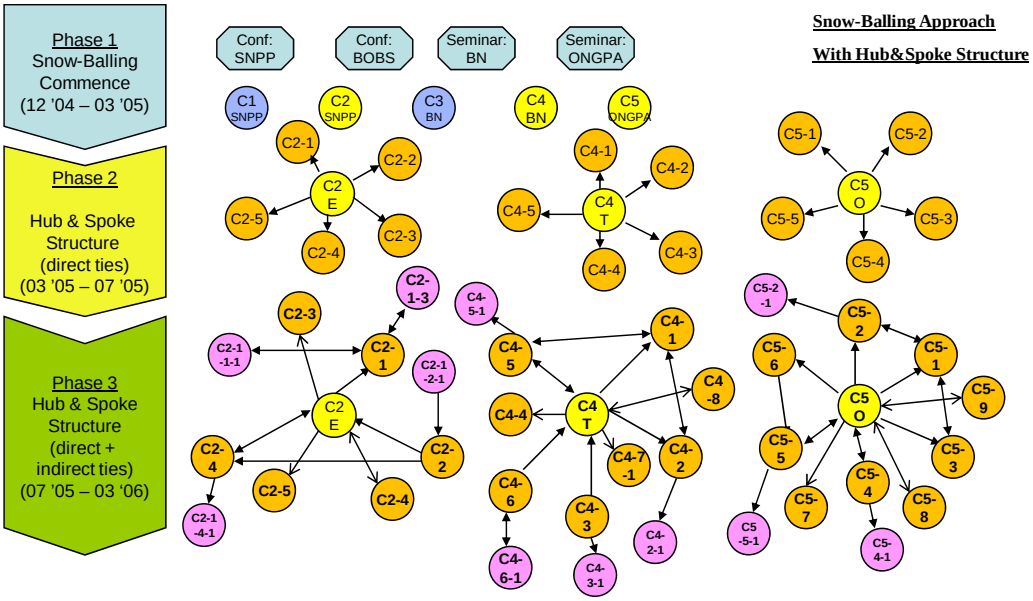
APPENDIX

Table of Contents / Appendix

Multiple-case study Data Collection:
Snow-ball approach with hub-spoke structure



NOTE:
Case e-Business Hub: C2E
Case Tourism Hub: C4T
Case Oil Hub: C5O

Source: Researcher

CASE STUDY PROTOCOL

Research Project:
How firms learn about new product development in their business networks

A. Overview

The objective of the case study is to explore how firms learn about new product development (NPD) in their business networks.

The synthesis from cross linking literature strands indicates that NPD is in itself the outcome of network collaboration and the result of inter-firm learning. Despite business network learning being claimed as an important managerial practice in NPD (e.g. Powell et al. 1996), how firms learn about NPD in their business networks remains an under-researched area. In exploring how firms learn about NPD in their business networks, exploratory multiple-case study and theory building techniques are employed.

B. Field Procedures

In collecting data from the field, the snow-ball approach with the 'hub and spoke' structure is employed. The 'hub' company refers to the company where NPD is initiated. The 'spoke' company refers to the company networked with a hub company for the identified NPD project. The data collection in this study is conducted in three phases. Phase one aims to observe the empirical practices of inter-firm learning in NPD networks, and to carefully select three quality 'hub' companies. The first phased research commenced with field observations in NPD and business network forums where inter-firm learning is facilitated and cultivated. The forums/seminars are selected by the following criteria: (1) it involves product development projects; (2) it provides business network opportunities; and (3) the participants are from different industries that offer the diversity of sample. Phase two aims to collect data from the 'spoke' companies having direct tie (e.g. customer, suppliers) with the hub companies for the NPD project identified in the phase one. Phase three aims to aims to collect data from the spoke companies which had indirect tie (e.g. customer's customer) with the 'hub' company. Four major data collection instruments are used in all three phases: documentation, archival records, direct observation and in-depth interview.

C. Case Study Questions

This study aims to bridge the gap identified from the literature review in cross-linked threads in NPD, business relationships, and learning by asking the main research question:

How do firms learn about new product development in their business networks?

In exploring the main research question, three sub-questions are proposed for investigation:

> ***Q1: How is business network learning processed in successful new product development?***
>
> ***Q2: How do firms engage with their business alliances in the business network learning process?***
>
> ***Q3: How does the business network learning mechanism impact on uncertainty reduction and speed-to-market in successful NPD?***

In this study, a successful new product development project is defined as a NPD project that has been brought from idea to commercial success (BAH 1982; Cooper 1984).

D. Guide for the Case Study Report

This multiple-case study is conducted as one part of the researcher's PhD study. Its main target audiences are supervisors, thesis committee, academic colleagues, internal/external examiners, as well as practioners. In bringing its results and findings to closure, the case study report follows the following guidelines. First, the case study report will contain narratives in the sequence of six stages suggested by Booz, Allen and Hamilton (1982)*. Second, results from within-case will be first reported, followed by results of cross-case patterns searching. Third, in analysing within-case data, coded data will be analysed and reported by the techniques of 'seeing plausibility', 'clustering', and 'comparisons/contrasted suggested by Miles and Humberman (1994) will be used. Fourth, in searching cross-case patterns, identified themes and patterns in three cases will be compared and reported by the techniques of 'constant comparative method' and 'counting' suggested by Glaser and Strauss (1967), Strauss and Corbin (1990), and Miles and Humberman (1994) will be employed.

*For practical reasons, the researcher grouped the six stages into three parts for reporting: (1) idea management includes the stages of idea exploration, idea screening, and business analysis; (2) product development covers stages of development and testing; and (3) commercialisation focusing on product launch.

