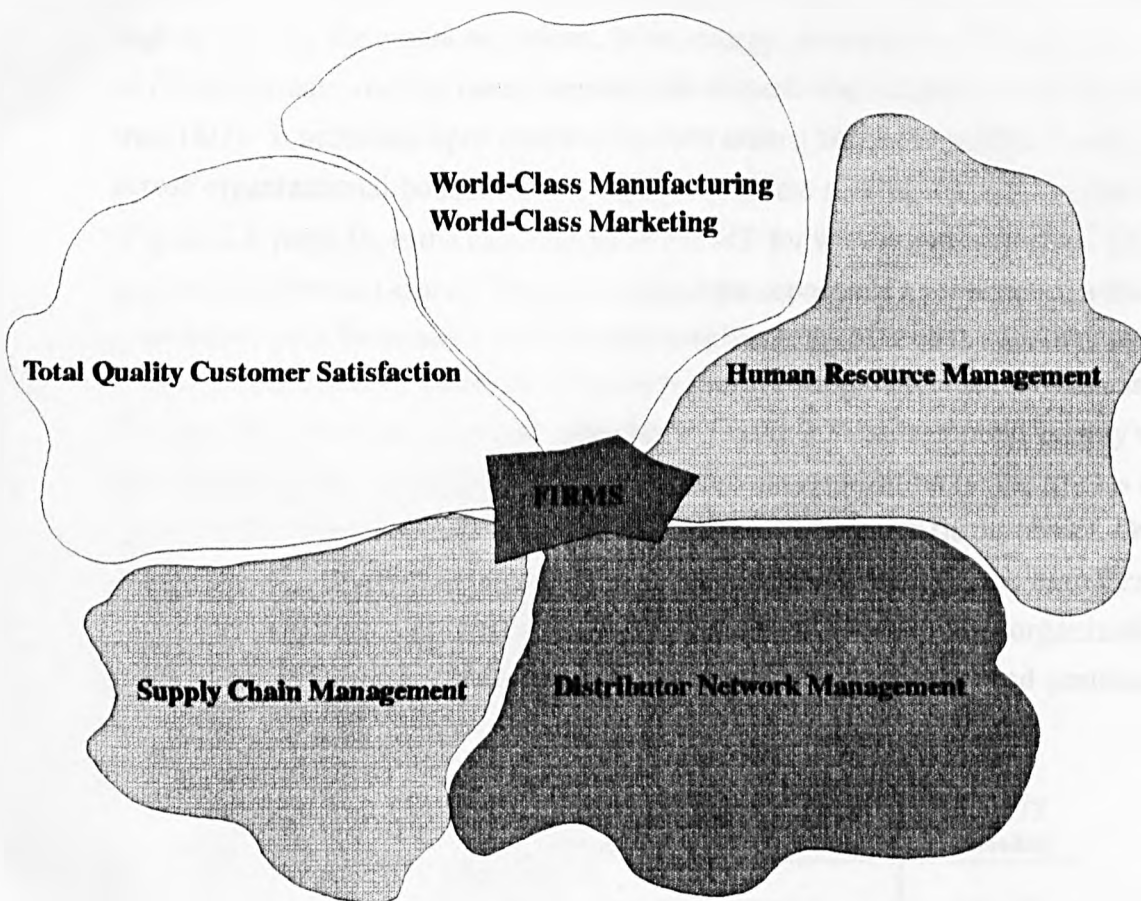


CHAPTER SIX

FLEXIBLE INTELLIGENT RELATIONSHIP MANAGEMENT STRATEGY





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FLEXIBLE INTELLIGENT RELATIONSHIP MANAGEMENT STRATEGY

6.1 Introduction to the Flexible Intelligent Relationship Management Strategy (FIRMS) : The Chain of Relationships

FIRMS is a unified theory of strategic corporate management. It unifies workers, suppliers, distributors, and even competitors, in the pursuit of excellence in customer service for profit/market share. It is a holistic people-oriented approach because it recognizes that although the world is increasingly driven by high technology, it continues to be influenced and managed by high spirits - by the emotions, values, drive, energy, persistence of the people. The essence of *FIRMS* is teamworking based on principle-centred relationships of sincerity, integrity and trust (*SIT*). It promotes open communications among functions within the organization and across organizational boundaries for creative problem solving and quality decision making. (Figure 2.3, page 35, is the basic model of *FIRMS* for win-win relationships for the business goal of profit/market share.) This novel paradigm represents a breakthrough that will benefit customers (value for money), workers (meeting hierarchy of needs), suppliers and distributors (expanding and reliable business) and competitors (setting standards for business excellence). The aim is to create value for all stakeholders. Figure 2.3 can be more precisely visualized by the model of a tree. In Figure 6.1, the foundation of organization (ie the tree) is rooted in *SIT* (ie the roots), from which grows a clear corporate vision/mission (ie the trunk). Other essential features of the organization include its focus on five key areas (ie the branches and leaves) which yield benefits (ie the fruit). Ultimately, in order for the organization to grow, reinvestment of profits (ie the windfall) is necessary to maintain and sustain competitive advantage (ie healthy soil):

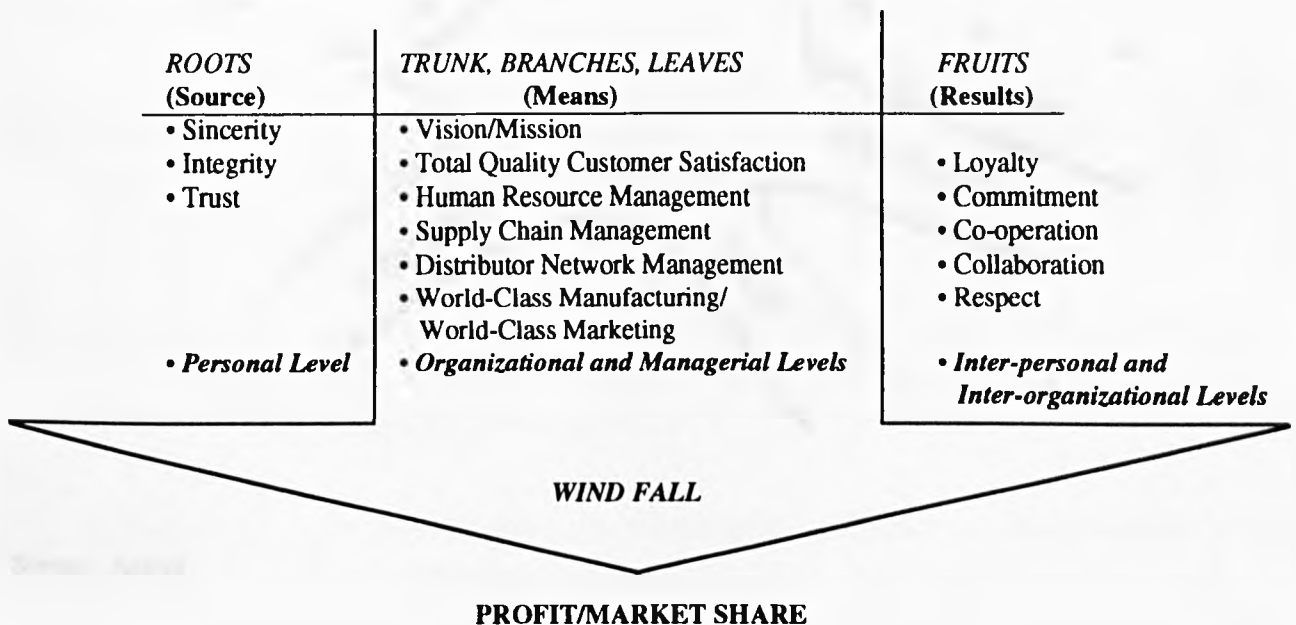
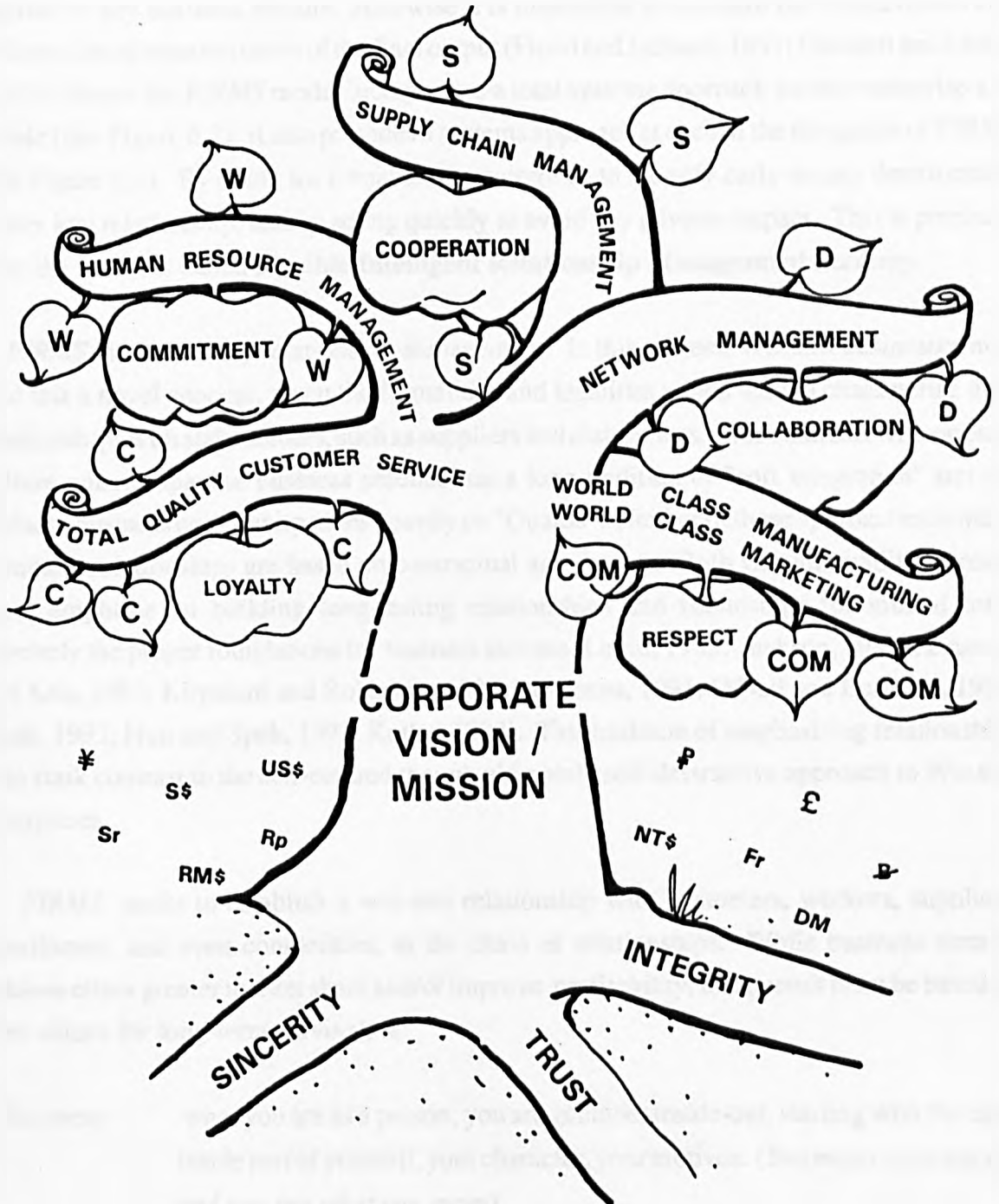


FIGURE 6.1 THE TREE OF FIRMS



Source: Author

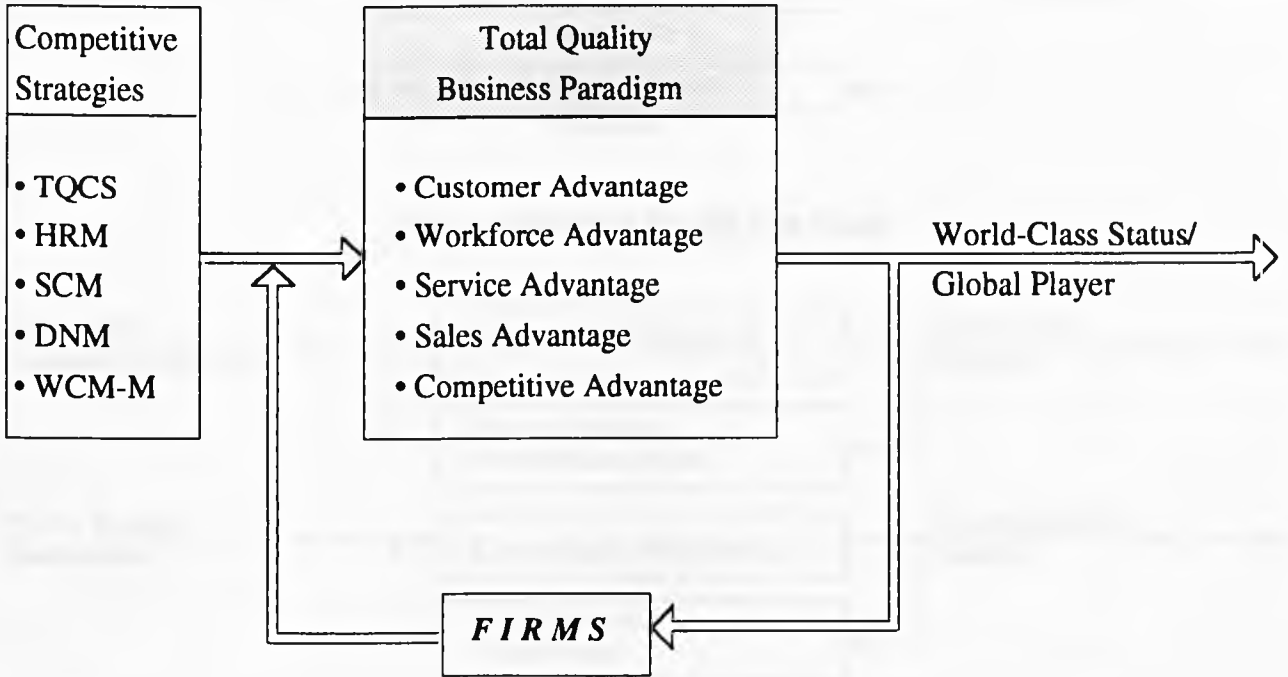
Engineering often employs a systems approach to analyse a particular situation in terms of the nature of inputs and outputs. It is vital that the results are measured (ie feedback obtained) in order to assess the performance of resources. Similarly, a systems approach should be applied in any business venture, otherwise it is impossible to measure the effectiveness and efficiencies of inputs in terms of the final output (Flood and Jackson, 1991; Cavaleri and Obloj, 1993). Hence the *FIRMS* model incorporates a total systems approach for the enterprise as a whole (see Figure 6.2); it also provides a systems approach at each of the five goals of *FIRMS* (see Figure 6.3). By doing so, it enables the enterprise to identify early on any deterioration in any key relationship, and by acting quickly to avoid any adverse impact. This is precisely why the model is called **Flexible Intelligent Relationship Management Strategy**.

FIRMS is essentially relationship management. In this respect, Western businesses may find this a novel concept, given the formalities and legalities which tend to characterise their relationships with stakeholders, such as suppliers and distributors. This contrasts with oriental culture where Japanese business practice has a long tradition of "soft integration" and the Chinese business community relies heavily on "Guanxi". Neither of these approaches to inter-company relationships are based on contractual agreements. Both Oriental traditions place great emphasis on building long-lasting relationships and friendships for mutual trust, precisely the proper foundations for business success (Levitt, 1983; Jackson, 1985a, Brunner and Koh, 1988; Kirpalani and Robinson, 1989; McKenna, 1991; O'Neil and Bertrand, 1991; Bank, 1992; Hutt and Speh, 1992; Kotler, 1994). This tradition of emphasising relationships is in stark contrast to the self-centred though ultimately self-destructive approach to Western enterprises.

FIRMS seeks to establish a win-win relationship with customers, workers, suppliers, distributors, and even competitors, in the chain of relationships. While business aims to achieve either greater market share and/or improve profitability, this pursuit must be based on core values for long-term survival, ie:

- *Sincerity* - what you are as a person; you are genuine; inside-out, starting with the most inside part of yourself, your character, your motives. (*You mean what you say and you say what you mean*)
- *Trust* - you inspire confidence and reliability as a person. (*You say what you mean and you do what you say*)

FIGURE 6.2 TOTAL SYSTEMS DIAGRAM IN FIRMS



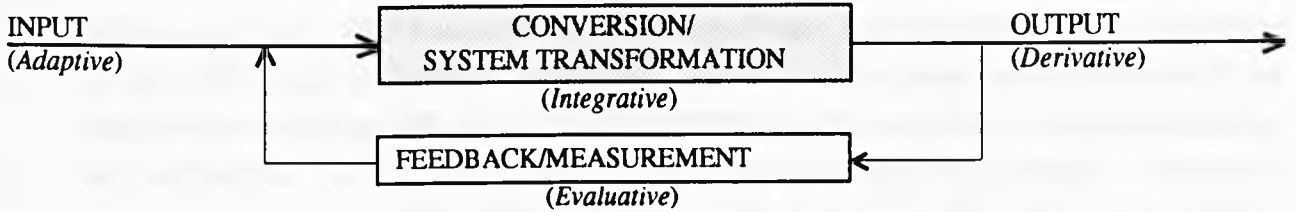
Abbreviations

- TQCS = Total Quality Customer Satisfaction
- HRM = Human Resource Management
- SCM = Supply Chain Management
- DNM = Distributor Network Management
- WCM-M = World-Class Manufacturing/World-Class Marketing
- FIRMS* = Flexible Intelligent Relationship Management Strategy

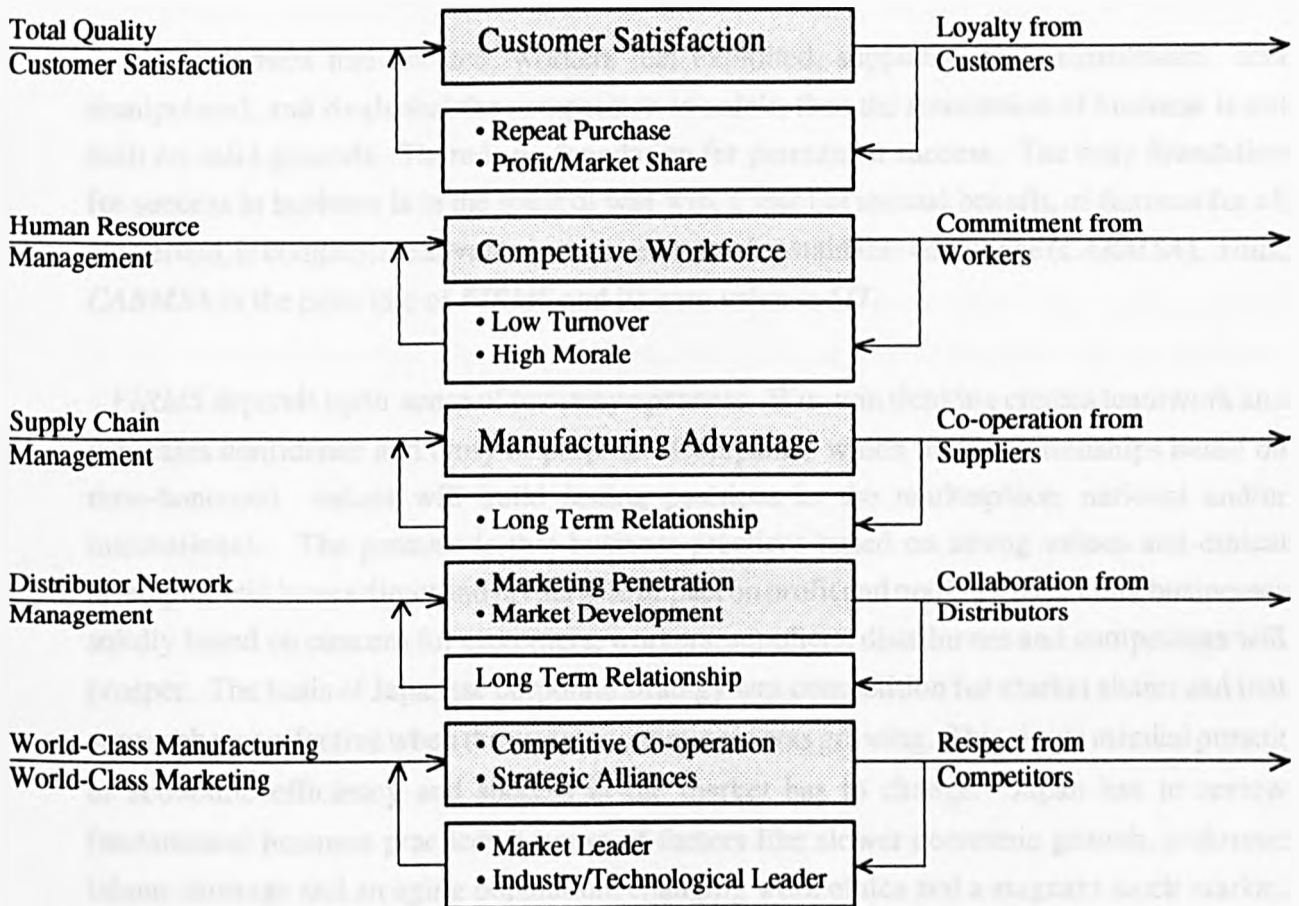
Source: Author

FIGURE 6.3 SYSTEMS DIAGRAM FOR THE FIVE GOALS IN FIRMS

Standard Systems Diagram



Systems Diagram for the Five Goals



Source: Author

- *Integrity* - your self-awareness and self-value lead to your making and keeping promises and commitment. (*You say, do and keep to what you mean*)

In the real world, these are the roots of success in relationships and in the bottom-line results of business (Sako, 1992; Chan, 1993; Sonnenberg, 1994). Recent research into the consumer of the 1990s from the Henley Centre found that in the more competitive environment of restrained economic growth, greater attention will focus on the potential of existing customers; an assessment of life-time value and the value of promoting loyalty. "Fairness", "transparency", "honesty" and "trust" were used to describe the relationship between consumers and marketing professionals. Relationship marketing is an appropriate concept for the 1990s (*Marketing Business*, July - August, 1993).

If customers feel cheated, workers feel exploited, suppliers and distributors feel manipulated, and rivals feel the competition is unfair, then the foundation of business is not built on solid grounds. There is no foundation for permanent success. The only foundation for success in business is in the spirit of win-win, a spirit of mutual benefit, of fairness for all concerned, ie competitive advantage requires mutual sustainable advantage (*CARMSA*). Thus, *CARMSA* is the principle of *FIRMS* and its core value is *SIT*.

FIRMS depends upon sense of two-way openness. Win-win thinking creates teamwork and generates confidence and unity of purpose. Companies which build relationships based on time-honoured values will build lasting positions in the marketplace, national and/or international. The premise is that business practices based on strong values and ethical principles will have a direct and favourable impact on profit and market share. Only businesses solidly based on concern for customers, workers, suppliers, distributors and competitors will prosper. The basis of Japanese corporate strategy was competition for market share; and that approach was effective when the world economic pie was growing. This single minded pursuit of economic efficiency and success in the market has to change. Japan has to review fundamental business practices because of factors like slower economic growth, a chronic labour shortage and an aging population, changing work ethics and a stagnant stock market. In the next stage of competition, a new approach is needed which includes giving better treatment to a wide range of individuals with stakes in the company, such as workers, suppliers and distributors. Hence, the need for *FIRMS*.

Western business practice is based on the rational assessment of options for a market and

a form of decision making to determine action. Formal contracts define the relationship between manufacturer and suppliers; distributors are channels for sales - to be appointed or dismissed depending on success - not sources of market intelligence and networks to be nurtured. The foundation of Japanese competitive style is "soft integration" - an inter-related industry structure that makes suppliers and distributors far more responsive than they are in the West. Whereas the classic Western concept of industrial integration depends on ownership, in Japan integration works by association and minimal ownership. The typical characteristics of soft integration are: many companies providing the supply and distribution network for the "parent" company; a high level of self-sufficiency (particularly in design) in the tasks suppliers perform; and strong links among companies, particularly in terms of personnel exchange. These inter-company relationships are not contractual. Soft integration is also critical in distribution. Distributors tend to push the products of one company when there is extensive sharing of information. The alliance between distributors and a primary manufacturer means that the former supply information on products which they consider the manufacturer ought to make. Deming advocates ending the practice of awarding business on the basis of price tag alone (Aguayo, 1990). Business must be based on a long-term relationship and trust (Levitt, 1983; Jackson, 1985a; McKenna, 1991; O'Neal and Bertrand, 1991; Bank, 1992; Hutt and Speh, 1992; Kotler, 1994). This relationship give birth to the concept of *Business Fusion* whereby companies in the supply chain form strategies together to achieve synergy and long-term competitiveness through cooperation in marketing, innovation and product development (*Business Times*, March 19, 1993).

In business dealings and/or negotiations, the rudimentary concept of relationship for the Chinese is mandatory. Relationships, better known as "guanxi", is one of the most vital elements in business dealings with Chinese the world over (whether they are Chinese from mainland China, Taiwanese-Chinese, Singaporean-Chinese, Thai-Chinese, Indonesian-Chinese, etc) - the same belief and principle applies. The Chinese believe that "guanxi" binds both parties to an obligation to assist each other when required to do so. Great emphasis is placed on building long-lasting business relationships and friendships for mutual trust (Brunner and Koh, 1988; Kirpalani and Robinson, 1989). In the Chinese context, the concept of relationship is the key to business success (Lee Kuan Yew, *Business Times*, March 1, 1994).

6.2 Justification for *FIRMS*

As industrial companies strive to develop and maintain profitable positions in the global markets of the 1990s, marketing and manufacturing strategy have moved to centre stage

(Chaston, 1990; Webster, 1991). For industrial marketeers, marketing has been virtually synonymous with corporate strategy because of the critical importance of market segmentation, targeting and positioning to the competitive performance and financial success of the company. We have reached a point where the concept of a customer-focused, market driven business is the value of many industrial companies (Webster, 1991; Wallace, 1992).

In theory, organizations have a hierarchy of inter-related strategies, each formulated at a different level of the company. The three major levels of strategy are: corporate strategy, business strategy and functional strategy. In practice, *FIRMS* merges the strategic issues at the corporate level and the business level to ensure minimum communication breakdown/gap at the tactical level.

For example (Figure 6.4):

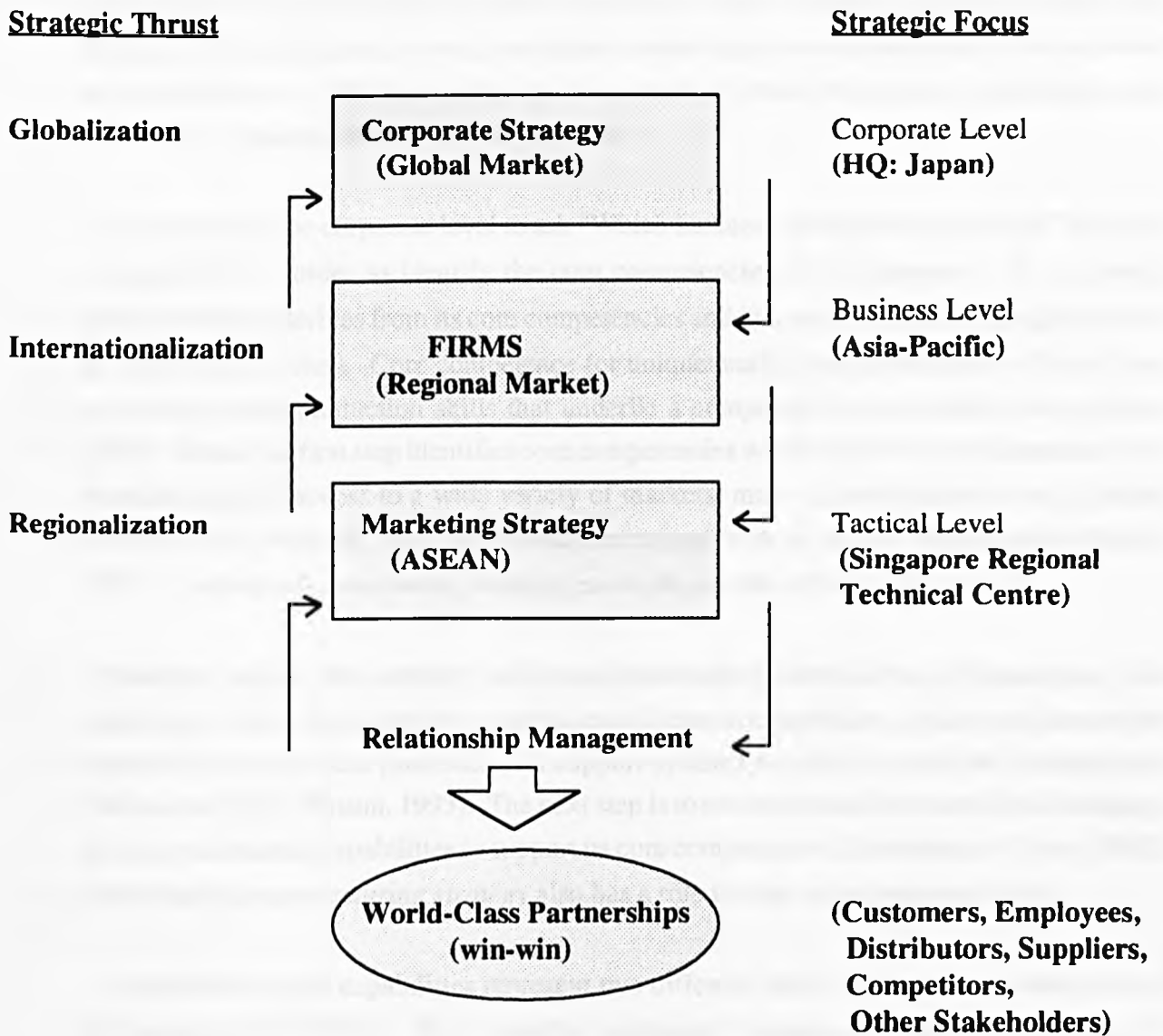
- **Three Levels of Strategy: The Case of Okuma Corporation**

- Corporate strategy aims at the global market. This is set at the Corporate Level by Headquarters in Japan. The strategic thrust is Globalization
- *FIRMS* bridges what is planned at the corporate level with recommendations from the Business Level - to capture the Regional Market with focus on Asia-Pacific. The strategic thrust is Internationalization, ie look for commonality for standardization of product specifications to achieve economies of scale
- *FIRMS* adapts what is planned at the Business Level to what is actually happening at the Tactical or Operational Level to ensure that expectations from Headquarters in Japan meet with performance. The Marketing Strategy aims at big market share in ASEAN. To achieve that, the strategic focus is to use Singapore as the Regional Technical Centre for Regionalization, ie to control the businesses in ASEAN

With the right strategic focus and strategic thrust at the three levels serving the interest of customers, employees, distributors, suppliers, competitors, and other stakeholders, Okuma can achieve world-class partnership through a win-win climate for all parties.

To go beyond world-class means that to achieve the number one position you have to beat the current world-class record. To drive this strategic intent, you need to create innovative

FIGURE 6.4 THREE LEVELS OF STRATEGY: THE CASE OF OKUMA CORPORATION



Source: Author

products through lead-marketing-manufacturing strategy, ie lead the customers, create and develop the markets, and manufacture quality products at low costs. The priorities for the application of manufacturing and marketing techniques must be based on corporate strategy and objectives. Planning and execution of techniques must be developed in response to corporate needs. The success of world-class manufacturing companies depends on the commonsense selection and application of these techniques. *FIRMS* links the manufacturing strategy and the marketing strategy so that an optimal implementation status can be achieved and standardized. *FIRMS* provides the framework in which the various technologies can deliver the considerable benefits they promise.

It is normal at the corporate level to ask "Which business should we be in?" and "What are we good at?" in order to identify the core competencies of the company. A company's competitiveness derives from its core competencies and its core products (the tangible results of core competencies). Core competence (or uniqueness) is the combination of individual technologies and production skills that underlie a company's myriad product lines (Egan, 1993). Hence, the first step identifies core competencies which meet three requirements: they provide potential access to a wide variety of markets; make a contribution to the customer benefits of the products; and are difficult for competitors to imitate (Prahalad and Hamel, 1990). Undoubtedly, *marketing strategy* has to play a role at the corporate level.

However, having the necessary skills and knowledge is essential but still inadequate. For world-class status, there must be a simultaneous focus on capabilities, to hone and harness the company's key business processes and support systems to build on the core competencies (Stalk, et al 1992; Watson, 1993). The next step is to review the architecture of the company, ie its manufacturing capabilities to support its core competences (Bartmess and Cerny, 1993). Undoubtedly, *manufacturing strategy* also has a role to play at the corporate level.

Competencies and capabilities represent two different but complementary dimensions of the paradigm for *FIRMS*. Both concepts emphasize "behavioural" aspects of strategy in contrast to the traditional structural model (see Table 6-1). *FIRMS* emphasizes behaviour, ie the organizational practices and business processes in which capabilities are rooted, and focuses attention on the infrastructure that supports capabilities. In the fluid, dynamic and ever-changing business environment, the essence of strategy is not the structure of a company's products or markets but the dynamics of its behaviour. And the goal is to identify and develop the hard-to-imitate organizational capabilities that distinguish a company from its

TABLE 6-1 MODERN STRATEGIC CORPORATE MANAGEMENT

Characteristics of Traditional Approach in Conventional Management	Characteristics of New Approach in Creative Management (<i>FIRMS</i>)
PIECEMEAL APPROACH	HOLISTIC SYSTEMS APPROACH
<ul style="list-style-type: none"> • Hierarchy of strategies • Unfocused • Reactive • Rational • Analysis • Opaque (functional barriers) • Within company boundary • Programmed learning • Conservative mindset/attitude • Short term profit 	<ul style="list-style-type: none"> • Interlinking of strategies • Focused (Corporate vision, mission, will) • Proactive • Innovative • Synthesis • Transparent (no functional barriers) • Across company boundary • Action/heuristic learning • Progressive mindset/attitude • Long term market share/profitability
HIERARCHICAL MANAGEMENT	RELATIONSHIP MANAGEMENT
<ul style="list-style-type: none"> • Process-oriented • Individual effort/problem solving • Stand-alone energy • Trade-off • Corporate image • Win-lose relationships 	<ul style="list-style-type: none"> • People-oriented • Collective teamwork/problem solving • Multi-party Synergy • Pay-off • Corporate character • Win-win relationships

Source: Author

competitors in the eyes of the customers. Whereas core competence emphasizes technological and production expertise at specific points along the value chain, capabilities are more broadly based, encompassing the entire value chain. In this respect, capabilities are visible to the customers in a way that core competencies rarely are. The author contends that the goals of core competencies are *strategic intelligence, strategic flexibility and strategic relationships* achieved and sustained through the strategic options and combinations of key capabilities (see Figure 6.5)

While world-class manufacturing and world-class marketing are the twin pillars (see Figure 6.6), the reinforcements are: total quality customer satisfaction (the *right focus*); human resource management (the *right attitude*); supply chain management (the *right connections*); distributor network management (the *right channels*).

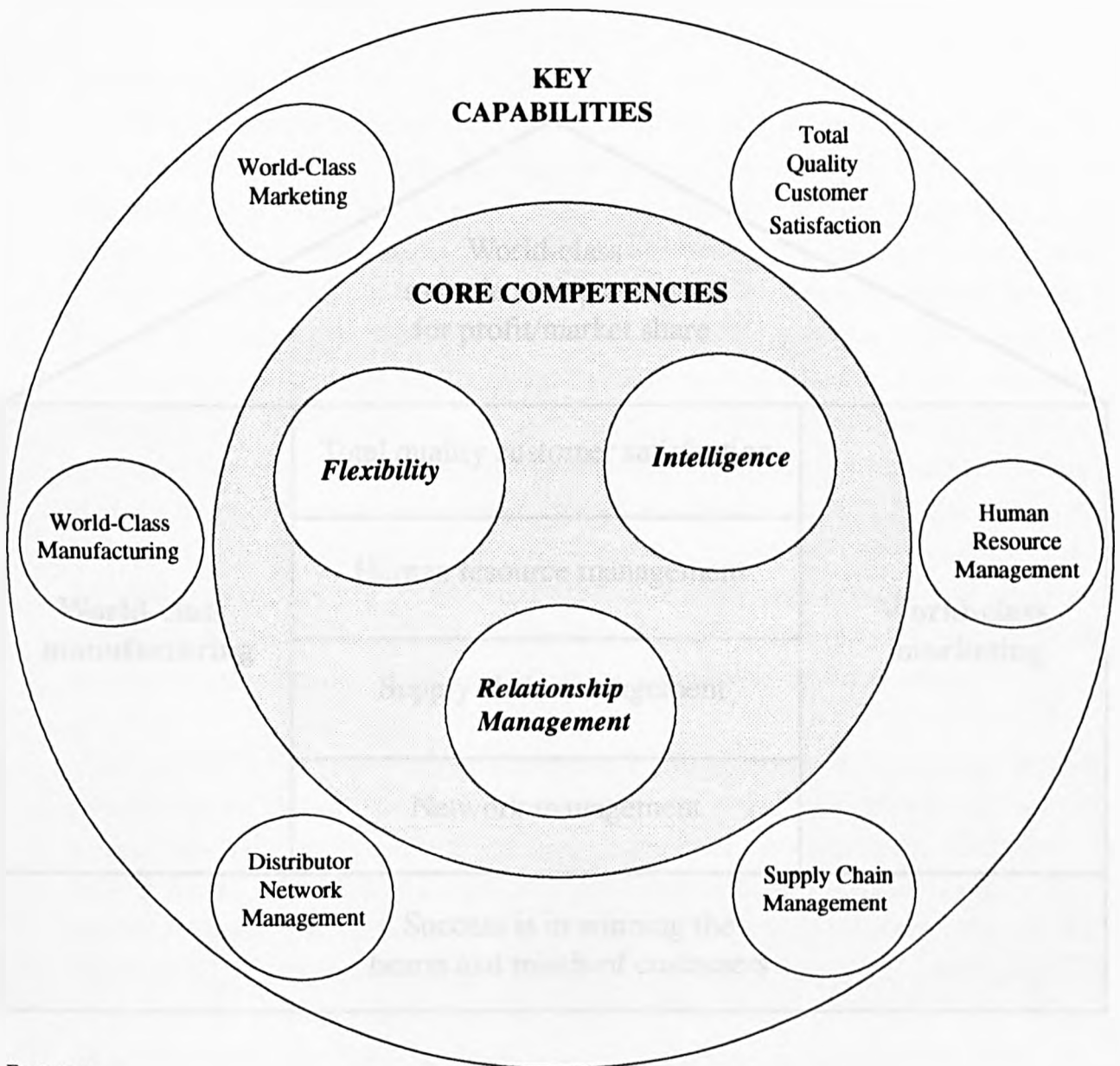
FIRMS directs and integrates the efforts of disparate groups of people through win-win relationships to maximize profit/market share. More importantly, it has the conviction and commitment of top management to drive the company in pursuit of business excellence.

FIRMS is a commonsense approach because it is built around pragmatism:

- Manufacturing and marketing are customer-focused because competitiveness is ultimately judged by current and prospective customers
- Manufacturing and marketing are integrated - quality alone, price alone, delivery alone are all inadequate to meet customers' demand for value
- *FIRMS* is a living system - it is dynamic, responsive, ultimately people-dependent, for people must know what to do and how to do it and developing the knowledge and competence of these human resources is essential
- *FIRMS* utilizes technologies appropriate to the company, its people and the market it serves

For a company to go beyond world-class status, it has to win the hearts and minds of customers through leadership in marketing and manufacturing. It has to exploit its core competencies and manufacturing capabilities to produce innovative products to capture the imaginations of its customers. It does not compete for the sake of competition but to anticipate and satisfy customers' needs by offering added value (benefits, quality, service, image, etc).

