive challenge. This study – the main part of a doctoral research project at one of Europe's leading Marketing Departments and in Co-operation with the Fachhochschule Münster –, for the first time attempts to investigate the question whether the Internet can constitute a source of international competitive advantage for firms just like yours.

I would be grateful if you could take the time to complete the questionnaire in order to enable this study, even if you currently do not use the Internet at all or only seldom. Completing the questionnaire should not take longer than 15 minutes. I assure you that your response will be treated in the strictest confidence and I will be very happy to send interested respondents a summary of this study's findings.

Thank you very much for your support in advance.

Jürgen Kai-Uwe Brock
Doctoral Researcher

Appendix 6.6: Survey, page 1

UNIVERSITY OF STRATHCLYDE

The Internet: A Strategic Weapon for the International Challenges in the High-Tech Industry?

QUESTIONNAIRE

General Questionnaire Guidelines

1. **Terminology:**

   International business:
   includes all international business investments and business activities that generate turnover. These include direct exporting to agents/ distributors abroad and/ or customers abroad, licensing out, contract R&D for foreign firms, international joint ventures, international strategic alliances, foreign sales subsidiaries and foreign production subsidiaries. Indirect international business activities like indirect exporting (sales to domestic exporters) are excluded from this definition.

   The Internet:
   comprises all information and communication services based on the Internet protocoll TCP/IP, like e-mail, newsgroups, the world-wide-web, intranets, extranets and listservs, including services like AOL or T-Online offering gateways to the Internet.

2. If you wish to receive **an executive summary of this study**, please fill out the information voucher on the last page.

3. **All returned questionnaires will be treated as confidential. Findings will only be reported at an aggregated level. Individual firm data will not be revealed!**

4. Please do not return this questionnaire. I will personally collect it in an est. 10 days.

5. If you have any questions regarding this questionnaire or the study, please contact:
   Jürgen Kai-Uwe Brock, tel.: 02505-1674.

Thank you very much for your time and co-operation.

Appendix 6.6: Survey, page 2

Section 1: Relevance of this Study to Your Firm

Please answer the following 4 questions to determine the relevance of this study to your firm. If you answer "No" to any of them, please do not continue with the questionnaire. I will personally collect your questionnaire in an est. 10 days.

1. **Does your firm undertake R&D (Research and Development)?**
   (R&D relates to product and process-related research, development and construction. This includes internal R&D, external R&D (contract R&D, licensing) and co-operative R&D.)

   ❑ Yes, ❑ No.

2. **Does your firm develop and market its own products?**
   (Products refer to technology-based products, including software, that are developed and marketed but not necessarily produced by your firm. If your firm is a pure service firm like a consultancy or a retailer/ distributor please answer "No.".)

   ❑ Yes, ❑ No.

3. **Is your firm currently engaged in international business activities?**
   (Should your firm not be engaged in any of the international business activities as defined on page 1, please answer "No.".)

   ❑ Yes, ❑ No.

4. **Is your firm an independent business firm?**
   (Should your firm be a subsidiary of another firm, a branch of a University or a non-profit organisation, please answer "No.".)

   ❑ Yes, ❑ No.

If you answered all four questions with "Yes", this study is relevant to your firm. Please continue with section 2.

Appendix 6.6: Survey, page 3

Section 2: International Business Activities of Your Firm

1. **What percentage of your firm's last financial year's turnover is generated from international business activities?**

   ☐☐☐ %

2. **In relation to your firm's business activities, to what extent do you agree with the following statements:**
   (Please tick the box next to each statement which best describes your view, ranging from 1 = "strongly disagree" to 7 = "strongly agree".)

	strongly disagree			neutral			strongly agree
	1	2	3	4	5	6	7
We think primarily about international applications for our technology.	❑	❑	❑	❑	❑	❑	❑
International markets and customers are essential to pay for the development costs of our products.	❑	❑	❑	❑	❑	❑	❑
International markets are more profitable than domestic markets.	❑	❑	❑	❑	❑	❑	❑
We need to address foreign markets pro-actively before our technologies become obsolete.	❑	❑	❑	❑	❑	❑	❑
We need to address foreign markets pro-actively before our competitors catch up.	❑	❑	❑	❑	❑	❑	❑
We have the necessary financial resources to pursue foreign markets.	❑	❑	❑	❑	❑	❑	❑
Our top management does not have the time to really focus on international opportunities.	❑	❑	❑	❑	❑	❑	❑
Our current staff has the necessary expertise to assess foreign market opportunities.	❑	❑	❑	❑	❑	❑	❑
We regularly conduct a systematic analysis of foreign market opportunities.	❑	❑	❑	❑	❑	❑	❑

Appendix 6.6: Survey, page 4

3. To what extent do you agree with the following statements regarding international business information and business contacts:

	strongly disagree 1	2	3	neutral 4	5	6	strongly agree 7
Our firm has sufficient information about foreign competitors.	❑	❑	❑	❑	❑	❑	❑
Our firm has sufficient information about foreign distributors/ agents.	❑	❑	❑	❑	❑	❑	❑
Our firm has sufficient information about potential business partners abroad.	❑	❑	❑	❑	❑	❑	❑
Our firm has sufficient information about potential foreign customers.	❑	❑	❑	❑	❑	❑	❑
Our firm has sufficient information about foreign technologies.	❑	❑	❑	❑	❑	❑	❑
Our firm has sufficient information about foreign markets.	❑	❑	❑	❑	❑	❑	❑
Our firm has sufficient information about how to conduct international business.	❑	❑	❑	❑	❑	❑	❑
Our firm lacks international business contacts.	❑	❑	❑	❑	❑	❑	❑

Appendix 6.6: Survey, page 5

4. Please state <u>your current foreign markets, the first year and the first month</u> your firm generated turnover from or invested in any of the listed international business activities, following the example below.
If you are engaged in an international activity not listed below, please state so in the provided space in the last column (see example below).

<u>Example</u>:

	First Year and Month of:					
Foreign Market	**Direct Export via foreign intermediary**	**Direct Export to customer**	**Licensing Out**	**Contract R&D**	**Sales Subsidiary**	**Other Activity** (please specify) *e.g.* *<u>joint venture</u>*
USA		*3/1996*				*6/1999*
France	*5/1998*		*6/1997*		*10/1998*	

<u>Enter your firm's international activities in the table below</u>:

	First Year and Month of:					
Foreign Market	**Direct Export via foreign intermediary**	**Direct Export to customer**	**Licensing Out**	**Contract R&D**	**Sales Subsidiary**	**Other Activity** (please specify) _____

Appendix 6.6: Survey, page 6

Section 3: Internet Use in Your Firm

1. **Does your firm currently use an Internet-based service for business purposes?**

   ❑ No. ➟ please continue with section IV on page 10!
   ❑ Yes. ➟ please continue with the next question!

2. **How many employees (full-time equivalent) have direct access to the Internet from their own office computer?**
   (If your firm has one computer with an Internet access, please state "1".)

   _____

3. **How many employees (full-time equivalent) have their own business e-mail address?**
   (If your firm has one central e-mail account, please state "1".)