Multiple-Case Study Selected Forums

The first phased research of this exploratory multiple-case study commenced with field observations in NPD and business network forums where inter-firm learning is facilitated and cultivated. The forums/seminars are selected by the following criteria: (1) it involves product development projects; (2) it provides business network opportunities; and (3) the participants are from different industries that offer the diversity of sample. As a result, the following forums were selected and attended:

1) 'Support for New Product s and Processes Seminar', 5th May 2005, hosted by the Scottish Enterprise;
2) 'Bring out the Best in Scottish' Business Forum, 4th June 2005, sponsored by the Scottish Enterprise;
3) 'Business Networking' Seminar, 1st July 2005, sponsored by Scottish Council for Development and Industry (SCDI);
4) 'Opportunities in Next Generation for Power Applications' workshop, 25th August 2005, co-funded by the Scottish Executive and the European Union.

Semi-Structured Interview Protocol

Research Project:
How firms learn about new product development (NPD) in their business networks

A. Overview

Semi-structure interview with open end questions is employed in the research project to tap on key informants insights on how firms learning about NPD in their business networks.

B. Field Procedures

This multiple-case study consists of three phases. Snow-ball approach with 'hub and spoke' structure is adopted. The interviewees of the first phase are the 'hub' companies identified in the business forums and the on-site interview agreement is made. One week before the agreed interview date, a cover letter with discussion agenda is sent to the key informant as a confirmation. In the interview, the hub company will be asked for providing list of network alliances for the specified NPD project. The interviewees of the second phase are the 'spoke' companies that have direct tie with the 'hub' company. An invitation letter with discussion agenda is sent to key informants, followed by phone calls for confirmation. In the interview, direct-tie spoke companies are asked to provide list of network alliances related to the specified NPD. The interviewees of the third phase are the 'spoke' companies that have in-direct tie with the 'hub' company. Same as the second phase, an invitation letter with discussion agenda is sent to key informants, followed by phone calls for confirmation.

Before the research questions, the researchers first gives a brief description of the study, defines 'successful NPD', and explaining the three parts of NPD process (i.e. idea management, product development, and commercialisation). All the interviewees are thanked for participating and told he/she will receive a copy of the typed transcript of the interview. This was sent within a few days with a short cover letter for comments, and/or verification. All the mentioned cover letter, invitation letter, discussion agenda are attached.

C. Interview Questions

The interview aims to explore how firms learn about new product development in their business networks. Interview participants are first asked to describe their successful new product development project; including with whom (network alliances) they mainly work for the project. Interviews are then followed by discussing the following open-end questions:

Q1: How did you work (or learn) with your network alliances in your successful new product development project at the idea management stage (defined as stage of idea exploration, idea screening and business analysis)?

Q2: How did you work (or learn) with your network alliances in your successful new product development project at the product development stage (defined as stage of development and testing)?

Q3: How did you work (or learn) with your network alliances in your successful new product development project at the commercialisation stage (defined as stage of product launch)?

Q4: Does the learning with your network alliances help uncertainty reduction and speed-to-market in the new product development project?

D. Guide for the Interview Report

All the interviews are tape recorded and transcribed within 3-5 days after the interview is conducted. The perspective case study database for three cases is built up. All the transcribed data are reported and stored in three 'case box' for further data analysis. Nvivo 7 (a computer-aided text analysis software package designed to enable coding for qualitative data analysis) is used to help the researcher to code and categorise narrative text. In analysing within-case data, content-analytic summary table presents and report the major themes found in each case. Counting table reports and compares the number of interviewees whose statements affirm/imply the coded corresponding concepts in three cases. A counting table for emergent theme reports the major themes suggested by the multiple-case study.

Invitation Letter and Discussion Agenda
Phase One

Research Project:
How firms learn about new product development (NPD)
in their business networks

****

Mr XXX
CEO
XXXXX
XXXXX
XXXX

6th October, 2005

Dear Mr XXX

First of all, please allow me to express my heartfelt gratitude for the agreement to the discussion on the topic of '*inter-firm learning in new product development network*'.

Attached please find a discussion agenda for our meeting on XXXX (Wednesday). As discussed in our last meeting, innovation and working together is the key to continued business success. Your input is very important to the success of new product development for the future.

I look forward to the meeting next week.

Sincerely

Rebecca Liu

Rebecca Liu
Research Fellow
Strathclyde Business School
University of Strathclyde, Glasgow

Inter-firm Learning in
New Product Development (NPD) Networks

Discussion Agenda

(Time: 50-60 minutes)

- A brief description of the study by Rebecca Liu
    - Definition of a successful NPD project
    - NPD process stages
- A brief description of the Company's background
- The nature of the targeted successful new product development (NPD) project/s.
- Who are the main network alliances your firm works with for the project?

Q1: How did you work (or learn) with your network alliances in your successful new product development project at the idea management stage (defined as stage of idea exploration, idea screening and business analysis)?

Q2: How did you work (or learn) with your network alliances in your successful new product development project at the product development stage (defined as stage of development and testing)?

Q3: How did you work (or learn) with your network alliances in your successful new product development project at the commercialisation stage (defined as stage of product launch)?

Q4: Does the learning with your network alliances help uncertainty reduction and speed-to-market in the new product development project?

Your input matters !!

Invitation Letter and Discussion Agenda
Phase Two and Phase Three

Research Project:
How firms learn about new product development (NPD)
in their business networks
****

Mr XXX
XXXX
XXXX
XXX

26th October, 2005

Dear XXX,

My name is Rebecca Liu. I am a Doctoral Research Fellow from Strathclyde Business School, University of Strathclyde.

Currently, I am conducting an interesting research project on the topic of **'Inter-firm Learning in New Product Development Networks'**. As an outstanding company in the innovation field, your Company is recommended by Mr XXX from XXX Ltd. Your input is very important to this study. I am, hereby, writing to you to invite your Company to be one of the participants in this study.

I wish to have a discussion session with you on the **3rd November (Thursday) at 14.00.** Attached please find a discussion agenda for this meeting. The meeting is expected no longer than 40-50 minutes. Thank you in advance for accepting this invitation. If you have any questions, I can be reached on: Email: rebecca.liu@strath.ac.uk; TEL: 0141 548 3249.

I look forward to meeting you soon.