FIGURE 6.5 STRATEGIC OPTIONS OF CORE COMPETENCIES AND KEY CAPABILITIES

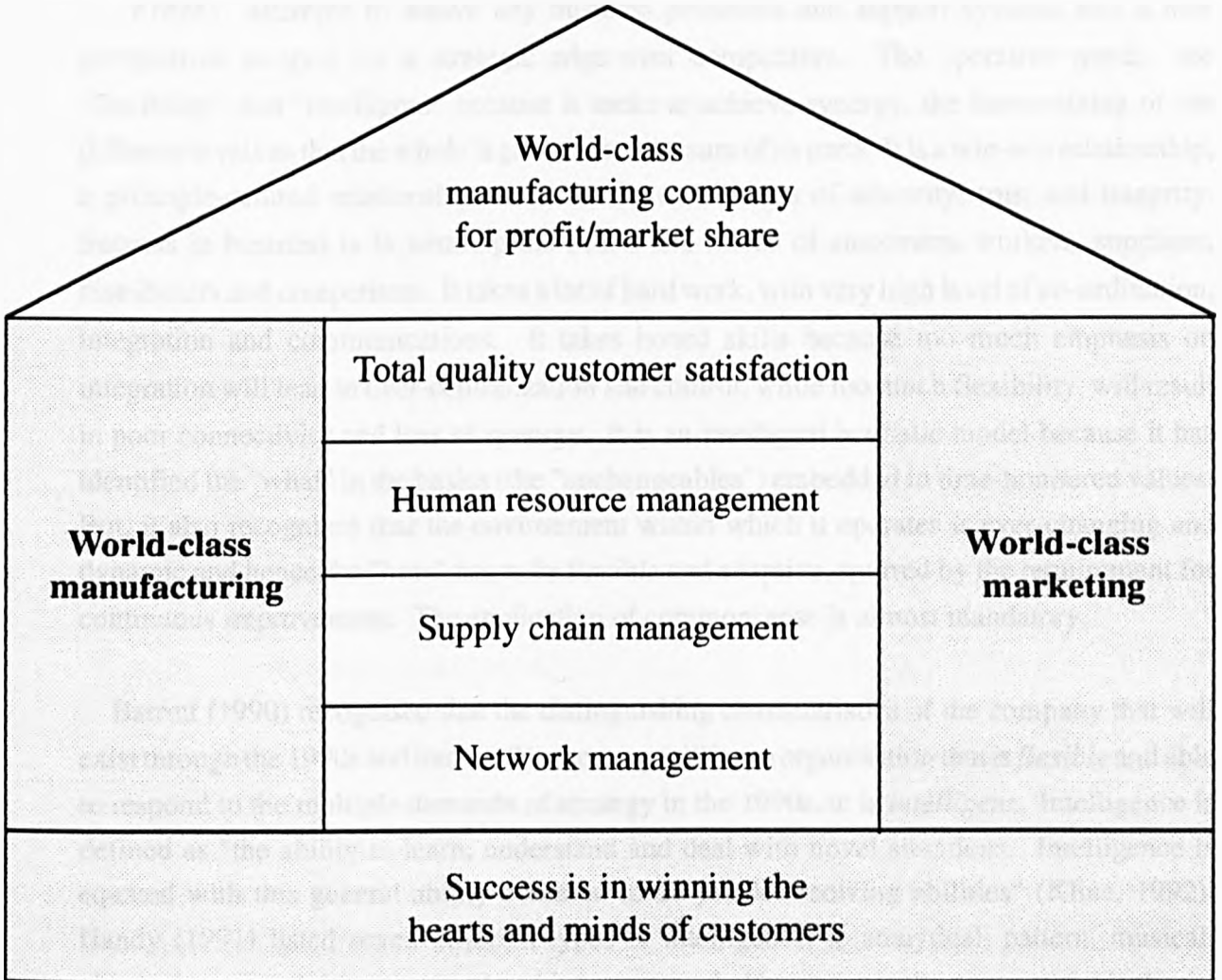


Footnote:

- *Flexibility* - the ability to cope with change, eg to switch gear from rapid product development to low cost, relatively quickly and with minimal resources
- *Intelligence* - the heuristic problem solving ability to learn, understand and deal with novel situation. Commonsensical approach to problem diagnosis and decision
- *Relationship Management* - the ability to manage and integrate competencies and capabilities relations with stakeholders for win-win outcome because competitive advantage requires mutual sustainable advantage (CARMSA)

Source: Author

FIGURE 6.6 SYNERGY IN FIRMS



Source: Author

FIRMS is a people-driven approach based on core values because only a principle-centred relationship will endure. World-class companies want to become more total, more balanced in their corporate character.

6.3 Properties of *FIRMS*

FIRMS attempts to weave key business processes and support systems into a new competitive weapon for a strategic edge over competitors. The operative words are "flexibility" and "intelligent" because it seeks to achieve synergy, the harmonizing of the different levels so that the whole is greater than the sum of its parts. It is a win-win relationship, a principle-centred relationship based on the core values of sincerity, trust and integrity. Success in business is in winning the hearts and minds of customers, workers, suppliers, distributors and competitors. It takes a lot of hard work, with very high level of co-ordination, integration and communications. It takes honed skills because too much emphasis on integration will lead to over-centralization and control, while too much flexibility will result in poor connectivity and loss of synergy. It is an intelligent heuristic model because it has identified the "what" in the basics (the "unchangeables") embedded in time-honoured values. But, it also recognizes that the environment within which it operates is ever-changing and dynamic and hence the "how" has to be flexible and adaptive, spurred by the requirement for continuous improvement. The application of commonsense is almost mandatory.

Barrett (1990) recognised that the distinguishing characteristics of the company that will exist through the 1990s and into the 21st century will be an organization that is *flexible* and able to respond to the multiple demands of strategy in the 1990s, ie is *intelligent*. Intelligence is defined as "the ability to learn, understand and deal with novel situations. Intelligence is equated with this general ability common to all problem-solving abilities" (Kline, 1992). Handy (1991) listed seven different types of intelligence, ie analytical, pattern, musical, physical, practical, intra-personal and inter-personal. However, in the context of this thesis, the general ability associated with intelligence in the commercial world would encompass:

<u>TYPES OF INTELLIGENCE IN <i>FIRMS</i></u>			
<u>Analytical</u> <ul style="list-style-type: none"> • Systems thinking • Market research • Strategic analysis • Innovation • Relationship management 	<u>Practical</u> <ul style="list-style-type: none"> • Commonsense • Diligence • Flexibility • Holistic approach • Action-Learning 	<u>Intra-Personal</u> <ul style="list-style-type: none"> • Sincerity • Integrity • Trust • Vision • Strategic intent 	<u>Inter-Personal</u> <ul style="list-style-type: none"> • Commitment • Loyalty • Collaboration • Co-operation • Respect

The properties of *FIRMS* are summarized in Table 6-2.

6.4 Goals of *FIRMS*

Works by many scholars have reached a similar conclusion about the critical difference in corporate goal between Western enterprise and Japanese business, ie Western corporations focus on short-term profitability while Japanese corporations nurse the long-term goal of industry dominance or greater market share by building barriers to new entrants and monopolising the market (Kono, 1992). Short-term thinking or long-term thinking must have a profit motive as the end result because a business enterprise has to make profits to remain in business. It needs profits to invest in people, process and technology to be a significant player in the highly competitive game of business. Hence, "profit/market share" is at the centre of *FIRMS*.

There are five strategic goals in *FIRMS* which represent the human aspect of enterprise:

- *Goal 1*: Loyalty from customers
- *Goal 2*: Commitment from workers
- *Goal 3*: Co-operation from suppliers
- *Goal 4*: Collaboration from distributors
- *Goal 5*: Respect from competitors

The focus of *Goal 1* in *FIRMS* is to gain loyalty from customers by ensuring customer delight through *total quality customer satisfaction* (see Figure 6.6). The corporate battle is won through customers' repeat purchases. It is only customers' loyalty that allows the corporation to do well in terms of world-class level of financial performance. *Goal 2* (commitment from workers), *Goal 3* (cooperation from suppliers), and *Goal 4* (collaboration from distributors) are value added partnerships to work towards serving the customers (shared focus).

In Figure 6.6, these are represented in:

- *Human resource management* to gain commitment from workers which will ensure a competitive workforce with low turnover and high morale
- *Supply chain management* to gain cooperation from suppliers which will ensure manufacturing advantage in the long term

TABLE 6-2 THE PROPERTIES OF FIRMS

SYNERGY - the principle of creative cooperation. This is the process of valuing the differences and creating the best possible solution

FLEXIBILITY - the ability to cope with change; versatility; the ease with which it can respond to change (macro perspective; the thinking)

ADAPTABILITY - the ability to change with changed circumstances (micro perspective; the doing)

INNOVATIVENESS - seeking better ways of serving internal and external customers (moving from maintenance learning to innovative learning)

WISDOM - learning from mistakes (action learning) and seeking continuous improvement (innovative learning through questioning insight)

COMMONSENSE - the use of innate knowledge and wisdom; practical understanding; the ordinary capacity to see and take things in their right light; sound judgement; mental balance (use of left brain/right brain); heuristic

INFORMATIVENESS - the garnering of information about customers' real needs and future needs; knowledge-based database for better quality decision making

CREATIVE SYSTEMS ORIENTATION - use of the total systems approach for creative problem solving; consideration of the whole (synthesis) rather than the parts (analysis) and finding inter-relationships between these parts and their impact on the whole; study of the main features of all systems to ensure that they are complete and do in fact dovetail one with the other

Source: Author

- *Distributor network management* to gain collaboration from distributors which will ensure market development and market penetration in the long term

Goal 5 (respect from competitors) can only be earned through the twin pillars of world-class manufacturing and world-class marketing (see Figure 6.6) in a world-class manufacturing company. Competitive cooperation among global players in the world-class league will determine the industry/market leader beyond the world-class status, because to sustain the number one position the world-class global player needs to break its previous record (Barrett, 1990; Williams, 1992; Weiss and Gershon, 1993). World-class companies will restrict competitive cooperation to others in the same league. This competitive cooperation accelerates and facilitates expansion of the frontier of world-class status. Thus deprived of world-class partners, today's companies that have failed to achieve world-class status face an even bleaker future as the gap widens between them and their more successful competitors.

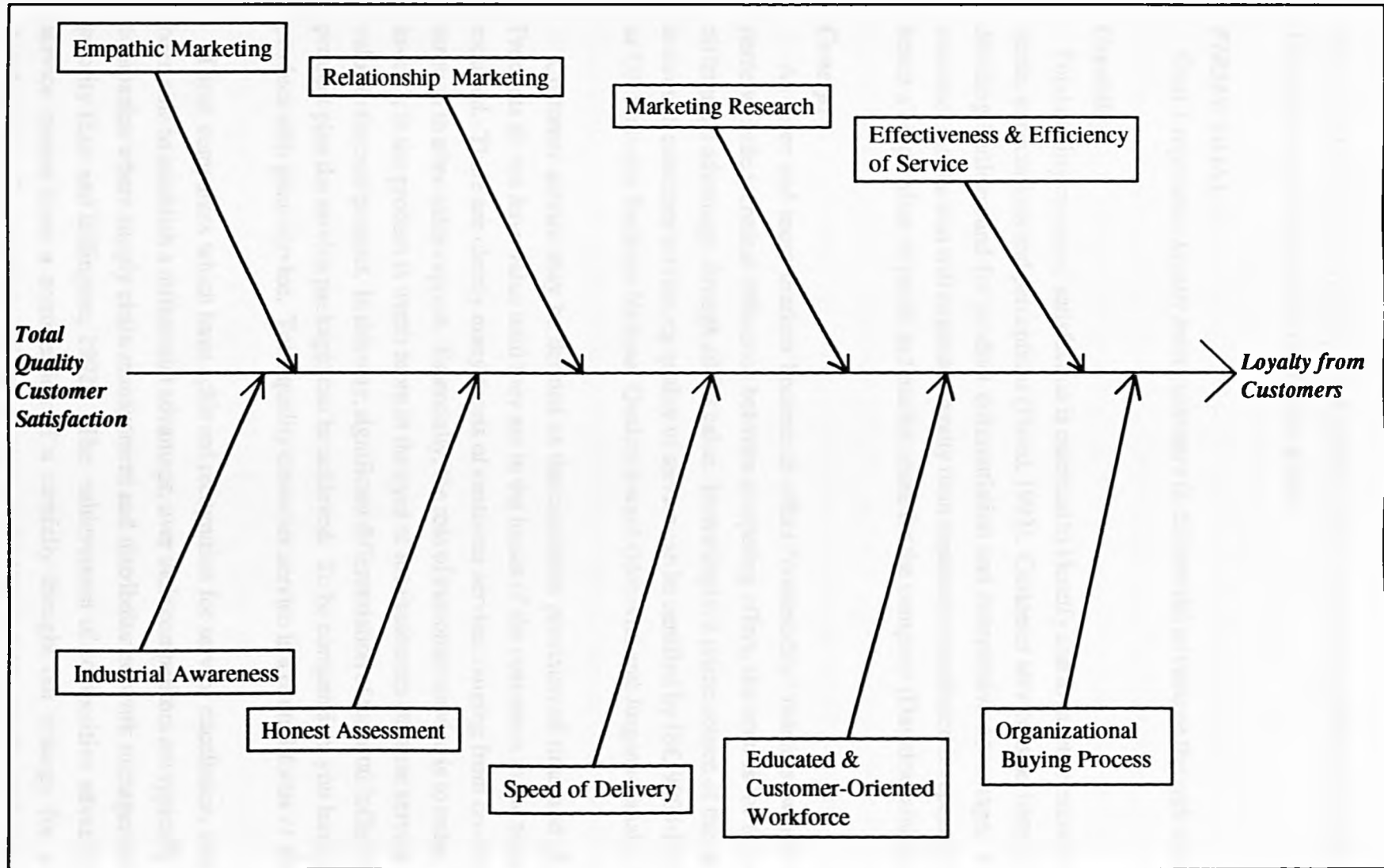
FIRMS exhibits these characteristics:

- the forging of close links with customers
- human resource management policies and practices focused on action learning, teamworking, workers' participation
- close links with suppliers
- close links with distributors
- a model deriving manufacturing imperatives from marketing imperatives and vice versa

First, there is a need to understand the customers - what they require, what they demand, what they want. Next, they must be given more than they expect - go the second mile, give them service, the augmented product that wins such competitive advantage in the minds of customers. This is working towards customer delight. It builds deep loyalty. There is a need for a feedback system on what customers, and others who have a stake in the welfare of the enterprise (workers, suppliers, distributors, and competitors), want and expect. The heart of the organizational continuous improvement is problem solving around such information.

The essence of *FIRMS* is relationship management, and the customer represents only one of five critical relationships. If any one of these relationships is weak then it is impossible for that company to deliver consistently Total Quality Customer Satisfaction (TQCS) in the long term, and relationship marketing is just one small element in delivering TQCS (Shani and Chalasani, 1993). See Figure 6.7 which itself is just a part of *FIRMS*. Companies must

FIGURE 6.7 FISHBONE DIAGRAM OF TOTAL QUALITY CUSTOMER SATISFACTION (TOCS)



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Source: Author

recognise the capability, concepts and techniques inherent in each of the five goals of *FIRMS*. The following section delves on the five goals.

FIRMS: GOAL 1

Goal 1 represents *loyalty from customers* (a differential advantage through added value).

Capability

Total quality customer satisfaction is essential to identify and to meet or exceed customers' needs, expectations and perceptions (Flood, 1993). Customer service is perhaps the final and deciding battleground for product differentiation and competitive advantage. Ultimately, customer satisfaction will engender loyalty from customers manifested in repeat purchase and hence a bigger slice of profit and market share for the company (Davidow and Uttal, 1989).

Concept

As more and more markets become in effect "commodity" markets, where customers perceive little technical difference between competing offers, the need is for the creation of differential advantage through added value. Increasingly, a prime source of this added value is through customer service, eg quality of service can be certified by ISO 9004:1991/BS5750 or US Malcolm Baldrige National Quality Award (Horovitz and Jurgens-Panak, 1992).

Customer service may be defined as the consistent provision of time and place utility. Products do not have value until they are in the hands of the customers at the time and place required. There are clearly many facets of customer service, ranging from on-time delivery through to after-sales support. Essentially, the role of customer service is to enhance "value-in-use", ie the product is worth more in the eyes of the customers because service has added value to the core product. In this way, significant differentiation of the total "offer" (ie the core product plus the service package) can be achieved. To be competitive, you have to back the product with great service. Total quality customer service is a central focus of *FIRMS* .

Those companies which have achieved recognition for service excellence, and thus have been able to establish a differential advantage, over their competitors are typically also those companies where supply chain management and distributor network management is a high priority (Lee and Billington, 1992). The achievement of competitive advantage through service comes from a combination of a carefully thought out strategy for service, the development of appropriate delivery systems, commitment from people, and a philosophy of instilling service excellence into every niche of the company.

The attainment of service excellence in this broad sense can only be achieved through a closely integrated manufacturing and marketing strategy. The ability to become a world-class company depends as much on the effectiveness of the operating systems as it does on the presentation of the product, the creation of images and the influencing of customer perceptions. The success of Singapore Airlines, or any of the other frequently cited paragons of service excellence, is not due to their choice of advertising agency, but rather to their recognition that the logistics of service delivery on a consistent basis is the crucial source of differential advantage.

Undoubtedly, loyalty from customers has to be earned. The frontline personnel have to inculcate a concern for their customers. In the interface with customers, they have to advise on the critical success factors to clinch that competitive manufacturing edge for them. There is a need to dispense with outmoded designations like "marketing manager", or manufacturing manager". Companies will need broad-based "integrators" who are oriented towards the achievement of marketplace success based on managing systems and people that deliver total quality customer service. Frontline staff are in effect the "integrators" who have to be experts in the operations of customers. They have to know what equipment mix best suits the customers and what additional equipment the customers need. They provide integrated sales and service capabilities to maximise the life-cycle profitability and growth of the customers. They have to focus on the more strategic role of understanding the long-term needs of their customers' businesses and to reorientate their company towards meeting these needs.

Research shows that marketing costs are three to five times higher for landing a new customer than for keeping an old customer (Hutt and Speh, 1992). Hence, the company should position its policies in corporate culture oriented towards strong service values. Total quality customer satisfaction is a philosophy which must permeate the organization. Empathy, a vision of customer service, reinforced commitment and a positive outlook will transform the output that reaches the customers, the ultimate arbiters of performance (Kotler, 1991; Marconi, 1992).

Companies must practise relationship marketing in this age of the customer (Levitt, 1983; Jackson, 1985b; Christopher, et al 1991; McKenna, 1991; Brown, 1992; Heide and John, 1992; Pathmarajah, 1993; Shani, et al 1993; Tjosvold, et al 1993). The way to achieve a superior market position is to build relationships with customers founded on sincerity, trust and integrity; quality contacts; in other words, the "*affective*" aspect of service.

Techniques

- ***Organizational buying process.*** Begins with the enquiry stage and progresses right through the successful installation of the product to then maintaining a closed-loop communication with customers to ensure that this leads automatically to the next purchase.
- ***Empathic marketing.*** Looking at customers' businesses through the customers' eyes then creating competitive advantages accordingly for the customers.
- ***Relationship marketing.*** Establishing dialogue and maintaining rapport with the customers to find out what they really want and delivering around these specific requirements. Customers should also be more specific about what they want from the company. The organization is a giant feedback loop that begins with identifying the needs of the customers and ends with satisfying them. It is only through two-way communications that relationships are built. The aim is to bring together marketing, quality and customer service as a whole rather than fragmenting these functions. The traditional marketing mix of product, price, place and promotion must be supported by people, processes and provision of customer service cum physical evidence (eg showroom, facilities).
- ***Marketing research.*** Knowing customers' expectations and segmenting customers' according to their service expectations; listening and discovering what important customers expect for service (ranking customers according to their value gives more flexibility); adjusting customer expectations to match ability to delivery service (Karakaya, et al 1991).
- ***Effectiveness and efficiency of service.*** The three measures of the quality of the customer service experience are process, product and satisfaction (see Table 6-3).
- ***Speed of delivery.*** Delivery promise and promptness for the commissioning of machines.
- ***Educated and customer-oriented workforce.*** Qualified, well-trained and professional sales and technical personnel to support customers' decision process and to give after-sales service support, ie to create positive service experiences at first and subsequent points of contact. The bottom-line for customers is improved performance for productivity gains towards profitability and growth.
- ***Honest assessment.*** To conduct an assessment of company's understanding, attitude and behaviour towards "customer" and "service" provision. A need to work long and hard

TABLE 6-3 MEASURES OF THE QUALITY OF CUSTOMER SERVICE EXPERIENCE

Product

The reliability of the product (mean-time-before-failure), safety, ease of operations, adequate product information and documentation, training, improved performance over competitors' product, consistent quality of output, simplicity, availability and continuity of supply of spare parts, product is never obsolete, able to upgrade with the advent of technology, flexible financial terms for products

Process

Diagnostic analysis for easy maintenance, quick resolution of quality and application problems, provision of complete solutions to technical process (application know-how, design of jigs and fixtures, single source for machine and computer-controller), artificial intelligence/expert system build into the manufacturing system for user-friendliness

Satisfaction

Repeat orders (modified or straight re-buy), customer satisfaction in relation to competitors' offerings (effectiveness and efficiency of service), warranty period, competitive pricing (value for money), speed of repair resulting in minimum machine down-time, low maintenance costs

Source: Author

towards total quality customer service, a commitment of all in the company to confront and respond to gaps in the design of total quality customer service; to understand and accept this vision of service.

- *Industrial awareness.* To be aware of the industrial, regulatory and competitive trends towards affecting total quality customer service and how fast they are doing so.

The integrated elements of TQCS is depicted in Figure 6.7.

FIRMS: Goal 2

Goal 2 represents *commitment from workers*.

Capability

Human resource management (HRM) must gain commitment from workers to ensure a competitive workforce with low turnover and high morale.

Concept

Management must perceive the human organization as a source of competitive advantage and create an environment based on workers' commitment, self-management and continuous learning. If world-class manufacturing and marketing techniques are to be successfully implemented, HRM must be brought into alignment with market dynamics and technological requirements.

A company's workers are its most important and valuable asset and as such they need to be nurtured. At the helm of a world-class company, there are leaders who:

- communicate a vision that capture the imagination and commitment of workers
- create an environment that promotes self-motivation and self-control among workers ("inner-directed")
- set high personal and professional standards that they encourage by their own actions
- possess a relatively consistent, predictable approach that engenders trust and support
- understand the importance of sharing
- seek and nurture ideas as valuable resources
- transform ideas into actions that benefits the company
- foster mutual exchange of ideas, information and ideals
- recognise their own limitations and believe in teamwork

In such an organization, HRM is founded on humanistic grounds for staff development. It subscribes to McGregor's Theory Y (1960), ie it takes a positive view of human nature. People are not by nature passive or resistant to organizational needs. The motivation, the potential for development, the capacity for assuming responsibility, and the readiness to direct behaviour towards organizational goals are all present in people. The essential task of management is to arrange organizational conditions and methods of operation so that people can achieve their own goals best by directing their own efforts towards organizational objectives. This is a process primarily of creating opportunities, releasing potential, removing obstacles, encouraging growth and providing guidance. There is a single-minded pursuit of people development. Training of workers is a form of investment . (The annual training budget should be measured against capital investment instead of payroll spending.) Better training enhances returns and the company can discover how much it can benefit from looking at training as an investment multiplier, and exploit this relationship fully.

Effective HRM looks for strengths in their workers and builds on them. Workers are perceived as resources rather than costs. Pfeffer (1994) demonstrates that a loyal and intelligent work force is now the critical element of sustainable competitive advantage.

In contrast to the individualistic orientation of the USA, the Japanese environment seems formal and controlled in its structure with a very strong orientation to the organization and the groups involved therein. The Japanese system (Figure 6.8; Ouchi in Theory Z, 1981) is one of very intense competition to qualify for the better schools and thereby be assured of career development in a major organization. Before the recent burst of the Japanese bubble economy, employees were assured of life-long employment and comfortable retirement. The employee will work in the company for ten years in many different departments before he is considered for promotion. The concept of life-long employment is very conducive to the ideas of group reward, quality assurance, job rotation, and employee loyalty to the company. Employees get a large share of their compensation in the form of a bonus (based on the company's performance). The employees accept and believe in teamworking. Japanese companies are concerned about the well-being of the family as well as the individuals. A great deal of effort is devoted to ensuring that the family is included in recreation and other corporate activities. Companies feel responsible to the families for the proper training, indoctrination and moral supervision of its workers. The corporate philosophies of Theory Z organizations have an intent to treat customers fairly, to treat workers fairly, to provide a quality product, and to operate the business in a manner intended to foster long-term growth.

FIGURE 6.8 THE "VIRTUOUS CIRCLE" UNDERLYING JAPAN'S INDUSTRIAL PERFORMANCE BASED ON OUCHI'S THEORY Z



Source: Dawson, Sandra (1992), Analysing Organisations. Second Edition, Macmillan, London, pp. 151.

For example, as a result of fewer turnover in the workforce, it allows for easier production planning and scheduling for a more stable manufacturing control system. Hence, more reliable delivery promise.

Techniques

- ***Developmental managers in HRM*** (individuals and organizations) need to learn at a speed that is greater than the rate of change if they are to survive in the long term. Freedom and individuality are reflected in questioning insight (innovative learning); order and predictability are reflected in programmed knowledge (maintenance learning). The developmental manager needs to be master of both. Action learning is a particular branch of learning theory that not only links individuals and organization, but also science and human values. It connects action with inner integrity. It is concerned about the essence of man, and for man's moral obligations to himself and others (McLaughlin, 1993).

The developmental manager's emphasis is social rather than technical or economic. His style is supporting, empowering and enabling. One qualification the manager cannot acquire but must bring to the task is *character*.

- ***Creating a "corporate family"***. The most important mission for management is to develop a healthy relationship with the workers, to create a family-like feeling within the company, a feeling that workers and managers share the same fate as permanent and valuable members of the "corporate family". It is a cohesive whole reflected in the cohesive structure of the company, held together by a sense of commitment to the corporate goals. A well-run company is of, by, and for its people. People-bonding is the way to ensure a competitive workforce.
- ***Lifetime employment***. This creates a high degree of employee stability and generates tremendous employee commitment to the company. Due to job security (lower order needs are met), employees are more receptive to organizational changes and the introduction of new technology. The company can confidently invest in training and development to improve current job performance and impart skills needed in future jobs. The company can step up efforts to train workers to adapt to the technologies and more flexible factories of the future. It can make strategic investments in equipment, training and research. It is a two-way committal relationship, very conducive to the concept of workers' loyalty to the company. It has given companies unusual flexibility to manage their businesses while guaranteeing security of employment to the workers.

- *Fostering the spirit of teamworking.* Teamwork is about working together towards corporate goals with workers and managers pulling in the same direction despite different roles and tasks. While individuals strive for excellence, they must be cognizant of membership in the teams. Each person contributes to the team effort, and each is rewarded as a valuable member. People still value financial rewards - profit sharing, quality bonuses, and other varied pay methods. The main objective is to get all workers buying into the ownership of the company and the quality of the products and services they deliver. This is a pragmatic approach to teamwork; teamwork is a yardstick by which the performance and reward of workers are measured. The individual merit system, with the notion of rewarding only a handful of "winners" and branding the rest as "losers", hurts morale and cooperation. And morale and cooperation are important in the search for quality and a competitive edge. Teamwork must eventually be linked to some incentives (monetary and non-monetary), not just job satisfaction.

Management has to build on teams to achieve integration, to weld together technology-based high quality and productivity, and people's aspirations to do meaningful work, work worthy of self.

- *Participative management.* This is a philosophy of management which believes that workers can creatively contribute to solving operational problems through quality control circles (QCCs). The QCC mechanism is one adaptation of the philosophy of action learning. QCC must be imbued with the spirit of teamworking. It is a method of solving productivity problems through a process that improves workers' opportunity for achievement, learning, participation and recognition. Management has to create the environment in which workers can flourish, have their own self-respect and see that their voices count, and where workers feel important. Workers who are listened to usually show initiative and dedication. Then, there is a sense of pride, of belonging to the company. People feel significant. They believe that what they do make a positive difference in the organization which seeks and develops ideas as valuable resources.
- *Continuous learning.* Management recognizes that to retain talented staff it has to provide them with continuing opportunities for development by expanding their capacity to learn. Interactive and lifelong learning is becoming the prevailing means of personal and organizational development. There must be openness to continually learning, both individual and with co-workers, learning within teams. In an age when quality, technology and variety

are all becoming widely available at relatively low costs, the only sustainable competitive advantage that a company can create may be the ability to learn faster than its rivals and to anticipate changes in the business environment. Companies can really only work and prosper if all of the people in them can reach their full potential. Learning and competence matter.

- *Staff welfare and benefits.* Management examines its treatment of staff and seeks to improve staff welfare and benefits to enable staff to feel that they are precious assets of the company. The company has to be progressive in its treatment of its workers. It should compete with other companies to offer workers better recreational and housing facilities, bonuses, gratuity and pension, medical and insurance benefits, etc, and invest in modern plant and equipment aimed at making work easier and more pleasant.

Progressive companies even offer share options to staff to cultivate further bonding between management and workers. With confidence in the company, workers and management are even willing to accept a cut in their salaries and bonuses when the economy is in recession.

FIRMS: Goal 3

Goal 3 represents *cooperation from suppliers* (value added partnership).

Capability

Supply chain management must not only gain manufacturing advantage, ie the entire chain of raw material supply, manufacture and assembly is managed, but also service advantage. Because many of the spare parts/sub-assemblies are manufactured by the sub-contractors or suppliers. There is no significant advantage added to the supply chain if customers in the chain, including end-users cannot experience the advantageous in the value added service, ie timely arrival or availability of spares at any corner of the world to achieve minimum down time of machines. This maximizes the effectiveness of relationships between the manufacturer and suppliers to serve the end customers for profit leverage through value added partnership (Lamming, 1993).

Concept

Physical distribution is today's frontier in business. It is the one area where managerial results of a great magnitude can be achieved with the adoption of the concept of integrated supply and, more recently, of logistics management.

The reach of logistics extends from managing supplier relations through to the management of final demand via intermediaries on to the final customers. Logistics is the process of strategically managing the acquisition, movement and storage of materials, parts and finished inventory from suppliers through the organization and its marketing channels, in such a way that current and future profitability is maximized through the cost-effective fulfilment of orders (Christopher, 1992a).

Logistics management is a means to achieve a closer integration between the marketplace and the company. The mission of logistics management is to plan and co-ordinate all those activities necessary to achieve the desired levels of delivered service and quality. Logistics is, therefore, the link between the marketplace and the operating activities of the business. The scope of logistics spans the organization, from the management of raw materials through to the delivery of the final product.

There is a very close analogy between the logistics management concept and this flow-oriented notion of integration.

The author recognises the enlarged definition of the scope of logistics. However, the scope of supply chain management is narrower. It spans the organization, from the management of raw materials through to the manufacture of the final product. (Network management of distributors is in the delivery of the final product to the end customers. This area needs special focus for competitive leverage).

Supply chain management requires the various parties in the suppliers-manufacturer chain to co-operate in the development of schedules and in the sharing of information. A major justification for such cooperation is the fact that the output efficiency of the suppliers will be reflected in the customers' costs. Because material costs represent such a large proportion of the sales value, perhaps as much as 40 percent for a typical manufacturer, anything that can be done to reduce those costs should be explored (Macbeth and Ferguson, 1994).

The most significant impact that the buyer can have on the suppliers' costs is through the integration of planning systems to provide the suppliers with improved visibility of the buyer's materials requirements and through schedule stability to enable suppliers to optimize their own production schedules and hence minimize their inventory and working capital investment.

Supply chain management reaps the potential benefits that organizations which adopt a cross-company boundary focus can derive. Management of supply chains is increasing in importance because of the trend towards longer international supply chains. The two main pressures for longer international supply chains are increasing world competition and differential labour costs. Increasing competition forces competing companies to focus on what they are good at. As companies specialize, and focus on a smaller range of activities, the number of organizations involved in a supply chain increases. Supply chains, therefore, become longer with a greater number of links. Many large organizations are now managing supply chains that cover long physical distances because to remain competitive they must either make in or buy from low-labour-cost-based countries (Houlihan, 1987; Scott, et al 1991).

Companies seeking to maintain and improve their competitive positions are recognizing increasingly the contributions of the many members of their supply chains, and the benefits of integrating the various activities throughout these chains (Ellram, 1991). The lean supply chain model of customer-supplier relationships is shown in Table 6-4.

Given the higher proportions of products sourced outside the company this implies that manufacturers are dependent on those suppliers innovating and improving and allowing them a share in that process. There is tremendous improvement potential available to management that is more supply chain aware. It is the locus of innovation, competence and the source of value added. This implies new ways of co-ordinating somewhat disparate interest groups to harness their collective expertise in support of the overall goal of end-customer satisfaction.

Techniques

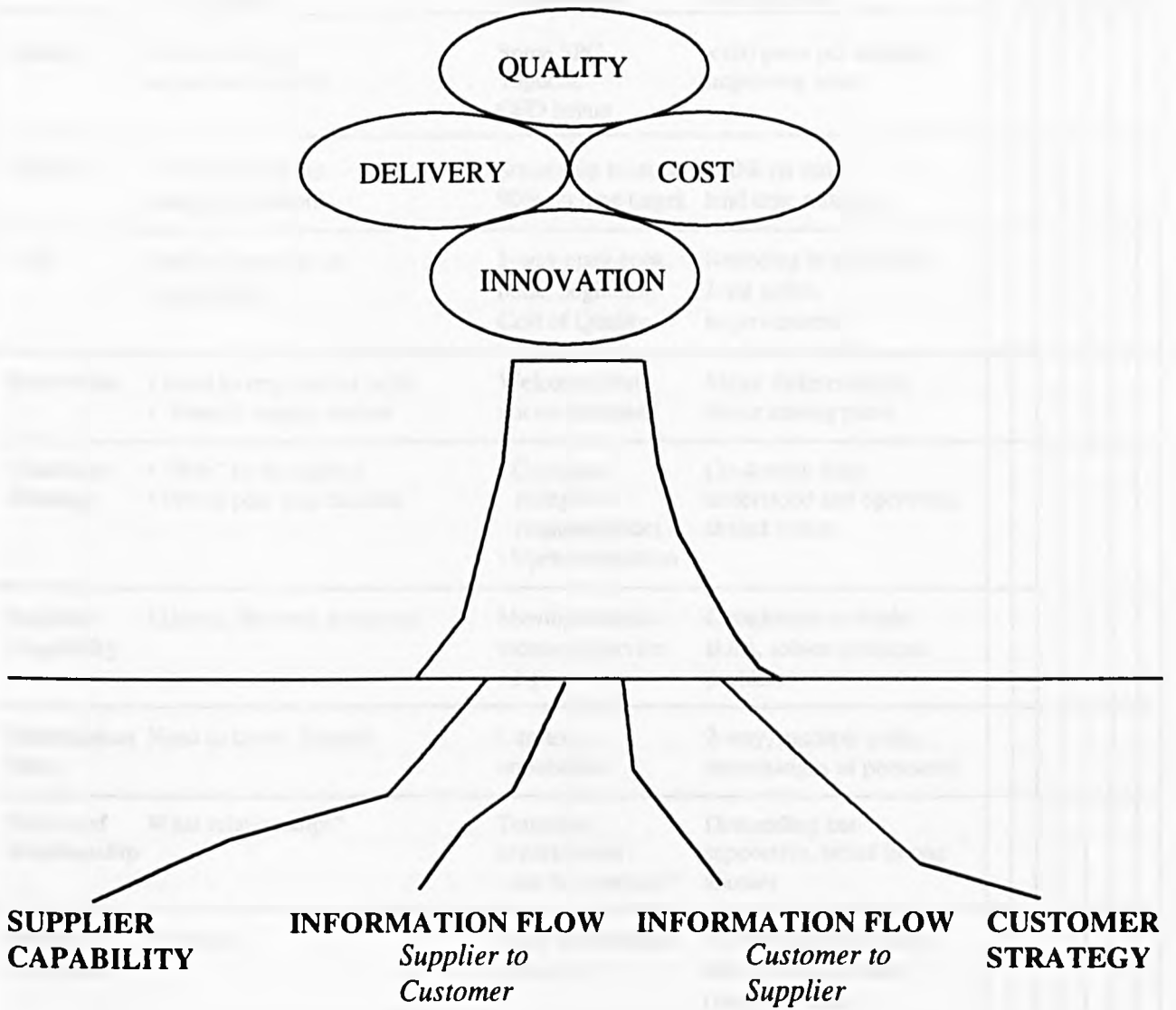
- *Positioning Tool and relationship improvement process.* This technique is developed by Macbeth and Neil (1991). See Figure 6.9 and Table 6-5.
- *Throughput management.* This is the process whereby manufacturing and procurement lead times are linked to the needs of the marketplace. At the same time, throughput management seeks to meet the competitive challenge of increasing the speed of response to those market needs. The goals of throughput management are: lower costs; higher quality; greater variety; more flexibility; faster response-time. The achievement of these goals is dependent on managing the supply chain as a pipeline and seeking to reduce the pipeline length and/or speed up the flow through that pipeline. In examining the efficiency of supply chains, it is often found that many of the activities that take place add more cost than they add value.

TABLE 6-4 THE LEAN SUPPLY MODEL OF CUSTOMER-SUPPLIER RELATIONSHIPS

Factor	Lean Supply Characteristics
Nature of Competition	Global operation; Local presence Based upon Contribution to Product Technology Organic Growth and Merger & Acquisition Dependent upon Alliances/Collaboration
Basic of Sourcing Decisions	Early involvement with suppliers Joint efforts in Target Costing/Value Analysis Single and Dual Sourcing Supplier provides global benefits Re-sourcing as a last resort after attempts to improve
Role/Model of Data/Information Exchange	True transparency: costs, etc. Two-way: discussion of costs and volumes Technical and commercial information Electronic Data Interchange Kanban system for production deliveries
Management of Capacity	Heijunka smoothing: Synchronised capacity Regionally strategic investments discussed Flexibility to operate with fluctuations
Delivery Practice	Trust Just-In-Time (JIT) with Kanban Local, long-distance and international JIT
Dealing with Price Changes	Price reductions based upon cost reductions from orders onwards: from joint efforts
Attitude to Quality	Supplier Vetting Schemes become redundant Mutual agreement on quality targets Continual interaction and Kaizen Perfect Quality as Goal
Role of R & D	Integrated: Assembler and Supplier Long-Term Development of Component Systems Supplier Expertise/Assembler Systems Integration
Level of Pressure	Very High for both customer and supplier Self-imposed: Not Culturally Specific

Source: Adapted from Lamming, R.C. (1992), "From National Competitive Advantage to Dominant International Operations: The Development of Lean Supply", in Hollier, R.H., Boaden, R.J. and New, S.J. (Eds), International Operations: Crossing Borders in Manufacturing and Service. Elsevier Science Publishers B.V., Amsterdam, The Netherlands, pp. 91.

FIGURE 6.9 POSITIONING TOOL CONCEPT FOR SUPPLY CHAIN MANAGEMENT



Source: Macbeth, D. K. and Neil, G. C. (1991), "Customer - Supplier Relationship Performance Measurement", Second International Conference of Production and Inventory Control Society, Belgium, August, pp 5.

TABLE 6-5 RELATIONSHIP MATURITY GRID

	Adversarial	Transitional	Partnership	1	2	3	4	5	6	7
Quality	Variable, high inspection/ rejects	Some SPC, Taguchi, QFD begun	<100 parts per million, improving trend							
Delivery	Not measured but complained about	Some ship to stock 90% on time target	100% on time, lead time reducing							
Cost	Hidden, tough price negotiations	1-way open book, book, beginning Cost of Quality	Reducing in real terms. Joint action improvements							
Innovation	<ul style="list-style-type: none"> • Used as negotiation tactic • "Forces" supply switch 	Welcomed but not co-ordinated	Major differentiating factor among peers							
Customer Strategy	<ul style="list-style-type: none"> • "Win" in the market • Power play negotiations 	<ul style="list-style-type: none"> • Customer recognises responsibilities • Open to question 	Co-destiny fully understood and operating, shared vision							
Supplier Capability	Limited, focused, protected	Moving towards increased service range	Contributes multiple skills, solves customer problems							
Information Flow	Need to know, filtered	Limited, unbalanced	2-way, multiple paths, interchanges of personnel							
Nature of Relationship	What relationships?	Tentative, experimental - are they serious?	Demanding but supportive, belief in one another							
Business Outcomes	Uncertain	Early performance pay-offs	Increased market share, reduced cost, greater competitiveness							

Source: Macbeth, D. K. and Ferguson, N. (1994), Partnership Sourcing: An Integrated Supply Chain Management Approach. Pitman Publishing, London, pp. 202.

Throughput management is concerned to remove the blockages that occur in the pipeline which lead to inventory build-ups and lengthened response times. The source of these blockages are, for example, extended set-up and change-over times, bottlenecks, excessive inventory, sequential order processing and inadequate pipeline visibility. Optimized production technique (OPT) is a useful technique for solving problems associated with bottlenecks in work-in-progress (Goldratt and Cox, 1993).

To achieve improvement in the throughput process requires focus on the lead time as a whole, rather than the individual components of that lead time. In particular, the interfaces between the components must be examined in detail. The greatest opportunity for throughput improvement will generally come from a better use of information regarding demand. Too often, data on demand is obscured from view because the order penetration point is too far down the chain; ie when an order hits the system it is passed sequentially from one node in the chain to another, its very existence being hidden by the presence of intermediate stockholdings. Thus, in a traditional system, inventory held by a supplier will hide demand until the supplier's re-order point is reached.

- *Enabling technologies and standards.* To facilitate changes that help to tackle the pressures that companies have faced to internationalize and lengthen their supply chains. For example, computing and communications technologies are enabling quick, reliable international transfer of data. The emergence of standards for transfer of invoices, purchase orders, engineering drawings and other business communications, have enabled international supply chains to pass information quickly in an acceptable form among operating companies. The benefits are lead time and inventory reductions.
- *Integrated information systems.* Information systems are a key factor for success in supply chain management. There is a need for an integrated systems strategy down the supply chain that reduces the level of business vulnerability.
- *Identify distinctive competences.* A formulated strategy possesses synergy if it results in an interaction of enterprise resources that produces total benefits greater than those that could be produced by the independent use of those resources. In a supply chain, this can be achieved either by applying distinctive competence or expertise to a related activity (eg supplier development to improve a supplier's performance and thus improve the manufacturer's performance) or through using one resource many times resulting in economies-of-scale

efficiencies (eg by centralizing purchasing at one node in a supply chain). From a systems viewpoint, managing the supply chain system as a whole will be synergistic (Davis, 1993).