   _____

4. **Regarding Internet use in your firm for international business activities, to what extent do you agree with the following statements:**
   (If any of the listed activities are not performed, please tick the 'not used"-box.)

	not used	strongly disagree 1	2	3	neutral 4	5	6	strongly agree 7
Using the Internet for international personal business communication (e.g. via e-mail) is a daily business routine.	○	❑	❑	❑	❑	❑	❑	❑
Using the Internet to search for international business information is a daily business routine.	○	❑	❑	❑	❑	❑	❑	❑
Using the Internet to internationally advertise our firm and its products is a daily business routine.	○	❑	❑	❑	❑	❑	❑	❑
Using the Internet to order foreign products on-line is a daily business routine.	○	❑	❑	❑	❑	❑	❑	❑
Using the Internet to sell our products internationally on-line is a daily business routine.	○	❑	❑	❑	❑	❑	❑	❑
Using the Internet for electronic links with our international business partners (e.g. via web links or an extranet) is a daily business routine.	○	❑	❑	❑	❑	❑	❑	❑
Receiving international business information from the Internet (e.g. from listservs or newsgroups) is a daily business routine.	○	❑	❑	❑	❑	❑	❑	❑

Appendix 6.6: Survey, page 7

5. Please indicate to what extent you agree with the following statements regarding the availability of relevant international business information on the Internet:

	strongly disagree 1	2	3	neutral 4	5	6	strongly agree 7
For our industry, there is sufficient business information about foreign competitors.	❑	❑	❑	❑	❑	❑	❑
For our industry, there is sufficient business information about foreign distributors/ agents.	❑	❑	❑	❑	❑	❑	❑
For our industry, there is sufficient business information about potential business partners abroad.	❑	❑	❑	❑	❑	❑	❑
For our industry, there is sufficient business information about potential foreign customers.	❑	❑	❑	❑	❑	❑	❑
For our industry, there is sufficient business information about foreign technologies.	❑	❑	❑	❑	❑	❑	❑
For our industry, there is sufficient business information about foreign markets.	❑	❑	❑	❑	❑	❑	❑
For our industry, there is sufficient business information about how to conduct international business.	❑	❑	❑	❑	❑	❑	❑

6. Please indicate to what extent you agree with the following statements regarding Internet business use among your firm's international business partners:

	strongly disagree 1	2	3	neutral 4	5	6	strongly agree 7
Our firm's international business partners use the Internet frequently for external personal business communication.	❑	❑	❑	❑	❑	❑	❑
Our firm's international business partners use the Internet frequently to advertise their firms and its products.	❑	❑	❑	❑	❑	❑	❑
Our firm's international business partners use the Internet frequently to electronically link (e.g. via web links or extranets) their businesses with other firms.	❑	❑	❑	❑	❑	❑	❑

7. Does your firm have a web site?

❑ No ➟ please continue with question 11 on page 8!

❑ Yes, our web site address (URL) is: http://_____

Appendix 6.6: Survey, page 8

8. With regards to your firm's own web site, please indicate how often you perform the following activities:

	annually	quarterly	monthly	weekly	daily
Investigating your web site effectiveness by analysing who accesses your web site.	❑	❑	❑	❑	❑
Updating the content of your web site.	❑	❑	❑	❑	❑

9. With how many international search engines did you register your fim's web site?

_____

10. With regards to developing and maintaining your firm's web site, please indicate whether your firm undertakes the following activities mostly in-house or mostly uses an outside source:

	in-house	external
• text creation	❑	❑
• graphics/ images creation	❑	❑
• web page programming (e.g. html code, cgi scripts)	❑	❑
• web page maintenance/ updates	❑	❑
• web server maintenance	❑	❑

11. When (year and month) did your firm start using the following Internet services for business purposes?
(If any of the listed services are not used, please tick the 'not used"-box.)

	not used	We have used this Internet service since:
• e-mail	○	year: 19 ☐☐, month:_____
• access to the www	○	year: 19 ☐☐, month:_____
• corporate website	○	year: 19 ☐☐, month:_____
• corporate webserver	○	year: 19 ☐☐, month:_____
• intranet	○	year: 19 ☐☐, month:_____
• extranet	○	year: 19 ☐☐, month:_____
• Internet telephony	○	year: 19 ☐☐, month:_____
• Internet videoconferencing	○	year: 19 ☐☐, month:_____

Appendix 6.6: Survey, page 9

The following two questions are concerned with your perception of the Internet's various impacts on your firm's international operations.

12. Please indicate to what extent you agree with the following statements:

	strongly disagree 1	2	3	neutral 4	5	6	strongly agree 7
The Internet has increased our firm's number of international business contacts.	❑	❑	❑	❑	❑	❑	❑
The Internet has increased the amount of unsolicited orders our firm receives from abroad.	❑	❑	❑	❑	❑	❑	❑
The Internet has decreased the need for face-to-face meetings with our international business partners and customers.	❑	❑	❑	❑	❑	❑	❑
The Internet has decreased our firm's average cost of conducting international business.	❑	❑	❑	❑	❑	❑	❑
The Internet has decreased our firm's need to establish our own physical presence abroad (e.g. a foreign sales subsidiary).	❑	❑	❑	❑	❑	❑	❑
The Internet has influenced our international business investments.	❑	❑	❑	❑	❑	❑	❑

13. To what degree (weak influence to strong influence) have the following factors influenced your firm's decision to do business in your current foreign markets:

	weak influence 1	2	3	4	5	6	strong influence 7
Internet-related factors:							
Information search (your firm searched for foreign firms/ markets/ customers on the Internet which led to international business activities)	❑	❑	❑	❑	❑	❑	❑
Receipt of Information (your firm received international business information over the Internet which led to international business activities)	❑	❑	❑	❑	❑	❑	❑
Business inquiry (your firm has received unsolicited business inquiries over the Internet which led to international business activities)	❑	❑	❑	❑	❑	❑	❑
Factors unrelated to the Internet: (information obtained and/ or contacts made via other media, e.g. trade shows, trade journals, visits abroad, which led to international business activities)	❑	❑	❑	❑	❑	❑	❑

Appendix 6.6: Survey, page 10

Section 4: Management and Firm Background

1. Please describe your status in this company?

❑ I am the founder of this firm. ❑ I am a co-founder of this firm.
❑ Other*, please specify: _____

* if you answered other, please specify how many people founded this company:
❑ This firm was founded by one person.
❑ This firm was founded by more than one person.

2. With regards to your firm's current business priorities, to what extent do you agree with the following statements?

	strongly disagree			neutral			strongly agree
	1	2	3	4	5	6	7
For our firm, R&D is the key priority.	❑	❑	❑	❑	❑	❑	❑
For our firm, finance is the key priority.	❑	❑	❑	❑	❑	❑	❑
For our firm, marketing is the key priority.	❑	❑	❑	❑	❑	❑	❑

3. Did you or any other member of the current management team have experience in marketing products outside Germany prior to founding or joining this company?

❑ Yes, ❑ No.

4. Did you or any other member of the current management team work outside Germany prior to founding or joining this company?

❑ Yes, ❑ No.

5. Did you or any other member of the current management team have experience in using the Internet prior to founding or joining this company?

❑ Yes, ❑ No.

6. In what year and month did your firm start its business operations?

Year: 19 ☐ ☐ , Month: _____

Appendix 6.6: Survey, page 11

7. **In what year and month did your firm commercially introduce its first product?**
(Please leave blank if your firm is still in its initial product development process.)