Sincerely

Rebecca Liu
Rebecca Liu
Research Fellow
Strathclyde Business School
University of Strathclyde, Glasgow

cc. Mr XXX

Inter-firm Learning in
New Product Development (NPD) Networks

Discussion Agenda

(Time: 40-50 minutes)

- A brief description of the study by Rebecca Liu
    - Definition of a successful NPD project
    - NPD process stages
    - The identified successful NPD project
- A brief description of the Company's background
- Who are the main network alliances your firm works with for the project?

Q1: How did you work (or learn) with your network alliances in your successful new product development project at the idea management stage (defined as stage of idea exploration, idea screening and business analysis)?

Q2: How did you work (or learn) with your network alliances in your successful new product development project at the product development stage (defined as stage of development and testing)?

Q3: How did you work (or learn) with your network alliances in your successful new product development project at the commercialisation stage (defined as stage of product launch)?

Q4: Does the learning with your network alliances help uncertainty reduction and speed-to-market in the new product development project?

Your input matters !!

Cover Letter - After Interview

Research Project:
How firms learn about new product development (NPD) in their business networks

---

Mr XXXX
XXXX
XXXXX
XXX

16 November 2005

Dear Mr XXX

It was my great pleasure to meeting on XXX. As promised, attached please find the transcripts of what we have discussed in regard to the research project of inter-firm learning in business networks.

I appreciate your kindly comments and/or for anything I missed.

Again, many thanks.

Sincerely

Rebecca Liu

Rebecca Liu
Research Fellow
Strathclyde Business School
University of Strathclyde, Glasgow

Case-by-Attribute Summary Table: Inter-firm Learning in NPD Networks

(Case Tourism)

NODE / CODE	HOW		
	Description	Analysis	Antecedents
A	Articulation: be specific of what you want: through probing and asking questions	Idiosyncratic language issue. Without it, it can be a mass especially for tacit knowledge. Doing research/interview could be helpful.	Each of our customers is different, through many meetings and discussions, she (Kate) chatted and met with our staff to understand what we meant…
CL	Collective learning Knowledge can be corss-transferred	Synergise different learning from different partners; learning with group of customers (tourism), learning with suppliers, lawyers, accountants (tourism). It can be for idea generation or idea feasibility.	…It's like look after each other. We help each other. And we enjoy learning from each other…
CPR	Learning by comparison:	Learning especially from competitors. This is where the cutting edge can be found.	Yes, we look at whether other hotel had voucher system on line, and what they have. We make sure we look at our competitor's all the time.(tourism)
D	Documentation:	Company's archival document plays an important role in learning with/form network alliances	We set targets from previous year performance. And we will remove those vouchers that don't sell. This has gone through experience. And we want our suppliers also know about it…
E	Experience:	Learn from experience, past learning, experiential knowledge. Some can be documented, some cannot.	It was the learning from other hotels helped me. The way I look at it is we built a product from what you called inter-firm learning.
EI	Early involvement:	(1) Acquire supplier's early involvement for feasibility (2) acquire customer's early involvement for accepting learning	…therefore, there is an open communication channel between us…and we always involve them early on in the developing process…
F&I	Formal/Informal meeting/chatting/discussion	Formal: online feedback form, feedback from placed in room, interview (tourism),	...through many meetings and discussions, she (Kate) chatted and met with our staff..
IS	Knowledge is assessed, assimilated, and dissimilated	Direct: (1) Share selective information with competitors and look for a return or publicised info; (2) Indirect by talking to customers and find out what customers are receiving from competitors (3) talk to engineers from suppliers (4) by sales talk (5) from competitor's employees who joins the firm.	... Yes. We learnt, especially we became more aware of what we weren't have, and what information we didn't have..I probably say through customer feedback, competitor analysis. In short it is sharing information…
LBC	Learning by being challenged	Supplier challenges PD initiator for feasibility (tourism)	'…So, they might come with an idea, and we would go "mmh.. That could be very difficult, very expensive, takes a long time to create a bill. And it might be out-weight their budge…So, we do challenge them.' (tourism)

LBD	Learning by doing	Inter-firm learning involves a hands-on approach	We found some problems, and we identify what they were, and the, we went about and edit them…we learn from them.
LI	Late involvement:	Do not involve supplier in product developing stage, reasons could be: Not relevant, although the idea came from the supplier. It's a negative effect on learning at this stage.	Because I knew what we could be getting from them is essentially the software only. And what I need to get there is the operation element, how we can put it better for the company. It's not really relevant for them (supplier).
P	Pollination	The integration of what company learns from its network partners	…To be honest with you, the way I look at it is, I think, all companies (network partners) all contributed to this project. We are just combine all the knowledge and make a better one…
RD	Regular dialogue	On-going communication	You know, we have frequent constant contacts with their people (customers). If there is any problem, they'll let me know…
RFN	Refinement	It doesn't matter how many tests have been done at the development stage, it still can be expected that mistakes occur at the launch stage. Thus, learning must be taking place. When implementation does not get through smoothly - follow up error, communication issue, system does not support, etc. This is important for future PD	We learn from XXX of how we improve for the next time round…what we could be better, what we could keep the same, how we can change it…
T	Transformation: New/advanced knowledge is developed	(1) Synergised, suppliers via focal firm learn from focal firm's customer (tourism). (2) educate customers	So. that was a big learning experience for me. Because I've never been that situation…So we built it by working, talking with different people (supplier, customer, etc.) and we turn all these into something different.
T&E	Trial and Error	Learning from doing again and again	There was the time they might need to go back, adjust them, fine tune them, and bring them back to us…This might be gone up a few times, we then start programming…

Case-by-Attribute Summary Table: Inter-firm Learning in NPD Networks

(Case e-B)