- *Creating membership of an "extended family"*. Suppliers-manufacturer relationships must be mutually supportive and mutually developmental. The best of companies already engender a familial attitude and are bringing the immediate members of their supply chain into an extended family grouping, where concern and support are freely given and received, where manufacturer and suppliers work together to minimize risks (Burt and Doyle, 1993).
- *Management and technological support*. The manufacturer will give management and technological support to suppliers to help refine their technology and quality, share production information, and assist in feasibility studies on investing in special/high-tech equipment. Hence, parts suppliers are willing to develop new techniques and buy state-of-the-art equipment because of this long-term relationship. Further, giving design responsibility to suppliers speeds product development and increases flexibility. The manufacturer no longer needs to have every technology (Merli, 1991).
- *Financial clout*. The manufacturer acts as guarantor for suppliers. This would ease suppliers' credit-worthiness with the banks (often members of the same banks); another benefit for the suppliers is lower transaction costs. Manufacturers should be willing to bail out a failing supplier company. This can create a problem when the economy is in depression because the suppliers still expect the manufacturers to protect their interests even though the manufacturers themselves are facing a financial crisis due to the steep drop in demand.
- *Supplier rating system*. Traditional supplier (vendor) rating systems measure unit price, quality, delivery, performance, and service. More fundamental are suppliers' management stability, conviction of the importance of end-customer satisfaction, and commitment to invest in the future capability of their companies (Jones and Clark, 1990; Pendlebury, 1990).
- *Give awards*. To efficient and effective suppliers (Jones, 1989).

FIRMS: Goal 4

Goal 4 represents *collaboration from distributors* (value added partnership).

Capability

Network management of distributors builds rapport and establishes long-term relationships

for market penetration and market development, sometimes at the expense of profitability for longer-term market share to erect barriers for potential new entrants/competitors. The principle of "cross-subsidy" is extremely effective in such an arrangement because manufacturers and their respective distributors can optimise the resources in view of the joint efforts. The apportioning of costs and overheads can be adjusted according to the marketing strategy to attain market share in spite of loss in a particular market. Whilst the country-focus (eg Singapore) as a cost centre may reflect a loss, the resultant overall regional performance (eg ASEAN) may be acceptable to top management because it still shows bottom-line profitability.

Concept

In distribution to the end-customers, this will be the last point at which a product differentiation decision is made. These end-customers are the decision makers whose decisions determine a company's success or failure now and in the future. The end-customers pay for a product/service package based on the following factors: quality; delivery; price; service; innovation; and product range.

Some of these factors win orders (order-winning criteria) and some qualify you to be considered by the customers (qualifying criteria). It is recognized that orders are increasingly being won on delivery and service aspects (Soin, 1992; Cortada, 1993). This has significant implications for the distributors-manufacturer relationship. This focus should be reflected in decision making related to resources, to strategy, to organizational structure and to long-term market share/profitability (Berry and Parasuraman, 1991).

Techniques

- *Members of an "extended family"*. Treat distributors as members of the extended family, inculcate a concern for the development and growth of their business (Iyer, 1992).
- *Consultancy service*. In high technology products, like CNC machines, technical information provision to support the end products is one of the key factors influencing organizational buying behaviour. Customers expect the distributor to collaborate with the manufacturer to provide consultancy on how to manufacture their components using the most productive method. The distributor who can provide the shortest manufacturing cycle time while complying with the technical specifications would most likely clinch the order. Consultancy service is practice in such businesses and plays a critical role in influencing the purchase decision (JMTBA, 1992).

- *After-sales service and productive maintenance support.* To reduce machine downtime to the minimum, the manufacturer and distributors to jointly devise a total productive maintenance (TPM) programme for the end-customers. Eventually, end-customers are trained to perform their own TPM programme resulting in further reduction in unnecessary costs, time and efforts (Christopher, 1992b).
- *Market Intelligence.* The distributor network is a critical link between the manufacturer and the customers, supplying market intelligence leading to product improvement, product development, and better design for function and manufacture (Band, 1991; Whiteley, 1991).
- *Market coverage and product availability.* Principles of JIT marketing and inventory management are employed for market coverage and product availability. The objective is to minimize logistics costs and pass on the "savings" to the customers at a competitive price (Jackson, 1985b; Leenders and Blenkhorn, 1988; O'Neal and Bertrand, 1991).
- *Market development and accounts solicitation.* The distributors can play a major role in soliciting new accounts. Also, they can expand the size of the market with complementary products. For example, most CNC machine tool users will link-up the machine tool to a personal computer or CAD/CAM system. The distributors can capitalize on the situation by providing a "one-stop" solution which includes computers with suitable CAD/CAM software to exploit the capabilities of the CNC machines. The aim is to sell complete "systems" or "solutions" to meet customers' needs (Albrecht, 1992).
- *Network management and control.* More time and effort are devoted to developing distribution channels. As the size of the market increases, there is a corresponding increase in the number of distributors. This often leads to the need for more professional management to look into planning, financial cash flow, inventory policies, service efficiency, etc (Lele and Sheth, 1991). The manufacturer has to decide on the form and level of support to be given to the distributors, eg to encourage centralized or decentralized control; to joint venture with the manufacturer playing a passive role in operational matters and an active role in strategic issues; to transfer technical/application servicing know-how from the manufacturer to the distributors with the establishment of a technical-support centre, the distributors to concentrate on sales-related activities and to attend to routine servicing problems. This is to develop and upgrade distributors' know-how and skills (Payne, 1993).

FIRMS: Goal 5

Goal 5 represents *respect from competitors* (industry/market leader working on the principle of competitive cooperation).

Capability

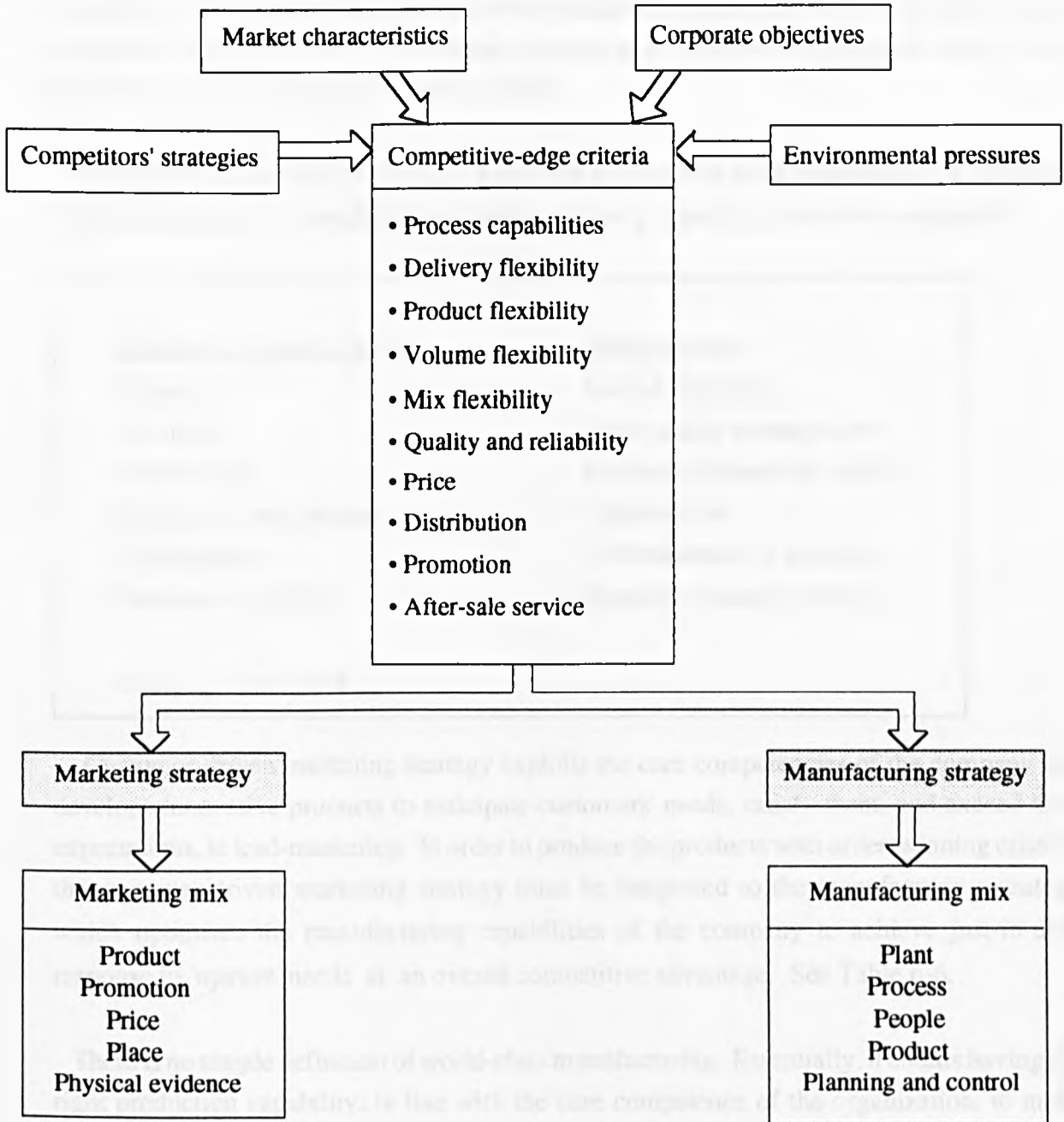
World-class manufacturing and world-class marketing are the twin pillars of world-class manufacturing companies. These companies seek to achieve competitive advantage by identifying world markets for their products and then develop manufacturing strategy (with the aid of supply chain management) to support their market-driven cum customer-driven marketing strategy (with the aid of distributor network management). Respect from competitors is earned through this synergistic approach. Competitive cooperation among global players in the world-class league will determine the industry/market leader, beyond the world-class status, which practises lead-marketing-manufacturing strategy. This strategy addresses the target market by defining the manufacturing imperatives (quality, price, delivery, flexibility and service) coupled with product innovation and the capability to design and introduce new products to the market quickly (See Figure 6.10).

Manufacturing and marketing recognize and accept fluid strategic problems, how customers and competitors interact with the external environment, to create a competitive advantage. Hence, the best competitive advantage usually combines both the customer and competitor orientations (Day, Weitz and Wensley, 1990).

Concept

It is critical to realize that different marketing strategies and approaches to gaining a competitive advantage place different demands on manufacturing. The purpose of manufacturing (as in marketing) is to serve the customers, to meet their needs. With skilful leadership at the helm, the company will be able to make a profit, increase market share, and grow, to ensure the long-term survival of the company. Manufacturing is part of the strategic concept that relates a company's strengths and resources to opportunities in the market. Each strategy creates a unique manufacturing task. There is, therefore, a logical need for manufacturing strategy to work in tandem with marketing strategy to develop and support a lasting competitive advantage for overall corporate success (Hill, 1993). Manufacturing should take an equal role in defining the desired competitive advantage if manufacturing is to become a significant competitive weapon because once the manufacturing capabilities are fixed, marketing strategy is constrained by their limitations.

FIGURE 6.10 MANUFACTURING - MARKETING STRATEGY FRAMEWORK



Source: Adapted from New, Colin C. (1992), "World Class Manufacturing versus Strategic Trade-Offs", International Journal of Operations and Production Management. Vol. 12, No. 4, pp. 19 - 31.

Manufacturing can be converted into a competitive weapon in the business by ensuring that manufacturing strategy supports products in the market-place (Skinner, 1985). This requires the development of sound marketing which establishes the order-winning criteria and that manufacturing structure and infrastructure are designed to support these for each product range (marketing superstructure). The process is iterative as order-winning criteria change in the dynamic and fluid market (Tompkins, 1989).

Manufacturing strategy is the set of goals and policies that guide manufacturing decisions. The key elements of manufacturing strategy can be grouped into these two categories:

<u>Structure (process choice)</u>	<u>Infrastructure</u>
Capacity	Human resources
Facilities	Total quality management
Technology	Production/materials control
Equipment and process	Organization
Technologies	Diversification of products
Vertical integration	Supplier (vendor) relations
Source: Voss, 1992	

Customer-driven marketing strategy exploits the core competencies of the company and develops innovative products to anticipate customers' needs, satisfy them, and exceed their expectations, ie lead-marketing. In order to produce the products with order-winning criteria, the customer-driven marketing strategy must be integrated to the manufacturing strategy which optimizes the manufacturing capabilities of the company to achieve just-in-time response to market needs at an overall competitive advantage. See Table 6-6.

There is no simple definition of world-class manufacturing. Essentially, it entails having the right production capability, in line with the core competence of the organization, to make money from totally satisfying the customer with high quality services and products at the right price, delivered at the time. It means operating at standards equal to the best in the world. It is relevant not only to companies that export - it is just as relevant to companies facing overseas competition, and that is the concern of every business enterprise (Chan, 1994a).

TABLE 6-6 THE INTERDEPENDENCE OF MANUFACTURING STRATEGY AND MARKETING STRATEGY

1	2	3	4	5
Corporate objectives	Marketing strategy	How do products win orders in the market place?	Manufacturing Strategy	
			Process choice	Infrastructure
<ul style="list-style-type: none"> • growth • survival • profit • return on investment • other financial measures 	<ul style="list-style-type: none"> • product markets and segments • range • mix • volumes • standardisation <i>versus</i> customization • level of innovation • leader <i>versus</i> follower alternatives 	<ul style="list-style-type: none"> • price • demand • conformance • quality • delivery speed • reliability • colour range • product range • design leadership • brand image • technical support 	<ul style="list-style-type: none"> • choice of alternative processes • trade-offs embodied in the process choice • role of inventory in process configuration • process positioning • capacity • size • timing • location 	<ul style="list-style-type: none"> • function support • manufacturing planning and control systems • manufacturing systems • quality assurance and control • clerical procedures • work structuring • organizational structure • payment systems

Note: Although the steps to be followed are given as finite points in a stated procedure, in reality the process will involve statement and restatement, for several of these aspects will impinge on each other.

Source: Hill, Terry (1993), The Essence of Operations Management. Prentice Hall, Hemel Hempstead, Hertfordshire, pp. 19.

Some Elements in World-Class Manufacturing

- A change in attitude and mind-set. Manufacturing as a process extending from customer need to customer satisfaction: concept of manufacturing from that of the isolated factory to that of the focused, flexible factory in the process of creating national economic value
- Approach manufacturing from a balanced perspective placing equal emphasis on structural, infrastructural concerns and integrating elements of strategy
- Understand that product and market drives manufacturing and service requirements match marketing, engineering, and manufacturing capabilities
- Manufacturing as a Total System. Integrated manufacturing for total manufacturing planning and control
- Lean production and intelligent manufacturing systems for manufacturing advantage (see Table 6-7)
- Benchmarking
- Proper management of technology
- Manufacturing strategy clearly defines a winning strategic intent
- Information technology as the missing link between strategic resources and enterprise functions
- Becoming the best competitor
- Growing more rapidly and being more profitable than competitors
- Hiring and retaining the best people
- Developing a top-notch engineering staff
- Being able to respond quickly and decisively to changing market conditions

TABLE 6-7

THE MAJOR CHARACTERISTICS OF CRAFT PRODUCTION, MASS PRODUCTION AND LEAN PRODUCTION IN THE AUTOMOBILE INDUSTRY

Characteristic	Craft Production	Mass Production	Lean Production
<i>Technology</i>	Simple, but flexible tools and equipment using unstandardized components	Complex, but rigid, single-purpose machinery using standardized components. Heavy-time and cost penalty involved in switching to new products	Highly flexible methods of production using modular component systems. Relatively easy to switch to new products
<i>Labour force</i>	Highly skilled workers in most aspects of production	Very narrowly skilled professional workers design products but production itself performed by unskilled/semi-skilled "interchangeable" workers. Each performs a very simple task repetitively and in a predefined time and sequence	Multiskilled, polyvalent workers operated in teams. Responsibilities include several manufacturing operations plus responsibility for simple maintenance and repair
<i>Supplier relationships</i>	Very close contact between customer and supplier. Most suppliers located within a single city	Distant relationships with suppliers, both functionally and geographically. Large inventories held at assembly plant "just in case" of disruption of supply	Very close relationships with a functionally tiered system of suppliers. Use of "just in time" delivery systems encourages geographical proximity between customers and suppliers
<i>Production volume</i>	Extremely low	Extremely high	Extremely high
<i>Product variety</i>	Extremely wide - each product customized to specific requirements	A narrow range of standardized designs with only minor product differentiation	Increasingly wide range of differentiated products

Source: Adapted from Dicken, Peter (1992), Global Shift, Second Edition, Paul Chapman Publishing Ltd, London, pp. 282.

Footnote:

"Lean production is 'lean' because it uses less of everything compared with mass production - half the human effort in the factory, half the manufacturing space, half the investment in tools, half the engineering hours to develop a new product in half the time. Also, it requires keeping far less than half of the needed inventory on site, results in many fewer defects, and produces a greater and ever growing variety of products" (Womack, Jones and Roos, 1990).

"What the new lean production techniques allows is the production of a variety of cars but within a large annual volume. Hence, an assembly plant is still optimum at around 250,000 units a year, although the model specific optimum can be lower. What the new techniques do is to make it easier for large companies to make a variety of products, but they do not make it easier for small companies to survive" (Rhys, 1990).

On-The-Job Training is crucial to the success of lean production. Three strategies help sustain Japanese companies' productivity growth - QCC, JIT and Lean Production (*Straits Times*, April 11, 1992). Nevertheless, there is still a need for a new synthesis in manufacturing as a strategy for postlean production:

"Japanese companies are very competitive in such industries as cars, consumer electronics, semi conductors, and standardized machine tools. They have not invented any universal production or management system, however, and Porter(1990) finds them to be much less successful in industries demanding customization and individualized customer relations. Another drawback of much of the flexibility debate is that the strong interest in changed product markets and new technology as driving forces for new production strategies tend to obscure the significance of labour market conditions and the role of trade unions, government policies, and national institutions in general. High unemployment, large income inequalities, deficient social protection, and low labour standards facilitate the adoption of the regressive features of lean production that are causing so much dissatisfaction in Japan. Advanced labour market policies, solid social security, and regulation of the work environment raise costs in the short term. In the long run, however, if companies, financiers, and management are committed to their industry, such selective disadvantages will stimulate innovation, upgrading, and sustainable competitive positions. To maintain the advanced social demands that are the basis for *human-centered production*, governments must play an important role. This is particularly true in Europe, where the much-delayed development of the 'social dimension' of the integrated market could be a very important element in the movement toward postlean production" (Berrgren, 1992).

- Adopting a product and process engineering approach which maximises the performance of both
- Continuously improving facilities, support systems and skills
- World-class management
- People involvement
- Vision
- A fundamentally different way of operating
- Focus on success of products and markets before financial performance
- Manufacturing capabilities: high quality, adaptive production system, low cost/high volume production, dependable, consistent

The Key Elements

The key elements in world-class marketing are:

- lead-marketing-manufacturing global strategy in lieu of customer-driven marketing strategy
- manufacturing strategy as an integral part of marketing strategy
- vision and leadership for global marketing
- total quality marketing management to achieve superior customer service
- image marketing to create and sustain a distinctive position in the minds of target customers
- turbo marketing and innovation (product engineering) for market development to achieve JIT marketing
- long-term commitment of human resources to the target market segment, organized around core competences of the corporation

Some Elements of World-Class Marketing

- Parkinson (1991) six foundation stones of world-class marketing:

- vision and leadership
- understanding the customer
- recruitment training and motivation of employees
- developing a total quality operation
- innovation
- creating/sustaining a distinctive position in the minds of target customers

- Keegan, et al (1992), Mazur and Hogg (1994) concurred that the real challenge of emerging global markets transformed every company from a local- or national-class enterprise to a real world-class enterprise. The essence of a world-class enterprise is that it is customer-driven because it creates greater value for customers and also greater competitive advantage for itself. Hence, the world-class company adopts the following practices:

- customer-focused
- draws upon corporate imagination to envision latent markets and the ability to shake them out
- strives to become a low-cost producer
- stakes itself out as a fierce competitor
- involves employees at all organization levels and locations
- committed to continues improvement and quality products

- Kotler (1994) has traced the best marketing practices in the 1970s, 1980s and 1990s (see Table 6-8). The fad has shifted from prestige marketing to value marketing and world-class marketing.

TABLE 6-8 MARKETING BEST PRACTICES IN THE 70's, 80's and 90's

1970s¹	1980s²	1990s³
Product Driven	Market Driven	Market Driving (create market)
Mass-Market Oriented	Segment Oriented	Niche Oriented and Customer Oriented (mass customization)
Product Offer	Augmented Product Offer	Customer Solutions Offer
Average Product Quality	Better Than Average	Legendary
Average Service Quality	Better Than Average	Legendary
End-Product Oriented	Core-Product Oriented	Core-Competency Oriented
Function Oriented	Process Oriented	Result Oriented
Reacting to Competitors	Benchmarking Competitors	Leapfrogging Competitors (beyond world-class)
Supplier Exploitation	Supplier Preference	Supplier Partnership
Dealer Exploitation	Dealer Support	Dealer Partnership
Price Driven	Quality Driven	Value Driven
Average Speed	Better Than Average	Legendary
Hierarchy	Network	Teamwork
Vertically Integrated	Flattened Organization	Strategic Alliances
Stockholder Driven	Stakeholder Driven	Societally Driven



Footnote:

- Prestige Marketing¹** : if we offer you a Mercedes-Benz, you will have to pay the price for it, ie more for more.
- Value Marketing²** : the discounting or value generation who wants more for the same, or same for less.
- World-Class Marketing³** : value-oriented plus satisfaction guaranteed; you need not necessarily change the lowest price for top quality products, but you should have the capability to do so.

Source: Adapted from Kotler, Philip (1994), Marketing Management: Analysis, Planning, Implementation, and Control. Eighth Edition, Prentice Hall, Englewood Cliffs, New Jersey, pp. 763.

- Kotler (1994) has identified the following elements in world-class marketing strategy:

<u>Understanding Strategy</u>	<u>Creating/Sustaining a Strategic Organization</u>	<u>Managing Strategy Analysis</u>
<ul style="list-style-type: none"> • Companies must manage strategy and operations • Strategy is a choice process that begins in the strategist's mind • The goal of strategy is to create and sustain competitive advantage • Competitive advantages are the products of entrepreneurial thinking • Competitive advantage may be more than distinctive competences • Effective strategies are conditional on company and market factors • Strategic choice is limited to manageable factors • The companies' goals constrain and direct strategic choice • Market structure does not dictate strategy • Latent competitors can hurt more than manifest competitors • Customers, not competitors, determine who wins the competition • Continuous incremental changes can beat occasional revolutionary changes • Strategy timing is as important as strategy choice • Commitment, flexibility, and creativity are the keys to successful strategy 	<ul style="list-style-type: none"> • The major cause of strategy failure is is strategy success • Organizations need to built a strategic culture • Strategic cultures are created by strategic leaders committed to making their organization be strategic • Companies need to form strategy circles • Structure needs to co-evolve with strategy 	<ul style="list-style-type: none"> • The purpose of strategy analysis is insight, not numbers • Strategic learning takes place through actions • Strategyformulation and implementation require continuous interfacing •Management must identify and manage issues of most substantial import and the organization • Towards strategic renewal

Techniques

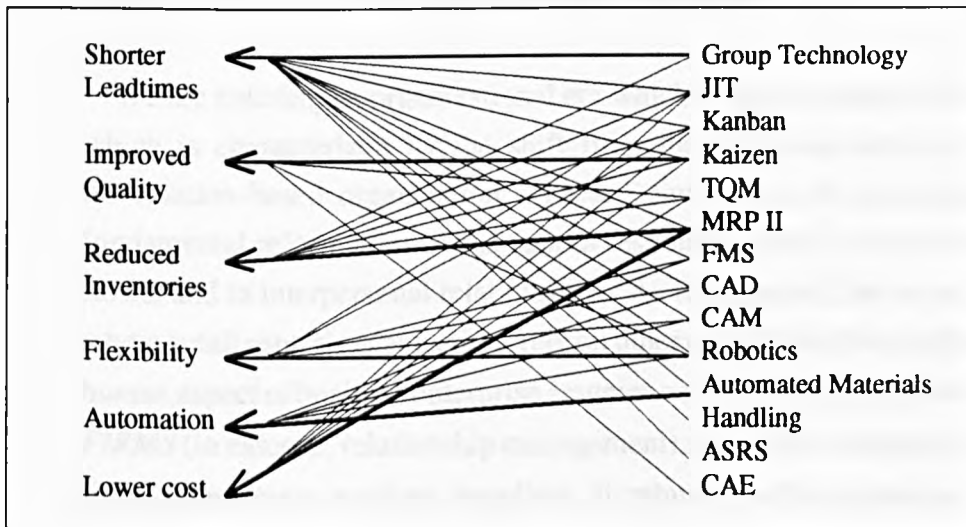
In business, the pursuit of the ideals of world-class manufacturing is fundamental. It is the main aim for which other manufacturing techniques like JIT, MRP II, TQM, CNC, FMS, CIM, GT, OPT, IMS, Concurrent Engineering, Lean Production - play contributory roles. For example:

<u>Production Capabilities</u>	<u>Supporting Concepts / Tools / Techniques</u>
High quality	Total quality management, design for manufacturing
Adaptive production system	Flexible manufacturing systems (FMS), CNC
Low-cost/high-volume production	Just-in-Time systems (JIT), focused factory concepts
Speed to market	Concurrent engineering, FMS, JIT
Augmented service	Service factory concepts
Reduced inventories	Supply chain management, manufacturing resource planning (MRP II), optimized production technique (OPT)
Shorter leadtimes	Group technology (GT), JIT, CNC
Flexibility	GT, CNC, FMS, supply chain management

Source: Author

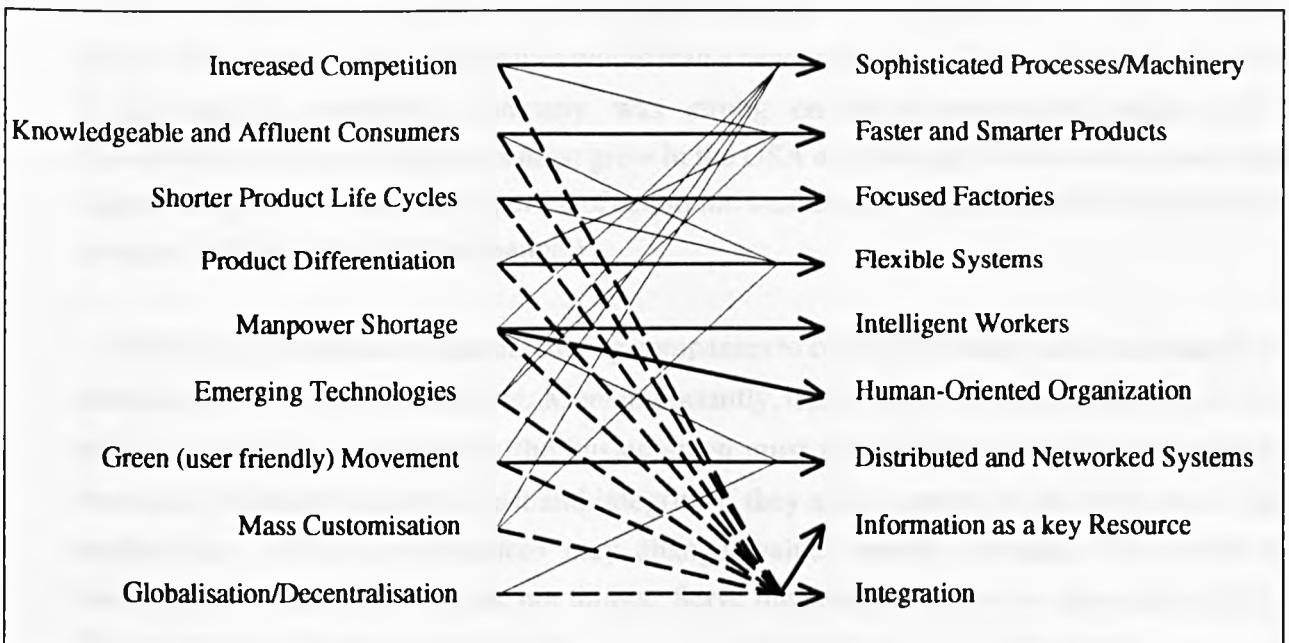
It is vital to recognize that modern techniques (like JIT production, MRP II, TQM, FMS, CIM and the latest development on IMS - including concurrent engineering) are no more than tools, and are not manufacturing strategies. Similarly, product life cycle analysis, diffusion of innovation, PIMS, value-chain analysis, and directional policies are marketing tools and not marketing strategies. These techniques can be combined to achieve the aforementioned production capabilities (Aggarwal, 1985; Crowe and Nuno, 1991). See Figure 6.11.

FIGURE 6.11(a) RELATIONSHIP BETWEEN STRATEGIC OPTIONS AND TECHNIQUES



Source: Author

FIGURE 6.11(b) RELATIONSHIP BETWEEN TRENDS AND CAPABILITIES



Source: Author

6.5 Summary

Changes in the internal and external business environment since the 1940s have been the catalyst behind a dramatic organizational evolution.

We are entering an organizational era which is fundamentally different from the past, one which is characterized by the shift from the command-and-control organization to the information-based organization. These new forms of organizational structure involve fundamental reformation in managerial responsibilities, in communication and information flows, and in interpersonal relationships. As we approach the network form of organization where small central organizations rely on other companies (for supplies and distributions), the human aspect of business enterprise assumes a central role in the game of competition. Hence, *FIRMS* (in essence, relationship management) is needed to manage the chain of relationships linking customers, workers, suppliers, distributors and even competitors.

The Japanese *Zaibatsu*, such as Mitsui, Mitsubishi, Sumitomo and Yasuda, grew not from strength but from weakness. Co-operation was a vehicle for strengthening weak domestic companies and allowing them to compete against much stronger foreign companies. Information about new technologies and scarce managerial talent was shared; the cost of funds was lower inside a group than outside it; mutual support was forthcoming in bad economic times. The group's trading companies would lead a new product into foreign markets and give it aid until the producing company was strong enough to promote the product itself. Co-operation among competitors must grow in the USA and Europe for the same reason that it grew in Japan; it is needed in a period of economic weakness. (It is also needed in the present times of radical and turbulent change.)

FIRMS is a paradigm for manufacturing companies to cope with change and uncertainty in their search for profit/market share. More importantly, it provides the right perspective. In the midst of relentless competition, the businessmen must anchor their practices in the time-honoured values of sincerity, trust and integrity if they are to survive in the long run in the marketplace. While circumstances may change, values remain constant. The world is composed of inter-relationships, not things. Serve the customers, involve the stakeholders. The continuity of relationships in the long run will result in continued improvements of systems and processes of working together to serve the customers. This is the strategic intent.

The basic stance of *FIRMS* is that the quality of human relationships in the corporate world

contributes to business success or failure. *FIRMS* attempts to make manifest or explicit the following intangible psychological factors for value added partnerships:

- Goal 1 : Loyalty from customers (*value for money*)
- Goal 2: Commitment from workers (*meeting hierarchy of needs*)
- Goal 3: Co-operation from suppliers (*expanding and reliable business*)
- Goal 4: Collaboration from distributors (*expanding and reliable business*)
- Goal 5: Respect from competitors (*setting standards for business excellence*)

These goals are inter-linked (see Figure 6.12). Hiccups in any relationships would have a chain effect on the ultimate satisfaction of customers' needs. If workers are sluggish or suppliers and distributors pursue parochial interests, corporate performance would not and could not be competitive. Competitors are needed to spure excellence in performance. *FIRMS* is a shared vision of excellence and a passion for customers. These are the win-win relationships for business goal of profit/market share anchored in sound corporate values:

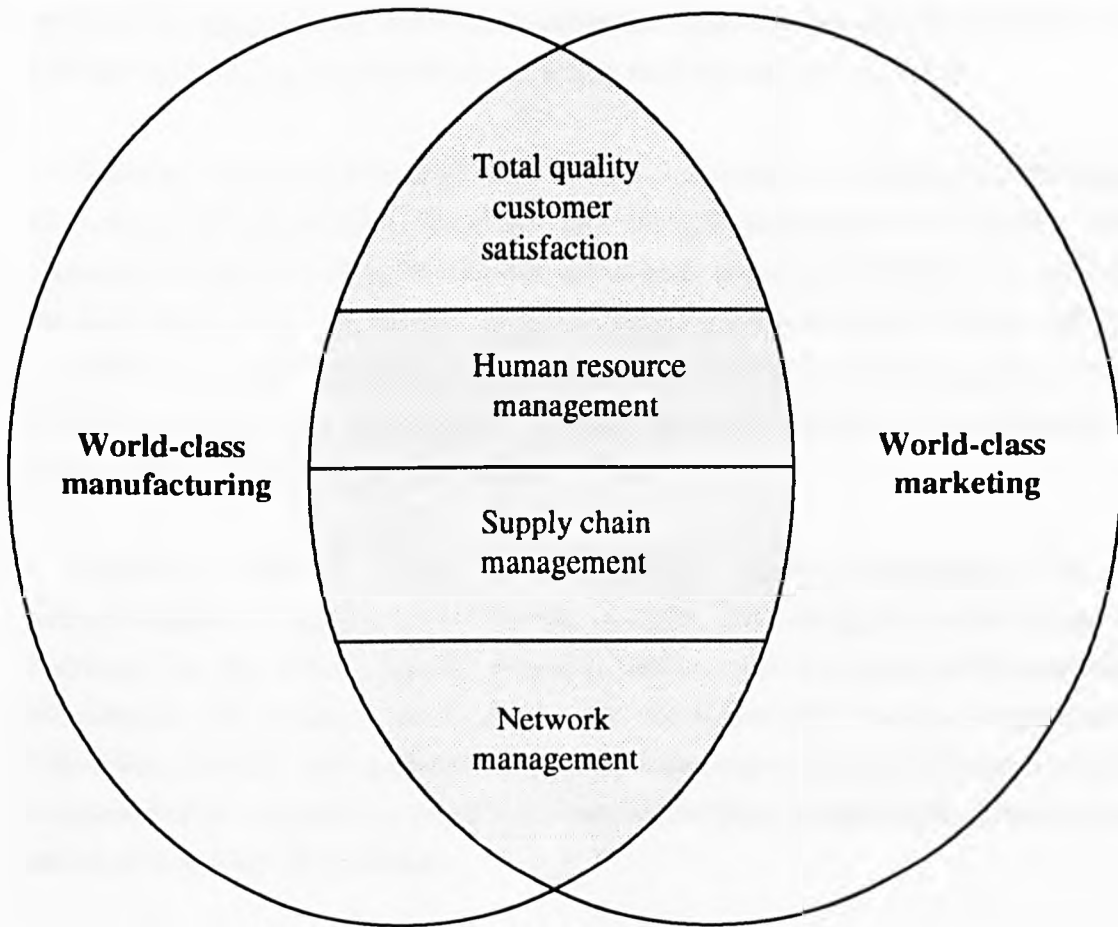
- *Sincerity*: You mean what you say and you say what you mean
- *Trust* : You say what you mean and you do what you say
- *Integrity*: You say, do, and keep to what you mean

These time-honoured values give definition to the corporate character.

FIRMS takes a creative systems approach towards the chain of relationships (Flood, 1993). It identifies the stakeholders, ie the workers, the suppliers, the distributors and the competitors. These are partners-in-adversity, each with different sets of problems and concerns. Together, they can work towards the common goal of customer satisfaction. Hence, these inter-linking relationships are alive and dynamic, constant learning with and from each other to solve the here and now problems amidst the difficulties, the uncertainties and the changes. It is result-oriented. These partners-in-adversity address the real problems, invite alternatives, generate innovative ideas, and act on realistic and practical solutions. This is action-learning, which is about real people in the real world working on real issues and real problems that have no answers. Thus the need for innovative learning to build on maintenance learning (Chan, 1994b).

Action-learning, learning from experience and life, is the guiding philosophy of *FIRMS* for world-class performance. Human resource management must address the learner's changing environment. We must improve knowledge, skills and attitudes that are critical to staying

FIGURE 6.12 SYNERGY IN FIRMS



Source: Author

competitive. And, human resource management must be linked to corporate strategy and goals. Learning is the challenge of the 1990s.

Technological advancements, competition, restructuring and globalization point to the need for lifelong learning. In world-class companies, constant change means constant learning. The world is changing quickly; individuals and entire organizations must become more and more effective at learning. Experiential and action learning will be a priority.

Learning cannot be separated from action. Learning is the process of enhancing our capacity for effective action. There are many strengths in being action-oriented. Ultimately, learning is related to action. We have to act in order to get some feedback to see if we are on the right track. The philosophy of action-learning permeates the flexible and intelligent corporations. Action-learning is lifelong, efficient and effective (the Japanese called it "On-the-job training for lean production"). We can expect the dynamics of learning and actions at all the five interlinking goals of *FIRMS*.

FIRMS is a dynamic, living and learning model. There is intelligence in the corporate strategy because it applies commonsense, wisdom and synergy to ensure longevity in its corporate life. It has to be flexible, adaptable and innovative because of dynamic changes in the internal and external environment. In the knowledge society, corporations, like individuals, have to learn continuously and be informative, to climb the spiral of learning to stay ahead of the competition. A high premium will be placed on the ability to learn for personal and organizational effectiveness.

Corporations live and learn (or stagnate and die); learn from fellow partners-in-adversity trying to serve the customers. *FIRMS* embraces these partners to work towards customers satisfaction. These partners are action learners and action learners are holistic by inclination. They are no respectors of boundaries. Problems concerning manufacturing are not separated from marketing, human resource matters or supplies and distributions. Action-learning is a spiral of knowledge building on knowledge. It is very efficient and effective for us to learn what we need to know just-in-time and act from and build on that learning process. The chain of relationships is also a learning partnership; learning from and with one another, a source of ideas, feedback, and support. It is an enriching learning environment as partners-in-adversity offer different perspectives on the common intractable problem, end customer expectation/satisfaction, for innovative solutions and practical implementations (Baker, 1994).

To Handy (1991), those who are always learning are those who can ride the waves of change and see a changing world as full of opportunities rather than of damages. They are the ones most likely to be the survivors in a time of turbulence.

FIRMS is a total business concept and is the way to become the benchmark company of the world because it anticipates the skills needed in the "age of the customer" (see Table 6-9).

It is no accident that the emergence of Relationship Marketing as a key concept has coincided with the "discovery" of business ethics, not least by companies themselves which are endowing universities with chairs on the subject. Companies which build relationships based on strong values and ethical principles will have a direct and positive impact on profitability and market share. Only those businesses which have a genuine concern for customers and other stakeholders will prosper.

The paramount importance of being **flexible** in strategic formulation for corporate planning, design of manufacturing systems, devising marketing strategies, etc have proven to play a significant role in attaining competitive advantage for business success (Toffler, 1985; Mather, 1988; Roth, et al 1989; Slack, 1989, 1991; De Meyer, 1992; Miller, et al 1992; Stewart, 1992; Davidow and Malone, 1992; Byrne, 1993; Harrison, 1993; Pumpin, 1993; Kotler, 1994; Underwood, 1994). Undoubtedly, another vital factor for success is **intelligence** (Covey, 1989; Gilad, 1989; Herring, 1992; Quinn, 1992; Roth, 1992; Taylor, 1992; Babbar and Rai, 1993; Chan, 1993; Handy, 1993; Prescott, et al 1993; Lee, 1994; JETRO, 1994). These three parameters (flexibility, intelligence and relationship management) are the core competencies of *FIRMS*, crucial for devising and coordinating relationships in corporate strategy.

In a similar vein, Hayes et al (1994) recognised that virtually all manufacturers aspire to "world-class" status. However, even those who attain it will not have a competitive advantage as they will only be as good as their toughest competitors. Hence, there is a need for a new manufacturing strategy to go beyond world-class. This requires a paradigm shift in thinking about manufacturing especially in the turbulent 1990s where the goal of competitive strategy should be strategic flexibility. It is imperative to note that improvement activities/programs like TQM, JIT, design for manufacturability (DFM) and lean manufacturing are techniques not strategies (Chan, 1994a). Most companies focus on the form of their organizational assets and the mechanics of their techniques rather than on the substance, skills and capabilities (Stalk, et al 1992). Traditionally, companies viewed investments in new facilities, technology, and

TABLE 6-9 RELATIVE SKILLS EMPHASIS IN THE AGE OF THE CUSTOMER

<u>Skill Areas</u>	<u>Workers, Suppliers, Distributors, Competitors</u>
Managing change and ambiguity	Adaptability, flexibility, innovation
Teamwork	Synergy (partners-in-adversity)
Thinking	Creative systems orientation, commonsense, wisdom
Continuous learning	Informative, action-learning (acquisition of knowledge, skills, and attitudes critical to staying competitive)
Personal effectiveness and empowerment	Inner-directed
Business practices	Sincerity, integrity, trust

Source: Adapted from Cohen, Stephen L., "The Challenge of Training in the Nineties", in Training and Development. July 1993, pp. 30 - 35.

R&D as the primary means to enhance their existing manufacturing capabilities. Now, managers should think about investments more in terms of their capacity to build new capabilities; capabilities that provide enduring sources of competitive advantage are usually built over time through a series of investments in facilities, human capital, and knowledge. A company's capabilities is more than its physical assets. In fact, they are largely embodied in the collective skills and knowledge of its people and the organizational procedures that shape the way employees interact.