Year: 19 ☐☐, Month: _____

8. **How many employees (full-time equivalent) were employed in your firm's last financial year?**

_____

9. **What percentage of your firm's last financial year's turnover was earned from pure services?**

☐☐☐ %

10. **What percentage of your firm's last financial year's turnover was spent on R&D?**

☐☐☐ %

11. **How many employees (full-time equivalent) were mainly working within R&D in your firm's last financial year?**

_____

12. **In what industry is your firm mainly operating in?**

- ❑ Biotechnology
- ❑ Chemical Industry (incl. pharmaceuticals)
- ❑ Electronics/ Microelectronics
- ❑ Environmental Technology
- ❑ Information Technology (Hardware)
- ❑ Information Technology (Software)
- ❑ Measuring and Checking Instruments
- ❑ Medical Instruments
- ❑ Mechanical Engineering
- ❑ Telecommunications
- ❑ Other industry, please specify: _____

13. **What was the turnover in your firm's last financial year?**

- ❑ less than 500.000 DM
- ❑ between 500.000 and 1m DM
- ❑ between 1m and 3m DM
- ❑ between 3m and 5m DM
- ❑ between 5m and 10m DM
- ❑ over 10mDM

Appendix 6.6: Survey, page 12

14. To what extent do you agree with the following statements regarding your firm?

	strongly disagree			neutral			strongly agree
	1	2	3	4	5	6	7
This firm has met its corporate growth objectives.	❑	❑	❑	❑	❑	❑	❑
This firm has met its corporate financial objectives.	❑	❑	❑	❑	❑	❑	❑
This firm has met its international growth objectives.	❑	❑	❑	❑	❑	❑	❑
This firm has met its international financial objectives.	❑	❑	❑	❑	❑	❑	❑

Information Voucher for an Executive Summary of this Study

I have participated in your study and I would like to receive an executive summary of this study's main findings.

Please send the summary to the following e-mail address:

Firm: _____

_____

Name: _____

e-mail: _____

Thank you very much for your time and co-operation!

I will personally collect your questionnaire in an est. 10 days.

Appendix 7.1: Population, Sample and Response

Population of firms in Science Parks in Germany*	5,256	100%			
Population of firms in Science Parks in Northrhine-Westphalia	1,751	33%			
firms excluded ex ante (non-eligibles)# **	948	54%	no response (pre-test)	1	0.1%
			moved (pre-test)	1	0.1%
			too large (pre-test)	2	0.2%
			non-internationals (pre-test)	16	1.7%
			non-STBFs	21	2.2%
			Uni. dept. (incl. pre-test)	25	2.7%
			trader	30	3.2%
			Subsidiary (incl. pre-test)	60	6.3%
			GbRs	76	8.0%
			non-profit firm (incl. pre-test)	91	9.6%
			pure service firm	625	65.9%
Potential STBFs sampled	803	46%			
firms excluded ex post (non-eligibles) #	526	66%	too old	1	0.2%
			in the founding process	2	0.4%
			non-profit firm	2	0.4%
			Uni. dept.	3	0.6%
			merged with another firm	4	0.8%
			Ch11 (firm ceased to exist)	11	2.1%
			non-STBF	22	4.2%
			trader	27	5.2%
			pure service firm	36	6.5%
			subsidiary	103	19.7%
			moved	113	21.6%
			non-internationals	202	38.5%
Non-Respondents	165	21%			
Respondents (eligibles)	112	14%			
Total Response Rate	**79%**	638/803	[(total – non-respondents) / total]		
Net Response Rate	**40%**	112/277	[eligibles / (total – non-eligibles)]		

Categories are not mutually exclusive; * Baranowski and Raetz, 1998; ** based on Baranowski and Raetz (1998), TZ NRW e.V. (http://www.tznrw.de) and the pre-test.
Source: The author.

Appendix 7.2: Overview of Organisational Internet Use Indicators

Variable	Mean	Std Dev	Minimum	Maximum	N	Meaning
INTDIFF1	0.64	0.36	0.03	1.0	101	internal diffusion: web access
INFDIFF2	0.71	0.36	0.04	1.0	102	internal diffusion: e-mail accounts
PCOMUSE	6.13	1.42	1 (0% no use)	7	105	routinisation of international use: personal communication
INFOPULA	5.46	1.80	0 (1% no use)	7	105	routinisation of international use: infopull active
INFOPUSH	3.88	2.31	0 (6% no use)	7	105	routinisation of international use: infopush
ECOMMER1	3.21	2.30	0 (9% no use)	7	106	routinisation of international use: e-commerce (ordering)
ECOMMER2	2.06	2.06	0 (25% no use)	7	105	routinisation of international use: e-commerce (selling)
ELINKS	3.55	2.61	0 (19% no use)	7	105	routinisation of international use: e-links (web links/ extranet)
INFOPULP	4.12	2.39	0 (9% no use)	7	105	routinisation of international use: infopull passive
INFUSION	3.96	1.36	1	8	104	infusion with Internet services (extended use)
WEBEXP	3.24	1.67	0.5	8.92	101	experience with the world-wide-web (in years)
WEBPEXP	2.55	1.39	0.17	5.92	82	experience with a website (in years)
IINVEST	2.64	.99	1 (annually)	5 (daily)	81	Level of Website investigation
IUPDATE	2.52	.93	1 (annually)	4 (weekly)	82	Level of Website Updatedness
IREGIS	60.45	160.63	0	1000	62	Level of Website Registration
INTERNA	3.83	1.40	0	5	82	Level of Internalisation of Website implementation and maintenance

Source: The author

Appendix 7.3: Overview of Industry and Peer Wiredness Items

Variable	Mean	Std Dev	Minimum	Maximum	N	Meaning
INDWIR1	4.50	1.65	1	7	103	perceived international industry wiredness: competitors
INDWIR2	3.49	1.45	1	7	102	perceived international industry wiredness: intermediaries
INDWIR3	3.73	1.46	1	7	103	perceived international industry wiredness: potential biz partners
INDWIR4	3.76	1.55	1	7	103	perceived international industry wiredness: potential customers
INDWIR5	4.69	1.49	1	7	104	perceived international industry wiredness: technology
INDWIR6	3.83	1.48	1	7	103	perceived international industry wiredness: markets
INDWIR7	2.55	1.39	1	7	100	perceived international industry wiredness: how to dos
PEERWIR1	5.50	1.49	1	7	101	perceived international peer wiredness: personal communication
PEERWIR2	4.29	1.66	1	7	102	perceived international peer wiredness: marketing
PEERWIR3	4.00	1.84	1	7	100	perceived international peer wiredness: e-links

Source: The author

Appendix 7.4: Initial Wiredness Pattern Matrix

	Factor	
	1	2
Industry Wiredness1	**.692**	.032
Industry Wiredness2	**.739**	.100
Industry Wiredness3	**.880**	-.084
Industry Wiredness4	**.826**	-.031
Industry Wiredness5	**.507**	.073
Industry Wiredness6	**.833**	-.084
Industry Wiredness7	**.579**	.071
Peer Wiredness1	.020	**.668**
Peer Wiredness2	-.075	**.854**
Peer Wiredness3	.224	**.544**
Extraction Method: Principal Axis Factoring Rotation Method: Oblim with Kaiser Normalisation		

Source: The author.

Appendix 7.5: International Business Attitude & Resources Indicators

Variable	Mean	Std Dev	Minimum	Maximum	N	Meaning
IBATTI1	4.44	1.95	1	7	111	international business attitude measure (items 1-5)
IBATTI1	4.22	2.08	1	7	111	
IBATTI3	3.85	1.61	1	7	111	
IBATTI4	4.55	1.88	1	7	110	
IBATTI5	4.94	1.84	1	7	110	
IBRES1	3.64	1.81	1	7	110	international business resources measure (items 1-4)
IBRES2	4.85	1.87	1	7	111	
IBRES3	4.56	1.60	1	7	111	
IBRES4	2.73	1.91	1	7	111	

Source: The author.