NODE / CODE	HOW		
	Description	Analysis	Antecedents
A	Articulation	'Language' (specialty) can be an issue.	Client found difficulty understanding us, and we found difficulty understanding client, even you speak the same language. This is the true understanding can be a mass. (e-B)
CL	Information sharing: Knowledge is transformed in the networks	By a communication link which goes from the firm provides the need (customer's customer) to the firm initiates the idea (customer) , to the firm who realises the product (supplier);) It is a rich 'fusion', the fusion comes from the entire supply chain of ideas (e-B).	For idea generation, there is no simple learning model, like production line. It is not a linear learning pattern. It is a rich 'fusion' approach - all the combinations mixing into it.' (hi-tech, hub)
CPR	Learning by comparison:	By comparison, company learn from the benchmark, that enables them to make better product	We have competitors worldwide…I go to events and find out what people are doing, sit with them, talk to them…From that, we make our application better and better…
D	Documentation:	Documentation is important to transfer knowledge	The most important part is the 'documentation' at the end to make sure you transfer that technology.
E	Experience:	Utilise past experience, assimilate new experience.	…we have a control production process, controlled by control document. This control document also recorded our experience..
EI	Early involvement:	Situated with supplier	We found if you involve your suppliers early on, they can actually help you with the design…
F&I	Formal/Informal meeting/chatting/discussion	Formal: meeting conference, making presentation; Informal: talks, 'like 2 people having a fight', talk in exhibition (e-B)	We meet customer and make power point presentation. In addition to that, we attend exhibition to find information for us to look at…
IS	Information sharing:	Information sharing for a return. It can be a selective sharing by different tactics.	…What we have developed will benefit us in a long run. Because we will be able to go to other clients, and we will use what customers told us to sell to other customers…
LBC	Learning by being challenged	Learning by being in chaotic environment (e-B) for generating great ideas.	There is no simple learning model, like production line. It is a rich 'fusion' approach – all the combinations mixing into it.. The more it is uncertainty, the great idea it comes out..
LBD	Learning by doing	(1) Come with T&E, hands-on approach on site, or can be taken place by 'use case' (tourism). (2) In e-B, 'virtual product' paths the way of learning and LbD are the approach.	It's (work with us) the only way to transfer the technology. Regular meeting is when they come up for the day. It doesn't achieve anything after they have the confidence to the progressive of the red line. It is

			when they come to, then we talk about the way up to....It's not until towards when they see it and play with it...
LI	Late involvement:	--	--
P	Pollination	Integrated knowledge, it could be from focal firms to customers and customers' competitors (oil).	Yes, I mean we combine all kinds of feedback, customers, suppliers, and then we have our own development…
RD	Regular dialogue: Regular dialogue, on-going communication, good listen skill	Important for quality control (w/ distributor). It was conducted even after launch. Quarterly review, annual review; Interaction is the key	…Because the on-going communications, because we discuss issues over the whole process, that way you learn some lessons to avoid big mistake at the end…
RFN	Refinement	Company learn from testing, revision of the developed product	Only when it does need the specification. So, we deliver the product, and they've got to test it, and we may need to bring back and fix that, and we send them out to them again…We learn so much form this process..
T	Transformation:	Knowledge is transformed by combining different knowledge and new/advanced knowledge is developed	We say 'Ah…we can develop our software this way or that way', actually we combine that with different client's requests and transform their requests into a very competitive product.
T&E	Trial and Error	come with LbD	For some degree, we learn from modify and adjust their equipment at the process…

Case-by-Attribute Summary Table: Inter-firm Learning in NPD Networks

(Case Oil)

NODE / CODE	HOW		
	Description	Analysis	Antecedents
A	Articulation: Tackle tacit knowledge is the key Ae/for explicit knowledge, or when talking the same language (in a specific area); At/for tacit knowledge, or when talking the different language.	(1) Ae: dealt by interaction 2 firms' existing capability; At: (a) specification, (b) story board (c) road map (e-B) (2) It can be oral or can be written a formal 'story board', or 'used case'. Key point is there are different way of communication, the data showed that the most effective way is find out the right (most comfortable) way to communicate, it could through face to face, used case, email, phone call, but you need to find it out. For example, one of my cases chose the approach of 'working towards their language. Because it gets better responses.'	There is always miscommunication. You have always to be careful, and very clear what you want. Be specific what you want…
CL	Collective learning:	Learning with group of competitors under protectiveness (oil),	They are all competitors, but we are all in the same business. We are all learning from each other all the time…
CPR	Learning by comparison:	Learning especially from competitors. Learn for good developing methods	There are projects we owned that we (with competitors) have take partners…
D	Documentation:	Can be used internally and externally for the purpose of knowledge storage (oil)	We document everything here. For some cases working with our network partners, we need these documents…
E	Experience:	The application of past learning	This goes back to our earlier experience. I've been in this industry for 10 years…
EI	Early involvement:	For better product development, supplier need to involve early on	…And looking for the design, from cost effective point view, the way it manufactured by our suppliers, you need to involve them early on…
F&I	Formal/Informal meeting/chatting/discussion	A formal document and quality control system, quarterly review, annual review; Informal: talk, emails. Formal: feedback form; Informal: talk, emails	Yes, we arranged conference calls and several chat…
IS	Information sharing:	Knowledge is shared with each other for a better product development	Because if you give them something good, they will give you something back. You know, in oil industry, we always want to build up relations. So you can save something here or there work for a bigger picture.
LBC	Learning by being challenged	Challenged by customers' complaints	We listen to customer's complaints. It sounds like this is to evaluate potential failure. That's really as product come through

			process. You look at the failure, looking at what could have done wrong.
LBD	Learning by doing	Working with network partners enables company to learn and bring the NPD to another level	We will get together and work through the design. And then, we will talk through the process with them and bring it to another level…
LI	Late involvement:	--	--
P	Pollination	The pollination could be from focal firm to many suppliers and customers or from customer via focal firm to suppliers.	This is the learning effect through in-direct learning. For example: 'we are not teaching them, but our clients, through use, are teaching them (suppliers)'
RD	Regular dialogue	Talk to people, customers,	…Especially listen to our customers. Customers are fantastic 'levellers'…
RFN	Refinement	The perfectionism for customer's satisfaction seems help the inter-firm learning.	Well.. I think before we buy it, it will have to be perfect…we won't buy it until we are happy. They develop and test until we are happy. And both our companies learn a lot from it…
T	Transformation:	Better knowledge is developed by working together	I guess the idea comes from different sources. Because we have experience in this industry, we know what and how to develop better knowledge and technology for our new product
T&E	Trial and Error	A trial and error approach helps network partner to learn and develop the requested product	If you develop something, and you cannot make it yourself, you need them in there, and you need to ask then can you do this, if not , then we revise our design and ask again…