Manufacturing strategy is about creating operating capabilities a company need for the future. For example, Hitachi-Seiki's first flexible manufacturing system was plagued with problems, but developing the system provided a rich learning experience that built capabilities for future projects. The employees learned from past mistakes in prior projects. These were vehicles for building capabilities. With each project, the company expanded its knowledge of technical matters (ie computer software) and organizational issues (ie how to integrate disciplines to solve problems). Engineers who began as specialists gradually became generalists. In effect, we have witnessed the success of action learning in Hitach-Seiki. The company has effectively appreciates and integrates manufacturing strategy with the notion of both core competences and learning organizations.

In *FIRMS*, core competencies of flexibility and intelligence defines the corporate vision/mission and core capabilities are found in the mastery of some fundamental processes/techniques (see Table 6-10). *FIRMS* is tantamount to the concept of the lean enterprise advocated by Womack and Jones (1994). The lean enterprise is a group of individuals, functions, and legally separate but operationally synchronised companies that creates, sells, and services a family of products. The lean enterprise can satisfy the needs of these diverse groups of people up and down the value chain with a new code of behaviour (*Financial Times*, March 11, 1994). In January 1993, the Royal Society for the encouragement of Arts, Manufactures and Commerce (RSA) brought together senior executives from 25 top UK companies to lead an RSA Inquiry into *Tomorrow's Company: the role of business in a changing world*. The Inquiry's "central concern is the achievement of sustainable business success in the face of continuing and sustainable changes in the nature and intensity of global competition" (RSA, 1994). The RSA is due to publish its final report on the *Inquiry into Tomorrow's Company* in 1995, but its interim report has already reached the conclusion that "to achieve sustainable success tomorrow's company must take an inclusive approach with customers, suppliers, employees, investors and the community" (RSA, 1994).

TABLE 6-10 SUMMARY OF THE FIVE GOALS OF FIRMS

	Goal 1	Goal 2	Goal 3	Goal 4	Goal 5
Output	Loyalty from Customers	Commitment from Workers	Co-operation from Suppliers	Collaboration from Distributors	Respect from Competitors
Capability	Total quality customer satisfaction	Human resource management	Supply chain management	Distributors network management	World-class manufacturing World-class marketing
Techniques	<ul style="list-style-type: none"> • Stages in total quality customer satisfaction • Empathic marketing • Relationship marketing • Marketing research • Effectiveness and speed of delivery • Educated and customer-oriented workforce • Honest assessment • Industrial awareness 	<ul style="list-style-type: none"> • The development managers in HRM • Creating a "corporate family" • Lifetime employment • Fostering the spirit of teamwork • Participative management • Continuous learning • Staff welfare and benefits 	<ul style="list-style-type: none"> • Positioning tool and relationship improvement process • Throughput management • Enabling technologies and standards • Integrated information systems • Identify distinctive competences • Member of "extended family" • Management and technological support • Financial clout • Supplier rating system • Awards 	<ul style="list-style-type: none"> • Members of an "extended family" • Consultancy service • After-sales service and productive maintenance support • Market intelligence • Market coverage and product availability • Market development and accounts solicitation • Network management and control 	<ul style="list-style-type: none"> <i>World-class Manufacturing</i> • Materials requirements planning • Manufacturing resource planning • Total quality control • Just-in time/kanban • Lean production • Group technology/cellular manufacturing • Optimized production techniques • Flexible manufacturing systems • Computer-integrate manufacturing • Intelligent manufacturing systems • Concurrent/simultaneous engineering • Reengineering the process/continuous improvement (Kaizen) <i>World-class Marketing</i> • Market-driven marketing strategy • Customer-driven marketing strategy • Value-oriented marketing • Just-in-time marketing • Reverse marketing (buyer-supplier relationship) • Benchmarking

Source: Author

6.6 Conclusion

Comparison of management philosophies between best practices in Japanese companies against typical US companies are shown in Table 6-11. But, in the light of vast global, technological, economic, political and social challenges facing today's companies, businessmen must re-examine their foundational concepts and even reverse the very premises on which they have built their successful businesses. For example, Japan once built its economy through low cost, high-quality electronics. The relentless rise of the Yen and the ensuing higher costs made Japanese products less price-competitive in foreign markets. To remain competitive, companies were forced to shift production to countries that offer cheaper overall manufacturing cost. This leads to the fear of the "hollowing-out" impact on the Japanese economy and the cost of manufacturing supremacy because the newest production facilities move overseas. The heydays of Japan's traditional industries like automobiles, steel, machine tools and electronics are now numbered. Such industries, which excelled at low-cost mass production, began losing competitiveness in the 1980s to East Asian countries like Taiwan.

Past successes is no guarantee for the future as research has shown that the average corporate lifespan has shrunk, given the major environment pressures and issues in the 1990s (Kotler, 1994) viz:

- Slower growth of product market
- Growing domestic and foreign competition
- Growing product proliferation
- Growing perceived product parity
- Shortening product life cycles
- Increased niche attacks by competitors
- Rising customer sophistication and price sensitivity
- Strong downward price pressure
- Rising promotion costs and diminishing effectiveness
- Rising salesforce costs
- Rapidly changing distribution patterns and growing power of the channels
- Rapid erosion of competitive advantages

Many old assumptions no longer apply:

TABLE 6-11 COMPARISON OF MANAGEMENT PHILOSOPHIES BETWEEN BEST PRACTICES IN JAPANESE COMPANIES AGAINST TYPICAL US COMPANIES

<u>Best Japanese Companies</u>	<u>Typical US Companies</u>
<ul style="list-style-type: none"> • Focus on customer satisfaction • Market-in (supply demand) • Manage by means/systems • Holistic approach • Patience • Incremental improvement • Teams • Leaders teach • Continuous education (investment) • Top management has technical background • Top management contact with plant/customers • Your subordinates are your customers • Homogeneity (conformity) • Problems are treasures • Visual communication techniques • Sequential phases of corporate direction • Standardization is essential • Focus is clear to everyone • Top down direction is followed • Everyone is responsible for improvement • Top people working on TQM • Methodical/relentless • Make commitments • Engineers/development in plants • Management span of support • Continuity • Crisis mentality 	<ul style="list-style-type: none"> • Focus on profit • Product-out (create demand) • Manage by objectives • Linear/segmented approach • Impatience • Breakthrough improvements • Individuals • Staff/consultants teach • Sporadic training (expense) • Top management has marketing or financial background • Top management distant from plant/customers • Your boss is your customer • Diversity (individuality) • Problems are a sign of weakness • Verbal communication techniques • Independent corporate programs not sustained • Standardization is constraining • Everything is important • Top down direction is resisted • "They" are responsible for improvement • Staff working on TQM • Hit and run • Make promises • Engineers/development away from plants • Management span of control • Frequent assignment changes • Complacency

Source: Adapted from Band, William A. (1991), Creating Value for Customers: Designing and Implementing a Total Corporate Strategy. John Wiley, New York, pp. 18.

The Changing Business Environment

Old

- Incremental Adjustment
- Continuity
- Planning
- Cartels, Barriers and Oligopolies
- Barriers to Entry
- National Borders
- Restrictions and Constraints
- Uniformed Customers
- Consumer Protection
- Standard "Commodity" Products and Services
- Track Record
- Scale and Security
- Diversification
- Expansion
- Static Structure
- Hierarchy
- Procedures
- Individuals
- Single Discipline
- Facts and Theories
- Quantity
- Absolutes
- Knowledge
- Information
- Automation
- Management
- Instruction

New

- Radical Transformation
- Change
- Coping with the Unexpected
- Competition
- Freedom of Choice
- Freedom of Movement
- Access and Opportunity
- Demanding Customers
- Consumer Power
- Differentiated Products and Services
- Relevance of Contribution
- Flexibility, Responsiveness and Speed
- Focus and Segmentation
- Prioritization
- Dynamic Flows
- Relationships
- Processes
- Project Groups and Teams
- Multidisciplinary
- Values and Feelings
- Quality
- Relative and Contextual
- Competence
- Understanding
- Adding Value
- Facilitation
- Learning

Implications for Human Resource Management

Old

- Getting Ahead
- The Self
- Individuals
- Personal Space and Status
- Unsupported
- Single Discipline
- Expertise and Knowledge:
 - facts
 - security
 - position
 - dependent
- Initial Qualifications
- Lifetime Commitment

New

- Achieving Balance
- The Environment
- Groups and Teams
- Interpersonal Relationships
- Facilitating and Supporting Technology
- Multidisciplinary
- Personal Qualities and Competence:
 - values
 - challenge
 - contribution
 - inner direction and motivation
- Continual Updating
- Mobile Careers

Source: Adapted from Coulson-Thomas, Colin (1992), Creating the Global Company. McGraw-Hill, London, pp. 3 - 14.

Hence, the major strategic issues facing the businessmen are:

- Assessing changing customer characteristics
- Adapting company structure to evolving changes in corporate strategies
- Concentrating corporate policies on selected market segments
- Developing effective international business strategies
- Competing and cooperating with key competitors
- Creating a market-focused and customer-driven culture throughout the corporation
- Adapting business strategies to changing regulations and environmental pressures
- Managing rising corporate costs

Magrath (1992) proposed that the marketing's agenda for the 1990s for the world's best companies calls for mastering six major challenges - *productivity, innovation, distribution channels, alliances, globalization, and quality*. Thus, to achieve world-class status the following factors are indispensable for sustaining competitive advantage:

- A global approach to business
- A balanced business strategy
- Leadership
- A flexible/responsive enterprise
- Competitive advantage enablers
- The value added pipeline
- The company's core culture and values

Kotler emphasizes that successful enterprises do not settle for being anything other than world-class, and that they recognize the importance of mutually profitable relationship marketing with customers, suppliers and distributors. This mindset is of major importance and hence the author has integrated into a model which demonstrates succinctly how to achieve the bundle of benefits (ie value-oriented marketing through synergy from other function areas with value added chain effect). To quote:

" Winning companies also develop mutually profitable relationships with their suppliers and distributors. If the company squeezes its suppliers' profits unduly, if it forces too much product on its distributors, if it wins by making its partners in the supply chain lose, the company will fail. Smart companies partner with their suppliers and distributors in the drive to better serve their ultimate customers. Ultimately, marketing at its best is about value creation and raising the world's living standards."

There is a growing awareness that businesses can win through value-oriented relationships with all constituencies, ie winning through *FIRMS*. Hence, the imperative for relationship management in all spheres of business life. The relationship objectives for the constituencies are:

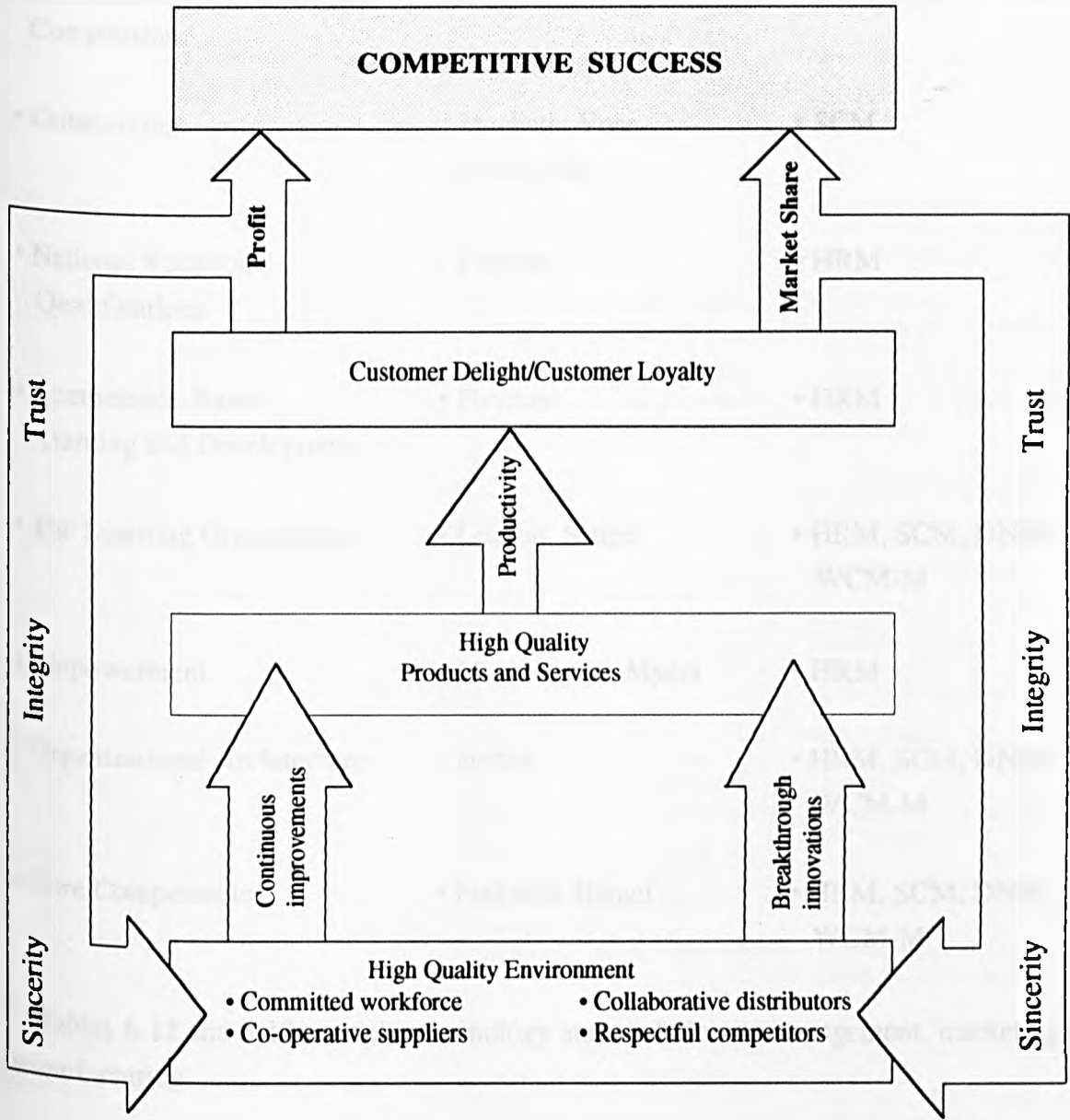
<u>Constitutencies</u>	<u>Relationship Objectives</u>
• Customers	• Value for money
• Workers	• Meeting Maslow's hierarchy of needs
• Suppliers	• Expanding and reliable business
• Distributors	• Expanding and reliable business
• Competitors	• Setting standards for business excellence

The relationship management philosophy is based on sincerity, integrity and trust (SIT). The logic of profit and market share is depicted in Figure 6.13. It is based on a paradigm shift from what Covey (1989) called "Scarcity Mentality" (win-lose, ie zero sum game) to an "Abundance Mentality" (win-win, ie positive sum game) through creative synergy for greater results for all. The "Abundance Mentality" is the positive-sum paradigm of business life. Competitive advantage in the 1990s and beyond can be achieved only by those companies which excel in developing a series of world-class relationships with all stakeholder groups.

The hot topics of the 1990s identified by *International Business Week* (August 31, 1992) and *Professional Manager* (November, 1993) are actually issues addressed in *FIRMS*, ie:

<u>Hot Topics</u> (Tenets of Management Gurus)	<u>Management Gurus</u>	<u>Architecture of <i>FIRMS</i></u>
• Self-Directed Work Teams	• Fisher, Wellins, Byham	• HRM
• Benchmarking	• Watson, Camp, Zairi, De Meyer	• WCM
• Business Process Reengineering	• Hammer, Morris, Johansson	• HRM, SCM, DNM, WCM-M

FIGURE 6.13 THE LOGIC OF PROFIT AND MARKET SHARE (VIRTUOUS CIRCLE)



Source: Adapted from Strata, Ray (1992), "Organizational Learning: The Key to Success in the 1990s", *Prism*, Fourth Quarter, pp. 102.

• Simultaneous Engineering/ Concurrent Engineering/ Time-Based Manufacturing Competition	• Shunk, Bockerstette, Stalk Jr.	• WCM-M
• Outsourcing	• Macbeth, Voss, Christopher	• SCM
• National Vocational Qualifications	• Fletcher	• HRM
• Competence-Based Training and Development	• Fletcher	• HRM
• The Learning Organization	• Lessem, Senge	• HRM, SCM, DNM, WCM-M
• Empowerment	• Marchington, Myers	• HRM
• Organizational Architecture	• Nadler	• HRM, SCM, DNM, WCM-M
• Core Competencies	• Prahalad, Hamel	• HRM, SCM, DNM, WCM-M

Tables 6-12 and 6-13 trace the chronology and evolution in management, marketing and manufacturing.

The aforementioned concepts, tools or techniques may be applicable to help solve some management problems some of the time because of piece-meal approach. They do not provide sufficient ideas as to how to go about solving these problems, ie providing the conceptual framework.

FIRMS provides the business people with an architecture to examine, understand, and use as a reference. In the real world, everyone is thinking differently without a common model.

TABLE 6-12

A CHRONOLOGY OF MANUFACTURING, MARKETING AND MANAGEMENT THEORIES

Period ¹	Manufacturing ²	Marketing ³	Management ⁴
1780 - 1850	<ul style="list-style-type: none"> • Manufacturing leader as technology capitalists 	<ul style="list-style-type: none"> • Industrial Revolution 	<ul style="list-style-type: none"> • Pre-scientific Management
1850 - 1890	<ul style="list-style-type: none"> • Manufacturing leaders as architects of mass production 		
1890 - 1920	<ul style="list-style-type: none"> • Manufacturing management moves down in the organization 	<ul style="list-style-type: none"> • World War I <i>(Economy emphasizing on comparative advantage)</i> 	<ul style="list-style-type: none"> • Scientific Management <ul style="list-style-type: none"> - universal principles of efficiency - search for frictionless organization
1920 - 1960 <i>(Production Driven)</i>	<ul style="list-style-type: none"> • Manufacturing management refines its skill in controlling and stabilizing 	<ul style="list-style-type: none"> • Production/Operations Management <ul style="list-style-type: none"> - world demand for goods greater than world capacity - companies sell all they could make and hence the production/operations function hold sway in strategic debate (Production-Oriented/ Sales Oriented) <i>(Economy emphasizing on employment - Keynesian Theory)</i> 	<ul style="list-style-type: none"> • Human Relations <ul style="list-style-type: none"> - Hawthorne studies at Western Electric - Psychology of work and motivation - Participative management and job enrichment • Operations Research <ul style="list-style-type: none"> - World War II needs and the advent of computers - Quantitative models of organizational problems • Systems Analysis <ul style="list-style-type: none"> - Cybernetic perspective (building control systems) - Focus on dynamic interactions
1960 - 1980 <i>(Market Driven/ Environment Driven)</i>	<ul style="list-style-type: none"> • Shaking the foundations of industrial management 	<ul style="list-style-type: none"> • Marketing-Oriented <ul style="list-style-type: none"> - the mid-1960s experienced the imbalance between available world capacity and world demand had begun to be redressed - Advent of marketing's strategic role came into centre stage because in most markets selling products became increasingly difficult <i>(Economy emphasizing on monetarism)</i> 	<ul style="list-style-type: none"> • Strategic Planning <ul style="list-style-type: none"> - Diversification and search for synergies - Redeployment of assets and restructuring • Japanese Management <ul style="list-style-type: none"> - Quality control systems involving people - Novel approaches to inventory and production management
1980 - 2000 <i>(Product Development Driven/Advanced Technology Driven)</i>	<ul style="list-style-type: none"> • Manufacturing heavily reliant on computer-aided systems 	<ul style="list-style-type: none"> • Marketing Interface with other Functions <ul style="list-style-type: none"> - the late 1970s and early 1980s resulted in many companies experiencing financial difficulties and witnessed a spate of corporate failures - emergence of finance/accounting function and its role in strategic formulation - emergence of integration of functional strategies into the corporate strategy, ie Marketing Strategy, Manufacturing Strategy, Financial Strategy, Supplier Strategy, IT Strategy, etc. See Figure 6.12 <i>(Economy emphasizing on Competitive Advantage)</i> 	<ul style="list-style-type: none"> • The Cognitive Perspective <ul style="list-style-type: none"> - Emphasis on understanding how people think - Recognition of errors made in managing information - Use of artificial intelligence technology • Intelligence Enterprise/Organization <ul style="list-style-type: none"> - Adaptive organization - Learning organization

Footnote: Ansoff¹ (1993); Skinner² (1988); Hill³ (1993); Lessem⁴ (1993); Handy⁴ (1994).

TABLE 6-13 MILESTONE/EVOLUTION OF MANAGEMENT, MARKETING AND MANUFACTURING

90's	<ul style="list-style-type: none"> Learning capability Learning organization Culture change Strategic unity Core competence Organizational capability Empowerment 	<ul style="list-style-type: none"> Value-oriented/added marketing Marketing engineering Business marketing relationships Turbomarketing World-class marketing Total quality marketing Lead-marketing-manufacturing Entrepreneurial marketing 	<ul style="list-style-type: none"> Intelligent manufacturing strategy Share manufacturing Concurrent engineering Supply chain management Reengineering
80's	<ul style="list-style-type: none"> Japanese management/Theory Z Quality circles Excellence Mission/vision/values Cycle time (competing through time) Customer service Intrapreneuring 	<ul style="list-style-type: none"> Marketing warfare Internal marketing Global marketing Local marketing Direct marketing Relationship marketing Megamarketing 	<ul style="list-style-type: none"> Japanese manufacturing techniques JIT, TQM, Kaizen OPT, Zero inventory FMS/ CIM World-class manufacturing Service quality and productivity Manufacturing automation protocol
70's	<ul style="list-style-type: none"> Strategic planning Life cycles Value chain Zero-based budgeting Matrix management Participative management 	<ul style="list-style-type: none"> Social marketing Demarketing Positioning Strategic marketing Societal marketing Macro marketing Services marketing 	<ul style="list-style-type: none"> Focus factory concept CAD/CAM CNC machines MRP II
60's	<ul style="list-style-type: none"> Management by objectives Transaction analysis Team building Job enrichment 	<ul style="list-style-type: none"> Broadened concept of marketing Theory of buyer behaviour Consumer behaviour (life styles) Marketing myopia Marketing mix (4P's) 	<ul style="list-style-type: none"> MRP Industrial dynamics GERT/Network simulation Industrial engineering Organizational behaviour
50's	<ul style="list-style-type: none"> T-groups Theory X/Theory Y Managerial grid Forecasting 	<ul style="list-style-type: none"> Marketing audit Marketing concept Market segmentation Brand image Product life cycle Marketing mix (12 elements) 	<ul style="list-style-type: none"> PERT CPM ABC/Pareto inventory analysis Plantwide QC systems Operations research Management in the industrial world



Source: Adapted from American Marketing Association (1987), Marketing News, July 31; Ulrich, Dave, Glinow, Mary Ann Von and Jick, Todd (1993), "High-Impact Learning: Building and Diffusing Learning Capability", Organizational Dynamics, Autumn, pp. 52 - 66; Chase, Richard B. and Aquilano, Nicholas J. (1992), Production & Operations Management: A Life Cycle Approach, Sixth Edition, Irwin, Homewood, Illinois; Nahmias, Steven (1993), Production and Operations Analysis, Second Edition, Irwin, Boston, Massachusetts.

This is compounded by communications gaps caused by different perceptions due to different education background, race, culture, values, experiences and mindsets, etc. *FIRMS* gives different stakeholders a focus by uniting them through a "common language" that facilitates the plotting of strategies for mutual advantage based upon the architecture of *FIRMS*. Strategies can be plotted based on the framework/structure of the model. The five levels of *FIRMS* need not be of the same order or sequence because it is an Adaptive-Integrative-Derivative and Evaluative strategic model, (AIDE):

Adaptive: All companies may utilise the model but each can apportion emphasis to different constituent parts and alter the sequence as it deems fit. Adaptiveness is the core of flexibility. Whereas flexibility is the macro aspect, adaptiveness is the micro agent of change. Any strategy must adapt to various forces in the domestic and international business environments. The five strategies in *FIRMS* are not based on any sequence. Companies can choose their particular strategy in line with change in the environment and stages of their corporate planning. For example, a new company may have to grapple with the correct mix of the five strategies aim at customer delight, competitive workforce, manufacturing/service advantage, market penetration/market development, market leader/industrial leader. A company facing a saturated market, may focus on world-class manufacturing-marketing to create new products and services with quality and at low cost. Further, the list of techniques are not comprehensive but inclusive of latest development in all fields of strategy (to be updated continuously).

Integrative: It integrates the essential elements in any business concerns. It is wholistic because it focuses on all aspects of business management capabilities of total quality customer satisfaction, human resource management, supply chain management, distributor network management, world-class manufacturing and world-class marketing. It is not a piece-meal approach. It looks at all aspects of business management impacting favourably upon profitability and market share.

Derivative: Because of the adaptive and integrative pursuit, a bundle of benefits can be derived, ie the output of being adaptive and integrative. These are - loyalty from customers, commitment from workers, cooperation from suppliers, collaboration from distributors, respect from competitors, the whole chain of relationships.

Evaluative: The adaptive-integrative-derivative process is incomplete without the evaluative component, ie the feedback mechanism which measure the performance of the

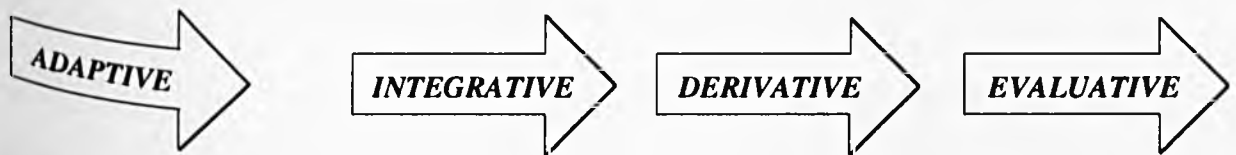
adaptive strategies, integrative management capabilities and the derivative end-results so that preventive and/or corrective actions can be taken. It identifies easy-to-measure indicators of excellent corporate performance. These are incidence of repeat purchases and profit/market share; low staff turnover and high morale; long term relationships with suppliers and distributors; and, competitive cooperation between rivals. This process is a closed-loop system to achieve higher aspirations of excellence.

Strategies must be adapted to the changing environment; management capabilities must be integrated to achieve the corporate vision/mission; the end result is thus derived and measured. See Table 6-14. This process is iterative and reiterative in a rapid and dynamic business environment, ie a continuous improvement process for breakthrough in innovations (see Figure 6.13). Thus, *AIDE* exhibits the properties of being flexible and intelligent. Owyang observed that "the key to the successful management of uncertainties rests with the ability to acquire the right information and interpret it intelligently" (*Business Times*, September 17, 1992). To quote Stevenson (1992), "the more you rise to world standards, the more you have to be clever." However, Porter's (1993) axiom is that "you do not have to be high-tech to be clever or rich." The next few chapters will address these axioms.

Finally, the sandcone model in the development of manufacturing, marketing and management capabilities of world-class manufacturing company is depicted in Figure 6.14. The sand represents management core values (sincerity, integrity and trust), efforts and resources. A stable sandcone is created on the solid foundation of *SIT*. Upon such foundation, core competencies of intelligence, flexibility and relationship management permeates the organization (the sandcone). Though *TQCS* will remain the base capability of manufacturers, it must be built on cumulative and evolving capabilities of *HRM*, *SCM*, *DNM*. Peak capabilities of world-class manufacturing and world-class marketing will distinguish these manufacturing companies. To go beyond world-class, companies must subscribe to a new organization design paradigm which has elements of *TQM*, *HRM*, *SCM*, business reengineering, the learning organization and world-class status (Talwar, 1993; Luthans, et al 1994). More importantly, it must include corporate values and mutual benefits for all stakeholders advocated in *FIRMS* for lead-marketing-manufacturing. To sustain more layers of sand, you need a broader base sandcone as solid foundation. Hence, to achieve higher profitability and bigger market share, you need a broader base of loyal customers to carry more layers of the cumulative and evolving capabilities for higher levels of competencies. The strata of relationship management towards *FIRMS* to strive for competitive success is shown in Table 6-15.

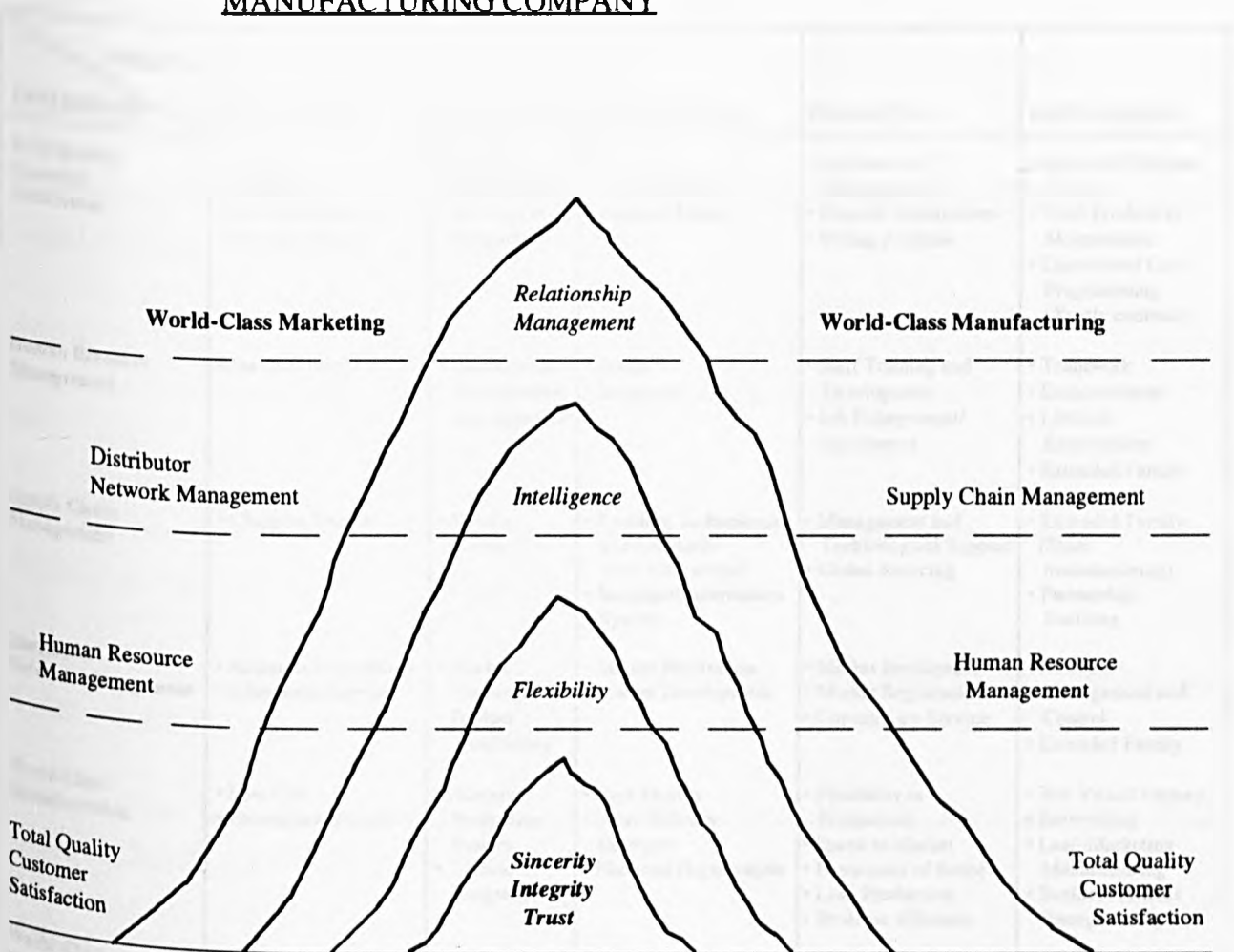
TABLE 6-14 THE ROUTE TO BUSINESS GOAL OF PROFIT/MARKET SHARE

COMPETITIVE ADVANTAGE (STRATEGY)	MANAGEMENT CAPABILITIES (CAUSE)	RESULT (EFFECT)	HOW DO YOU KNOW YOU ARE THERE? (MEASUREMENT)
Customer Delight	Total Quality Customer Satisfaction	Loyalty from Customers	Repeat Purchase Profit/Market share
Competitive Workforce	Human Resource Management	Commitment from Workers	Low Turnover High Morale
Manufacturing/ Service Advantage	Supply Chain Management	Co-operation from Suppliers	Long Term Relationship
Market Penetration Market Development	Distributor Network Management	Collaboration from Distributors	Long Term Relationship
Beyond World-Class: Industrial Leader/ Market Leader	World-Class Manufacturing World-Class Marketing	Respect from Competitors	Competitive Co-operation/ Strategic Alliance



Source: Author

FIGURE 6.14 THE SANDCONE MODEL IN DEVELOPMENT OF WORLD-CLASS MANUFACTURING COMPANY



Source: Adapted from Ferdows, Kasra and De Meyer, Arnaud (1989), "Lasting Improvement in Manufacturing Performance: In Search of a New Theory", Working Paper No. 89/4, INSEAD, Fontainebleau, France, pp. 32.

TABLE 6-15 STRATA OF RELATIONSHIP MANAGEMENT TOWARDS FIRMS

STRATA CAPABILITIES	BARE BONES	REACTIVE	ACCOUNTABLE	PROACTIVE	PARTNERSHIP
Total Quality Customer Satisfaction	<ul style="list-style-type: none"> • Manuals • Warranty • Recommendations • Routine Billing 	<ul style="list-style-type: none"> • Help Line • Service Calls • Respond to Enquiries 	<ul style="list-style-type: none"> • Revisit • Initiate Service • Itemised Billing 	<ul style="list-style-type: none"> • Training and Development • Planned Maintenance • Billing Analysis 	<ul style="list-style-type: none"> • Regional Technical Centre • Total Productive Maintenance • Customised Cost Programming (Yearly contract)
Human Resource Management	<ul style="list-style-type: none"> • Survival Needs 	<ul style="list-style-type: none"> • Performance Measurement and Appraisal 	<ul style="list-style-type: none"> • Bonus • Incentives 	<ul style="list-style-type: none"> • Staff Training and Development • Job Enlargement/ Enrichment 	<ul style="list-style-type: none"> • Teamwork • Empowerment • Lifetime Employment • Extended Family
Supply Chain Management	<ul style="list-style-type: none"> • Cheapest Vendor 	<ul style="list-style-type: none"> • Vendor Rating 	<ul style="list-style-type: none"> • Enabling Technologies and Standards (ISO 9000 series) • Integrated Information System 	<ul style="list-style-type: none"> • Management and Technological Support • Global Sourcing 	<ul style="list-style-type: none"> • Extended Family (Share manufacturing) • Partnership Sourcing
Distributor Network Management	<ul style="list-style-type: none"> • Accounts Solicitations • After-Sales Service 	<ul style="list-style-type: none"> • Market Coverage • Product Availability 	<ul style="list-style-type: none"> • Market Penetration • Market Development 	<ul style="list-style-type: none"> • Market Intelligence • Market Segmentation • Consultancy Service 	<ul style="list-style-type: none"> • Network Management and Control • Extended Family
World-Class Manufacturing	<ul style="list-style-type: none"> • Low Cost • Economies of Scale 	<ul style="list-style-type: none"> • Adaptive Production System • Vertical Integration 	<ul style="list-style-type: none"> • High Quality • Short Delivery Leadtime • Flattened Organization 	<ul style="list-style-type: none"> • Flexibility in Production • Speed to Market • Economies of Scope • Lean Production • Strategic Alliances 	<ul style="list-style-type: none"> • The Virtual Factory • Networking • Lead-Marketing-Manufacturing • Business Process Reengineering
World-Class Marketing	<ul style="list-style-type: none"> • Product Driven 	<ul style="list-style-type: none"> • Market Driven 	<ul style="list-style-type: none"> • Customer Driven 	<ul style="list-style-type: none"> • Create Market 	<ul style="list-style-type: none"> • Value-Oriented

Source: Adapted from Kotler, Philip (1994), Winning Through Value-Oriented Marketing, Senior Managers' Seminar organised by the Marketing Institute of Singapore, held at the Dynasty Hotel on January 28, pp. 17.

Footnote:

- Bare Bones (no relationship) : The Product is all that you need
- Reactive (one-way relationship) : The Customer approaches you ("Call me if you need me")
- Accountable (one-way relationship) : You are responsible to the customer ("I am calling to see if the product is okay")
- Proactive (one-way relationship) : You approach the customer, anticipating his needs ("I can enhance your use of the product")
- Partnership (two-way relationship) : Win-Win relationship for stakeholders ("We want to succeed together in everyway")

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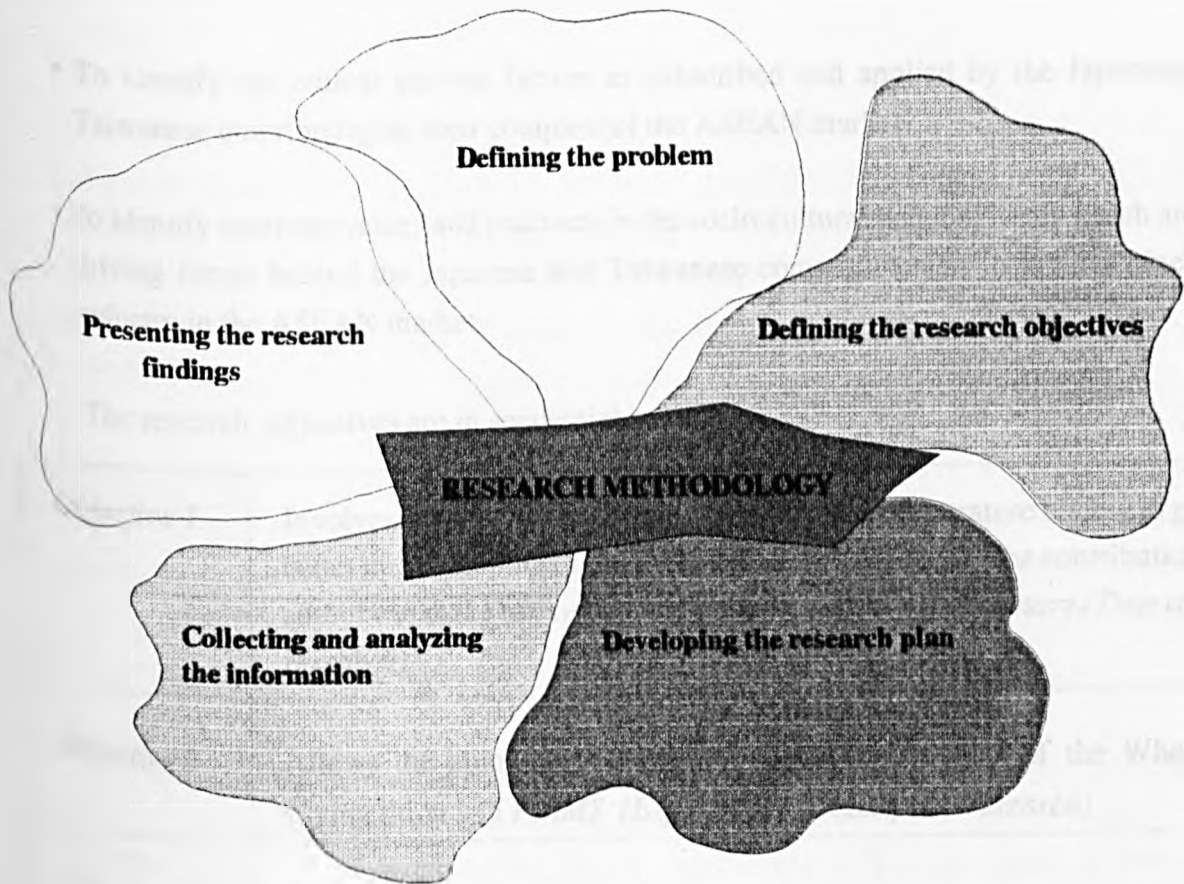
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CHAPTER SEVEN

RESEARCH METHODOLOGY



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RESEARCH METHODOLOGY

7.1 Introduction

The research objectives of this thesis are:

- To explore and link concepts like "World-Class" status, "Competitive Advantage of Nations", "Commonsense Nations", and "Global Player" as propounded by academics/practitioners and as exemplified by Japan and Taiwan in the machine tool industry
- To explore the Wheel of Competition of Asian Producers and the Model of *FIRMS* in the success of CNC machine tool business to go beyond world-class status
- To identify the critical success factors as subscribed and applied by the Japanese and Taiwanese contributing to their conquest of the ASEAN market
- To identify common values and practices in the socio-cultural belief systems which are the driving forces behind the Japanese and Taiwanese competitiveness in the machine tool industry in the ASEAN market

The research objectives are in sequential order:

Objective 1	Involves presentation of secondary data through literature review to gain a better understanding of the environment and to identify the contribution the author can make to existing body of knowledge (<i>Exploratory/Descriptive research</i>)
Objective 2	Allows the author to develop his theoretical models of the Wheel of Competition and <i>FIRMS</i> (<i>Exploratory/Descriptive research</i>)
Objective 3	Focuses on the end-users as critical success factors are ultimately determined by the customers of the machine tool producers (<i>Explanatory/Predictive research</i>)
Objective 4	Concludes with the identification of common values and practices for the competitive success of the Japanese and Taiwanese machine tool builders (<i>Explanatory/Predictive research</i>)

The propositions are:

- Japanese and Taiwanese share some common cultural belief systems embedded in Confucianism
- Japanese and Taiwanese prescribed to Communitarianism
- Japanese and Taiwanese use Sun Tzu's Art of War Strategy in business
- Japanese and Taiwanese business and management ethos are derived from their socio-cultural belief systems

Like Cowan (1993), the author believes that a very valuable role of research is to provide good understanding of key business issues by generating highly relevant "nuggets" of information. Usually several "nuggets" are needed to come to grips with any situation and these "nuggets" are glued together to form an argument or line of reasoning to arrive at an understanding. In the same vein, the author is investigating the "nuggets" (the parameters) in his Total Quality Business Philosophy to gain an understanding of the corporate performance of the Japanese and Taiwanese machine tool builders (the situation). The frameworks of the Wheel of Competition and *FIRMS* are glues which bond them together into a pattern we call understanding. In this endeavour, real-time research through fieldwork is invaluable in harnessing immediate data given the turbulent business environment as described in Chapter 3. Real-time research is a critical strategic capability essential for competitive success in dynamic businesses/markets.