Appendix 7.6: Reliability: International Business Attitude & Resources Scale

Variable	Alpha if Item is Deleted	Overall Scale Reliability
IBATTI1	.7498	α = .7901 (standardised)
IBATTI2	.7418	
IBATTI3	.8002	
IBATTI4	.7235	
IBATTI5	.7274	
IBRES1	.6285	α = .7017 (standardised)
IBRES2	.6290	
IBRES3	.6307	
IBRES4	.6652	

Source: The author.

Appendix 7.7: Pattern Matrix International Business Attitude & Resources

	Factor	
	1	2
IB Attitude 1	**.526**	.284
IB Attitude 2	**.612**	.188
IB Attitude 3	.468	-.083
IB Attitude 4	**.796**	-.034
IB Attitude 5	**.816**	-.093
IB Resources 1	.032	**.621**
IB Resources 2	-.097	**.679**
IB Resources 3	-.040	**.603**
IB Resources 4	.175	.462
Extraction Method: Principal Axis Factoring Rotation Method: Oblim with Kaiser Normalisation		

Source: The author.

Appendix 7.8: Overview of International Information Indicators

Variable	Mean	Std Dev	Minimum	Maximum	N	Meaning
INFO1	4.34	1.83	1	7	111	level of information regarding foreign competitors
INFO2	3.53	1.71	1	7	110	level of information regarding foreign intermediaries
INFO3	3.72	1.68	1	7	111	level of information regarding potential foreign business partners
INFO4	3.85	1.62	1	7	111	level of information regarding potential foreign customers
INFO5	4.93	1.54	1	7	111	level of information regarding foreign technologies
INFO6	4.00	1.60	1	7	111	level of information regarding foreign markets
INFO7	4.09	1.73	1	7	111	level of information regarding how to conduct international business

Source: The author.

Appendix 7.9: Overview of International Business Indicators

Variable	Mean	Std Dev	Minimum	Maximum	N	Meaning
IBINTENS	0.25	0.23	0.00	1.00	104	international business intensity (% of international sales to total sales)
IBEXP	4.26	3.24	0.50	15.50	97	international business experience (in years)
IBEARLI1	2.89	3.25	0.00	18.08	96	earliness of internationalisation (from inception to first market entry abroad in years)
IBEARLI2	1.66	2.97	-2.83	18.08	89	earliness of internationalisation (from first product to first market entry abroad in years) taking the initial NPD into consideration
IBSPEED1	4.76	4.50	0.08	21.00	60	speed of internationalisation (time that passed until the third country was served in years)
IBSPEED2	3.50	4.05	0.00	19.25	58	speed of internationalisation (time that passed until the third country was served in years) taking initial NPD into consideration
IBDIRECT	0.73	0.35	0.00	1.00	96	directness of international business mode used (direct vs. use of an intermediary)
IBDIVERS	4.34	3.19	1.00	14.00	98	diversity of international business: number of countries served

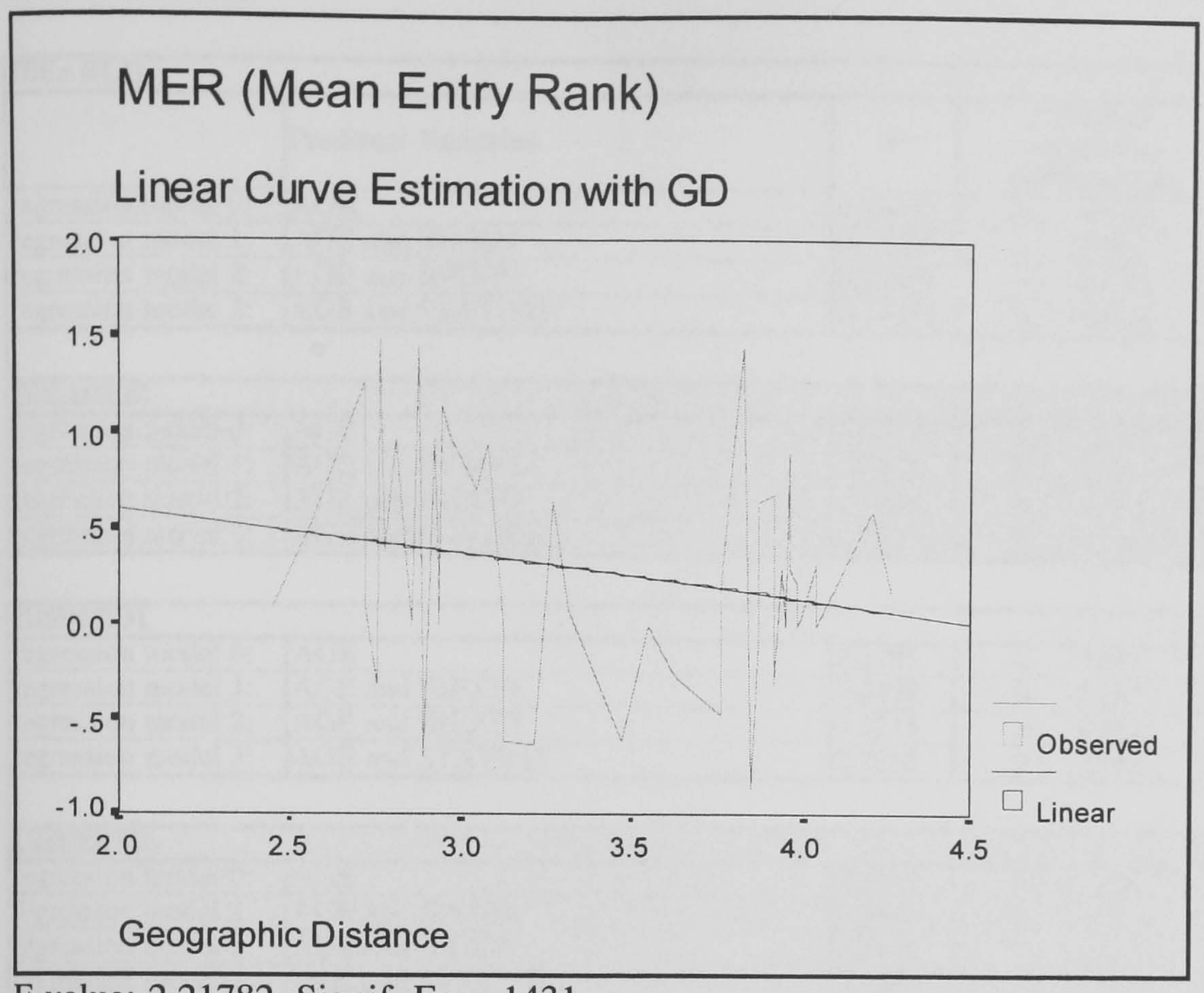
Source: The author.