Counting Table – Sixteen Themes

(The number of interviewees whose statements affirm/imply the coded corresponding concept at three stages of NPD process)

Node	Industry	Idea Management	Product Developing	Product Launch	General	**TOTAL NUMBER**
A						
	Oil		5		1	6
	Tourism	1	7	1	1	10
	e-Business	4	8	2	2	16
	TOTAL	**5**	**20**	**3**	**4**	
CL						
	Oil	2	8			10
	Tourism	3	4			7
	e-Business	5	7	1		13
	TOTAL	**10**	**19**	**1**		
CPR						
	Oil	2	2			4
	Tourism	5	1	1	1	8
	e-Business	4		2		6
	TOTAL	**11**	**3**	**3**	**1**	
D						
	Oil			2		2
	Tourism			1		1
	e-Business		1	5		6
	TOTAL	**0**	**1**	**8**	**0**	
E						
	Oil	3	2	4		9
	Tourism	4	1	3		8
	e-Business	3	1			4
	TOTAL	**10**	**4**	**7**	**0**	
EI						
	Oil		5			5
	Tourism	7	7			14
	e-Business	1	3			4
	TOTAL	**8**	**15**	**0**	**0**	
F&I						
	Oil	6	6	1		13
	Tourism			3		3
	e-Business	3	4			7

	TOTAL	**9**	**10**	**4**	**0**	
IS						
	Oil	6	4	3	4	17
	Tourism	9	7	7		23
	e-Business	6	5	7	3	21
	TOTAL	**21**	**16**	**17**	**7**	
LBC						
	Oil		4	1		5
	Tourism	2	4	1		7
	e-Business	6	4		3	13
	TOTAL	**8**	**12**	**2**	**3**	
LBD						
	Oil		9			9
	Tourism		11	1		12
	e-Business		4			4
	TOTAL	**0**	**24**	**1**	**0**	
LI						
	Oil					0
	Tourism			3	2	5
	e-Business					0
	TOTAL	**0**	**0**	**3**	**2**	
P						
	Oil	1	2	6		9
	Tourism	2	3	3		8
	e-Business	2	4	6		12
	TOTAL	**5**	**9**	**7**	**0**	
RD						
	Oil	3	8	1		12
	Tourism	2	2	3		7
	e-Business	1	3	3		7
	TOTAL	**6**	**13**	**7**	**0**	
RFN						
	Oil			4		4
	Tourism			12		12
	e-Business			3	1	4
	TOTAL	**0**	**0**	**19**	**1**	
T						
	Oil	2		2		4
	Tourism		3	7	1	11
	e-Business	1	2	3		6
	TOTAL	**3**	**5**	**12**	**1**	
T&E						

Oil	2	6			8
Tourism		3	2		5
e-Business		1			1
TOTAL	**2**	**10**	**2**	**0**	

Note:

A (articulation); CL (collective learning); CPR (comparison screening learning); D (document); E (experience); EI (early involvement); F&I (formal/informal meeting); LBC (learning by challenged); LBD (learning by doing); LI (late involvement); P (pollination); RD (regular dialogue); RFN (refinement); T (transformation); T&E (trail & error)

The Survey Questionnaire

PRODUCT DEVELOPMENT & PARTNERSHIP

GENERAL INSTRUCTIONS

This survey is based on Your Company's practice on working with your important network partner(s) for a successful product development project(s) in the past 3 years. A successful product development project is one that has been brought from idea to commercial success.

To ensure that the data are useful, it is *extremely important* that all parts of the survey are filled out. In answering a question please 'click' the appropriate box. Once you completed your answers, please click 'SUBMIT' at the end of the questionnaire.

If you have a product development counterpart in another division of your organisation who could provide us with an additional perspective, please feel free to provide the website link of this survey to them. All data will be fully anonymous and confidential. For further information about this questionnaire, please contact Rebecca Liu via email at rebecca.liu@strath.ac.uk * Thank You Very Much !! *

Q1. Please rate your network partner(s) by their importance in helping your successful product development project(s).

Not at all Important	***Not so Important***	***3***	***Important***	***Very Important***	***Extremely Important***

	1	2		4	5
Supplier	☐	☐	☐	☐	☐
Competitor	☐	☐	☐	☐	☐
Joint Venture (with Formal Agreement)	☐	☐	☐	☐	☐
Customer (Business to Business Only)	☐	☐	☐	☐	☐
Distributor	☐	☐	☐	☐	☐
Professional/Trade Association	☐	☐	☐	☐	☐
Academic Institution	☐	☐	☐	☐	☐
Consultant	☐	☐	☐	☐	☐
Others	☐	☐	☐	☐	☐

Please Specify:

Please answer the following questions in relation to those partners who are important to you (the ones you rated 3 or more in Q1).

Q2. In successful product development projects, my Company involved the important network partners...

	Never 1	2	3	Some-times 4	5	6	Always 7
2a...in setting new product goals & priorities.	☐	☐	☐	☐	☐	☐	☐
2b...in finding commercial applications of new product	☐	☐	☐	☐	☐	☐	☐

ideas or technologies.							
2c...in generating new product ideas.	☐	☐	☐	☐	☐	☐	☐
2d...in analyzing customer requirements and needs.	☐	☐	☐	☐	☐	☐	☐
2e...in finding competitor's moves.	☐	☐	☐	☐	☐	☐	☐
2f...in developing new products according to market needs.	☐	☐	☐	☐	☐	☐	☐
2g...in screening ideas.	☐	☐	☐	☐	☐	☐	☐
2h...in test-marketing activities.	☐	☐	☐	☐	☐	☐	☐
2i...in launching activities.	☐	☐	☐	☐	☐	☐	☐

Please answer the following questions in relation to those partners who are important to you (the ones you rated 3 or more in Q1).