The data sought in this investigation are therefore *descriptive, explanatory and predictive* in nature which necessitates a qualitative-quantitative mix of research methodology. The use of both qualitative and quantitative research approaches in a single study is known as "methodological triangulation" (Todd, 1979; Easterby-Smith, 1991). It is in recognition of the strengths and weaknesses of both qualitative and quantitative research approaches that has brought about the development of hybrid methodologies designed to maximise the strengths while overcoming the weaknesses of both methods (Gordon and Langmaid, 1988). Further, complementary research methods will prevent the research from becoming method-bound (Abrahamson, 1983). Qualitative data can be used to illustrate or clarify quantitatively derived findings. Quantitative data can be used to partially validate qualitative analysis (Strauss and

Corbin, 1990). The author aims to analyse and synthesize research findings in this comparative study of international marketing strategy of the Japanese and Taiwanese CNC machine tool industry in the ASEAN region. According to McDaniel Jr and Gates (1993), this is in the field of applied research as it aims at better understanding of the business and the marketplace and the determination of why a strategy succeeded or failed.

The purpose of this chapter is to discuss the author's research plan which is designed to meet the specific objectives. It will delve on data sources, research instruments, sampling plan and contact methods. The chosen research design is described and presented as follows:

AUTHOR'S RESEARCH PLAN		
Research Approaches	Quantitative	Qualitative
Data Sources	Secondary Data	Primary Data
Research Instruments	Survey Research (Questionnaires)	Case Study (Questionnaires/Depth Focused Interview)
Sampling Plan	25 End-Users per country (Minimum)	3 Japanese Machine Tool Builders 3 Taiwanese Machine Tool Builders
Contact Methods	Face-to-face (Personal interviews with respondents in 5 ASEAN countries)	Face-to-face (Personal interviews in Japan and Taiwan)

7.2 A Pragmatic Approach : Qualitative - Quantitative Mix

According to Kotler (1994), effective research involves the following five steps:

- Defining the problem
- Defining the research objectives
- Developing the research plan
- Collecting and analyzing the information
- Presenting the research finding

There are many ways to collect and analyse information. Research methods (Howard and Sharp, 1994) include:

- Sample surveys
- Case studies

- Experimentation
- Analysis of archival information
- Observations
- Focus groups
- Interviews
- Questionnaires

As advised by Nachmias and Nachmias (1976), Dabbs (1982), Maanen et al. (1982), Howard (1983), Yin (1984), Phillips and Pugh (1987) and Smith (1991), the appropriateness of each research strategy will depend on the following three conditions:

- i) the type of research questions (eg "who", "what", "where", "when", "why" and "how")
- ii) the control a researcher has over the actual events under study
- iii) the time period of the research focus (eg a contemporary event as against a historical phenomenon)

The criterion of a good research design is that the information gathered is consistent with the study objectives and that the data are collected by accurate and economical procedures. There is no standard or idealised research design to guide the research, since many different designs may accomplish the same objective (Kinnear and Taylor, 1991). Similarly, Morgan and Smirich (1980) observed that the appropriateness of a research approach is derived from the nature of the social phenomenon to be explored.

Crimp (1990), Kinnear and Taylor (1991), Holbert and Speece (1993), and (Kotler 1994), suggested that the purpose of the research efforts can be categorised under three headings (see Table 7-1):

- Exploratory
- Descriptive
- Explanatory or Causal

McDaniel Jr and Gates (1993) listed the three functional roles of research as:

TABLE 7-1

DIFFERENT TYPES OF RESEARCH METHODOLOGY

Research Category	Purpose	Advantages/ Disadvantages	When to Use	Some Research Methods
Exploratory Research	<ul style="list-style-type: none"> To gather preliminary data to shed light on the real nature of the problem and to suggest some hypotheses or new ideas 	<ul style="list-style-type: none"> Flexibility in order to be sensitive to the unexpected and to discover insights Useful for the discovery of ideas rather than firm conclusions 	<ul style="list-style-type: none"> Appropriate where research objectives include: <ul style="list-style-type: none"> - developing a more precise formulation of a vaguely identified problem or opportunity - gaining a perspective of the breadth of variables operating in a situation - establishing priorities regarding the potential significance of various problems or opportunities - gaining management and researcher's perspective about the character of the problem situation - identifying and formulating alternative courses of action 	<ul style="list-style-type: none"> Causal observation Experimentation Group interviews with knowledgeable persons Interviews with experts Literature search
Descriptive Research	<ul style="list-style-type: none"> To describe certain magnitudes 	<ul style="list-style-type: none"> May characterise phenomena and demonstrate association among variables; however, statements regarding cause-and-effect relationships are not possible 	<ul style="list-style-type: none"> Appropriate where research objectives include: <ul style="list-style-type: none"> - portraying the characteristics of phenomenon and determining the frequency of occurrence - determining the degree to which variables are associated with the phenomenon - making predictions regarding the occurrence of such phenomenon 	<ul style="list-style-type: none"> Use of secondary data Interrogation of respondents
Explanatory or Causal Research	<ul style="list-style-type: none"> To find cause 	<ul style="list-style-type: none"> Simple cause to effect relationship is often difficult to establish 	<ul style="list-style-type: none"> Appropriate where research objectives include: <ul style="list-style-type: none"> - to understand which variables are the cause of what is being predicted (the effect) - the focus being on why things happen - to understand the nature of the functional relationship between causal factors and the effect to be predicted. 	<ul style="list-style-type: none"> Interrogation of respondents through surveys and conducting experiments

Source: Compiled by Author

Descriptive function	The gathering and presentation of statements of fact
Diagnostic function	The explanation of data or actions
Predictive function	Specification of how to use the descriptive and diagnostic research to predict the results of a planned marketing decision

There are two modes of research viz, qualitative and quantitative. Researchers must recognise the strengths and weaknesses of both qualitative and quantitative research approaches (see Table 7-2).

In the quantitative research approach, sample sizes are normally greater and controlled in such a way as to be representative of the population from which they are drawn. This allows greater confidence in accepting the reliability or generalisability of the findings. As there are well-documented guides for both descriptive and inferential analysis and thus less room for subjective interpretation, the research findings' internal validity can be more easily assessed. However, quantitative methods are able to investigate only the more rational aspects of motivation and behaviour, and therefore omit the subtleties, nuances and idiosyncrasies of individual or organizational behaviour (Green et al., 1988).

Much attention has been given to describing, coding and counting events, often at the expense of understanding *why* things are happening. This has led to a predominance of quantitative research methods which are geared, for example, to finding out how many people hold particular views or variations in measures of corporate performance. By contrast, qualitative methods might concentrate on exploring in much greater depth the nature and origins of people's viewpoints, or the reasons for, and consequences of corporate performance "criteria" (Easterby-Smith et al., 1991).

Qualitative research is concerned with the assessment of the quality of phenomenon because the techniques are explanatory and interpretive rather than being deterministic. Strauss and Corbin (1990) described qualitative research as that which "produces findings not arrived at by means of statistical procedures or other means of quantification". Quantitative research is designed to explain what is happening and the frequency of occurrence.

TABLE 7-2

STRENGTHS AND WEAKNESSES OF QUALITATIVE AND QUANTITATIVE RESEARCH APPROACHES

Qualitative Research Approaches

Strengths

- Use an array of interpretive techniques to seek to describe, decode, translate and otherwise come to terms with meaning, not the frequency, of certain more or less naturally occurring phenomena in the social world (Van Maanen, 1983)
- With qualitative data one can preserve chronological flow, assess local causality, and derive fruitful explanations. Qualitative data are more likely to lead to serendipitous findings and to new theoretical integrations (Miles and Huberman, 1984)
- Diagnostic attempt to discover what may account for certain types of behaviour, seeking a deeper understanding of factors, sometimes covert, which influence decisions (Green, Tull and Albaum, 1988, Chisnall, 1986)
- The strength of qualitative methods is usually associated with the depth and richness of the data it provides (Hart, 1987)
- Answer such questions as "WHAT", "WHY", "HOW" (Gordon and Langmaid, 1988)
- Use to uncover and understand the nature of experiences with a phenomenon (Strauss and Corbin, 1990)

Weaknesses

- The most serious and central difficulty in the use of qualitative data is that methods of analysis are not well formulated (Miles and Huberman, 1984)
- Qualitative analysis is generally self-generated and controlled (Hart, 1987)
- "Soft" data produced by qualitative research efforts are often viewed as lacking in both reliability and validity (Gordon and Langmaid, 1988; Hart, 1987)
- Cannot answer the question "HOW MANY" (Gordon and Langmaid, 1988)
- Produce findings not arrived at by means of statistical procedures or other means of quantification (Strauss and Corbin, 1990)

Quantitative Research Approaches

Strengths

- The numerical form makes comparison easy, data are standardised, visible and amenable to the tests of classical survey statistics. Quantitative data are associated with clear analytical procedures, clear conventions that researcher can use. Research findings' internal validity can more easily be assessed. (Hart, 1987)

Weaknesses

- Quantitative data manipulation techniques have become increasingly complex, mathematically sophisticated and governed by strict assumptions, but, paradoxically, our interpretative frameworks which make such data meaningful have grown looser, more open-ended, fluid and contingent (Van Maanen, 1979)
- Complaints about quantitative methods seems to centre not on the scientific content of the study, but on the nature of the data they provide (Hart, 1987)
- Quantitative methods (especially surveys) are more inclined to describe and interrelate verbally expressed sentiments and beliefs rather than describe actual conduct. This increases the likelihood of rationalising behaviour after the event (Hart, 1987)

Source: Compiled by Author

Qualitative research is best used for problems where the results will increase understanding, expand knowledge, clarify the real issues, generate hypotheses, identify a range of behaviour, explore and explain individual's motivations, attitudes and behaviour, and thus identify distinct behavioural groups (Gordon and Langmaid, 1988; Clifton et al., 1992). There are therefore many valid reasons for conducting qualitative research, one being the nature of the research problem. Some areas of study naturally lend themselves more to qualitative types of research, for instance, research that attempts to uncover the nature of persons' experiences with a phenomenon (Strauss and Corbin, 1990). Qualitative methods can be used to uncover and understand what lies behind any phenomenon about which little is yet known. They can give the intricate details of phenomena that are difficult to convey with quantitative methods (Sekaran, 1992).

Qualitative researchers are often concerned with building theory (Luck and Rubin, 1987). Building theory by its very nature implies interpreting data, for the data must be conceptualised and the concepts related to form a theoretical rendition of reality. The theoretical formulation that results, can be used not only to explain that reality, but to provide a framework for action (Strauss and Corbin, 1990). Thus a "grounded" theory is one that is inductively derived from the study of the phenomenon it represents, ie it is discovered, developed, and provisionally verified through systematic data collection and analysis of data pertaining to that phenomenon. Therefore, data collection, analysis, and theory stand in reciprocal relationship with each other (Strauss and Corbin, 1990). Qualitative data are more likely to lead to new theoretical integrations; they help researchers go beyond initial preconceptions and frameworks (Miles and Huberman, 1984; Malhotra, 1993).

However, it is noted that qualitative data collection is:

- labour-intensive
- requires a good deal of skills to be carried out correctly
- can be time consuming and expensive
- data is often copious and the ensuing analysis lengthy

Hart (1987) recommended some conditions which are deemed appropriate for quantitative and qualitative researches (see Table 7-3a). Holbert and Speece (1993) classified them as "hard" and "soft" emphasis, respectively (see Table 7-3b). See Table 7-4 for comparison of qualitative versus quantitative research.

TABLE 7-3A WHEN TO USE QUALITATIVE AND QUANTITATIVE METHODS

Qualitative Methods	Quantitative Methods
<ul style="list-style-type: none"> • Traditional preliminary exploration • Sorting out and screening behaviour • Exploring complex behaviour 	<ul style="list-style-type: none"> • Testing hypotheses • Synthesising a large number of variables to determine strength of associations • Controlling for generalisability

Source: Hart, Susan (1987), "The Use of the Survey in Industrial Market Research", Journal of Marketing Management, Vol. 3, No. 1, pp. 25 - 38.

TABLE 7-3B SOFT (QUALITATIVE) AND HARD (QUANTITATIVE) METHODS

Qualitative emphasizes	Quantitative emphasizes
" Soft" Hidden Diagnostic Humanistic Art Strategy "Pre"-action Personal	" Hard" Obvious Evaluative Mechanistic Science Tactics "Re"-action Massive

Source: Holbert, N. B. and Speece, M. W. (1993), Practical Marketing Research: An Integrated Global Perspective, Prentice Hall, New York, pp. 45.

TABLE 7-4 QUALITATIVE VERSUS QUANTITATIVE RESEARCH

COMPARISON DIMENSION	QUALITATIVE RESEARCH	QUANTITATIVE RESEARCH
Types of Questions	Probing	Limited probing
Sample Size	Small	Large
Information per Respondent	Much	Varies
Administration	Requires Interviewer with Special Skills	Fewer Special Skills Required
Type of Analysis	Subjective, Interpretive	Statistical, Summarization
Hardware	Tape Recorders, Projection Devices, Video, Pictures, Discussion Guides	Questionnaires, Computers, Printouts
Ability to Replicate	Low	High
Training of the Researcher	Psychology, Sociology, Social Psychology, Consumer Behaviour, Marketing, Marketing Research	Statistics, Decision Models, Decision Support Systems, Computer Programming, Marketing, Marketing Research
Type of Research	Exploratory	Descriptive or Casual

Source: McDaniel Jr, C. and Gates, R. (1993), Contemporary Marketing Research, Second Edition, West Publishing Co., Minneapolis, St. Paul, pp. 188.

7.3 Data Sources

Most research projects involve some primary data collection. Primary data collection is more costly, but the data is usually more relevant to the issue under investigation. It consists of original information with reference to the specific research objectives, ie new data gathered to help the investigation.

Thus, primary data provides real-time market intelligence/information and may be collected by one, or a combination of four methods (see Table 7-5):

- Observation
- Experimentation
- Focus Groups
- Sample Survey

The questionnaire is by far the most common instrument in collecting primary data. A questionnaire consists of a set of questions presented to a respondent for his/her answers. The questionnaire is very flexible in that there are a number of ways to ask questions. Questionnaires need to be carefully developed, tested and debugged before they are administered. Questionnaire design is more of an art than a scientific undertaking (Kinnear and Taylor, 1991). Nachmias and Nachmias (1976) listed a number of factors for consideration in deciding on open-ended or closed-ended questions. (See Table 7-6).

Secondary data is information that already exists somewhere, having been collected for some other purposes. Normally, it provides a starting point for research and offers the advantages of lower cost and quicker availability. Researchers usually start their investigation by examining secondary data to see whether their problem can be partly or wholly solved without resorting to costly primary data collection. There is a rich variety of secondary data in any field of endeavour. The four main sources are:

- Internal sources (including company profit and loss statements, sales figures, inventory records, and annual reports)
- External sources (including government and statutory boards' publications, surveys by research companies, agencies, universities)
- Periodicals and Books (including journals, trade magazines)

TABLE 7-5

FOUR METHODS OF OBTAINING PRIMARY DATA

Research Methods	Definitions	Advantages	Disadvantages
Observation	<ul style="list-style-type: none"> Observe processes associated with the factors under investigation (Malhotra, 1993) People are observed in natural or contrived situations which allows behaviour patterns to be exhibited and inferences to be drawn regarding the individual's feelings and beliefs 	<ul style="list-style-type: none"> Simple Does not rely on the respondent's willingness to provide the desired data Potential bias caused by the interviewer is reduced or eliminated Behaviour patterns of which the respondent is not aware can be recorded only by observation 	<ul style="list-style-type: none"> Less satisfactory Observational techniques depend heavily on the skills and objectivity of the observer Suffer from the need for secrecy if behavioural patterns are not to be disturbed because of the subject's awareness that he or she is under scrutiny Overt behaviour rarely elucidates that subject's motivation and decision processes, these are often central to the research study; inability to observe such things as awareness, beliefs, feelings and preferences, important factors when examining any decision-making process within an organization Observed behaviour patterns must be of short duration, occur frequently, or be reasonably predictable if the data collection costs and time requirements are to be competitive with other data collection techniques
Experimentation	<ul style="list-style-type: none"> An experiment is conducted when one or more independent variables are consciously manipulated or controlled and their effect on the dependent variable(s) measured. The objective of an experiment is to measure the effect of the independent variables on a dependent variable, while controlling for other variables that might confuse the researcher's ability to make valid causal inferences. Thus, the data from an experiment are organised in such a way that relatively unambiguous statements can be made regarding cause-and-effect relationships (Kimmeary and Taylor, 1991) 	<ul style="list-style-type: none"> Experimentation is the most scientifically valid research which calls for selecting match groups of subjects, subjecting them to different treatments, controlling extraneous variables, and checking whether observed response differences are statistically significant. To the extent that extraneous factors are eliminated or controlled, the observed effects can be related to variations in the stimuli. A major advantage of experimentation lies in the relative accuracy with which it helps the researcher establish causality. The lack of control common to observational methods can be avoided and it is usually less expensive to undertake than a sample survey 	<ul style="list-style-type: none"> Experimentation, is unrealistic as a result of the laboratory situation in that only a limited number of respondents may be tested and that these may not be representative of the whole population. Clearly the major drawback of this approach lies in the difficulty of replicating "normal" behaviour in the laboratory setting. While this may be overcome by conducting such experiments in their normal context, if the results are to be taken as valid it is necessary to hold constant all variables other than that which is actually under test. Difficulties in identifying both the nature and effect of other variables may be largely overcome by repeating the experiment a sufficient number of times to permit the derivation of average or representative results, and through the use of controls
Focus Group	<ul style="list-style-type: none"> A focus group consists of six to ten people who spend a few hours with a skilled interviewer to discuss a project, service or organisation. The interviewer needs objectivity, knowledge of the subject matter and industry, and knowledge of group dynamics, otherwise the results can be misleading. The interviewer encourages free and easy discussion among the participants, hoping that the group dynamics will reveal deep feelings and thoughts that are new to the researcher. Focus group research is a useful exploratory step to take before designing a large-scale survey. It provides insight into participants' perceptions relating to the phenomenon under study and can thus help to define the issues to be researched more formally. Although focus groups are useful, researchers must avoid generalising the reported feelings of the group to the population as a whole, since the sample size is small and not drawn randomly (Kotler, 1994) 	<ul style="list-style-type: none"> The group environment is less intimidating than the individual depth interview One participant's experiences or feelings may "spark off" another's The process highlights the differences between participants thus making it possible to understand a range of attitudes and behaviour in a relatively short time Spontaneity of response is encouraged in a group setting 	<ul style="list-style-type: none"> Group processes may inhibit the frank exchange of attitudes and beliefs and encourage unrealistic recounting of behaviour Strong personality may overawe the other members who either withdraw or simply agree Minority viewpoints may be lost by group members feeling insecure at voicing opinions that appear to be different to the majority
Sample Survey	<ul style="list-style-type: none"> "Observational methods of data collection are suitable for investigating phenomena that can be observed directly by the researcher. However, not all phenomena are accessible to the investigator's direct observation; occasionally, therefore, the researcher must collect by asking people who have experienced certain phenomena to reconstruct these phenomena for him or her. The researcher approaches a sample of individuals presumed to have undergone certain experiences and interviews them concerning these experiences. The obtained responses constitute the data upon which the research hypotheses are evaluated" (Nachmias and Nachmias, 1976) 	<ul style="list-style-type: none"> A great deal of information can be collected from a large population economically Theoretically, the ideal method of collecting primary data is to undertake a census of the whole population possessing the attribute to be investigated, in practice such an exercise is usually impossible and only practical where the population is both small and readily accessible. Thus most researchers content themselves with a representative sample of the population they wish to study (Baker, 1991) The objectives of most research require factual, attitudinal and behavioural data. Survey research provides the researcher with the means of gathering both qualitative and quantitative data required to meet such objectives (Kimmeary and Taylor, 1991) 	<ul style="list-style-type: none"> The unwillingness of respondents to provide the desired data: the overriding concern here is of the non-response error which can invalidate research findings The ability of respondents to provide data: in studying managerial decision, it is important to target those individuals in the organization with the knowledge and experience of the subject under examination The influence of the questioning process on the respondents: respondents may give the answer they think the researcher will want to hear, thus distorting the accuracy of the data

Source: Compiled by Author

TABLE 7-6

APPROPRIATENESS OF OPEN-ENDED QUESTIONS VERSUS
CLOSE-ENDED QUESTIONS

Open-ended Questions	Closed-Ended Questions (Fixed-Alternative Questions)
<ul style="list-style-type: none"> • Objectives of the interview <ul style="list-style-type: none"> - When the interviewer wishes to learn about the process of which the respondent arrived at a particular point of view • The respondents level of information about the topic in question <ul style="list-style-type: none"> - Provides opportunities for the interviewer to ascertain lack of information on the part of the respondent • The extent to which the topic has been thought through by the respondent so that his/her ideas about it are well-structured <ul style="list-style-type: none"> - Preferable where the respondents have not crystallised their opinion 	<ul style="list-style-type: none"> • Objectives of the interview <ul style="list-style-type: none"> - When the researcher's objective is to lead the respondent to express agreement or disagreement with an explicit point of view • The ease with which the content of the answer can be communicated by the respondent or the extent to which the respondent is motivated to communicate on the topic • Requires less motivation to communicate on the part of the respondent

Source: Nachmias D. and Nachmias C. (1976), Research Methods in the Social Sciences, Edward Arnold, London.

- Commercial data (including index on profit, market share, products and brands sold worldwide)

The advantages and disadvantages of secondary data are as follows:

Advantages	Disadvantages
<ul style="list-style-type: none"> • Cut cost and time • Help to better state problem • Suggest improved methods/data • Provide comparative data • Clarify problem • Provide solution to the problem • Provide research method alternatives • Provide background information 	<ul style="list-style-type: none"> • Wrong or inappropriate unit of measurement • Publication currency • Difficulty in assessing accuracy • Outdated • Lack of availability • Lack of relevance • Inaccurate data • Insufficient data

7.4 Case Studies as a Research Strategy: Some Theoretical Considerations

A case study can be defined as an empirical enquiry which investigates a contemporary phenomenon within its real-life context. It is used when the boundaries between a phenomenon and context are not clearly evident and when multiple sources of evidence are possible (Davis, 1976; Miles, 1979; Yin, 1981a, 1987; Smith, 1989). A case study is a detailed examination of an event or series of related events which the analyst believes reflects the operation of some identified phenomena. It is a presentation and interpretation of detailed information about a single subject using multiple sources of evidence and based on some general theoretical propositions (Hakin, 1987; Yin, 1987; Burgess, 1988; Smith, 1989).

Other definitions of a "case" are:

- In a business context, a case is the factual description of an actual situation, commonly involving a decision or problem. It is normally written and contains relevant data about the situation available to the key person in the case, plus background information about the organisation (Eriskine et al., 1981)
- A case typically is a record of a business issue which actually has been faced by business executives, together with surrounding facts, opinions, and prejudices upon which executives' decisions have to depend (Gragg, 1954)

- A case is the record of complex situation that must literally be pulled apart and put together again before the situation can be understood. It is the target for the expression of attitudes or ways of thinking (Paul R. Lawrence, 1953)

Although "cases" have been used in one form or another by both law and medicine for a long period, the case method as used in the teaching of management is relatively new. This explains the paucity of materials on case study as a research methodology. In business situations, the case method is ideal for describing and explaining the decision process. Dean Wallace B. Bonham of Harvard Business School, a lawyer trained by the case method, pushed hard to get a total school commitment to the case method.

Case studies are appropriate when a researcher wishes to answer the "why" and "how" questions about the temporal links within a set of contemporary events which the researcher has little control. It is also appropriate when the use of specific examples (ie individual cases) can aid understanding of a contemporary phenomenon better than findings based on analysis of aggregate data (Miles, 1979; Kidder, 1981; Simon and Burstein, 1985; Yin, 1987).

7.4.1 Functions of Case Studies

Eckstein (1975) and Burgess (1988) noted that case studies can serve "rhetorical or logical functions". Rhetorical functions are concerned with the presentation of specific arguments. Logical functions range from tentative and exploratory studies to strong assertions. They define abstract terms or special usages. They aid understanding by giving examples and enhance memory via the use of rich and specific details. Thus, case studies provide empathy, make a phenomenon visible as well as offer insights to the existing situation. Consequently, they have the power to persuade the reader to support the arguments presented.

Case studies (Burgess, 1988) can also be subdivided into four logical functions (as highlighted earlier in section 7.2):

- To reach instrumental rather than terminal conclusions (ie they have an exploratory function)
- Inferences for future case studies can be developed (ie they have a predictive function) from existing case studies

- To generate implications that are beyond a particular case that is under study. They give a profile of any long-term interactive process that may exist and are useful for generating a hypothesis (ie they have a descriptive function)
- To develop theories on generalised findings of case studies that are representative of a population or where applicable, findings of a single case in itself can be analytically generalised to some broader theory (ie they have an explanatory function)

While survey or quantitative methods are useful only for the investigation of the more rational aspects of behaviour and motivation, case studies prevent the researcher from missing the subtleties and idiosyncrasies of individual or organisational behaviour (Cooper and Rantwaite, 1977).

7.4.2

Criticisms of Case Studies

As Majazrack (1985) indicated, a daunting but crucial task in any research is to choose a topic and then define its scope of study. As a case study proceeds, the original research questions may become inappropriate for research problem due to slippage. Thus, case studies have been criticised for lack of rigour. Further, it is difficult to generalise from one case to another. It is also time consuming to collect data and write-up a case form (Krause and Miller, 1974). However, it must be recognised that case studies rely on "analytical generalisation" (Yin, 1987), therefore an analyst should only strive to generalise particular set of empirical evidence to a broader body of knowledge.

Unless statistical generalisation is applied to analyse the findings (ie in the case of survey research), no set of cases, irrespective of its size, can be reasonably generalised to a larger universe. There is also no optimal way to ascertain the ideal number of cases (Smiths, 1989). Rigour can be ensured if an appropriate research design is used in the first place. Indeed, quantitative methods of research can also suffer from lack of rigour (Glaser and Straus, 1967; Mintzberg, 1979; Van Maanen, 1979). An appropriate research design at the onset of the research can help to expedite data collection and analysis. This applies to any other research strategy. The following sections provide some general guidelines to developing effective research design for case studies.

7.4.3

Case Studies Research Design

A research design is the logic that connects empirical evidence to a case's research questions, and ultimately, to its conclusions (Yin, 1987). It is a plan that guides the researcher "in the process of collecting, analysing and interpreting data" (Nachmias and Nachmias, 1987) or a "blueprint" of research which deals with at least four problems:

- What questions to study
- What data are relevant
- How to analyse the data collected
- How to interpret (Phillibe et al., 1980)

7.4.4

Components of Research Design

For case studies, a research design should include components such as research questions, research propositions, the units of analysis to be investigated, any logical links between data to be collected and the research propositions as well as specific criteria for selecting the unit of analysis and interpreting the research findings (Lucas, 1974; Campbell, 1982; Cooper, 1984; Yin, 1981a, 1981b, 1987). The rationale for having such components and the procedures for defining and developing it are highlighted in the following sections.

7.4.5

Research Questions

Research questions are important because the aim of a research design is to ensure that the empirical evidence that will be gathered addresses the research problem. A comprehensive review of previous research and theoretical literature enables the a researcher to develop sharper and more insightful questions about the research topic. For example, having ascertained that to address the research involves asking mainly "why" and "how" questions rather than the "who", "what" and "where" questions, a researcher will more often than not opt for case study (as the most appropriate research strategy).

7.4.6

Research Propositions

Propositions or hypotheses reflect theoretical issues. They act as pointers to where to look for relevant data and help the study to stay within feasible limits. For example, having developed a specific proposition based on published theoretical

and empirical literature, a researcher will logically consider how to verify it, ie a researcher will focus on certain data and ignore others.

7.4.7

Unit of Analysis

The units of analysis will depend on the given research propositions and the research questions of the study. Having clearly defined units of analysis will allow a researcher to examine a theory even within a single case. The definition of each unit of analysis should be logically linked to the research problem and previous studies to allow a comparison of one's findings with previous researchers'. The unit of analysis should not be defined idiosyncratically. Defining and developing it into an operational "case" to study requires examination and integration of existing empirical and theoretical literature. Specific time parameters must be applied to define the beginning and the end of a selected case. This will help to ensure that the research stays within its boundaries.

7.4.8

Selecting "a Case"

A "case" can consist of the following:

- an individual entity (eg an individual company within a specific industrial sector, a particular group of industries or a specific type of person within a community)
- a geographical area (eg a particular neighbourhood, a country or a region)
- a phenomenon or an event (eg a process or a programme or a decision or even consequences of the decision made)

Overall, the selection of each case should always be based on its explanatory power rather than how representative it is. Thus, the presentation of the "best cases" should also be confined to the "best elements" within each specific case which would most effectively reveal the body of theories investigated (Mitchell, 1983; Silverman, 1985; Yin, 1987; Smith, 1989).

7.4.9

Sampling Plan for Questionnaires

The sample size for the survey through questionnaires to ascertain end-users' perception of the characteristics of a world-class manufacturing company was determined as follows:

- Set confidence level at 95 percent which gives $Z = 1.96$ for a normal distribution
- Set permissible error of tolerance at 10 percent or $E = \pm 0.10$
- Set frequency of occurrence at 50 percent or $P = 0.50$ (50/50 chance of acceptance/rejection by respondents to be interviewed)
- The formula for the calculation of the sample size where the proportion of the true population can be estimated (or known) is given by:

$$\begin{aligned}
 n &= \frac{Z^2 [P(1-P)]}{E^2} && \text{(McDaniel Jr and Gates, 1993)} \\
 &= \frac{(1.96)^2 [0.50 (1-0.50)]}{(0.10)^2} \\
 &= 96 \\
 &= 100 \text{ (rounded-off)}
 \end{aligned}$$

Therefore, the minimum sample size should be one hundred respondents from the target population for the five ASEAN markets, ie twenty respondents from each country/market.

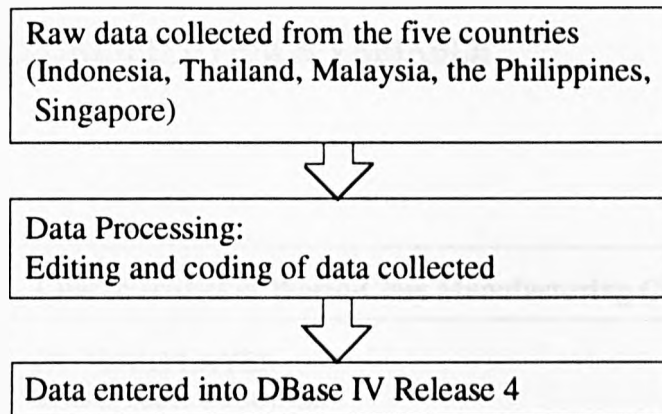
The final batch size was fixed at twenty five respondents per market because this is the minimum sample size for any individual batch size to estimate for the population of a normal distribution (Murdoch and Barnes, 1973; Sanders et al., 1980; Webster, 1992). Hence, the total sample size (n) for five countries (Indonesia, Thailand, Malaysia, the Philippines and Singapore) was at least one hundred and twenty five respondents.

7.4.10

Data Processing and Analysis for Questionnaires

7.4.10.1 Data Processing

After the responses from the survey were collected from each target country, the data were processed. The data processing procedure involved editing, coding and data entry of the responses received as depicted in the following diagram:



In editing the raw data from the questionnaires, a thorough examination of the data was carried out to check for eligibility, completeness, consistency and accuracy of the responses received. After the data were edited, a process of coding was undertaken to prepare for data entry into a database environment. All variables and data were coded and defined with alphanumeric labels. The data were subsequently entered into a database environment using DBASE IV Release 4.0. Table 7-7 shows a list of labels assigned to each variable component (characteristic) used.

- Data analysis using SPSS Software Package

The data were then tabulated and analysed using Statistical Package for the Social Sciences (SPSS) Release 5.0.2 in the windows environment. SPSS was chosen as the statistical computer software tool to analyse the findings of the survey as the package offers an integrated system of computer programs that is easy and flexible to use. This is because of the simple syntax application of its control and procedure commands. In addition, the PC-based menu-driven package also offers outstanding output features and variable labelling capabilities. Table 7-8 highlights a list of procedures for SPSS Release 5.0.2.

7.4.10.2 Data Analysis

- *Target population and sample size*

The sample responses were collected over a six-month period from the five target countries (Indonesia, Thailand, Malaysia, the

TABLE 7-7

LABELS ASSIGNED TO EACH VARIABLE

Variable Label	Characteristics of World-Class Manufacturing Company
GLOBAL1	GLOBAL PLAYER
PRODUCT1	Sells product worldwide
MSHARE1	Has a significant market share in its industry
LEADER1	Is a leader in innovation
COMPO1	Makes critical components in the country of origin
MANU1	MANUFACTURING STRATEGY
TECH1	Is technologically superior to competitors
QUAL1	Produces high quality products (accuracy/process capability)
RELIAB1	High reliability of products (mean-time-before- failure/few breakdowns)
COSTEFF1	Cost-efficiency (value-for-money)
MKT1	MARKETING STRATEGY
CUSTOM1	Produces customized products
ART1	Has state-of-the-art technology (software is never obsolete)
MSALES1	Has strong marketing and sales strategies
SERVICE1	Has excellent customer service
FINANCE1	Is financially stable and profitable
STRAT1	CORPORATE STRATEGY
IMAGE1	Has strong and consistent corporate image/brand
RND1	Has commitment to R&D
FLEX1	Has flexibility to respond to market, political, and competitive changes
PROMISE1	Always meet delivery promise
VALUES1	CORPORATE VALUES
ETHICS1	Has high standards of ethics
INTEG1	Has integrity in dealing with people
SINCERE1	Is sincere in approach to people
TRUST1	Builds trust in business/marketing relationship
BENEFIT1	Sells benefits/solutions rather than empty promise
HRS1	HUMAN RESOURCE STRATEGY
MANAGED1	Is a well-managed company
TURN1	Has low turnover of staff
CARE1	Is a company that cares for its people

Source: Author

TABLE 7-8

LIST OF PROCEDURES FOR SPSS RELEASE 5.0.2

- | | |
|---|---|
| <ul style="list-style-type: none">• Frequencies• Descriptive• Crosstabs• Custom tabulations• T test• Analysis of Variance• One-way ANOVA• ANOVA models• Correlations functions• Regression (all types) | <ul style="list-style-type: none">• Reliability Analysis• Multidimensional Scaling• Factor Analysis• Discriminant Analysis• Nonparametric Tests• Multiple Response• Graphic presentations |
|---|---|

Source: Author

Philippines and Singapore). Based on a 95 percent confidence level (with a tolerable error of 10 percent), responses from a total of one hundred and thirty three respondents were collected to ensure that the samples drawn would be statistically significant. The target population from each country comprised of senior executives of machine tool user-companies.

- ***Statistical tests***

The ordinal data collected were tested for validity, reliability and consistency using statistical tests available in SPSS Release 5.0.2. Figure 7.1 depicts the statistical tests that were carried out.

- *Kolmogorov-Smirnov Goodness-of-Fit Test* (Luck and Rubin, 1987; Churchil Jr, 1991)

This is basically designed to test the distribution of the data, check its statistical significance, as well as determine the degree of agreement between the distribution of observed values and expected frequencies. An example of the test on the degree of agreement between observed values and expected frequencies of each variable is illustrated below.

Example:

- H_0 : (null hypothesis) that there will not be any differences in the observed frequency distribution of a variable

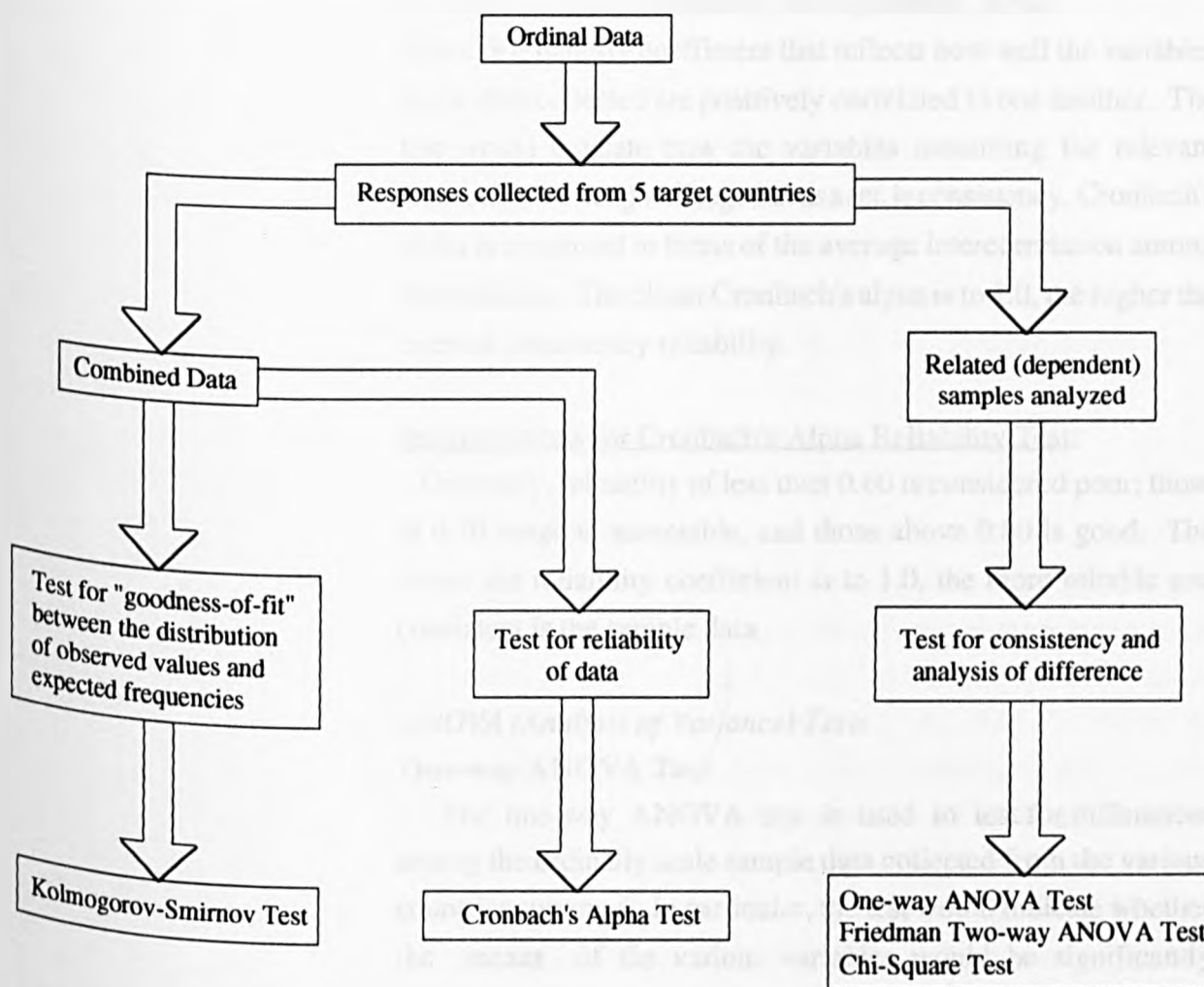
H_1 : (alternative hypothesis) that there are differences in the frequency distribution of the variable

- Level of significance of 5 percent, critical value = $\frac{1.36}{\sqrt{n}}$

(In this case, $n = 133$, critical value = 0.12)

- Kolmogorove-Smirnov test statistics (absolute value for most extreme differences) for the variable is generated by SPSS

FIGURE 7.1 STATISTICAL TESTS PERFORMED



Source: Author

- If the absolute value of the variable exceeds its critical value, then H_0 is rejected, ie there are differences in the frequency distribution of the variable (data are unreliable)

- *Cronbach's Alpha Reliability Test* (Sekaran, 1992)

This is a reliability coefficient that reflects how well the variables in the data collected are positively correlated to one another. The test would indicate how the variables measuring the relevant characteristics hang well together as a set, ie consistency. Cronbach's alpha is computed in terms of the average intercorrelation among the variables. The closer Cronbach's alpha is to 1.0, the higher the internal consistency reliability.

Interpretations for Cronbach's Alpha Reliability Test:

Generally, reliability of less than 0.60 is considered poor; those in 0.70 range is acceptable, and those above 0.80 is good. The closer the reliability coefficient is to 1.0, the more reliable and consistent is the sample data.