Appendix 7.10: Mode Progression

Country	Σ	Step	Mode Progression: Direct Export via Intermediary	Direct Export without Intermediary	Licensing	Contract R&D	Sales Subsidiary	other: R&D subsidiary	other: Strategic Alliance	other: services
1st	115	1	26	57	5	16	5	1	3	2
	24	2	7	3	4	5	3	1	1	0
	4	3	0	2	0	1	1	0	0	0
2nd	98	1	31	45	7	11	2	0	1	1
	17	2	2	11	2	1	1	0	0	0
	0	3	0	0	0	0	0	0	0	0
3rd	61	1	21	25	1	8	3	0	1	2
	6	2	4	1	0	1	0	0	0	0
	0	3	0	0	0	0	0	0	0	0
4th	45	1	21	18	1	2	1	0	1	1
	2	2	1	1	0	0	0	0	0	0
	0	3	0	0	0	0	0	0	0	0
5th	33	1	11	16	1	0	4	0	1	0
	5	2	2	2	0	0	1	0	0	0
	1	3	0	0	1	0	0	0	0	0
6th	22	1	10	8	1	0	3	0	0	0
	1	2	0	1	0	0	0	0	0	0
7th	8	1	5	2	1	0	0	0	0	0
	0	2	0	0	0	0	0	0	0	0
8th	8	1	3	4	1	0	0	0	0	0
	0	2	0	0	0	0	0	0	0	0
9th	5	1	1	2	1	0	1	0	0	0
	1	2	1	0	0	0	0	0	0	0
10th	5	1	2	2	1	0	0	0	0	0
	0	2	0	0	0	0	0	0	0	0
11th	5	1	1	3	1	0	0	0	0	0
	0	2	0	0	0	0	0	0	0	0
12th	1	1	0	0	1	0	0	0	0	0
	0	2	0	0	0	0	0	0	0	0
13th	1	1	0	0	1	0	0	0	0	0
	0	2	0	0	0	0	0	0	0	0

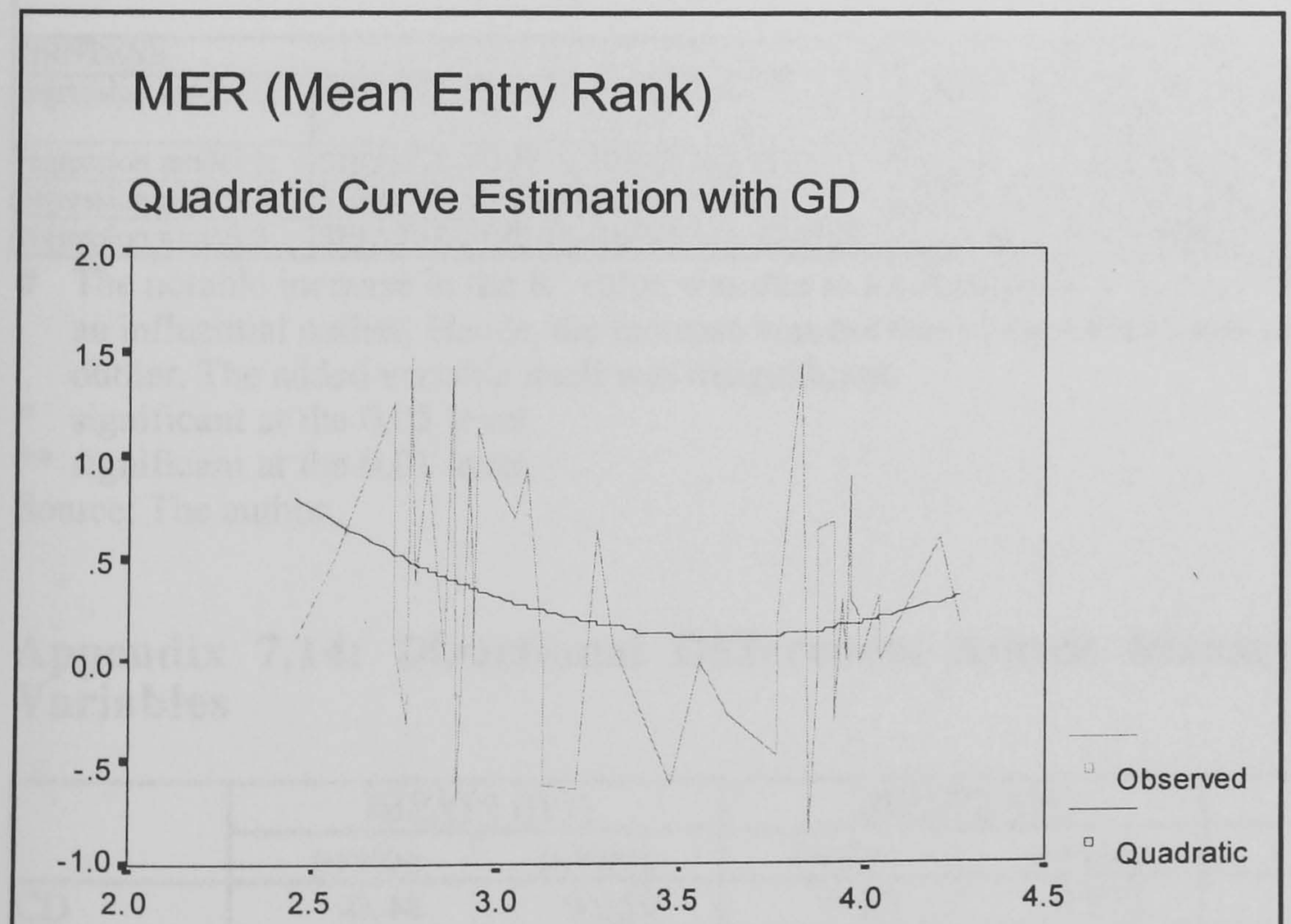
Source: The author.

Appendix 7.11: Linear Curve Estimation – MER and GD



F-value: 2.21782, Signif. F = .1431
Source: The author.

Appendix 7.12: Non-Linear Curve Estimation – MER and GD



F-value: 1.81198, Signif. F = .1748
Source: The author.

Appendix 7.13: Previous Experience and Team Impacts on IB Process Dimensions

	Predictor Variables	R^2	t-value of regression coefficient(s)	p-value of regression coefficient(s)
IBEARLI1				
regression model 0:	AGE	0.33641	b_1: 6.697	b_1: 0.0000**
regression model 1:	AGE and IBEXP1	0.34268	b_2: -0.922	b_2: 0.3592
regression model 2:	AGE and IBEXP2	0.33899	b_2: -0.589	b_2: 0.5570
regression model 3:	AGE and STATUS2	0.34393	b_2: -0.956	b_2: 0.3416
IBEARLI2				
regression model 0:	AGE	0.0977	b_1: 2.980	b_1: 0.0038**
regression model 1:	AGE and IBEXP1	0.0985	b_2: 0.256	b_2: 0.7988
regression model 2:	AGE and IBEXP2	0.1206	b_2: -1.452	b_2: 0.1503
regression model 3:	AGE and STATUS2	0.2007#	b_2: 0.728	b_2: 0.4690
IBSPEED1				
regression model 0:	AGE	0.3195	b_1: 5.081	b_1: 0.0000**
regression model 1:	AGE and IBEXP1	0.3198	b_2: -0.167	b_2: 0.8678
regression model 2:	AGE and IBEXP2	0.3218	b_2: 0.432	b_2: 0.6677
regression model 3:	AGE and STATUS2	0.3283	b_2: -1.667	b_2: 0.1015
IBSPEED2				
regression model 0:	AGE	0.3464	b_1: 5.199	b_1: 0.0000**
regression model 1:	AGE and IBEXP1	0.3506	b_2: 0.567	b_2: 0.5733
regression model 2:	AGE and IBEXP2	0.3464	b_2: -0.190	b_2: 0.9848
regression model 3:	AGE and STATUS2	0.3540	b_2: 0.765	b_2: 0.4476
IBDIVERS				
regression model 0:	SIBATTI and IBEXP	0.2499	b_1: 2.982/ b_2: 4.463	b_1: 0.0037**/ b_2: 0.0000**
regression model 1:	SIBATTI, IBEXP and IBEXP1	0.2521	b_3: -0.514	b_3: 0.6084
regression model 2:	SIBATTI, IBEXP and IBEXP2	0.2815	b_3: -1.989	b_3: 0.0497*
regression model 3:	SIBATTI, IBEXP and STATUS2	0.2389	b_3: -0.186	b_3: 0.8527
IBINTENS				
regression model 0:	SIBATTI, SIBRES and IBEXP	0.3156	b_1: 3.616/ b_2: 2.853/ b_3: 2.243	b_1: 0.0005**/ b_2: 0.0055**/ b_3: 0.0276*
regression model 1:	SIBATTI, SIBRES, IBEXP and IBEXP1	0.3160	b_4: -0.213	b_4: 0.8319
regression model 2:	SIBATTI, SIBRES, IBEXP and IBEXP2	0.3171	b_4: 0.421	b_4: 0.6745
regression model 3:	SIBATTI, SIBRES, IBEXP and STATUS2	0.3887#	b_4: -0.035	b_4: 0.9718