Q3. In developing products, my Company...

	Never			*Some-times*			*Always*
	1	*2*	*3*	*4*	*5*	*6*	*7*
3a...listened to the above important network partners.	☐	☐	☐	☐	☐	☐	☐
3b...spoke to the above important network partners.	☐	☐	☐	☐	☐	☐	☐
3c...thought together with the above important network partners.	☐	☐	☐	☐	☐	☐	☐
3d...interpreted the product development knowledge with the above important network partners.	☐	☐	☐	☐	☐	☐	☐

Q4. My Company's product development (PD) personnel...

	Never 1	2	3	*Some-Times* 4	5	6	*Always* 7
4a...understood knowledge from network partners by studying a complete set of blueprints, documents or plans.	☐	☐	☐	☐	☐	☐	☐
4b...understood knowledge from our network partners by talking to their experienced personnel.	☐	☐	☐	☐	☐	☐	☐
4c...spent time in trial and error (experimenting) and developed a sense of the feasibility of knowledge from network partners.	☐	☐	☐	☐	☐	☐	☐
4d. It was a doable job to educate and train our company's PD personnel with knowledge from our network partners.	☐	☐	☐	☐	☐	☐	☐

(Almost Done! 4 / 10)

Please answer the following questions in relation to those partners who are important to you (the ones you rated 3 or more in Q1).

Q5. From different network partners, my Company...

	Never 1	2	3	*Some-times* 4	5	6	*Always* 7
5a...continuously received different knowledge in product development projects.	☐	☐	☐	☐	☐	☐	☐

5b...continuously integrated different knowledge in product development projects.	☐	☐	☐	☐	☐	☐	☐

Q6. Independently from our network partners, my Company...

	Never 1	2	3	*Some-times* 4	5	6	*Always* 7
6a...had a high level of <u>expertise</u> with our partners technology / process know-how.	☐	☐	☐	☐	☐	☐	☐
6b...had a high level of <u>experience</u> with our partners technology / process know-how.	☐	☐	☐	☐	☐	☐	☐

(Almost Done! 6 / 10)

Please answer the following questions in relation to those partners who are important to you (the ones you rated <u>3 or more in Q1)</u>.

Q7. Our network partners...

	Never 1	2	3	*Some-times* 4	5	6	*Always* 7
7a...had intentional procedures, routines, and policies to restrict the sharing of relevant knowledge in product development projects.	☐	☐	☐	☐	☐	☐	☐
7b...were cautious in passing knowledge to my company in product development projects.	☐	☐	☐	☐	☐	☐	☐

Q8. In product development projects, my Company...

	Never 1	2	3	Some-times 4	5	6	Always 7
8a...had access to network partners knowledge.	☐	☐	☐	☐	☐	☐	☐
8b...collected network partners knowledge.	☐	☐	☐	☐	☐	☐	☐
8c...shared knowledge with network partners.	☐	☐	☐	☐	☐	☐	☐
8d...worked on the collected knowledge to reduce its complexity.	☐	☐	☐	☐	☐	☐	☐
8e...developed advanced/new knowledge through joint activity.	☐	☐	☐	☐	☐	☐	☐
8f...brought back new knowledge from different important network partners in joint activity.	☐	☐	☐	☐	☐	☐	☐
8g...shared our newly gained knowledge to all network partners when it is needed.	☐	☐	☐	☐	☐	☐	☐

(Almost Done! 8 / 10)

Please answer the following questions in relation to those partners who are important to you (the ones you rated 3 or more in Q1).

Q9. Through working/learning with our important network partners, my Company reduced the uncertainty about...

	Strongly Disagree 1	2	3	4	5	6	Strongly Agree 7
9a...the customer needs (user requirements).	☐	☐	☐	☐	☐	☐	☐

9b...the potential market.	☐	☐	☐	☐	☐	☐	☐
9c...the buyer behaviour of the potential customer.	☐	☐	☐	☐	☐	☐	☐
9d...the quality of the applied technologies (e.g. information technologies).	☐	☐	☐	☐	☐	☐	☐
9e...the user-friendliness of technologies.	☐	☐	☐	☐	☐	☐	☐
9f...the cost-efficiency of the technologies.	☐	☐	☐	☐	☐	☐	☐
9g...the technological strategy of the competition.	☐	☐	☐	☐	☐	☐	☐
9h...the marketing strategy of the competition.	☐	☐	☐	☐	☐	☐	☐
9i...the required R&D strategy for the product development projects.	☐	☐	☐	☐	☐	☐	☐
9j...the required technological support for the product development projects.	☐	☐	☐	☐	☐	☐	☐
9k...the required personnel for the product development projects.	☐	☐	☐	☐	☐	☐	☐

(Almost Done! 9 / 10)

Q10. Our product development project(s) was...

	Strongly Disagree ***1***	***2***	***3***	***4***	***5***	***6***	***Strongly Agree*** ***7***
10a...developed and launched faster than the major competitors for a similar product.	☐	☐	☐	☐	☐	☐	☐
10b...completed in less time than what was considered normal and customary for our industry.	☐	☐	☐	☐	☐	☐	☐

10c...launched on or ahead of the original schedule developed at initial project go-ahead.	☐	☐	☐	☐	☐	☐	☐
10d. My company's top management was pleased with the time it took us from product idea to full commercialisation.	☐	☐	☐	☐	☐	☐	☐

(10 / 10...About Your Company)

Please tell us about Your Company

Q11. Which industry category best describes your Company?