- *ANOVA (Analysis of Variance) Tests*

One-way ANOVA Test

The one-way ANOVA test is used to test for differences among the ordinally scale sample data collected from the various countries surveyed. In particular, the test would indicate whether the means of the various variables would be significantly different thereby checking the consistency of the responses given. The key issue in the ANOVA test is whether the differences in means between the target groups are large in relation to the uncertainty and variability within the groups on the dependent variable (countries surveyed).

Interpretation for One-way ANOVA Test:

- H_0 : (null hypothesis) that the means of variable GLOBAL1 are equal in all countries

H₁: (alternative hypothesis) that the means of variable GLOBAL1 are not equal in the countries surveyed

- Level of significance of 5 percent, 4 degrees of freedom (between groups) and 128 degrees of freedom (within groups), critical value: $F_{0.05, 4, 128} = 2.37$
- F-ratio test statistics generated by SPSS
- If F ratio exceeds critical value, then H₀ is rejected, ie the means of variable GLOBAL1 are not equal between individual country sample against the total sample size for ASEAN countries

Friedman Two-way ANOVA Test

The Friedman Two-way ANOVA test is a logical extension of the ANOVA method where there are two influencing (independent) variables that may affect the key (dependent) variable. The test basically examines the interactions between the variables. The procedure for conducting this ANOVA test is similar to that of the one-way ANOVA. The test would be applicable to more than 2 dependent samples of data that are ordinal in nature. For the samples of data collected, the ANOVA test was applied to key variable characteristics of world-class manufacturing companies such as Global Player (GLOBAL1), Manufacturing Strategy (MANU1), Marketing Strategy (MKT1), Corporate Strategy (STRAT1), Corporate Values (VALUES1) and Human Resource Strategy (HRS1).

Chi-Square Test

To test a hypothesis about the variance of a population, ie to draw conclusions regarding the *variability* of a population.

7.4.11

Sampling Plan for Case Studies

The sampling plan for selection of the Japanese and Taiwanese CNC machine tool manufacturing companies as case studies were based on the following criteria:

- Manufacture both CNC lathes and machining centers
- Among the top three in either of the two segments (CNC lathes and machining centers) in their respective domestic market (in Japan or Taiwan) in terms of average annual sales turnover between 1989 and 1992
- Export both CNC lathes and machining centers on a worldwide basis
- Employ over 400 workers in its parent company in Japan or Taiwan
- CNC lathes and machining centers are installed and operating in end-users' factories in the ASEAN countries (these end-users would be participating in the survey on characteristics of a world-class manufacturing company)
- Significant market share in the ASEAN region must be at least 10 percent (either in one market or a combination of markets)

The selection of Japanese CNC machine tool manufacturers was much easier to ascertain because of the ready availability of information and also due to the longer history of their NC/CNC products in the ASEAN markets (since 1963). Data were taken from *American Machinist* (USA), *Metalworking Engineering and Marketing* (Japan), *Yano Research Institute* (Japan), *Economist* (UK), *Financial Times* (UK), and *Nikkei Industry Statistical Report* (1993). The final decision on the three Japanese producers was based on the following statistics:

Company	Ranking in terms of Sales Turnover	
	CNC Lathe (billion Japanese Yen)	Machining Center (billion Japanese Yen)
Okuma Corporation (public-owned)	No. 2 (18.5)	No. 2 (14.1)
Mori Seiki Co. Ltd (public-owned)	No. 1 (19.7)	No. 3 (11.3)
Yamazaki-Mazak Corporation (private-owned)	No. 2 (18.5)	No. 1 (14.6)

Although the market size for CNC machine tools had shrunk by 30 percent in 1992, the export ratio for Okuma, Mori Seiki, and Yamazaki-Mazak were 32 percent, 53 percent, and 45 percent, respectively. In 1991, these top three Japanese

CNC machine tool builders alone (US\$2.84 billion) accounted for 36.4 percent of Japan's total production of CNC machines at US\$7.8 billion (JMTBA, 1992).

Although Amada (produces CNC metal-stamping machines) and Fanuc (produces CNC controllers) were the biggest producers of machinery, they were not included in the case studies because both companies do not manufacture CNC lathes and machining centers.

The choice of Taiwanese CNC machine tool manufacturers was more difficult because the fact gathering phase was hindered by the lack of availability of information/data. Nevertheless, after an initial visit to the Taiwan Association of Machinery Industry (TAMI) and Mechanical Industry Research Laboratories (MIRL) by the author, there was adequate information to narrow the choice to three world-class Taiwanese manufacturers who met similar criteria as their Japanese counterparts. It is interesting to note that the Taiwanese machine tool builders have identified some world-class Japanese competitors as benchmarks for their business: Okuma, Mori Seiki and Yamazaki-Mazak for CNC lathes; Okuma, Makino and Hitachi-Seiki for machining centers.

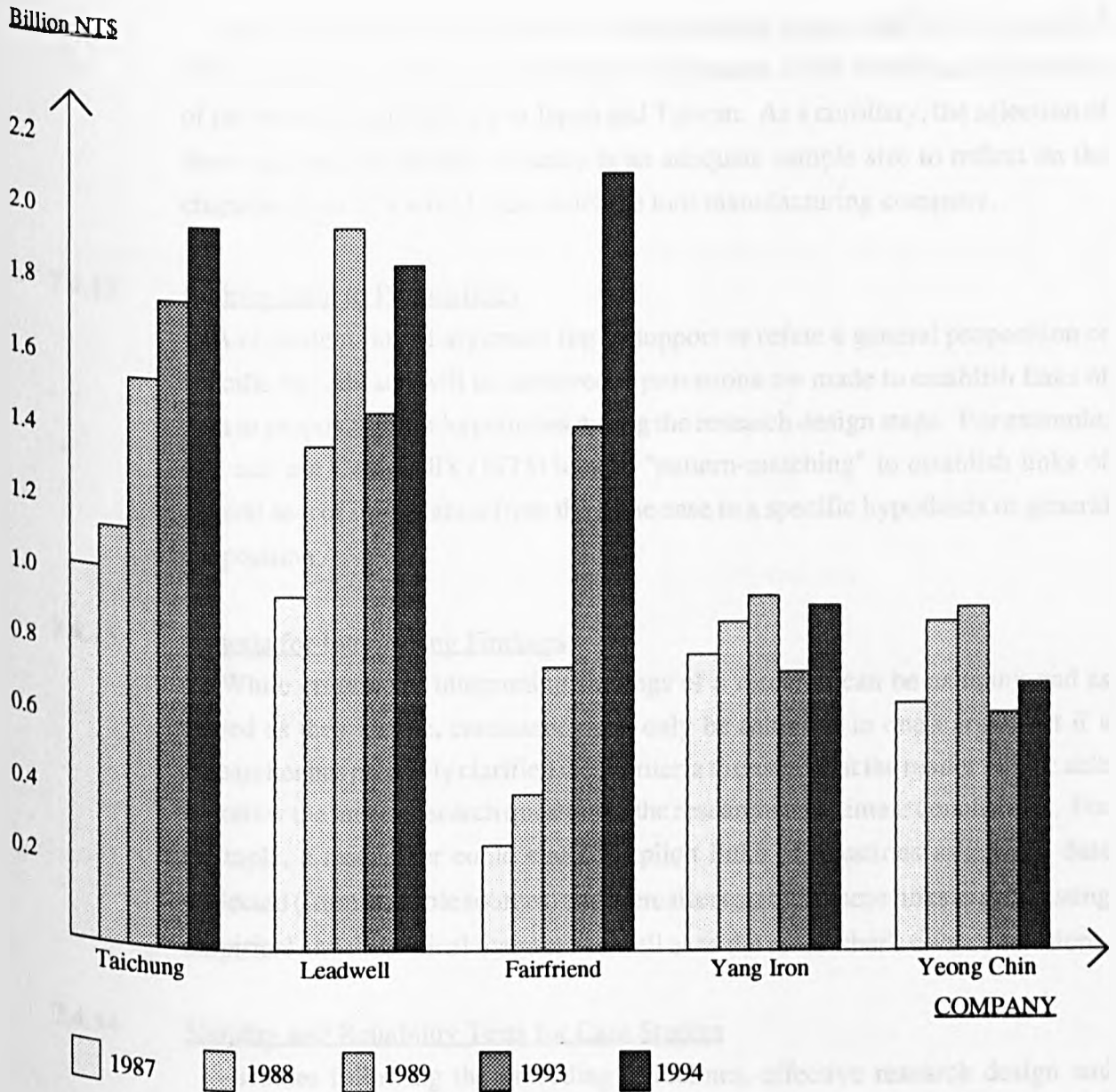
Based on data available from TAMI (Taiwan), MIRL (Taiwan), Business Journal (Taiwan), Banque Indosuez Group (Switzerland), Arthur D. Little (UK), the three Taiwanese CNC machine tool manufacturers who met the aforementioned criteria were (see Figure 7.2 for top five performers):

Company	Ranking in terms of Sales Turnover (average of 1991 to 1993)	
	CNC Lathe (billion NT\$)	Machining Center (billion NT\$)
Taichung (private-owned)	No. 1 (1.20)	No. 1 (0.80)
Leadwell (private-owned)	No. 2 (1.08)	No. 2 (0.72)
Fair Friend (private-owned)	No. 3 (0.92)	No. 3 (0.61)

All three companies have applied for public-listing and are scheduled to be converted into public companies before the end of 1994. Yang Iron used to be one

FIGURE 7.2

SALES FIGURES FOR TOP FIVE TAIWANESE CNC MACHINE TOOL PRODUCERS (MARCH 1987 TO MARCH 1994)



Source: Compiled by Author from Taiwan Institute of Economic Research (1994), Survey of the Sixth Manufacturing Automation, April.

of the top three Taiwanese CNC machine tool producers in the 1980s but it was displaced by Fair Friend since 1991 and hence had to be excluded in this research (see Table 7-9).

Like the Pareto's Rule, it could be concluded that approximately 20 percent of the machine tool builders contributed to 80 percent of the wealth and dynamism of the machine tool industry in Japan and Taiwan. As a corollary, the selection of three case studies for each country is an adequate sample size to reflect on the characteristics of a world-class machine tool manufacturing company.

7.4.12 Linking Data to Propositions

A consistent line of argument (eg to support or refute a general proposition or specific hypothesis) will be achieved if provisions are made to establish links of data to propositions or hypotheses during the research design stage. For example, one can use Campbell's (1975) idea of "pattern-matching" to establish links of several sets of information from the same case to a specific hypothesis or general proposition.

7.4.13 Criteria for Interpreting Findings

While criteria for interpreting findings of a research can be as many and as varied as they can be, consistency can only be achieved in one's argument if a researcher has precisely clarified these criteria to ensure that the reader will be able to follow the initial research question to the researcher's ultimate conclusions. For example, a researcher could clarify explicit links of questions asked and data collected (from multiple sources) and thereafter establish these links to the existing empirical and theoretical literature as well as to the researcher's own conclusions.

7.4.14 Validity and Reliability Tests for Case Studies

Besides following the preceding guidelines, effective research design and subsequently, the quality of findings, of case studies can be ensured if validity and reliability tests are made while a "case work" is still in progress (ie before a researcher ultimately draws any conclusive interpretation from the findings).

Figure 7.3 gives a summary of stages in the research process at which to apply these validity and reliability tests. It also provides an outline of what constitutes

TABLE 7-9

**SALES FIGURES OF THE TOP TEN MACHINE TOOL MANUFACTURERS
FROM TAIWAN (1987 - 1994)**

Sales Figures (Unit: Thousand of NT\$) of Top Five Taiwanese CNC Machine Tool Manufacturers

YEAR	COMPANY				
	TAICHUNG	LEADWELL	FAIR FRIEND	YEONG CHIN	YANG IRON
1987	1,087,000	1,068,000	290,000	718,000	873,000
1988	1,205,000	1,473,000	464,000	952,000	977,000
1989	1,639,000	2,018,000	856,000	1,001,000	1,025,000
1993	1,760,000	1,610,000	1,501,000	680,000	840,000
1994	1,980,000	1,890,000	2,160,000	785,000	990,000

Comparison of Sales Figures (Unit: Thousands of NT\$) in 1987 against 1988, 1989, 1993, and 1994

YEAR	COMPANY				
	TAICHUNG	LEADWELL	FAIR FRIEND	YEONG CHIN	YANG IRON
1987	100	100	100	100	100
1988	90	138	160	134	112
1989	151	189	205	139	117
1993	162	151	518	92	96
1994	182	177	745	109	113

Comparison of Workers and Productivity in 1989 against 1988, 1993, and 1994

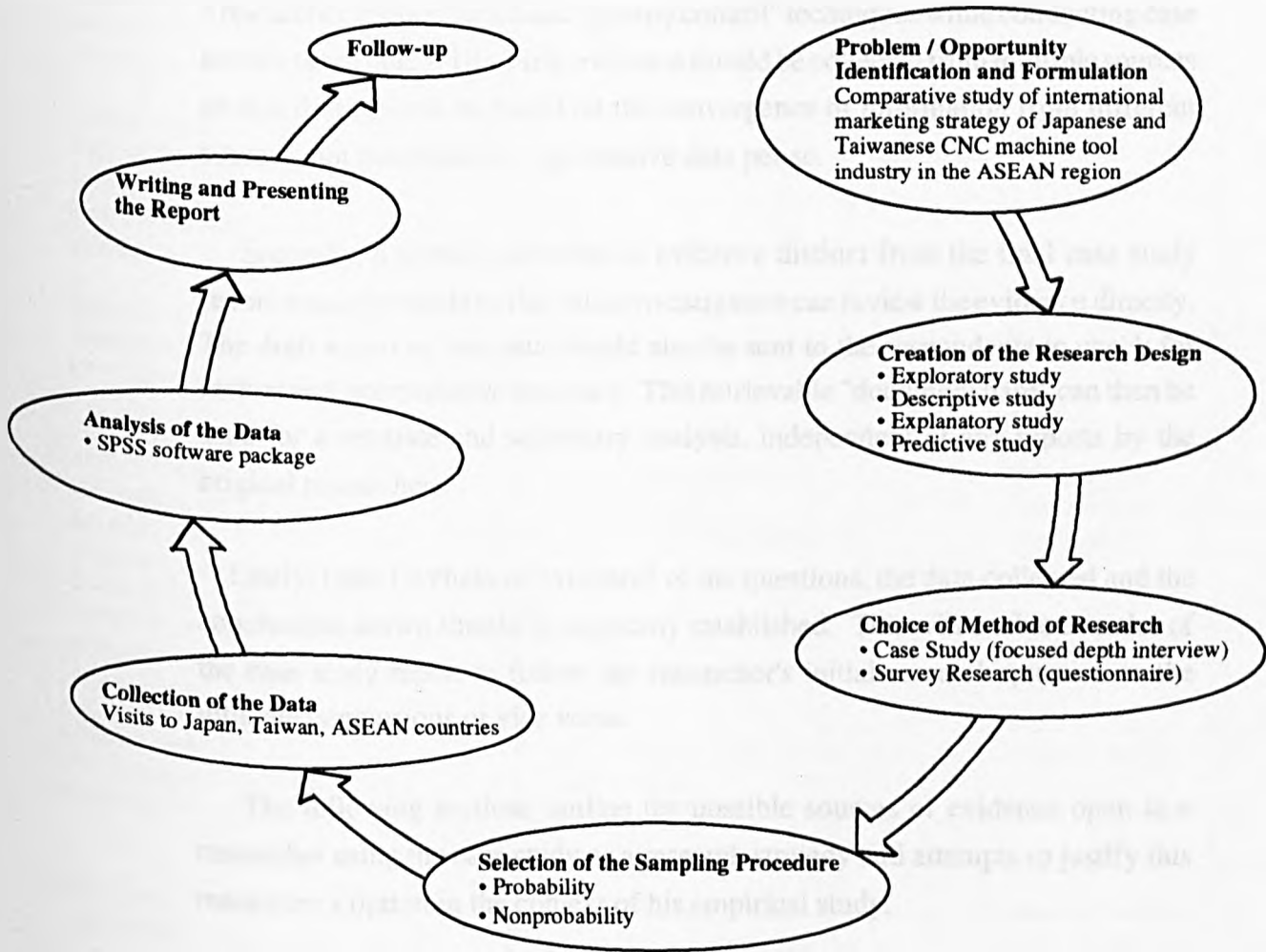
Year	COMPANY				
	TAICHUNG	LEADWELL	FAIR FRIEND	YEONG CHIN	YANG IRON
1989/1988	100	100	100	100	100
1989/1993	107	79	175	66	66
1989/1994	119	94	252	79	79
No. of workers	690	490	400	430	390
Productivity	2,869,000	3,857,000	6,224,000	1,826,000	2,538,000

Listing by Industry for Top 1,000 Companies base on Sales Turnover and Sales Growth (%) in 1993

Ranking	COMPANY				
	TAICHUNG	LEADWELL	FAIR FRIEND	YANG IRON	YEONG CHIN
Ranking	330	360	442	529	756
Sales Turnover	16.83	15.13	11.68	9.52	6.16
Sales Growth (%)	0.10	0.98	2.07	5.42	-23.01

Source: Compiled by Author [abstract from Taiwan Industrial Products Statistics (1994), General Trends of Machinery Industry, Ministry of Economic Affairs, April.]

FIGURE 7.3 RESEARCH PROCESS



Source: Author

each of these tests (ie those that have been identified by Jacoby, 1978; Murphy, 1980; Yin, 1981; Kidder, 1981; Kinnear and Taylor, 1987; Easterby-Smith et al., 1991).

7.4.15 Techniques to Improve the Quality of Case Studies

The benefits of case studies over other research strategies can be maximised if a researcher applies three basic "quality control" techniques while conducting case studies (see Table 7-10). First, evidence should be collected from multiple sources so that findings can be based on the convergence of information from different sources, not quantitative or qualitative data per se.

Secondly, a formal collection of evidence distinct from the final case study report should be made so that other investigators can review the evidence directly. The draft report of this data should also be sent to the respondents to check for factual and interpretative accuracy. This retrievable "document base" can then be used for a separate and secondary analysis, independent of any reports by the original researcher.

Lastly, links (ie chain of evidence) of the questions, the data collected and the conclusions drawn should be explicitly established. This will enable a reader of the case study report to follow the researcher's initial research question to the ultimate conclusions or vice versa.

The following sections outline the possible sources of evidence open to a researcher using the case study as a research strategy and attempts to justify this researcher's option in the context of his empirical study.

7.4.16 Source of Evidence

The sources of evidence for case studies which a researcher can incorporate into the research design (Miln and Vineall, 1977; Schvaneveldt, 1985; Yin, 1987) include the following:

- interviews (eg personal interviews with key informants in the company)

TABLE 7-10 VALIDITY AND RELIABILITY TESTS FOR CASE STUDY

<u>Test</u>	<u>Tactics</u>	<u>Stage of Research</u>
<p>Construct Validity</p> <ul style="list-style-type: none"> • establishing correct operational measures for the concepts being studied (ie to fulfil the research objectives) 	<p>Use multiple sources of evidence Establish chain of evidence Have key informants review draft</p>	<p>Data collection Data collection Thesis write-up</p>
<p>Content Validity (face validity)</p> <ul style="list-style-type: none"> • rests on the researcher's subjective evaluation as to the validity of the measuring instrument sampling validity • relates to whether or not a given population is adequately sampled by the measuring instrument 		
<p>Internal Validity</p> <ul style="list-style-type: none"> • ascertaining the relationships of variables, whereby certain conditions are shown to lead to other conditions, as distinguished from spurious relationships, ie applicable to explanatory studies only 	<p>Do pattern matching Make inferences Do time-series analysis</p>	<p>Data analysis Data analysis Data analysis</p>
<p>External Validity</p> <ul style="list-style-type: none"> • identifying the domain to which a study's findings can be generalised 	<p>Use replication logic in multiple case studies</p>	<p>Research design</p>
<p>Reliability</p> <ul style="list-style-type: none"> • demonstrating that the operations of a study (eg data collection procedures and analysis techniques) can be repeated and produce the same results 	<p>Use case study protocol Develop case study data case</p>	<p>Data collection Data collection</p>

Source: Adapted from Yin (1987), Case Study Research: Design and Methods, pp. 36.

- documents (eg written reports in the mass media of investments undertaken by specific companies, publications by official organizations such as the Department of Statistics)
- archival records (eg company's annual reports, newsletters, memoranda and invoices)
- physical artifacts (eg a company's products or technological device)
- direct observation (eg a field visit to the case study "site")
- participant-observation (eg playing a role in the events being studied)

In the context of this research, it is this researcher's view that these sources of evidence are relevant in his undertaking. The following sections show why this researcher has chosen to use in-depth personal interviews against mail questionnaires to corroborate and augment evidence from the other three sources (ie documentary reports or official publications, company annual reports and companies' products).

7.4.17

Personal Interview as Data Collection Method

Personal interviews can generally be categorised into three groups (Hart, 1987). (See Table 7-11):

- the structured interview
- the focused or unstructured interview
- the depth interview

At the Academy of International Business Annual Meeting panel in San Francisco, Professor Robert Vambéry, Editor-at-large of Journal of International Business Studies, expressed reservations on the widespread use of mail questionnaires for empirical research in international business (Dymsza, 1984). The researcher also takes the view that while mail questionnaires represent economical means of surveying a large population, they present some significant methodological problems. For example, mail questionnaires do not permit probing into deeper feelings.

TABLE 7-11 THREE GROUPS OF PERSONAL INTERVIEWS

Types of Interview	Definitions	Assumptions	Advantages/Disadvantages
Structured Interview (Standardised Interview)	<ul style="list-style-type: none"> • Set questions are asked, their sequence/wording are fixed, answers recorded in standardised forms 	<ul style="list-style-type: none"> • Respondents have a sufficiently common vocabulary so that it is possible to formulate questions which will have the same meaning for each of them • It is possible to phrase all questions in a form meaningful to each respondent • The sequence of questions must be identical as preceding questions form the context of subsequent questions (Hart, 1987) 	<ul style="list-style-type: none"> • Variability between interviews is reduced, resulting in comparability of data (Nachmias and Nachmias, 1987) • While the reliability of this technique is higher than with more informal types of interviewing, its rigidity is not appropriate for probing, searching questions (Hart, 1987)
Unstructured Interview (Focused Interview)	<ul style="list-style-type: none"> • Most of the questions are open-ended, designed to encourage the respondent to talk freely about each topic. A "topic guide" can be used as a loose structure for the questions • Researchers should be free to encourage to make choices as they collect their data as to which lines of questioning to explore or discard. While there is a framework from which to begin to plot out developing themes, they should not be duly constrained by it (Easterby-Smith et al., 1991) 	<ul style="list-style-type: none"> • It takes place with respondents known to have been involved in a particular experience • It refers to situations that have been analysed prior to interview • It proceeds on the basis of an interview guide specifying topics related to the research hypotheses • It is focused on subjective experiences regarding the situations under study (Hart, 1987) 	<ul style="list-style-type: none"> • Interviewers must be skilled and have a certain knowledge of the subject under study • Avoids inflexibility of structured interviews but at the same time assures that all the relevant topics under research will be addressed. The researcher can thus investigate emotions, motives and gain a fuller understanding of the respondent • The potential for interviewer bias is increased in both questioning and answering (Hart, 1987)
Depth Interview	<ul style="list-style-type: none"> • An unstructured personal interview which uses extensive probing to get a single respondent to talk freely and to express detailed belief and feelings on a topic (Kinnear and Taylor, 1991) • The interviewee is encouraged to talk about the subject under investigation and the course of the interview is mainly guided by him. No pre-specified set of questions is employed and usually no schedule is used (Holt, 1987) 		<ul style="list-style-type: none"> • Role of interviewer is usually confined to clarifying responses and probing generally (Hart, 1987) • The information obtained is not only copious, but richer in its fullness and more revealing of the personality of the respondent • In the context of industrial marketing research, it can be used to promote a free flow of information regarding the non-rational elements of management behaviour. However, interview variation is likely to be pronounced and thus comparability is reduced. (Hart, 1987)

Source: Compiled by Author

In multiple-choice questions, attitudes tend to be imposed on respondents, not allowing them to express themselves in their own terms. Arguably, even when an alternative of "other (please specify)" is open to respondents, there is a tendency that they will choose from the given alternatives rather than the "other" alternatives.

Secondly, it is difficult to ensure that mail questionnaire will be answered only by the person (ie the addressee or key informant) most competent to answer it. Indeed, even if the questionnaire is answered by the key individual whom the researcher has selected, very little is known regarding how much attention the respondent will give to the answers.

Thirdly, the questions may be interpreted in various ways by respondents, and in the international business field, the responses are also more prone to distortions by cross-cultural variables such as language and social norms. The advantages and disadvantages of the mail methods is in Table 7-12.

On the other hand, personal interviews highly involve the respondents once the interviewer is able to establish trust and rapport with the former. As a data collection method, it elucidates complex behaviour as it permits probing into deeper feelings. Attitudes are not forced on respondents. They are, therefore, allowed to express their attitudes in their own terms and the interviews can be adapted to respondents when the need arises. However, the possibility of inherent bias with the qualitative aspects of results in the findings should be recognised. Indeed, when bias occurs, the relevancy of findings cannot be improved even with the application of sophisticated statistical techniques.

7.4.18

Limitations of Personal Interviews

As some authors of research methodology have also cautioned (Yin, 1987; Gordon and Langmaid, 1988; Smith et al., 1990; Kinnear and Taylor, 1999), while personal interviews are seen to be more appropriate than mail questionnaires as sources for qualitative data, they can also present some methodological problems. For example, it must be recognised that because interviews are verbal reports, they are problems such as interviewer and interviewee bias as well as poor or inaccurate articulation by both the former and the latter (see Table 7-13). Correlating data

TABLE 7-12 PRIMARY DATA COLLECTION : MAIL METHOD

ADVANTAGES	DISADVANTAGES
<ul style="list-style-type: none"> • May be the only method able to reach respondent • Sampling frame easily developed when mailing lists are available • Not subject to interview bias • Respondents work at their own pace • Assures anonymity of respondent • Wide distribution possible • Best for personal, sensitive questions • Generally least expensive 	<ul style="list-style-type: none"> • Very little control in securing response from specific individual • Cannot secure responses from those who do not understand the language used in the questionnaire • Cannot control speed of response; often long response time • Researcher cannot explain ambiguous questions • Does not allow probing with open-ended questions • Sequence bias: respondents can view entire questionnaire as they respond • Sample may be biased: only those interested in the topic will respond

Source: Author

TABLE 7-13 PRIMARY DATA COLLECTION ; PERSONAL INTERVIEW METHOD

ADVANTAGES	DISADVANTAGES
<ul style="list-style-type: none"> • Probably highest response rate • Best for getting response from specific, identified person • Allow use of any type of question/questionnaire • Sequencing of questions easily changed • Allow probing of open-ended questions • Allow clarification of ambiguous questions • Permit use of visual aids 	<ul style="list-style-type: none"> • Generally narrow distribution - cannot cover large area • Interviewer control and supervision difficult to maintain • Difficult to identify individuals to include in sampling frame • Generally most expensive method of administration • Costly to revisit • Relatively slow method of administration • Subject to interview bias

Source: Author

obtained from interviews with information from other sources (such as documentary evidence) should help to overcome these limitations.

7.4.19 The Need to Justify the Selected "Cases"

The diversity of applications and flexibility in the case study method which a researcher can tap to generate insightful data is particularly helpful when he/she wants to investigate (ie to answer to the "how" and "why" questions) a contemporary phenomenon within its real-life context. The case study method is also applicable when the parameters between the former and the latter are not clearly evident.

However, underlying these potential benefits, there is still a need to justify why specific case studies are chosen in the first place. Moreover, in empirical studies where key informants can only provide subjective evidence to strengthen the plausibility of a theory or refute a proposition, there is also a need to examine whether it is possible to have a quantitative dimension to the qualitative data to be collected from the chosen case studies.

Quantitative data would provide objective evidence to establish a construct in the context of the research objectives to be achieved in this study. The following sections attempt to address these issues. They present the sampling methods used and the sources of information available to this researcher to complement the information derived from personal interviews with the selected case companies. An outline of the profiles of the selected companies is also presented.

While qualitative research is "hard", "definitive" and "scientific", qualitative research is "soft", "suggestive" and more "art" than anything else. To Holbert and Speece (1993), the investigation of "strategy" falls under the category of qualitative research as it involves "think" rather than "thing" and is "lateral" rather than "literal. Since quantitative research encompasses any findings which can be factorised and quantified, it can be applied to the investigation of strategy. In the model of FIRMS, the qualitative data is converted to a measure and becomes quantitative, ie using numbers to describe relationships (see table as follows).

From Qualitative Investigation of Competitive Strategy	To Quantitative Measure
<ul style="list-style-type: none"> • Customer delight • Competitive workforce • Manufacturing service advantage • Market penetration/market development • Industrial / Market leader 	<ul style="list-style-type: none"> • Repeat purchase • Profit/market share • Low turnover • High morale • Long term relationship with suppliers • Long term relationship with distributors • Competitive cooperation/Strategic alliance

Statistical data is drawn from published sources (eg Annual Report, MITI) and from the fieldwork. Numeric data ("hard" data) are not necessarily superior to non-numeric data. They are complementary in order to acquire a full understanding of the phenomenon under investigation. Seymour (1988) showed that the different research approaches can be seen in something other than a competitive structure. The mix qualitative and quantitative research methodology is as follows:

- Face-to-face interview in each case study (Qualitative)
- Questionnaires administered by the author to the machine tool builders and end-users (Quantitative)

Hague (1992) recognised that qualitative research places a heavy responsibility on the researcher, as the empathy, sensitivity and creativity to responses are likely to be as important as logical deduction in gaining in-depth understanding. Qualitative research studies the subject in greater depth than quantitative research. It therefore requires a face-to-face interview which allows detailed probing. The interviewer may follow a route of questioning which requires him to respond and redirect the discussion spontaneously. The discretion is not permissible in quantitative research as the same line of questioning must be used with every respondent.

Empirical research on the Wheel of Competition and the model of *FIRMS* involves social-cultural scanning exercise to identify and assess underlying beliefs and attitudes. This is qualitative research as the findings are often described as "soft" data. The essence of

qualitative research is that it is diagnostic; it explores certain kinds of behaviour and seeks explanations (Chisnall, 1991). The author is exploring the corporate performance of Japanese and Taiwanese machine tool builders, explicitly stated in his research objectives. His paradigms of the Wheel of Competition and *FIRMS* provide the conceptual links.

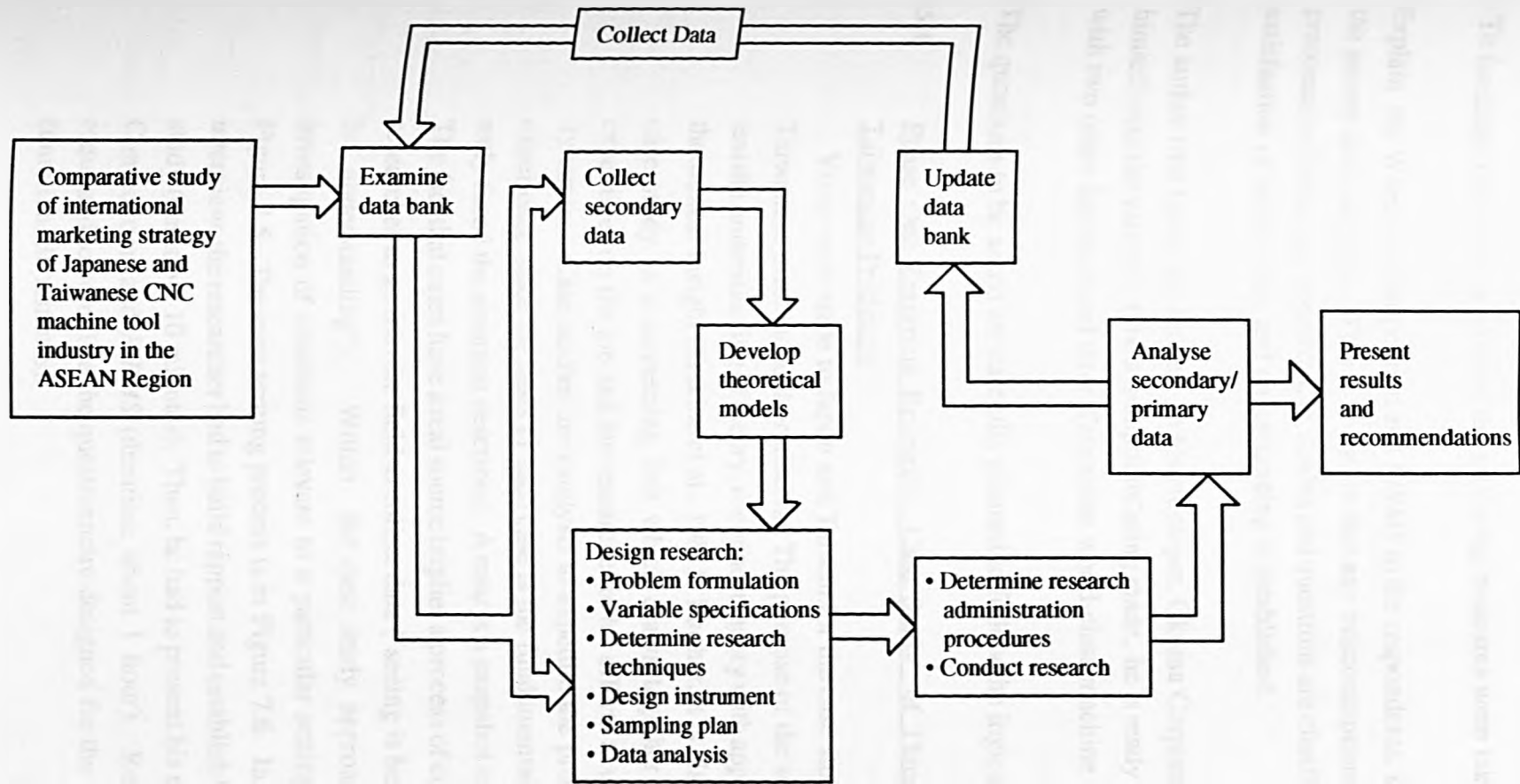
The following sections describe the selected research methodology in relation to the empirical research of this thesis.

7.5 Design and Methodology

The nature of research can be classified as applied industrial marketing research (also known as business-to-business marketing research). It is directed towards the nation's and organization's specific situation within which Japanese and Taiwanese machine tool builders devise their international marketing strategy for profit/market share. In this context, probably the most prevalent form of exploratory research is to use qualitative data to generate ideas, assumptions, propositions or hypotheses which will be tested in the quantitative setting (Seymour, 1988). Qualitative research can also be used after quantitative in an explanatory role. The design of the international research process is in Figure 7.4. Phase 1 focused on the Japanese and Taiwanese machine tool builders; it used the case study method. Phase 2 was the survey research on one hundred and thirty-three end-users in the ASEAN countries (although the pooled sample size of one hundred and twenty-five is adequate). The breakdown is given below.

Indonesia	=	32
Thailand	=	25
Malaysia	=	25
The Philippines	=	26
Singapore	=	25
Total sample size (n)	=	133

The primary measurement techniques are questionnaires (closed-ended questions), depth, focused, unstructured interviews (open-ended questions/discussions). Due to the nature and complexity of the parameters associated with the Wheel of Competition and the *FIRMS* models, the author attempts at both qualitative and quantitative analysis and synthesis of the "soft" and "hard" data.



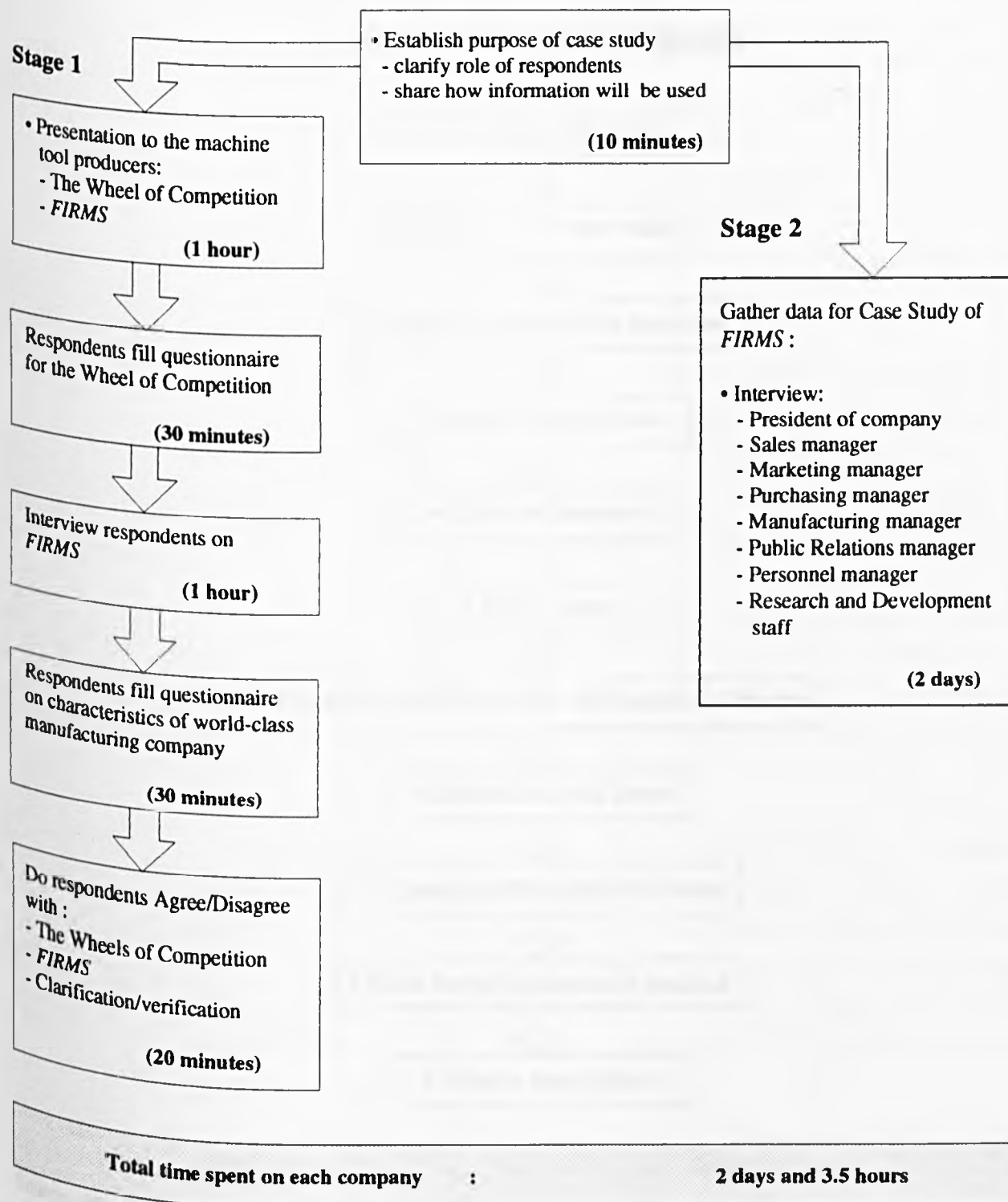
To facilitate the research process, the following measures were taken:

- Explain the Wheel of Competition and *FIRMS* to the respondents, ie a presentation before the survey and interview. This is to ensure that any misconceptions on terminologies and preconceived ideas are ironed out, ie doubts and questions are clarified and answered to the satisfaction of both parties and understanding is established.
- The author first tested the models on his employer, Okuma Corporation. Having satisfied himself with the validity of the assumptions being made, he is ready to carry out the survey with two other Japanese and three Taiwanese world-class machine tool producers.
- The questions to be asked are carefully planned to follow the logical flow of the models.

7.5.1 Phase One Empirical Research: Case Study of Three Japanese and Three Taiwanese Producers

Visits were made to Japan and Taiwan for the case study of 3 Japanese and 3 Taiwanese machine tool producers. The purpose of the series of case study is to test the understanding of theory, to connect theory with application, and to develop theoretical insight (Erskine et al., 1981). Further, it is also useful to think of the case study as a connecting link which draws together the experience of the executives on the job and the researcher in his efforts to understand the business dynamics. Case studies are catalysts to expedite the process of learning from experience since the basis of each case is the fundamental fact that businessmen truly faced the situation described. A case is a snapshot of reality, a slice of life. The fact that cases have a real source implies a process of collection that forces the researcher to go into the field to collect data ("seeing is believing" and "listening is understanding"). Within the case study approach, there is intensive investigation of situations relevant to a particular setting. The approach is in Figure 7.5. The case writing process is in Figure 7.6. In the face-to-face depth interview, the researcher had to build rapport and establish his purpose for the case study (duration: 10 minutes). Then, he had to present his models of the Wheel of Competition and *FIRMS* (duration: about 1 hour). Respondents were then requested to complete the questionnaire designed for the Wheel of Competition (duration: 30 minutes).