\# The notable increase in the R^2 value was due to a reduction of *n* by two observations, one of which was an influential outlier. Hence, the increase was not due to the added variable but due to the removal of the outlier. The added variable itself was insignificant.

* significant at the 0.05 level.

** significant at the 0.01 level.

Source: The author.

Appendix 7.14: Directional Differences Across Management-Level Variables

	IBEXP1 (0/1)		IBEXP2 (0/1)		STATUS2 (0/1)	
	t-value	p-value	t-value	p-value	t-value	p-value
CD	-0.44	0.659	0.03	0.975	-0.68	0.501
ED	0.18	0.857	-0.35	0.726	1.95	0.055
ED2	-0.33	0.739	-1.93	0.057	-0.11	0.910
GD	0.99	0.324	-0.90	0.368	-1.79	0.077
TD	-0.05	0.961	-1.75	0.086	-1.11	0.268

Source: The author.

Appendix 7.15: Overview: Internet's Perceived Impacts

Variable	Mean	Std Dev	Group Differences		N	Meaning
	total, formative vs supportive group, non-SW vs SW firms					
IMPCONTA	4.25	2.18			105	perceived impact on the number of international contacts
	4.26	*2.43*			*42*	
	4.16	*2.00*	*z -0.598*	*p 0.550*	*50*	
	4.11	*2.23*			*65*	
	4.47	*2.10*	*z -0.732*	*p 0.464*	*40*	
IMPORDER	2.70	2.04			105	perceived impact on the number of unsolicited foreign orders
	2.83	*2.19*			*42*	
	2.52	*1.97*	*z -0.467*	*p 0.640*	*50*	
	2.38	*1.83*			*65*	
	3.20	*2.28*	*z -1.870*	*p 0.061*	*40*	
IMPFTF	3.58	1.91			105	perceived impact on the number of face-to-face meetings
	3.60	*2.10*			*42*	
	3.58	*1.85*	*z -0.036*	*p 0.971*	*50*	
	3.43	*1.73*			*42*	
	3.83	*2.17*	*z -0.871*	*p 0.384*	*50*	
IMPCOST	3.71	1.90			104	perceived impact on the average costs of international business
	3.85	*1.97*			*41*	
	3.62	*1.88*	*z -0.638*	*p 0.524*	*50*	
	3.48	*1.83*			*64*	
	4.08	*1.98*	*z -1.436*	*p 0.151*	*40*	
IMPFDI	2.84	1.87			105	perceived impact on the need to establish a foreign presence
	3.00	*2.01*			*42*	
	2.82	*1.86*	*z -0.334*	*p 0.739*	*50*	
	2.38	*1.58*			*65*	
	3.58	*2.09*	*z -2.843*	*p 0.004*	*40*	
IMPINVES	3.14	2.12			104	perceived impact on international business investments
	3.57	*2.25*			*42*	
	2.61	*1.85*	*z -2.075*	*p 0.038*	*49*	
	2.69	*2.00*			*64*	
	3.88	*2.13*	*z -2.705*	*p 0.007*	*40*	
IMPIPULA	3.29	2.07			104	perceived impact of Internet information search on stated foreign markets
	3.62	*2.25*			*42*	
	2.92	*1.83*	*z -1.480*	*p 0.139*	*49*	
	3.11	*1.95*			*64*	
	3.58	*2.24*	*z -1.049*	*p 0.294*	*40*	
IMPIPULP	3.54	1.94			104	perceived impact of Internet information receipt on stated foreign markets
	3.74	*2.16*			*42*	
	3.30	*1.68*	*z -1.083*	*p 0.279*	*50*	
	3.31	*1.77*			*64*	
	3.90	*2.16*	*z -1.509*	*p 0.131*	*40*	
IMPUINQ	3.24	2.02			104	perceived impact of Internet-based unsolicited inquiries on stated foreign markets
	3.76	*2.09*			*42*	
	2.90	*1.87*	*z -2.055*	*p 0.040*	*50*	
	3.14	*2.00*			*64*	
	3.40	*2.07*	*z -0.534*	*p 0.591*	*40*	
IMPNOI	4.90	1.79			104	perceived impact of non-Internet related factors on stated foreign markets
	4.90	*2.44*			*42*	
	4.92	*2.17*	*z -0.088*	*p 0.930*	*50*	
	4.80	*1.80*			*64*	
	5.08	*1.77*	*z -0.844*	*p 0.399*	*40*	

z and p-value for group differences based on the non-parametric Mann-Whitney U-test (due to non-normality of the impact variables).
Source: The author.

Appendix 7.16: Internet Use Impacts on Attitudinal Dimensions

n	Impact Variable	Pseudo R2	Model $\chi 2$	df	sign.	Independent Variables	Wald statistics	sign.	R
65	IMPCONTA	.368	33.061	3	.0000	SROUTINE	14.7000	.0001	.3757
						WEBEXP	2.1894	.1390	.0459
						IBEXP	3.0553	.0805	.1083
						WEBPEXP*	1.2436	.2648	.0000
72	IMPORDER	.242	23.663	3	.0000	SROUTINE	14.3986	.0001	.3560
						WEBEXP	.6813	.4091	.0000
						IBEXP	1.3824	.2397	.0000
						WEBPEXP*	2.3756	.1232	.0672
62	IMPFTF	.033	2.816	3	.4208	SROUTINE	.6765	.4108	.0000
						WEBEXP	1.1436	.2849	.0000
						IBEXP	.1952	.6586	.0000
						WEBPEXP*	2.1022	.1471	.0382
69	IMPCOST	.062	5.892	3	.1170	SROUTINE	1.3461	.2460	.0000
*61***		*.161*	*13.510*	*1*	*.0002*	WEBEXP	2.8221	.0930	.0927
						IBEXP	.0697	.7918	.0000
						WEBPEXP*	6.4593	.0110	.2382
73	IMPFDI	.234	23.322	4	.0001	SROUTINE	11.1560	.0008	.3033
						WEBEXP	.5527	.4572	.0000
						IBEXP	.2443	.6211	.0000
						FDI	4.9919	.0255	-.1734
						WEBPEXP*	7.2089	.0073	.2601
81	IMPINVES	.238	26.696	3	.0000	SROUTINE	13.5078	.0002	.3206
						WEBEXP	3.8280	.0505	.1278
						IBEXP	1.1185	.2902	.0000
						WEBPEXP*	4.1560	.0415	.1527
60	IMPIPUA	.286	23.750	3	.0000	SROUTINE	13.2559	.0003	.3680
						WEBEXP	.0902	.7640	.0000
						IBEXP	.4188	.5176	.0000
						WEBPEXP*	1.8359	.1754	.0000
61	IMPIPUP	.337	28.510	3	.0000	SROUTINE	13.9180	.0002	.3754
						WEBEXP	1.2373	.2660	.0000
						IBEXP	.5111	.4747	.0000
						WEBPEXP*	1.9538	.1622	.0000
58	IMPUINQ	.310	24.929	3	.0000	SROUTINE	11.8479	.0006	.3501
						WEBEXP	3.2693	.0706	.1257
						IBEXP	.3816	.5368	.0000
						WEBPEXP*	6.4642	.0110	.2617

* WEBPEXP was entered withou WEBEXP to avoid multi-collinearity problems. The model statistics relate to WEBEXP in the equation.