- ☐ Food & Beverages
- ☐ Finance & Insurance
- ☐ Petroleum & Fuel
- ☐ Chemicals & Pharmaceuticals
- ☐ Rubber & Plastic
- ☐ Hotel / Tourism / Leisure
- ☐ Machinery & Equipment
- ☐ Hi-Tech & e-Business
- ☐ Telecommunications
- ☐ Building and Construction
- ☐ Media

Q13. Your Company primarily provides:

- ☐ Products (physical goods)
- ☐ Services
- ☐ Mix of products/services

Q14. Your Company's products/services are primarily sold into the:

- ☐ Consumer market
- ☐ Business-to-business market
- ☐ Balanced mix of both

Q15. What role(s) do you perform within the firm?

- ☐ Owner/Chief Executive

- Consultancy / Research / Traning

Other

Q12. What size is your Company?

- Less than 10 Staff
- 10 to 49 Staff
- 50 to 199 staff
- 200 to 499 staff
- 500 or more staff

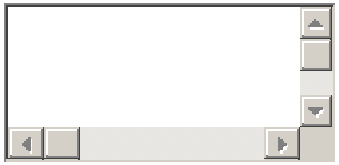
- Marketing / Sales
- IT/Technical/Research & Development (R&D)
- Finance
- New Product Development
- Operations / Manufacturing

Other

THANK YOU for taking part in our survey. We value your opinion.

If you would like us to send you a summary of final report, please leave your contact details.

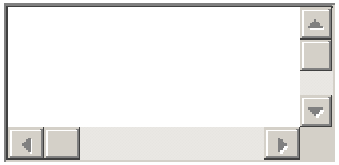
Name:



Company:

Address:

Tel:



E-Mail:

Measurement Model Evaluation

CONSTRUCTS SUMMARY TABLE

	Constructs / Items	Mean	S.D.	S. R. W.	Alpha	C.R.	AVE	1 (Dia)	2 (Art)	3 (Pol)	4 (Exp)	5 (TSF)	6 (CRT)	7 (U-cus)	8 (U-tec)	9 (U-com)	10(U-re)	11(SP)
1	**Dialogue**	**5.69**	**1.09**		**0.89**	**0.89**	**0.81**	**1.00**										
	…listen to network partners	5.65	1.18	0.89														
	…spoke to network partners	5.73	1.12	0.91														
2	**Articulation**	**4.62**	**1.31**		**0.65**	**0.66**	**0.50**	**0.60*** **	**1.00**									
	…spent time in trial and error and developed a sense of feasibility of knowledge from partners.	4.84	1.52	0.60														
	…it was a doable job to educate and train PD personnel with knowledge from network partners.	4.39	1.52	0.78														
3	**Pollination**	**4.56**	**1.21**		**0.82**	**0.82**	**0.70**	**0.43*** **	**0.63*** **	**1.00**								
	…received different knowledge in PD projects.	4.55	1.36	0.79														
	…integrated different knowledge in PD projects.	4.56	1.27	0.87														
4	**Experience**	**4.88**	**1.26**		**0.86**	**0.87**	**0.76**	**0.21****	**0.19****	**0.40*** **	**1.00**							
	…had a high level of expertise with partner's technology/process/know-how.	5.02	1.31	0.82														
	… had a high level of experience with partners technology/process/know-how.	4.75	1.37	0.93														
5	**Transfer**	**4.83**	**1.11**		**0.84**	**0.85**	**0.74**	**0.59*** **	**0.61*** **	**0.56*** **	**0.38*** **	**1.00**						
	… had access to network partners knowledge.	4.86	1.10	0.81														
	… collected network partners knowledge.	4.80	1.28	0.91														
6	**Cross-Transformation**	**4.56**	**1.13**		**0.75**	**0.77**	**0.54**	**0.48*** **	**0.68*** **	**0.63*** **	**0.35*** **	**0.69*** **	**1.00**					
	…brought back new knowledge from different important network partners in joint activity.	4.61	1.32	0.76														
	…developed advanced knowledge through joint activity.	4.62	1.32	0.60														
	… shared newly gained knowledge to all network partners when it is needed.	4.45	1.36	0.80														
7	**Uncertainty Reduction-customer**	**5.24**	**1.21**		**0.82**	**0.83**	**0.71**	**0.35*** **	**0.41*** **	**0.45*** **	**0.24****	**0.33*** **	**0.39*** **	**1.00**				
	…the customer needs (user requirements).	5.41	1.31	0.73														
	…the potential market.	5.06	1.32	0.94														
8	**Uncertainty Reduction-technology**	**4.60**	**1.21**		**0.83**	**0.83**	**0.71**	**0.43*** **	**0.57*** **	**0.45*** **	**0.30*** **	**0.49*** **	**0.66*** **	**0.55*** **	**1.00**			
	…the quality of the applied technologies.	4.61	1.35	0.85														
	…the user-friendliness of technologies.	4.59	1.27	0.83														
9	**Uncertainty Reduction-competition**	**3.88**	**1.46**		**0.83**	**0.83**	**0.70**	**0.16****	**0.44*** **	**0.33*** **	**0.20****	**0.28****	**0.51*** **	**0.51*** **	**0.62*** **	**1.00**		
	…the technological strategy of the competition.	3.94	1.57	0.84														
	…the marketing strategy of the competition.	3.80	1.60	0.84														
10	**Uncertainty Reduction-resources**	**4.71**	**1.30**		**0.83**	**0.83**	**0.72**	**0.41*** **	**0.51*** **	**0.33*** **	**0.36*** **	**0.45*** **	**0.51*** **	**0.29*** **	**0.77*** **	**0.57*** **	**1.00**	
	… the required personnel for the PD projects.	4.74	1.38	0.78														
	…the required technological support for the PD projects.	4.67	1.44	0.91														
11	**Speed-to-Market**	**4.57**	**1.39**		**0.84**	**0.85**	**0.73**	**0.15***	**0.38*** **	**0.26****	**0.42*** **	**0.25****	**0.28****	**0.29*** **	**0.47*** **	**0.21****	**0.28****	**1.00**
	… developed and launched faster than the major competitors for a similar product.	4.65	1.46	0.91														
	… completed in less time than what was considered normal and customary for our industry.	4.48	1.52	0.81														