FIGURE 7.5 **APPROACH TO MACHINE TOOL PRODUCERS**

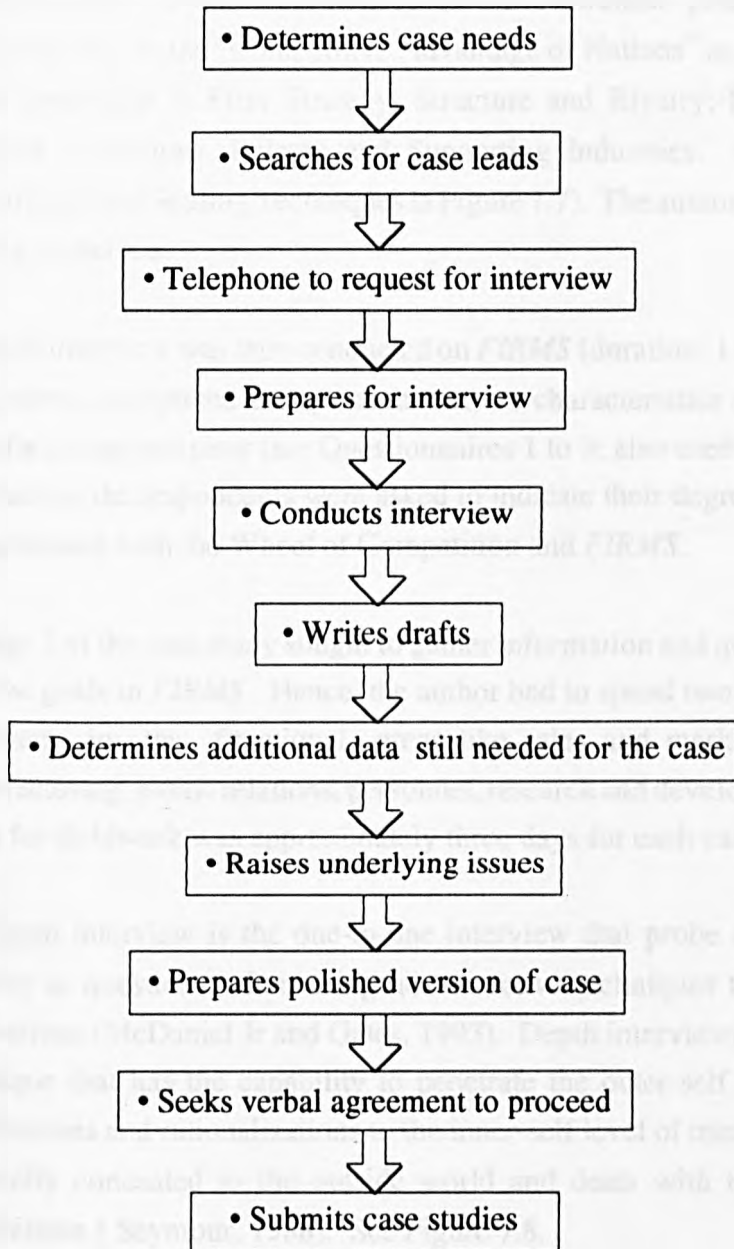


Source: Author

FIGURE 7.6

THE NORMAL CASE WRITING PROCESS

CASE WRITER RESPONSIBILITY



Source: Adapted from Leenders, M. R. and Erskine, J. A. (1978), Case Research: The Case Writing Process, Second Edition, Research and Publications Division, School of Business Administration, The University of Western Ontario, Canada.

See Questionnaire Set A. Respondents were asked to indicate their degree of agreement/disagreement on a scale of 5 (Strongly Agree) to 1 (Strongly Disagree) with the parameters in the Wheel of Competition specifically spelt out. One set of Questionnaire A was administered to the Japanese producers; another set of Questionnaire A was administered to the Taiwanese producers. The only difference was in the "Competitive Advantage of Nations" as Japan and Taiwan differ somewhat in Firm Strategy, Structure and Rivalry; Factor Conditions, Demand Conditions; Related and Supporting Industries. (For analysis, see Classification of Scaling Techniques in Figure 7.7). The author adopted the Likert scaling technique.

Depth interview was then conducted on *FIRMS* (duration: 1 hour). Finally, the respondents completed the questionnaire on characteristics of the world-class manufacturing company (see Questionnaires 1 to 3; also used for end-users). In conclusion, the respondents were asked to indicate their degree of agreement or disagreement with the Wheel of Competition and *FIRMS*.

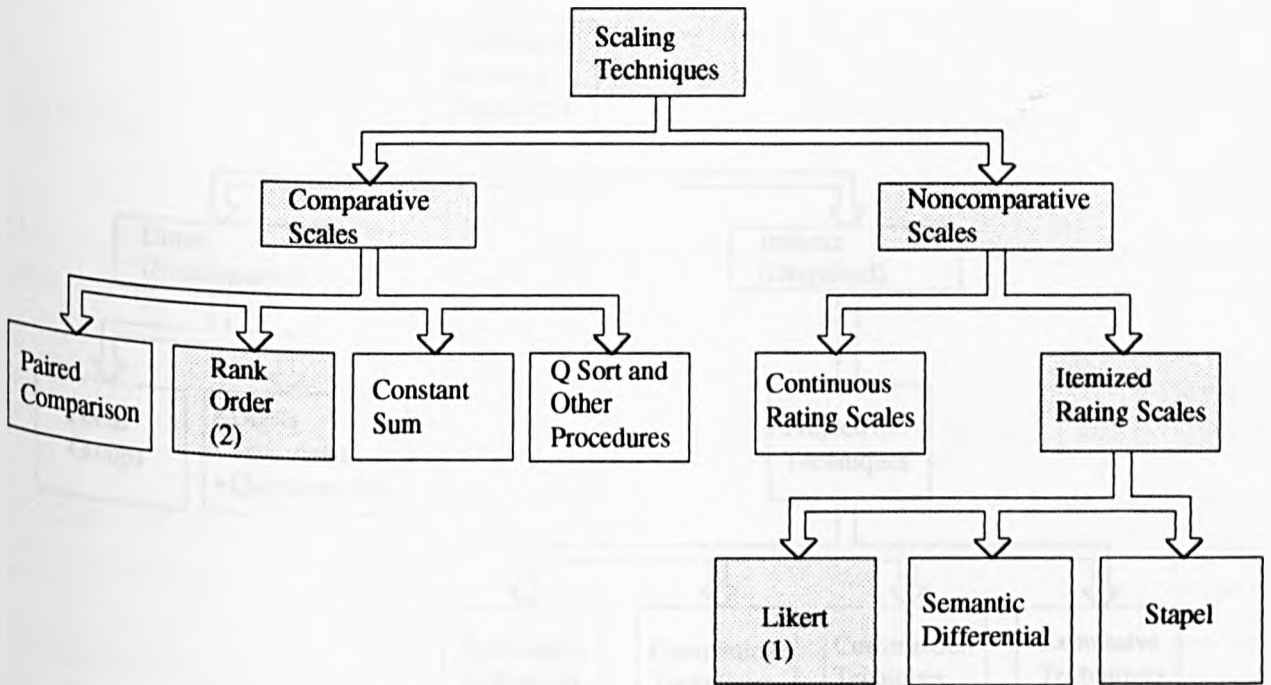
Stage 2 of the case study sought to gather information and quantitative data for the five goals in *FIRMS*. Hence, the author had to spend two days interviewing managers in the functional areas like sales and marketing, purchasing, manufacturing, public relations, personnel, research and development. Total time taken for fieldwork was approximately three days for each case.

Depth interview is the one-to-one interview that probe and elicit detailed answers to questions, often using non directive techniques to uncover hidden motivations (McDaniel Jr and Gates, 1993). Depth interviewing is a qualitative technique that has the capability to penetrate the outer-self level of reasoned justifications and rationalizations to the inner-self level of meaning - a level that is usually concealed to the outside world and deals with introspections and elaborations (Seymour, 1988). See Figure 7.8.

Face-to-face indepth interview was necessary for the following reasons:

- Presentation to the respondents on the author's theoretical models

FIGURE 7.7 A CLASSIFICATION OF SCALING TECHNIQUES



Footnote:

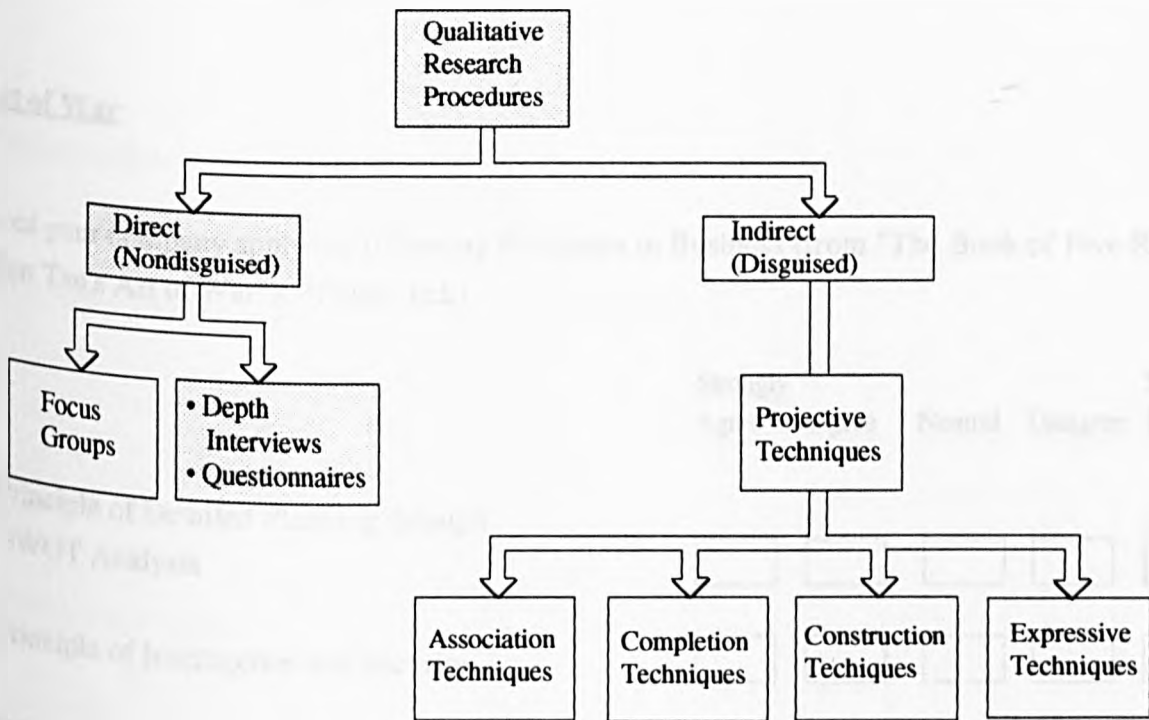
(1) Questionnaire Set A : Likert Scaling technique


(2) Questionnaire 1, 2 and 3: Rank order rating scale

Techniques selected for the survey

Source: Compiled by Author

FIGURE 7.8 QUALITATIVE RESEARCH PROCEDURES FOR CASE STUDY AND SURVEY RESEARCH



 Techniques selected for the survey

Source: Compiled by Author

Questionnaire A (1) : "The Wheel of Competition of Asian Producers in the CNC Machine Tool Industry in ASEAN Region"

Art of War

Does your company apply the following Principles in Business (from "The Book of Five Rings" or "Sun Tzu's Art of War"): (Please tick)

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
• Principle of Detailed Planning through SWOT Analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Principle of Intelligence and Security	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Principle of Swiftmess	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Principle of Adaptability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Principle of Deception	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Principle of Priority (of Goals) and Proactivity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Principle of Alternatives in Strategies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Questionnaire A (2) : "The Wheel of Competition of Asian Producers in the CNC Machine Tool Industry in ASEAN Region"

Confucianism

Does your company subscribe to these values: (Please tick)

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
• Thrift	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Reverence to elders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Hardwork	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Social responsibility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Hierarchy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Loyalty	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Sacrifice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Education	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Questionnaire A (3) : "The Wheel of Competition of Asian Producers in the CNC Machine Tool Industry in ASEAN Region"

Communitarianism

Does your company subscribe to these values: (Please tick)

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
• Equality of results/hierarchy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Consensus	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Community needs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Active planning state	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Holism	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Questionnaire A (4) : "The Wheel of Competition of Asian Producers in the CNC Machine Tool Industry in ASEAN Region"

Business and Management Ethos

Please describe your company according to the headings: (Please tick)

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
• Superordinate goals (vision/mission)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Strategy (profit/market share)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Systems (performance appraisal)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Structure (hierarchy/cross-functional teams)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Skills (engineering/marketing/sales/service)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Staff (education/experience/expatriate/local)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Style (service oriented/customer focused)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Questionnaire A (5) : "The Wheel of Competition of Asian Producers in the CNC Machine Tool Industry in ASEAN Region"

World-Class Status

Please tick the characteristics which described your company:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
• World-class brand/image	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Benchmarking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Corporate identity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Worldwide standard quality (eg ISO 9000 series)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Worldwide distribution and service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Financial strength and worldwide customer service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Questionnaire A (6) : "The Wheel of Competition of Asian Producers in the CNC Machine Tool Industry in ASEAN Region"

Global Player

Please tick the characteristics which described your company:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
• Global reach	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Significant market share	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Leader in R&D/Innovation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Global strategy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Questionnaire A (7) : "The Wheel of Competition of Asian Producers in the CNC Machine Tool Industry in ASEAN Region"

Competitive Advantage of Nations

Which of the Competitive Advantages does your nation (**Japan**) have:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
• Firm Strategy, Structure and Rivalry					
- Engineers at the helm of manufacturing companies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Strong belief in R&D	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Modern facilities, equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Strategy of standardisation, mass production	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- High level of automation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Goals in terms of profit, market share	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Low cost of capital	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
* Promote investment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
* Intense domestic rivalry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Factors Conditions					
- Able to create, upgrade needed factors, eg high saving rate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Rapid, continual upgrading of human resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Skills in sourcing technologies from abroad	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Pool of information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Demand Conditions					
- Domestic market led industry development	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Large home market : demand high quality superior service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Customer sophistication and "user pull"	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Many competitors : push to internationalise, introduce new products	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Related and Supporting Industries					
- Firms pursue related diversification	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Innovations in mechanical and electronics technologies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Well-developed network of of sub-contractors, suppliers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Questionnaire A (8) : "The Wheel of Competition of Asian Producers in the CNC Machine Tool Industry in ASEAN Region"

Competitive Advantage of Nations

Which of the Competitive Advantages does your nation (Taiwan) have:

Strongly Agree Agree Neutral Disagree Strongly Disagree

• **Firm Strategy, Structure and Rivalry**

- Small size and family orientation of Chinese businesses
- Skilled labour (eg engineers) is relatively cheap
- Niche marketing and flexibility
- Internationalisation (create overseas sales network, achieve cost reduction, market access, secure technology)

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

• **Factors Conditions**

- Stable growth of technology
- Abundance of capital at low rates
- Quality manpower and very hardworking
- Good geographical position
- Large capital surpluses

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

• **Demand Conditions**

- Switch from manual operations to automation
- Demand pull arising from shortage of skilled labour
- Demand push arising from intense domestic competitors
- Solid manufacturing base
- Lively and diversified domestic market

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

• **Related and Supporting Industries**

- Superior links to outside systems (networking with customers, suppliers, distributors, etc)
- Availability of Japanese technology through FDI

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Questionnaire A (9) : "The Wheel of Competition of Asian Producers in the CNC Machine Tool Industry in ASEAN Region"

Commonsense Nations

Please tick the characteristics of your nation (**Japan/Taiwan**):

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
• Political stability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Economic development	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Social harmony	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Takes the best from others	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Reverse engineering/innovativeness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Trade surplus	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Competitive cooperation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Enhanced standard of living	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- There are two sets of questionnaire to administer (one on the Wheel of Competition and the other on Characteristics of World-Class Manufacturing Company)
- Multiple choice questions in the questionnaires are followed by open-ended questions
- The respondents need to refer to their files or some other persons in the organization on the five goals of *FIRMS*

Like Chisnall (1991), the author recognises that interviewing is a social process involving interpersonal communication between the author and the respondent. It is important that this interaction should result in the successful collection of relevant, reliable data. The psychological atmosphere is immensely influential in determining the success of the interview and hence empathy and active listening skills are critical to avoid the "interview effect" where the influence of the interviewer on the respondent is such that it results in inaccurate, biased responses to specific questions. The author is sensitive to the fact that qualitative research has to be relatively unstructured, flexible, and oblique. Hence, he adopted a mixture of depth, focused or unstructured interview to overcome the disadvantages of each method and build on its advantages. His justification is as follows:

In the structured (or standardised) interview set questions are asked, their sequence and wording are fixed, and the answers recorded in standardised form. Using this method, variability between interviewers is reduced, resulting in comparability of data (Zaltman and Burger, 1975; Selltiz et al., 1965; Moser, 1967; Nachmias and Nachmias, 1976). This type of interview is based on three important assumptions:

- the respondents have a sufficiently common vocabulary so that it is possible to formulate questions which will have the same meaning for each of them (Richardson, Dohrenwend and Klein, in Nachmias and Nachmias, 1976)
- it is possible to phrase all questions in a form meaningful to each respondent

- the sequence of questions must be identical as preceding questions form the context of subsequent questions

The drawback of this type of interviewing is that its rigidity results in data of little depth, like the mail questionnaire (Hyman et al., 1954). In short, while the reliability of the technique is higher than with more informal types of interviewing, it is not appropriate for probing, searching questions (Moser, 1967). It is not appropriate given the purpose of this investigation.

In the guided, focused or unstructured interview, most of the questions are open-ended, designed to encourage the respondent to talk freely about each topic. Among authors, there is a good deal of debate as to whether or not this interview is guided by any written document (Moser, 1967; Green and Tull, 1978 say no; Zaltman and Burger, 1975; Nachmias and Nachmias, 1976 say yes). This type of interviewing avoids the inflexibility of the structured interview but at the same time assures that all relevant topics will be covered. The researcher can investigate emotions, motives and gain a fuller understanding of the respondent, who will often be encouraged to disclose information which cannot be obtained by more structured questioning. It is based on four assumptions:

- It takes place with respondents known to have been involved in a particular experience
- It refers to situations that have been analysed prior to interview
- It proceeds on the basis of an interview guide specifying topics related to the research propositions
- It is focused on the subjective experiences regarding the situations under study

These assumptions hold true for this research.

The major drawbacks from this type of interviewing stem from the increased role of the interviewer. Firstly, interviewers must be skilled and have a certain knowledge of the subject under study. Secondly, greater scope is given to the

forces of interviewer bias, in questioning and in the recording of answers. In short, the process is not always reliable (Moser, 1967). To overcome these, the author was the only researcher in order to hold constant the "interview effect". Further, he had over twelve years' experience in the CNC machine tool industry.

In the depth interview, the informant is encouraged to talk about the subject under investigation and the course of the interview is mainly guided by him. The role of the interviewer is usually confined to clarifying responses and probing generally (Moser, 1967). No pre-specified set of questions is employed, and usually no schedule is used. In the context of industrial marketing research, it can be used to promote a free-flow of information regarding the non-rational elements of industrial behaviour. However, there is a price for the increased quality of the interview. Comparability is reduced further still, and interviewer variation is likely to be even more pronounced (Zaltman and Burger, 1975). Table 7-14 is a summary of the pros and cons of the different types of interviews.

7.6 Presentation of Qualitative Data

The rigorous collection and analysis of qualitative data will not be sufficient in itself in persuading others of the value of the findings. Theoretical ideas require interpretation. The author would therefore follow the advice of Lofland (1974) on how to physically present non-standard data in a written report, ie

- The report was organised by means of generic conceptual frameworks in the models of *FIRMS* and the Wheel of Competition
- The frameworks were elaborated and developed in and through the report
- The framework were eventful in the sense of abundantly documented with qualitative data
- The framework were interpenetrated with empirical materials

Three case studies of Japanese machine tool builders and three case studies of Taiwanese machine tool builders are presented separately to allow the readers a better understanding of the dynamics of each case company, the nuances and subtleties, the triumphs and difficulties

TABLE 7-14

THE ADVANTAGES AND DISADVANTAGES OF DIFFERENT TYPES OF INTERVIEWS

	Advantages	Disadvantages
Standardised or structured interviews	<ul style="list-style-type: none"> • Interviewer briefing and training simplified • Less scope for interview bias • Less interviewer variation • Classifying, coding and analysis simpler • Results comparable • Higher reliability • Greater opportunity for measurement 	<ul style="list-style-type: none"> • Questions must be simple and (usually) closed • Data lack depth • Lower validity • Cannot probe • Cannot obtain clarification of ambiguities
Depth, focused or unstructured interviews	<ul style="list-style-type: none"> • Questions can be deep, searching • Data rich and full • High degree of validity • Probing possible 	<ul style="list-style-type: none"> • Interviewers need skill and training • Interviewer bias may increase • Greater interviewer variability • Reliability questionable • Less scope for measurement

Source: Hart, Susan (1988), Unit 6: Primary Data Sources. in MSc in International Marketing (Marketing Research Module) by University of Strathclyde, Department of Marketing.

underlying individual corporate performance. The structure of each case is presented in a similar sequence to facilitate identification of similarities and/or differences among them. The general format of presentation of each case study is as follows:

- Profile of the company
- Capital assets and manufacturing facilities
- Sales performance of the company
- Business management philosophy
- Analysis of *FIRMS* in the company
- The Wheel of Competition

Case analysis is often iterative - an understanding of the big issues invites an analysis of details - then the details may restructure the big issues and invite the analysis of other details. In some cases, getting to the "heart of the matter" will mean such iteration (Bruner, 1990). In carrying out the research, the numerical analysis and synthesis of many case facts is a challenge.

7.6.1

Phase Two Empirical Research: Survey of End-Users in the ASEAN Region

The primary objective of the market survey was to establish (through a set of questionnaires) end-users' expectations of a world-class CNC machine tool builder. A minimum sample size of twenty five companies for each country, were surveyed with the help of Okuma's distributor for each market. As noted by McDaniel Jr and Gates (1993), the most universal sampling problem in foreign countries is the language barrier. Differences in idiom and the difficulty of exact translation create problems in eliciting the specific information desired and interpreting respondents' answers. Equivalent concepts may not exist in all languages. Hence, the need to solicit the assistance of the local distributor in each market.

The criteria for selection of end-user companies were:

- Company must use more than one brand of CNC machines (for purpose of comparison)
- Export-oriented company (scope of business covers both domestic and international markets)

- SMEs or MNCs (number of employees between 50 to 2,000)
- No two companies with similar products will be interviewed (for wider range of usage of CNC machines)
- Company must be using or have used Japanese and/or Taiwanese CNC machines
- Interview the decision-makers (senior/top management)
- 95 percent of interviewees are local (Japanese or Taiwanese may be bias)

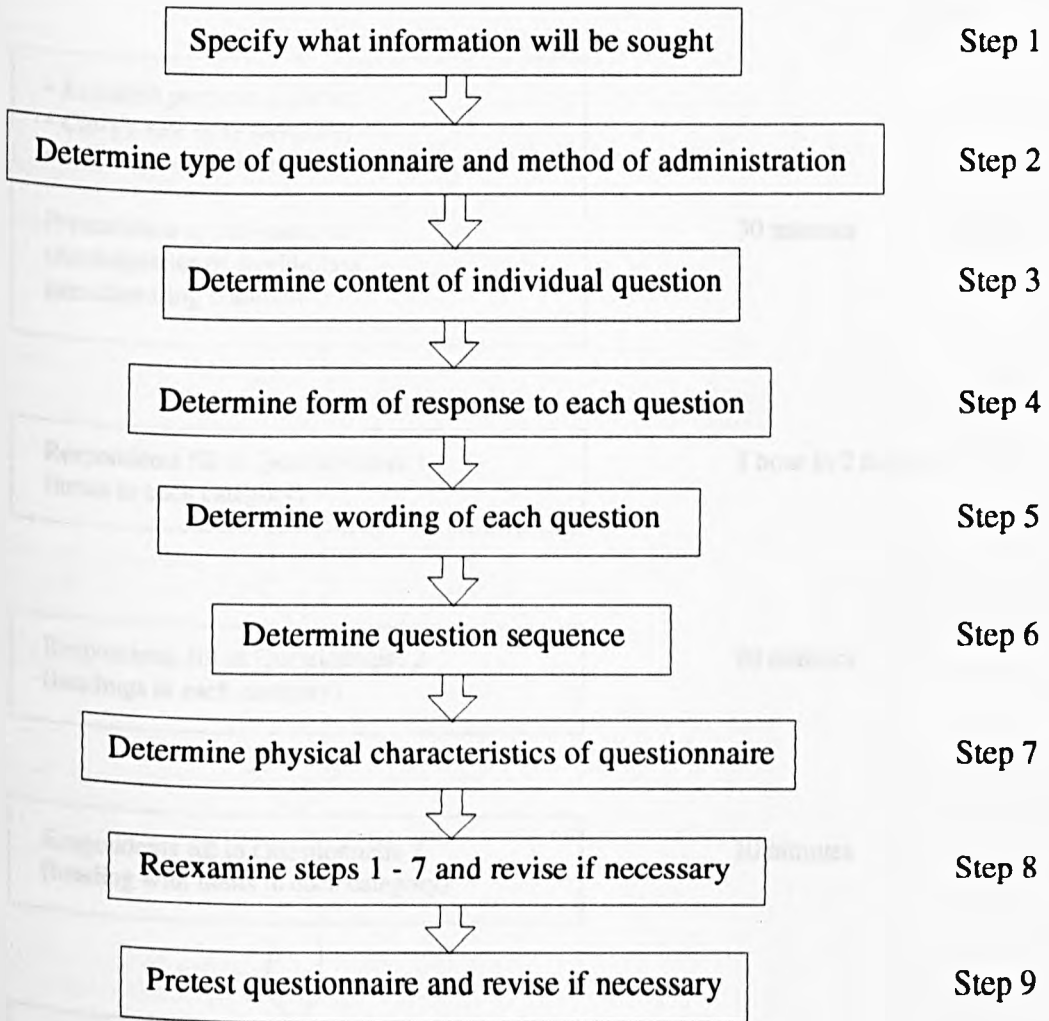
The researcher is responsible for the structure, syntax and context of the questionnaires (see Figure 7.9), its administration and the interview. This would ensure consistency in implementation and interpretation.

Regional sampling is most likely to be appropriate in industrial markets, such as injection moulding machines, surgical equipment, machine tools and main-frame computers (Douglas and Craig, 1983). Survey research was carried out in Indonesia, Thailand, Malaysia, the Philippines and Singapore. The approach to end-users is in Figure 7.10. Presentation on characteristics of world-class manufacturing company took approximately 30 minutes. Respondents were then requested to complete Questionnaire 1. Upon completion, they were asked to do the same for Questionnaire 2. Finally, they were given Questionnaire 3.

In Questionnaire 1, the respondents were asked to indicate on a scale of 1 (unimportant) to 10 (very important) their views on statements from Category A to Category F (Items G and H are not in Questionnaires 2 and 3. For convenience, the author added the 2 items to find out end-users' preference for country-of-origin of machines). Questionnaire 2 deleted the statements but captured the heading for each category from A to F. Again, the respondents were asked to rank from Priority 1 to Priority 6 the importance of each category in the make-up of the world-class manufacturing company. Questionnaire 3 combined the heading with the items in each category, the respondents were asked to complete the questionnaire. Statements in each category were actually items intended to define and clarify the category.

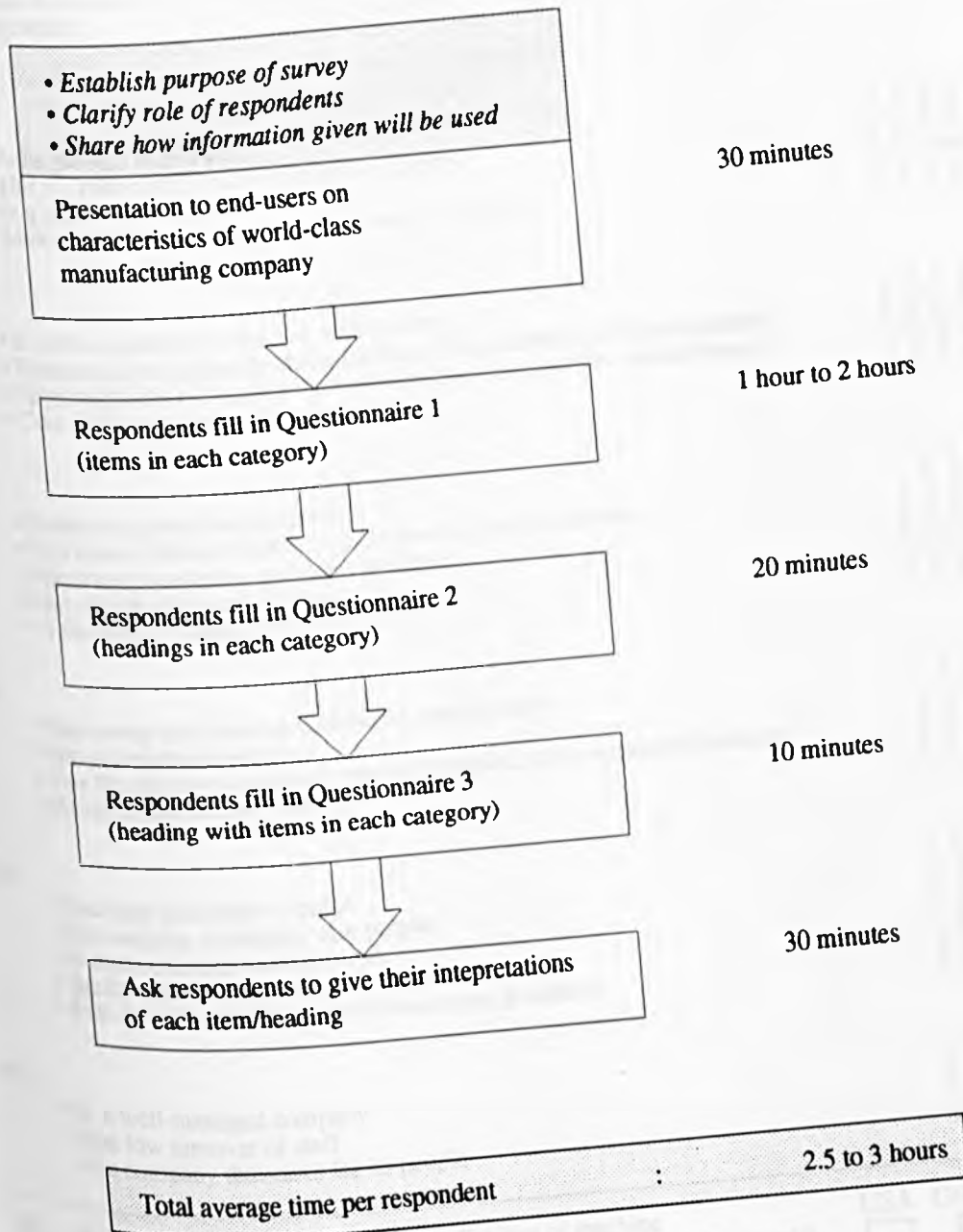
FIGURE 7.9

PROCEDURE FOR DEVELOPING A QUESTIONNAIRE



Source: Adapted from Kinneer, Thomas C. and Taylor, James R. (1991), Marketing Research: An Applied Approach, Fourth Edition, McGraw-Hill, New York.

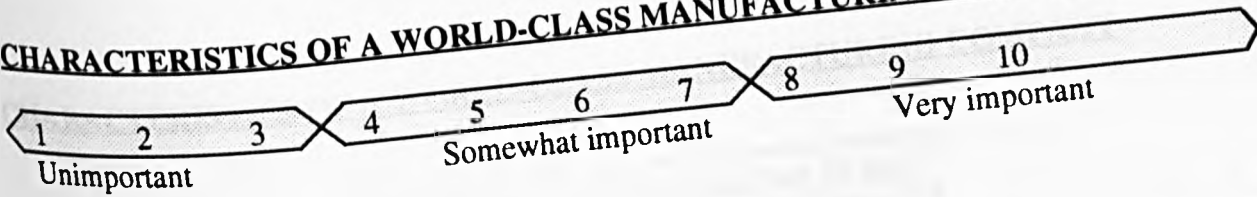
FIGURE 7.10 APPROACH TO END-USERS



Source: Author

QUESTIONNAIRE 1

CHARACTERISTICS OF A WORLD-CLASS MANUFACTURING COMPANY



- (A)
- Sells product worldwide
 - Has a significant market share in its industry
 - Is a leader in innovation
 - Makes critical components in the country of origin

1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10

- (B)
- Is technologically superior to competitors
 - Produces high quality products (accuracy/repeatability/process capability)
 - High reliability of products (mean-time-before-failure/few breakdowns)
 - Cost-efficiency (value-for-money)

1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10

- (C)
- Produces customized products
 - Has state-of-the-art technology (software is never obsolete)
 - Has strong marketing and sales strategies
 - Has excellent customer service
 - Is financially stable and profitable

1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10

- (D)
- Has strong and consistent corporate image/brand
 - Has commitment to R&D
 - Has flexibility to respond to market, political, and competitive changes
 - Always meet delivery promise

1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10

- (E)
- Has high standards of ethics
 - Has integrity in dealing with people
 - Is sincere in approach to people
 - Builds trust in business/marketing relationship
 - Sells benefits/solutions rather than empty promises

1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10

- (F)
- Is a well-managed company
 - Has low turnover of staff
 - Is a company that cares for its people

1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10

(G) Please rank in terms of quality and reliability of machine tools manufactured in the following countries (1 = highest; 4 = lowest)

USA	Germany	Taiwan	Japan
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Yes <input type="checkbox"/>		No <input type="checkbox"/>	

(H) Would buy CNC machines produced in Taiwan instead of Japanese-made if the price difference were 30 percent lower?

QUESTIONNAIRE 2

CHARACTERISTICS OF A WORLD-CLASS MANUFACTURING COMPANY

Rank in terms of Priority from *One* to *Six*

(A) **GLOBAL PLAYER**

Ranking	<input type="text"/>
---------	----------------------

(B) **MANUFACTURING STRATEGY**

Ranking	<input type="text"/>
---------	----------------------

(C) **MARKETING STRATEGY**

Ranking	<input type="text"/>
---------	----------------------

(D) **CORPORATE STRATEGY**

Ranking	<input type="text"/>
---------	----------------------

(E) **CORPORATE VALUES**

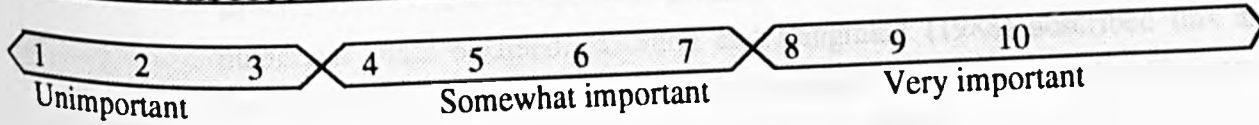
Ranking	<input type="text"/>
---------	----------------------

(F) **HUMAN RESOURCE STRATEGY**

Ranking	<input type="text"/>
---------	----------------------

QUESTIONNAIRE 3

CHARACTERISTICS OF A WORLD CLASS MANUFACTURING COMPANY



- (A) **GLOBAL PLAYER**
- Sells product worldwide
 - Has a significant market share in its industry
 - Is a leader in innovation
 - Makes critical components in the country of origin
- Ranking**
 1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10
- (B) **MANUFACTURING STRATEGY**
- Is technologically superior to competitors
 - Produces high quality products (accuracy/repeatability/process capability)
 - High reliability of products (mean-time-before-failure/few breakdowns)
 - Cost-efficiency (value-for-money)
- Ranking**
 1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10
- (C) **MARKETING STRATEGY**
- Produces customized products
 - Has state-of-the-art technology (software is never obsolete)
 - Has strong marketing and sales strategies
 - Has excellent customer service
 - Is financially stable and profitable
- Ranking**
 1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10
- (D) **CORPORATE STRATEGY**
- Has strong and consistent corporate image/brand
 - Has commitment to R&D
 - Has flexibility to respond to market, political, and competitive changes
 - Always meet delivery promise
- Ranking**
 1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10
- (E) **CORPORATE VALUES**
- Has high standards of ethics
 - Has integrity in dealing with people
 - Is sincere in approach to people
 - Builds trust in business/marketing relationship
 - Sells benefits/solutions rather than empty promises
- Ranking**
 1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10
- (F) **HUMAN RESOURCE STRATEGY**
- Is a well-managed company
 - Has low turnover of staff
 - Is a company that cares for its people
- Ranking**
 1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10
 1 2 3 4 5 6 7 8 9 10

After the respondents completed the questionnaires, the researcher conducted focused depth interview. The respondents were asked about their interpretations of each category, its heading and items. The insights thus gained from a less structured interview will provide greater understanding of the meaning of the numerical data obtained. Gordon and Langmaid (1988) described this as "qualitative interviewing in a quantitative process". It can improve the efficiency of quantitative research (McDaniel Jr and Gates, 1993).

Seymour (1988) expressed the concern that results derived from certain methods reflect the unique characteristics of the method, as well as the trait or phenomenon under investigation. The notion is that no single measure is, or can be, a perfect indicator of human activity. Instead, additional methods should be used to ensure that the variance which is measured reflects that of the trait or characteristics, not the method. By using multiple methods it is possible to increase confidence in our findings by generating differing viewpoints. The validation use of qualitative research is particularly appropriate when it is used in combination with quantitative results. It can provide the researcher with two conceptually and operationally different ways of measuring the same thing.

The ranking task and quantitative analysis (conjoint) resulted in a certain kind of understanding of preferences based upon a researcher-imposed measurement instrument. The validation of such responses was provided by an open discussion of the individual's decision logic. By asking them to defend their choices in an interview, the strength and precision of their choice pattern could be analyzed. This is a luxury which would not have been possible if the analysis (quantitative and qualitative) had been performed on an either/or basis.

7.7 Summary and Conclusion

Given the research topic, research objectives and propositions, the thrust of the investigation is exploratory, descriptive, explanatory and predictive in nature. Research efforts into the intimate sphere, socio-sphere, economic sphere and political sphere which encapsulate the author's theoretical models of *FIRMS* and the Wheel of Competition require analysis and synthesis of rich, qualitative information (affective/beliefs, intentions, behaviour) and measured quantitative data. See Figure 1.2 of Chapter 1 (page 17). Hence, the approach is the qualitative-quantitative mix : qualitative data to illuminate quantitatively derived findings;

quantitative data to elucidate qualitative analysis. With the use of complementary research methodology, the author seeks to overcome and counterbalance the advantages and disadvantages of each method. In the same vein, the use of questionnaires administered by the author and depth focused interviews are deemed to give the most comprehensive means of capturing qualitative and quantitative data.

In his empirical research, the author adopted a two-pronged approach, ie case study of three Japanese and three Taiwanese machine tool builders; and sample survey of one hundred and thirty three end-users in the five ASEAN countries.

Two conceptual models were used in the case study of the machine tool builders, ie:

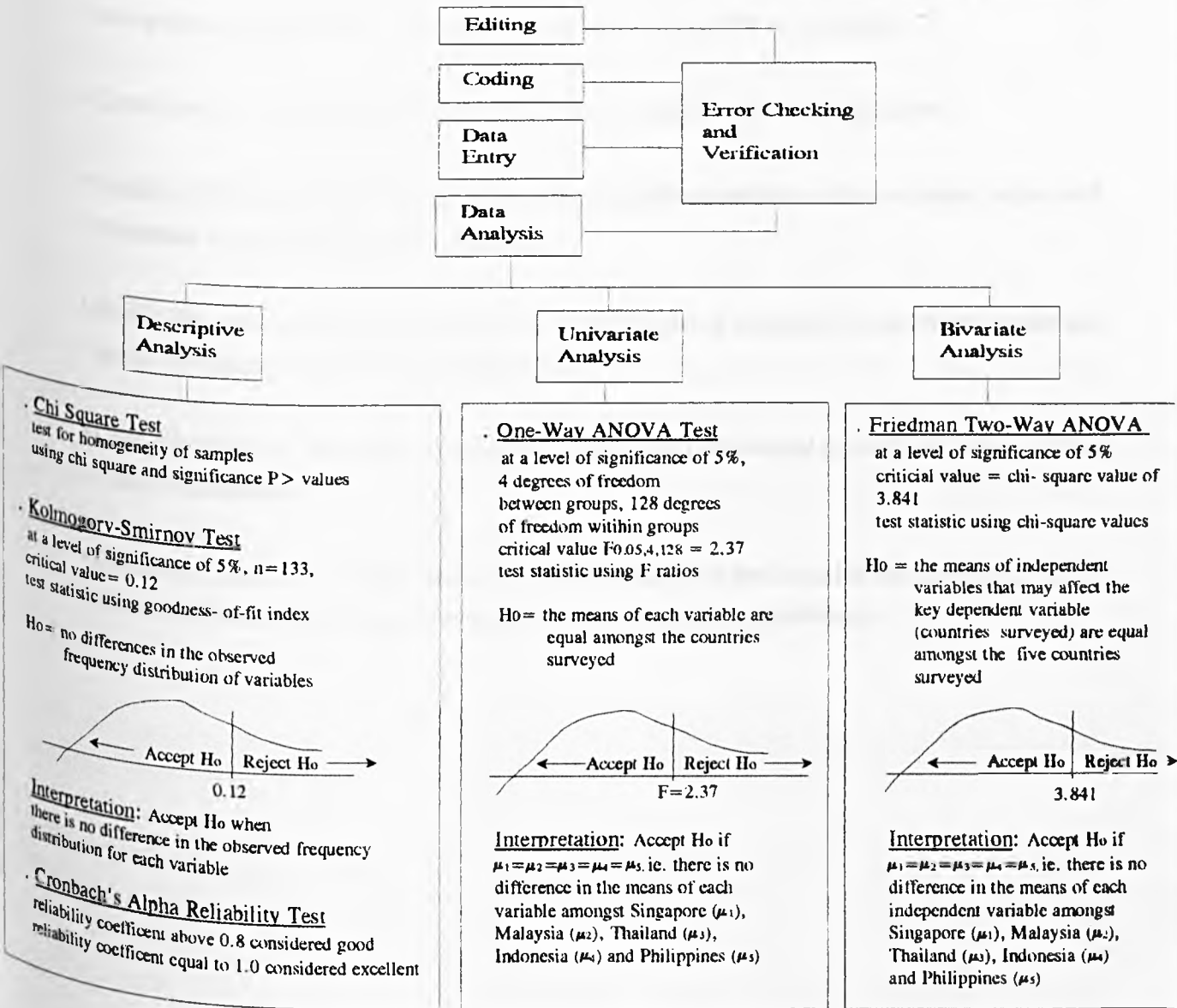
- "The Wheel of Competition of Asian Producers in the CNC machine tool industry in ASEAN Region" - the macro level (ie the nation). Use of questionnaire (Likert Scale) and depth interview of senior/top management
- "Model of Flexible Intelligent Relationship Management Strategy" - the micro level (ie the company). Use of depth interview with managers in the functional areas

Senior/top management were requested to indicate their ranking on the characteristics of a world-class manufacturing company on a questionnaire (ranked order rating scale). On the other hand, end-users were also asked to rank (in order of importance) the characteristics of a world-class manufacturing company using the questionnaires (priority rating scale). The purpose is to identify perception gap between the manufacturers and the end-users. In addition, end-users were also asked about their preference in terms of country of origin of the machines (frequency count).