** These model statistics refer to WEBPEXP being the only independent variable entered.

Source: The author.

Appendix 7.17: Locatability, Searchability of Websites

Variable	Mean	Std. Dev.	Minimum	Maximum	N	Meaning
WPLINKS (Locatability)	21.22	36.53	0	200	77	Number of External Websites with Links to Analysed Website
WPSEARCH (Searchability)	127.47	107.61	0	400	77	Keywords-Based Ranking of Website Address (URL) in Search Engines

Source: The author.

Appendix 7.18: Newness of Websites

Variable	Mean	Std. Dev.	Minimum	Maximum	N	Meaning
WPUPDATE (Newsness)	100.27	131.64	1	695	73	Updatedness of Website Content (in days)

Source: The author.

Appendix 7.19: Correlation Matrix of Information Provision Items

	WPINFOS	WPUPDATE	WPNAVS
WPINFOS	–		
WPUPDATE	-.285**	–	
WPNAVS	.321**	-.283**	–

** significant at the 0.01 level (1-tailed significance); *Spearman's r.*
Source: The author.

Appendix 7.20: Correlation Matrix of WEBPEXP

	WEBPEXP	*p-value*
WPLINKS	.487	.000
WPSEARCH	.249	.017
WPINFOS	.217	.032
WPUPDATE (reversed)	.252	.019

Source: The author.

Appendix 7.21: Website Impacts on Attitudinal Dimensions

n	Impact Variable	Pseudo R2	Model χ^2	df	sign.	Independent Variables	Wald statistics	sign.	R
54	IMPCONTA	.281	20.687	4	.0004	ZINFOPRO	.5899	.4424	.0000
						ZEMBED	6.8563	.0088	.2567
						WPCF*	5.7738	.0163	-.2263
						IINVEST	.8971	.3436	.0000
42	IMPORDER	.272	15.839	4	.0032	ZINFOPRO	.1199	.7291	.0000
						ZEMBED	6.3006	.0121	.2720
						WPCF*	.9102	.3401	.0000
						IINVEST	.3012	.5832	.0000
41	IMPFTF	.028	1.614	4	.8063	ZINFOPRO	.3011	.5832	.0000
						ZEMBED	.5014	.4789	.0000
						WPCF*	.0072	.9324	.0000
						IINVEST	.7357	.3910	.0000
47	IMPCOST	.015	.963	4	.9154	ZINFOPRO	.1227	.7262	.0000
						ZEMBED	.8582	.3543	.0000
						WPCF*	.0024	.9609	.0000
						IINVEST	.0007	.9787	.0000
40	IMPFDI	.362	20.049	4	.0005	ZINFOPRO	.340	.5569	.0000
						ZEMBED	6.5366	.0106	.2863
						WPCF*	6.1796	.0129	.2748
						IINVEST	1.9414	.1635	.0000
54	IMPINVES	.055	4.125	4	.3894	ZINFOPRO	.0065	.9356	.0000
						ZEMBED	1.6447	.1997	.0000
						WPCF*	1.0995	.2944	.0000
						IINVEST	.8384	.3598	.0000
49	IMPIPUA	.154	10.451	4	.0335	ZINFOPRO	.0580	.8097	.0000
						ZEMBED	6.4467	.0111	.2562
						WPCF*	1.2861	.2568	.0000
						IINVEST	1.6777	.1952	.0000
51	IMPIPUP	.257	18.155	4	.0012	ZINFOPRO	.0097	.9214	.0000
						ZEMBED	7.9055	.0049	.2394
						WPCF*	1.1232	.2892	.0000
						IINVEST	.0670	.7957	.0000
47	IMPUINQ	.393	25.437	4	.0000	ZINFOPRO	1.3257	.2496	.0000
						ZEMBED	7.0215	.0081	.2788
						WPCF*	3.4463	.0634	-.1490
						IINVEST	4.3070	.0380	.1889

* The parameter coding of WPCF (customer focus national/ international) was reversed during the logistic regression. A significant negative correlation does therefore indicate that international websites exhibit a higher value for the respective dependent variable.

Source: The author.

Appendix 7.22: Website Impacts on Indirect Attitudinal Dimensions

n	Impact Variable	adjusted R^2	F-value	sign.	Independent Variables	Beta	t-value	p-value
61	SINFOS	.043	1.684	.166	ZINFOPRO	.228	1.524	.133
					ZEMBED	-.135	-.879	.383
					WPCF*	-.269	-2.080	.042
					IINVEST	.030	.234	.816
58	SIBATTI	.329	8.117	.000	ZINFOPRO	-.208	-1.627	.110
					ZEMBED	.030	.224	.823
					WPCF	.602	5.376	.000
					IINVEST	-.136	-1.231	.224
60	SIBRES	.173	4.144	.005	ZINFOPRO	-.005	-.039	.969
					ZEMBED	-.142	-.989	.327
					WPCF	.416	3.454	.001
					IINVEST	.270	2.201	.032
63	SPERF	-.021	.678	.610	ZINFOPRO	-.103	-.669	.506
					ZEMBED	.116	.733	.467
					WPCF	.148	1.121	.267
					IINVEST	.080	.608	.546

* Although WPCF is significant, the overall equation is not. However, if analysed at the bivariate level, WPCF is significant (*t-value 2.285*; *p-value .025*).

Source: The author.

Appendix 7.23: Website Impacts on Behavioural Dimensions

n	Impact Variable	adjusted R^2	F-value	sign.	Independent Variables	Beta	t-value	p-value
57	IBCD	.080	2.212	.080	ZINFOPRO	.297	1.899	.063
					ZEMBED	-.292	-1.766	.083
					WPCF	.023	.171	.865
					IINVEST	-.234	-1.717	.092
57	IBED (reversed)	.152	3.545	.012	ZINFOPRO	.106	.734	.466
					ZEMBED	-.202	-1.349	.183
					WPCF	-.409	-3.294	.002
					IINVEST	.097	.761	.450
59	IBED2	.007	1.106	.363	ZINFOPRO	.164	1.053	.297
					ZEMBED	-.071	-.441	.661
					WPCF	.205	1.537	.130
					IINVEST	.063	.464	.645
58	IBGD	.197	4.553	.003	ZINFOPRO	.173	1.215	.230
					ZEMBED	-.009	-.060	.953
					WPCF	.445	3.691	.001
					IINVEST	.011	.093	.926
59	IBTD	-.047	.341	.849	ZINFOPRO	.060	.374	.710
					ZEMBED	.064	.391	.697
					WPCF	-.006	-.045	.964
					IINVEST	.087	.628	.533
62	AVIIIMP	.266	6.605	.000	ZINFOPRO	.042	.325	.747
					ZEMBED	.472	3.579	.001
					WPCF	-.019	-.167	.868
					IINVEST	.193	1.746	.086
53	IBINTENS	.311	6.979	.000	ZINFOPRO	-.189	-1.449	.154
					ZEMBED	.094	.689	.494
					WPCF	.583	4.960	.000
					IINVEST	-.002	-.013	.990
54	IBDIVERS	.218	4.774	.002	ZINFOPRO	.107	.740	.463
					ZEMBED	.132	.900	.373
					WPCF	.457	3.746	.000
					IINVEST	-.079	-.622	.537

Source: The author.