N = 211

*** p < .01

** p < .05

* p < .1

S.D. = Standard Deviation

S.R.W. = Standardised Regression Weight

C.R. = Composite Reliability

AVE = Average Variance Extracted

CFA measurement Model

Table: Composite Reliability and AVE Values

Construct				Std. Regression Weight	Critical Ratio (t-value)	p value	Composite Reliability	AVE
TSF	q8b	<---	TSF	0.91	12.43	***	0.85	0.74
	q8a	<---	TSF	0.81				
CRT	q8f	<---	CRT	0.83	11.44	***	0.77	0.54
	q8g	<---	CRT	0.57				
	q8e	<---	CRT	0.78				
UNC-cus	q9a	<---	unccus	0.74	9.41	***	0.83	0.71
	q9b	<---	unccus	0.93				
UNC-tec	q9d	<---	unctec	0.84	13.73	***	0.83	0.71
	q9e	<---	unctec	0.84				
UNC-com	q9g	<---	unccom	0.85	11.20	***	0.83	0.71
	q9h	<---	unccom	0.83				
UNC-res	q9k	<---	uncres	0.78	12.12	***	0.83	0.72
	q9j	<---	uncres	0.91				
SP	q10a	<---	sp	0.81	9.34	***	0.85	0.73
	q10b	<---	sp	0.90				
Dia	q3a	<---	dia	0.91	13.88	***	0.89	0.81
	q3b	<---	dia	0.89				
Art	q4d	<---	art	0.81	7.47	***	0.66	0.50
	q4c	<---	art	0.59				
Pol	q5b	<---	pol	0.89	10.53	***	0.82	0.70
	q5a	<---	pol	0.77				
Exp	q6b	<---	exp	0.91	10.41	***	0.87	0.76
	q6a	<---	exp	0.84				

Model Fit Results:

X^2 (175) = 265.923; X^2 /df = 1.52

GFI = 0.91; CFI: 0.96; TLI: 0.95

RMSEA: 0.050

*** significant at P<0.001

CFA measurement Model

Test of Discriminant Validity Correlations (Group number 1 - Default model)

Constructs Pairs	r Estimate	r-squarred (L)	MIN AVEs	**Test of Discriminant Validity**
Dia <---> Art	0.60	0.36	0.50	**TRUE**
Dia <---> Pol	0.43	0.18	0.70	**TRUE**
Dia <---> Exp	0.21	0.04	0.76	**TRUE**
TSF <---> dia	0.59	0.35	0.74	**TRUE**
CRT <---> dia	0.48	0.23	0.54	**TRUE**
unccus <---> dia	0.35	0.12	0.71	**TRUE**
unctec <---> dia	0.43	0.18	0.71	**TRUE**
unccom<---> dia	0.16	0.03	0.70	**TRUE**
uncres<---> dia	0.41	0.17	0.72	**TRUE**
sp <---> dia	0.15	0.02	0.73	**TRUE**
Art <---> Pol	0.63	0.39	0.50	**TRUE**
Art <---> Exp	0.19	0.04	0.50	**TRUE**
TSF <---> art	0.61	0.38	0.50	**TRUE**
CRT <---> art	0.68	0.46	0.50	**TRUE**
unccus <---> art	0.41	0.16	0.50	**TRUE**
unctec <---> art	0.57	0.33	0.50	**TRUE**
unccom <---> art	0.44	0.19	0.50	**TRUE**
uncres <---> art	0.51	0.26	0.50	**TRUE**
sp <---> art	0.38	0.15	0.50	**TRUE**
Pol <---> exp	0.40	0.16	0.70	**TRUE**
TSF <---> pol	0.56	0.31	0.70	**TRUE**
CRT <---> pol	0.63	0.39	0.54	**TRUE**
unccus <---> pol	0.45	0.20	0.70	**TRUE**
unctec <---> pol	0.45	0.20	0.70	**TRUE**
unccom <---> pol	0.33	0.11	0.70	**TRUE**
uncres <---> pol	0.33	0.11	0.70	**TRUE**
sp <---> pol	0.26	0.07	0.70	**TRUE**
TSF <---> exp	0.38	0.14	0.74	**TRUE**
CRT <---> exp	0.35	0.12	0.54	**TRUE**
unccus <---> exp	0.24	0.06	0.71	**TRUE**
unctec <---> exp	0.30	0.09	0.71	**TRUE**

unccom <---> exp	0.20	0.04	0.70	**TRUE**
uncres <---> exp	0.36	0.13	0.72	**TRUE**
sp <---> exp	0.42	0.17	0.73	**TRUE**
TSF <---> CRT	0.69	0.47	0.54	**TRUE**
TRS <---> unccus	0.33	0.11	0.71	**TRUE**
TRS <---> uncTEC	0.49	0.24	0.71	**TRUE**
TSF <---> unccom	0.28	0.08	0.70	**TRUE**
TSF <---> uncres	0.45	0.20	0.72	**TRUE**
CRT <---> unccus	0.39	0.15	0.54	**TRUE**
crt <---> unctec	0.66	0.43	0.54	**TRUE**
crt <---> uncCOM	0.51	0.26	0.54	**TRUE**
crt <---> uncres	0.51	0.26	0.54	**TRUE**
crt <---> sp	0.28	0.08	0.54	**TRUE**
unccus <---> unctec	0.55	0.30	0.71	**TRUE**
UNCcom <---> UNCcom	0.51	0.26	0.70	**TRUE**
unccom <---> uncres	0.29	0.08	0.71	**TRUE**
unccom<---> sp	0.29	0.09	0.71	**TRUE**
unctec <---> unccom	0.62	0.39	0.70	**TRUE**
unctec <---> uncres	0.77	0.59	0.71	**TRUE**
unctec <---> sp	0.47	0.22	0.71	**TRUE**
unccom <---> uncres	0.57	0.33	0.70	**TRUE**
unccom <---> sp	0.21	0.04	0.70	**TRUE**
uncres <---> sp	0.28	0.08	0.72	**TRUE**
TSF <---> sp	0.25	0.06	0.73	**TRUE**