Appendix 8.1: Post-Survey Interview Guide, page 1

A specific outline of the interview will <u>not</u> be communicated to the interviewee *<u>prior</u>* to the interview, only a broad indication of the nature of the interview; the actual "discussion plan" below will not be communicated or shown to the interviewee.

Background Details

Date of Interview : _____

Place of Interview : _____

Name of Company : _____

Name of Respondent : _____

Function of Respondent: ❑ Founder/ Manager, ❑ Co-Founder/ Manager, ❑ other

I. Experiential Factors

<u>Introduction:</u> traditional media theory suggests that experience with a new medium like the Internet is influential. However, the analysis has actually found that experiential factors were comparatively unimportant.

1.) Could you please decribe the role of Internet use experience, as well as, previous managerial experience with the Internet (prior to joining or founding the firm) on your firm's level of Internet use for international business?
(<u>prompt</u> [afterwards] for: team venture role, incubator role; Internet use in general, IB specific use, indirect objective Internet experience and subjective Internet experience; ease of using the Internet; usefullness of the Internet for IB)

2.) What role did use experience and previous experience on the perceived amount of IB specific information on the Internet (industry wiredness) and the perceived level of use among businss partners (peer wiredness) have?
(<u>prompt</u> [afterwards] for: team venture role, incubator role; Internet use in general, IB specific use, indirect objective Internet experience and subjective Internet experience; ease of using the Internet; usefullness of the Internet for IB; changes due to implementation/ use of a web site; other wiredness determinants...)

3.) Finally, what role did total Internet experience and international business experience play on your perceived levels of the Internet's internationalisation impacts?
(<u>prompt</u> [afterwards] for: see above; restate the impact items of the questionnaire)

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Appendix 8.1: Post-Survey Interview Guide, page 2

II. International Business

1.) What factors and motives played a role in you decision to invest abroad (FDI)?

(if the firm did not invest abroad, move directly to question 3)

(prompt [afterwards] for: market seeking, resource seeking, initiating factors (internal/ external), experiential factors, team venture role, incubator role)

2.) What role did the Internet play in you decision to invest abroad (FDI)?

(prompt [afterwards] for: enabling role, facilitating role, no role)

Explain [ex ante]: the analysis has shown that especially young STBFs internationalise significantly earlier and faster than older STBFs and that this is not due to Internet related factors)

3.) What were the key factors that have influenced the timing (earliness and speed) of your firm's internationalisation process?

Appendix 8.1: Post-Survey Interview Guide, page 3

II. International Business

Explain [ex ante]: the study has shown that the direction of STBFs internationalisation is mainly influenced by spatial and economic factors; cultural distance (language, business culture, economic development, traditions/ customs etc.) showed no impact whatsoever; this could be due to the operationalisation of cultural distance; therefore, the next question asks for your personal perception of cultural distance.

4.) How culturally distant/ close do you perceive the following list of foreign countries that your firm has entered?
And did using the Internet impact your perception of cultural distance of these countries?

Country	very close 0	1	2	3	4	5	6	7	8	9	very distant 10
Arab States											
Australia											
Austria											
Bangladesh											
Belgium											
Brazil											
Canada											
China											
Croatia											
Czech Rep.											
Denmark											
El Salvador											
Finland											
France											
Gabun											
Greece											
Hong Kong											
Hungary											
India											
Indonesia											
Iran											
Ireland											
Israel											
Italy											
Japan											
Korea (South)											
Latvia											
Luxembourg											
Macedonia											
Malaysia											
Netherlands											
New Zealand											
Norway											
Paraguay											
Poland											
Portugal											
Russia											
Singapore											
Slovak Rep.											
South Africa											
Spain											
Sweden											
Switzerland											
Taiwan											
Thailand											
Turkey											
UK											
USA											
Vietnam											
West Africa											

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Appendix 8.1: Post-Survey Interview Guide, page 4

III. Internet

Explain [ex ante]: the observational study of STBFs' web sites has found that only very few web sites do offer on-line transactions (on-line ordering/ e-commerce), despite the fact that quite a large share of firms stated to conduct on-line sales in the survey.

1.) How would you define on-line sales (outward e-commerce) and what technical services (eg. www, listserv) of the Internet do you use to conduct e-commerce (if at all)?

Explain [ex ante]: the observational study of STBFs' web sites has also found that especially firms that investigate frequently who accesses their web site, perceived an increase in the importance of unsolicited inquiries over the Internet on their selection of foreign markets...

2.) How does your firm analyse who accesses your web site and to what actions does that lead?

Explain [ex ante]: moreover, the observational study of STBFs' web sites has found that STBFs with more embedded (explain) web sites reported increases in Internet-based unsolicited inquries and orders from abroad, regardless of its domestic or international content...or its information richnes...

3.) From what countries did your firm (if at all) receive unsolicited inquiries and/ or orders over the Internet?

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Appendix 8.1: Post-Survey Interview Guide, page 5

IV. Internet's Impact

Explain [ex ante]: the analysis has shown various significant impacts of Internet use on international business operations of STBFs; however, the causal direction of some of these impacts can be argued both ways...

1.) Did the use of the Internet for international business in your firm lead to the use of more direct international business modes *or* did your firms use of direct international business modes lead to a more intensive use of the Internet ("de-intermediation thesis")?

2.) In your firm how (if at all) did Internet related factors influence the timing of your internationalisation (earliness and speed) and why?

3.) Did the use of the Internet for international business in your firm lead to a stronger international orientation *or* did your strong international orientation lead to higher levels of Internet use?

4.) Did the use of the Internet for international business in your firm lead to a freeing up of internal international business resources *or* did your level of internal resource lead to higher levels of Internet use?

5.) In the questionnaire you have stated a "x" with regards to the Internet's impact on a reduction in international business costs. Why did you see such a strong impact (attitudinal perception or behavioural experience)?

(for firms with low impact statements move to next question)

6.) What role did non-Internet related factors play in your selection of foreign markets? What were they and how do they relate to Internet-related factors?

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Appendix 8.1: Post-Survey Interview Guide, page 6

IV. Internet's Impact II

7.) Why do you think that the Internet reduces the need for FDI?

(only for firms with a high level of FDI substitution and/ or a domestic web site)

8.) Why did the Internet influence you international business investments?
(prompt [ex post]: due to the Internt per se (enabling role) or due to the Internet's cost reduction (facilitating role), i.e. enabling cheaper interaction with partners abroad)

(only for firms that stated a high linvestment impact)

9.) Did your international web site impact the direction of your markets served (spatial distance; relative richness), the turnover intensity of your international business, the IB modes used, the number of foreign markets served, your international outlook and internal business resources
or is it rather the other way round (data suggests the latter interpretation)?

(only for firms with an international web site)

10.) Could you give me 1 or 2 illustrative examples of Internet-influenced internationalisation of your firm?

11.) Would your firm have internationalised in the same manner without the Internet? What would have been different?

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V. Additional Observations/ Notes

(ex ante)

(ex post)