SPSS software package was used for statistical analysis to check for goodness of fit (Kolmogorov-Smirnov test), reliability of data (Cronbach's Alpha test), one-way analysis of variance, two-way analysis of variance (Friedman test) and Chi-Square Test. Overview of the stages of data analysis is in Figure 7.11.

With the use of multiple research models, the author aims for higher levels of validity and reliability. He is convinced that the time and efforts expended is justified by the increase in volume and accuracy of primary data because of the highly interactive process in the face-to-

FIGURE 7-11 OVERVIEW OF THE STAGES OF DATA ANALYSIS



Source: Author

face depth interview to explore the nature of the responses. The author seeks to meet the following criteria of a good research design:

- **Flexibility** : to be sensitive to the unexpected and to discover insights not previously recognized, to illuminate characteristics, nature and breadth of variables
- **Consistency** : information gathered is consistent with the research objectives
- **Validity** : the extent to which the scale is free from both random and systematic errors and measures what it is supposed to measure
- **Reliability** : the consistency of the measuring technique, ie repeated measurements under the same conditions will give the same results
- **Cost effectiveness** : data are collected by accurate and economical procedures; value versus cost of information
- **Creativity** : the use of multiple but complementary approaches found in the non-competitive theme embedded in the qualitative-quantitative research methodology

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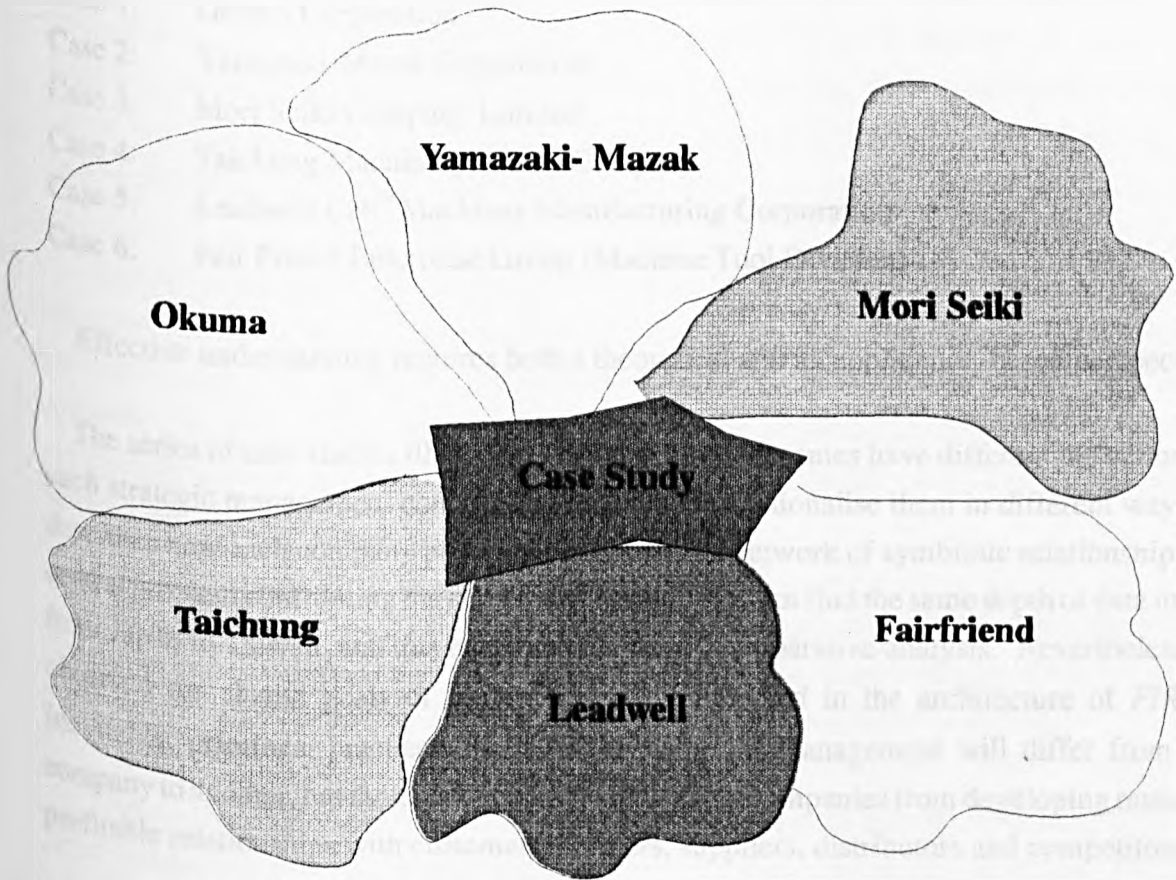
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CHAPTER EIGHT

**PHASE ONE EMPIRICAL RESEARCH: CASE STUDY OF THREE JAPANESE AND
THREE TAIWANESE CNC MACHINE TOOL PRODUCERS**



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8.1 Introduction

This chapter presents the findings from the empirical research of the author. The presentation of statistical analysis will be interpreted in relation to the theoretical models of the Wheel of Competition and *FIRMS*. The case studies aim to fulfil the four logical functions identified by Burgess (1988), ie to be exploratory, predictive, descriptive, and explanatory. The cases of the three Japanese and three Taiwanese world-class machine tool producers are presented in the following order:

- Case 1: Okuma Corporation
- Case 2: Yamazaki-Mazak Corporation
- Case 3: Mori Seiki Company Limited
- Case 4: Taichung Machinery Works Company
- Case 5: Leadwell CNC Machines Manufacturing Corporation
- Case 6: Fair Friend Enterprise Group (Machine Tool Division)

Effective understanding requires both a theoretical and an application-based perspective.

The series of case studies illustrates how different companies have different definitions of each strategic management concept and choose to operationalise them in different ways. It describes how each company positions itself within a network of symbiotic relationships. A central problem confronting the author was that he could not find the same depth of data inputs from Japan to Taiwan, and this had complicated his comparative analysis. Nevertheless, he observed the shared goals of these companies embodied in the architecture of *FIRMS*. Inevitably, priorities, practices, processes and style of management will differ from one company to another, but these differences do not detract companies from developing mutually profitable relationships with customers, workers, suppliers, distributors and competitors.

The author recognises that though the focus is primarily on the ASEAN market, it is difficult, if not impossible, to limit both description and analysis to the ASEAN region because the six machine tool builders are global players of world-class status. Hence, they carry out their business on a world-wide basis where there are competitive advantages in production and where market opportunities beckon. Inevitably, his investigation would impinge on the other markets, countries and regions because these are all interrelated in a wholistic approach to

business. International marketing strategy is a business concept and not a geographic concept. Analysis of the ASEAN market per se would not enliven and enrich knowledge and understanding of the performance of Japanese and Taiwanese producers. The mega vision of business can only be grasped through the process of synthesis.

8.2 Case One: Profile of Okuma Corporation

Founded in 1898, Okuma has always produced machine tools and gained a justifiable reputation for product innovation. It is a global player in the sales of CNC machine tools and computer control systems; a position attained and maintained through its constant search for perfection by upgrading the performance, quality and reliability of its products. Okuma is a multinational company competing in the machine tool business in the world-wide market. It carves out its market share by fulfilling customers' demand for innovative as well as high quality products and meeting its promise on delivery.

Through a unique combination of Okuma's machine technology expertise, electronics, servomotor control, and computer technology, Okuma has been able to meet market demand for high-speed, high precision, and increased flexibility of automated factory production systems. As the first Japanese machine tool company to produce both machines and CNC controllers, it established a competitive advantage over its domestic rivals. Its corporate slogan is "Your Single Source For Machine And Control".

Okuma's corporate image lies in its technological strength and product development. Its developmental strength is clearly evident in many and varied product lines which range from CNC lathes, machining centers, and grinders to CNC devices, FMS and CIM.

Through its corporate history, Okuma has played a major role in sustaining industrial development using metal-cutting/removal technology and computer applications. The basis of its efforts for further development remains straight forward - it intends to create the most innovative means of production possible, using a field-proven combination of computer control and machine technologies.

Okuma has a competitive advantage because of its emphasis on research and development programs in areas beyond the range of conventional machine tools. In 1971, Okuma collaborated with Sulzer Brothers in Switzerland in circular knitting machine technology and

with Shuttle of West Germany in multi-spindle lathe machine technology. This gave the company an impetus and a major competitive edge during the "Nixon Shock" of 1971 to 1972. Its commitments to research and development became the driving force in sustaining the company's steady business record despite the fact that the machine tool industry was suffering from a severe world-wide recession.

In 1982, Okuma developed digitally controlled brushless motors and thus expanded its peripheral equipment lines. This technology, coupled with the then development of 32-bit turbo-microprocessor for OSP controller, enabled Okuma to make a breakthrough in 1987, contributing to what is known as IDMS (Integrated Die Manufacturing System) state-of-the-art technology.

In 1983, Okuma Krauss-Maffei was formed. It was a joint venture with Krauss-Maffei AG of West Germany. This marked the company's advance into the field of plastic extrusion machines. In 1992, Okuma built EDM (electro-discharge-machining) machines for Excel of West Germany for sales restricted to Japan and Korea.

Okuma's advanced technologies dovetailed with market needs. The introduction of its products into the market was timely. One example to illustrate this was the best-selling "LB" series of small-sized CNC lathes.

Okuma took on a different business strategy in 1978 with a change in its Presidency. Mr Takeo Okuma, the new generation President, dealt with a number of strategic issues with particular tenacity. He looked into the establishment of cooperative relationship between labour and management; the successive development of competitive CNC machines aimed at small and medium-sized enterprises which accounted for a large segment of the market; the strengthening of the company's marketing and maintenance servicing systems; and the improvement of the company's financial structure.

Mr Takeo Okuma recognised that the competitive standard was global, not national. The company was competing world-wide in terms of product quality, innovation, cost, distribution and marketing skills. Mr Takeo Okuma upheld the corporate philosophy of "Increased Productivity Through New Product Development, Technological Innovation and Creative Marketing". This philosophy won him the ND (News Digest, January 1987) Marketing Award in 1986, in recognition of excellence in marketing strategies and successful policies.

Under his leadership as President of both Okuma and Okuma & Howa (OH), the company was successfully revitalised. Okuma & Howa is the sister company of Okuma. Mr Takeo Okuma intentionally had Okuma and OH made products that would compete against each other. Using the competition fostered within the group as a lever, he transformed Okuma and OH into machine tool builders with its own identity. This business strategy is also advocated by Porter (1990) who observed that companies gain advantage against the world's best competitors because of pressures and challenges from having strong domestic rivals, aggressive home-based suppliers, and demanding local customers, i.e. competitive advantage is created and sustained through a highly localised process.

In June 1988, due to a health problem, Mr T. Okuma relinquished his post as President and became an Advisor/Consultant to Okuma. Between July 1988 to February 1991, Mr T. Matsutani (who was Vice-President of Tokai Bank) was seconded from Tokai Bank to succeed Mr T. Okuma. In April 1991, Mr Y. Maeda (who invented the OSP) became President. The professional background of Okuma's President through its corporate history is given below:

Presidents	Period	Professional Background	Management Ideology
Eichi Okuma	1898 - 1955	Founder (Engineer)	Contribute to society; public interests first
Koichi Okuma	1955 - 1978	Engineer (University of Tokyo)	A socially responsible company
Takeo Okuma	1978 - 1988	Economist (University of Tokyo)	Virtue brings its own reward; debtless management
Akira Matsutani	1988 - 1991	Accountant (University of Tokyo)	Open management
Yutaka Maeda	1991 - present	Electronics Engineers (University of Nagoya)	Challenge perfection based on principle

The Okuma logo embraces the concepts of:

- *Trust* - expressing the trust placed in Okuma's high-tech products by customers and the trust in Okuma people by society because of their sincerity
- *Harmony* - expressing the blending and fusion of separate elements : machine and control, tradition and innovation, enterprise and society
- *Innovation* - expressing Okuma's endless quest and employee's aspiration for renewal within its traditional framework

The corporate colour is a brilliant blue to reflect hope for the bright future, and at the same time, expresses in a clear tone Okuma's high product quality.

8.2.1

Capital Assets and Manufacturing Facilities of Okuma

Okuma had a paid up capital of Japanese Yen 12,57 million. In terms of land and building, the figures were as follows:

Plant Name	Land	Building (sq meters)
Nagoya	7,447	11,281
Oguchi	155,068	93,933
Kani	347,019	28,714
Overseas	13,940	594
Others	35,490	18,893
Total *	558,964	153,415

* (Note: All figures quoted here and here-after are as at end 1991)

Okuma's high-quality, high precision machines are manufactured at its modern plants in Oguchi and Kani. The Oguchi Plant has 3 Assembly Factories, viz:

	Assembly Factory 1	Assembly Factory 2	Assembly Factory 3
Completed	1969	1981	1985
Floor Space sq.m.	9,000	15,000	10,530
Product Assembled	CNC Lathes (Medium size)	Double Column Machines	CNC Lathes (Compact)
	Vertical Machines (Small type)	Vertical Machines	Grinders (Compact)
		CNC Lathes (Large Type)	
		Environment Controlled Condition	

The Machining Factory is a display of Okuma's advanced technology. High-precision machining rooms are designed to maintain a systematic approach to tolerance control in manufacturing precision parts.

	Machining Factory	Environment Controlled Large Parts Manufacturing Factory
Completed	1979	1983
Floor Space sq.m.	19,000	3,000
Installed Machines	Lathes Coburg - 93 units	Surface Grinder & Waldrich Coburg - 3 units
	Machining Centers - 70 units	Machining Centers - 6 units
	Grinders - 65 units	Boring Machine - 1 unit
	Others - 212 units	
	TOTAL: 404 units	10 units

The Machining Factory has the following facilities:

- High Precision Machining "Clean Room": Grinding of spindles, etc.
- Precision Machining Room No. 1: Grinding of spindles, etc.
- Precision Machining Room No. 2: Precision boring of spindle heads, etc
- 5 FMSs (Prismatic Parts FMS, Collar FMS, Turret FMS, Spindle FMS, Saddles, FMS)

Temperature ($20^{\circ}\text{C} \pm 0.5^{\circ}\text{C}$) and humidity (65 percent) are strictly controlled to prevent dimension variation. Optimum environmental conditions are required to manufacture high-quality machine tools. About 45 percent of the machining operations are numerically controlled, with 60 percent of the CNC equipment made by Okuma. The use of computer terminals throughout the plant helps control production schedule based on various market requirements. Automated Guided Vehicles (AGVs) transport parts from storage areas to workstations on a just-in-time (JIT) basis. All manufacturing operations are monitored closely.

Development in comprehensive production systems allows Okuma to realise an efficient high-performance, rational production process centred around numerical control, automation, and fully automated production technology.

In the Kani Plant, Okuma uses the CIM concept to build its latest models with batch size ranging from one to ten. Simultaneously, the objective is also to demonstrate and experiment with the concept of flexibility in CIM systems.

In terms of monthly production, the average output figures are:

CNC Lathes	-	377 units
Machining Centers	-	120 units
Grinding Machines	-	25 units
Drilling Centers, etc.	-	4 units
Others	-	124 units
Total	-	650 units per month

8.2.2

Sales Performance of Okuma

On average, Okuma's production output for CNC lathes, machining centers, and grinders is about 60 percent, 18 percent and 4 percent, respectively. The remaining 18 percent comprises of drilling centers, electronic circular knitting machines, plastic injection moulding machines and electronic parts inserting machines for printed circuit boards.

• *Sales Profile (Fiscal Year 1991)*

Items	Number of Machines	Sales Amount Million Yen	Component Ratio %
Machine Tools:			
Lathe	4,536	57,661	48.8
Machining Centers	1,443	39,239	33.2
Drilling Centers, etc.	58	186	0.2
Grinding Machines	303	6,919	5.9
Parts and others		6,902	5.8
Total for Machine Tools	6,340	110,909	93.9
Total for Industrial Machines	1,489	7,183	6.1
Grand Total	7,829	118,092	100

• *Okuma's Annual Sales*

Fiscal Year	Total	Million Yen Export	Export Ratio %
1984	46,593	11,746	25
1985	71,535	22,262	31
1986	90,968	34,150	38
1987	76,700	35,345	46
1988	67,480	26,702	40
1989	87,153	28,583	33
1990	101,869	34,154	34
1991	118,092	35,055	30

• *Okuma's Export Sales*

Fiscal Year	Million Yen			
	Export Total	USA (%)	Europe (%)	Others (%)
1984	11,746 (100)	3,702 (26)	5,615 (48)	3,060 (26)
1985	22,262 (100)	9,484 (43)	7,181 (32)	5,597 (25)
1986	34,150 (100)	13,827 (41)	13,401 (29)	6,922 (20)
1987	35,345 (100)	18,261 (52)	11,987 (34)	5,097 (14)
1988	26,702 (100)	13,730 (51)	9,386 (35)	3,586 (14)
1989	28,583 (100)	13,415 (47)	11,175 (39)	3,993 (14)
1990	34,154 (100)	16,077 (47)	13,400 (39)	4,677 (14)
1991	35,055 (100)	13,371 (38)	16,213 (46)	5,471 (16)

CNC lathes and machining centers occupied 78 percent of the total production output, contributing to 82 percent of total sales revenue. In terms of export, USA and Europe accounted for the main bulk of the sales, accounting on the average, for 43 percent and 38 percent respectively of the annual total production output from 1984 to 1991. However, these two major markets are governed by US Department of Commerce (DOC) and Bundes Aus Fuhr Amt (BAFA) regulations which impose export restrictions. Hence, there is a need to cultivate other markets (especially the ASEAN market) as a strategic option.

8.2.3

Business Management Philosophy

Okuma's business management philosophy is:

- *Dynamic personnel and dynamic organization* - every effort shall be made to

create a flexible, dynamic organization that shows respect for the dignity of each employee while encouraging individual development to the utmost

- *Customer-oriented marketing* - every effort shall be extended to obtain the best market information and feedback in order to pinpoint customers needs to provide the best products and service
- *Global management* - every effort shall be made to developing business with a global vision as a leader the entire world can rely on
- *Pioneering innovative technologies* - every effort shall be made to pioneer innovative technologies of tomorrow by establishing the R&D organization based on a long-range commitment to basic research and application technologies
- *Quality first production* - every effort shall be made to assure cost-effective production of the highest quality that incorporates the best Okuma technology, know-how and abilities, using the most sophisticated production engineering systems, and their interdependence
- *Solid finance business management* - every effort shall be made to build a solid finance business in response to the times, by consistently updating financial prospects and through steady management

Okuma adopts the following commonsense business strategies:

- Okuma caters to the premier market segment. It maintains a price advantage of 10 to 15 percent higher than the next Japanese competitor for the equivalent machine model
- Okuma's policy is not to produce for stock. Most machines are customized. Hence, the manufacturing strategy is to utilize the combination of group technology and flexible manufacturing systems in lieu of a complete automated concept to reduce overall manufacturing cost as a result of mass production (economies of scale). In other words, the manufacturing technology involves a

certain amount of human skills which cannot be replaced by a fully automated unmanned factory. Okuma has decided to fix its production capacity based on achievable forecast demand. It will not expand rapidly in good times and resort to retrenchment when there is an economic downturn. When the economy is thriving, Okuma will thus lose some orders to its competitors because of a long delivery schedule (six months for standard machines and over 18 months for ultra-precision machines)

- Okuma will not sell a machine to the end-user if the production method or process does not improve customer's productivity. Every machine's specifications and the production method/process must be counterchecked and approved by Okuma's engineering department before the order is accepted. Okuma's business philosophy is that customers must be proud to own an Okuma machine. If the customer doubts the quality, reliability and/or performance of an Okuma machine to produce high precision parts, the deal is rejected. Okuma's sales motto is "Be honest to our customers and always put their interest before ours"
- Okuma is a high investment, high technology company and is the leader in CNC machines in the world. Therefore, Okuma's machines must be of the highest quality using the most advanced manufacturing technology and materials under the most stringent quality control. For example, all printed circuit boards and its electronic components (including microprocessors) undergo low and high temperature tests for three hours per cycle at minus 10°C and 75°C, respectively
- Okuma's after-sales service support must be prompt, the most efficient and reliable relative to its competitors
- Every overseas branch or representative office determines its "standard" package for machine and controller specifications. This is relative to the type and level of technology for the industries in the market given different socio-economic development. Hence, every overseas branch or representative office acts as a marketing and technical centre carrying out marketing research activities and applications of technology (process-time study, test-cutting, computer integration of manufacturing systems, etc).

- Export sales (expressed as a percentage of the total turnover) cannot exceed 35 percent as there is a voluntary restraint on exports to comply with DOC and BAFA regulations

In its search for profit and market share, the Okuma spirit is driven by values of sincerity, integrity and trust for greater harmony. Okuma's *raison d'etre* is to secure the happiness of its customers, workers, suppliers, distributors, and the communities in which it lives and works. The company seeks to create new values to build a better world. Helping to build a better world means growing with society to contribute to industrial development through Okuma's products, services and technologies that anticipate the needs of the market. To achieve these goals, Okuma must refine the traditional field-established technologies, the competencies and capabilities accumulated since its founding. In particular, it must make the most of machine and electronic/electric technologies. It must fuse these technologies for a unique brand of Okuma mechatronics. With these technologies, Okuma is determined to anticipate and respond to customers' needs to help realise customers' dreams and to drive Okuma beyond world-class status.

8.2.4

The ASEAN Market

Strategic analysis of the ASEAN market and the strategic market planning of Okuma Corporation are in Figures 8.1 and 8.2, respectively.

8.2.5

Analysis of FIRMS in Okuma Corporation

• **FIRMS: Goal 1**

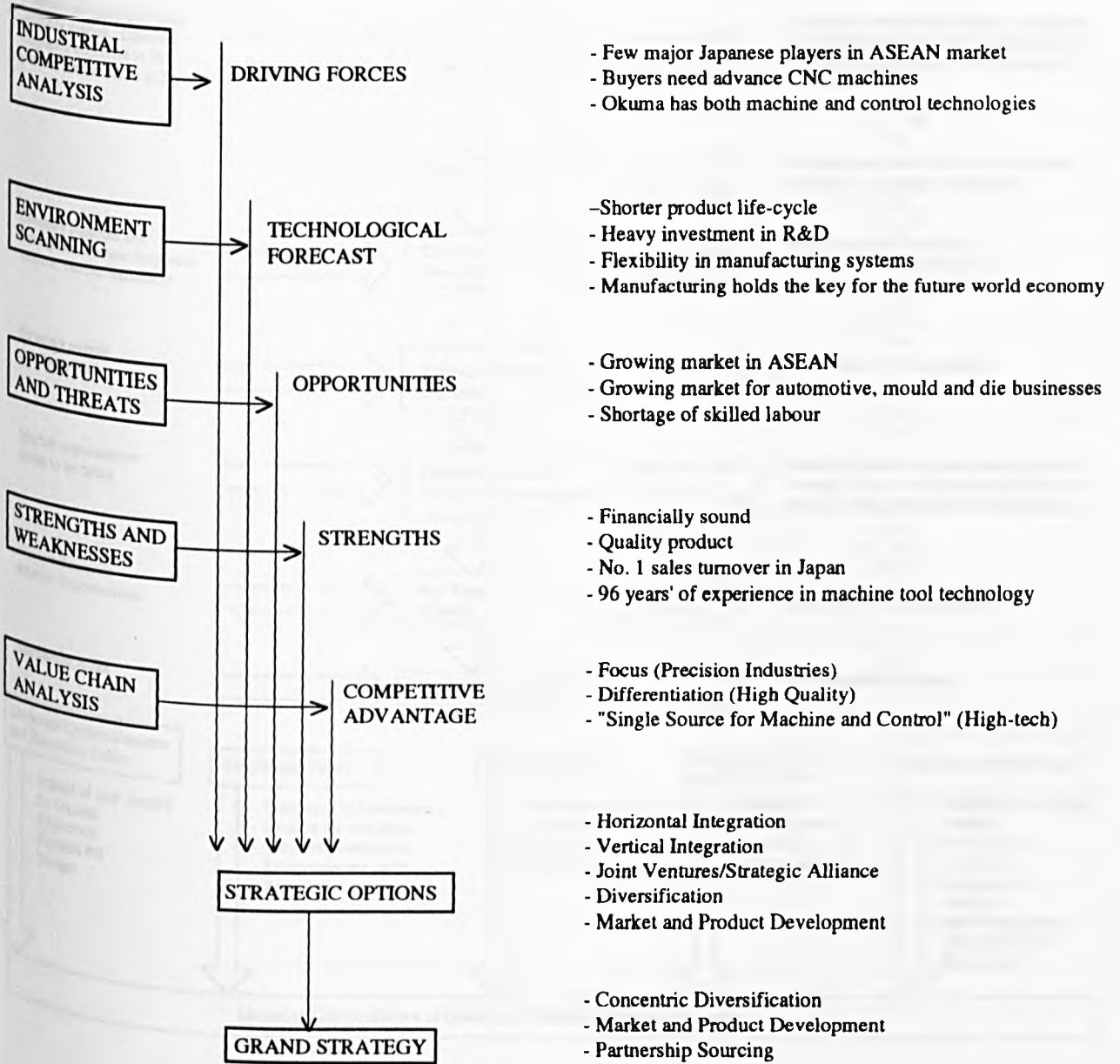
Goal 1 is *loyalty from customers* (differential advantage through value added). Its capabilities is total quality customer satisfaction.

Okuma is able to sell its products at a premium price because its customers are willing to pay an extra 25 to 30 percent over other Japanese brands for Okuma's quality and after-sales service support.

Okuma is focused on providing total quality customer satisfaction through value added service. This requires shared mental models, ie how do Okuma people develop their capacity to reflect on their internal pictures of total quality customer service to see how these shape their actions and responses? This is the

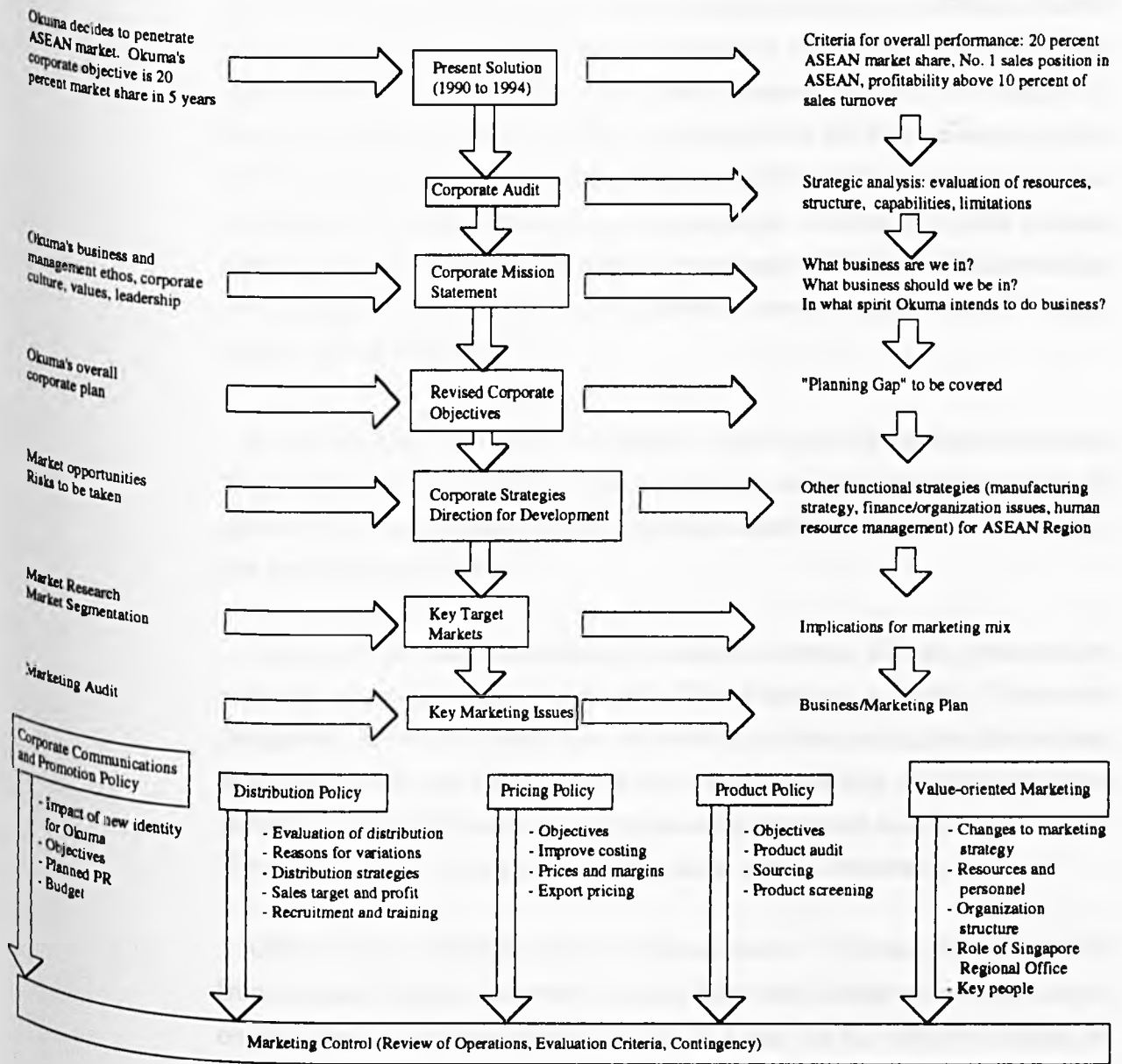
FIGURE 8.1

STRATEGIC ANALYSIS OF THE ASEAN MARKET



Source: Author

FIGURE 8.2 STRATEGIC MARKET PLANNING FOR OKUMA



Source: Author

circle of *SEE* (data) - *THINK* (evaluate, study) - *PLAN* (sequence of activities) - *DO* (action). It is everybody's business to ensure that the core focus is customer satisfaction leading to loyalty from the customer. Okuma will never sell in any market where it cannot provide total quality customer service. For example, in Bangkok, the first Okuma CNC lathe was installed in 1985 by a company called "ATP" which was assembling and marketing BMW and Peugeot passenger cars in Thailand. Initially, Okuma was very reluctant to close this order because Okuma had no distributor in Thailand. Subsequently, "COSA" (a Swiss machine tool distributor) offered to provide after-sales service support to ATP before Okuma agreed to the sale.

To maintain the confidence of customer, Okuma sells its machine only where they can be rapidly serviced. Service functions in Japan are supported by 24 offices; 15 of those locations have technical centres where potential customers can test-operate machines.

To promote the sale and service of machines overseas, Okuma personnel are stationed at various locations in the USA, West Germany, Australia, Taiwan and Singapore. These representatives are involved in overseeing the distribution, sales, maintenance and repair of machines, and the training of locally recruited personnel in a comprehensive and professional approach to sales and service. They also monitor changes in end-customers' service expectations.

Okuma enjoys a high proportion of repeat orders. The ratio of repeat orders from existing Okuma's customers to order from new customers is about one-to-one (50 percent) for the domestic market in Japan. In the ASEAN market, 60 percent of the enquiries are for repeat orders. Out of the repeat orders, there is a 95 percent chance of closing the deal.

Techniques

- *Empathy in relationship marketing.* Because Okuma independently develops and integrates the main mechanical and electronic parts of its machines, its sales and service engineers are qualified systems consultants. Besides advising potential customers about the optimal combination of machines to fit their manufacturing requirements, Okuma sales and service engineers listen to the

needs of the customers. A good frontline man must have empathy, the ability to think and feel as customer does. Salespeople cannot sell without the invaluable and irreplaceable ability to get powerful feedback from customers through empathy. Selling effectively in the foreign market - crossing cultural lines-requires even more empathy. Customer satisfaction is Okuma's responsibility, not just the distributors' job. In the event that a distributor defaulted, Okuma must maintain its integrity by continuing to support and service the customers (before and after the warranty period). Okuma endeavours to maintain relationship through rapport and dialogue with its customers. Okuma realises that empathic relationship marketing is the key to winning the hearts and minds of customers.

- *Marketing research.* Sales and service engineers are constantly involved in surveying customers' needs and competitors' product innovation, and transmitting information to headquarters for developing machine and numerical control products. In this way, Okuma continues to meet user needs while providing appropriate products and technology.

In marketing research, Okuma employs highly qualified staff to supply primary data to headquarters in Japan. Although Okuma's distributors can provide the necessary market intelligence, Okuma believes that more sources of information can provide different perspectives for that quality in decision making, and especially for modification/improvement to existing products and design of new product lines.

Okuma has established its regional offices in North Carolina to cover North and South America, Krefeld (West Germany) to cover Europe and South Africa, Singapore to cover the ASEAN region, Melbourne to cover Australia and New Zealand. All other markets are covered from Japan. The objective is to carry out marketing activities (including marketing research) and maintain close rapport with customers and distributors. Proximity to the scene of action would ensure speed in response.

- *Effectiveness and efficiency in producing quality-quality products.* Okuma's business philosophy of "quality first production" is more than just producing

a high quality product. It also includes the reliability of product. Okuma's warranty period is for two years (as opposed to one year from its competitors).

For export machines, the new product must be tested in the domestic market for a minimum period of one year. This is to identify design fault, technical problem, or debugging of software before it is marketed overseas.

In summary, Okuma's relationship marketing focus:

- puts customers first
 - emphasizes with customers
 - emphasizes customer satisfaction (potential and existing customers)
 - focuses on different advantages (quality, service, value for money, reliable delivery)
 - customer-oriented sales people for direct contact
 - long-term relationship within the "extended family" concept
- *Consistent delivery promise.* Okuma delivers over 90 percent of its CNC machines on time. Its integrity also lies in its promise delivery. Okuma salesmen cannot close the order first and change the delivery schedule later (a tactic which leads to dismay among customers). It does not want to lose its integrity in the eyes of its customers.
 - *Honest assessment.* Okuma is an established, medium-sized company aiming to go beyond world-class status. Undoubtedly, it is a company which believes in quality-quality products and quality services. It is also a company which invests in R&D.

Okuma is also a rather conservative company. It knows its business is in high quality, advanced technology machines and hence mass production cannot be the strategic focus. Its strategy aims at product differentiation (through quality) and not cost leadership (through low pricing). Demand is more a demand-pull situation. Advertising is through "word-of-mouth" reference.

- *Financial system.* In the event that the interest rates chargeable by the banks in the ASEAN region is higher than that of Japan, Okuma can effect the loan on the interest chargeable by industrial banks in Japan and pass on the benefits to the customers. This makes it extremely attractive to the end-users in some ASEAN countries. Okuma can extend the loan because of its strong ties with the Tokai Bank (Tokai Bank owns 5 percent of Okuma's share).

- **FIRMS: Goal 2**

Goal 2 is *commitment from workers* (competitive workforce). Its capability is human resource management.

Okuma's achievement as a world-class leader in machine tool production could not have been possible without the dedicated efforts of its workers. There were 1,695 male and 160 female workers at the end of 1991. The following shows the distribution among its divisions:

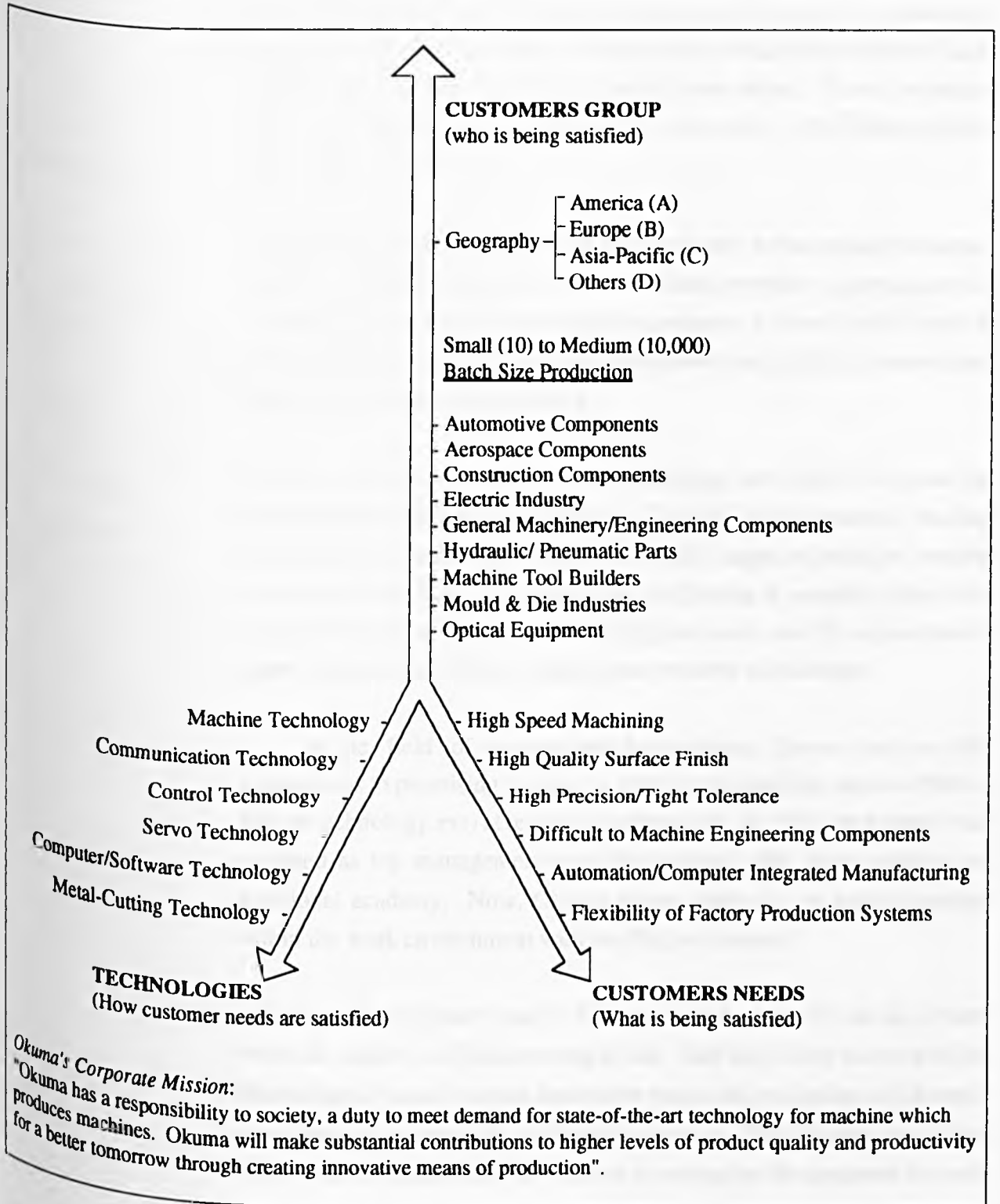
• Administration	:	170
• Sales	:	320
• Overseas	:	106
• Manufacturing	:	744
• Technology	:	259
• Electrical systems control	:	256

Okuma has a male:female ratio of approximately 11:1; with the females mainly in the clerical/secretarial work area and in assembly of electronic components for absolute encoder.

The electric systems control division is under the technology division, which is into R&D. In the allocation of manpower, the emphasis is in innovation and manufacturing efficiency.

Top management communicates a mission to capture the imagination and commitment of all workers. See Figure 8.3.

FIGURE 8.3 OKUMA'S CORPORATE MISSION



Okuma's Corporate Mission:
 "Okuma has a responsibility to society, a duty to meet demand for state-of-the-art technology for machine which produces machines. Okuma will make substantial contributions to higher levels of product quality and productivity for a better tomorrow through creating innovative means of production".

Source: Okuma Corporation

Techniques

- *Development managers.* The global business environment is increasingly complex, less predictable, faster changing and increasingly a global village. Okuma believes that to go beyond world-class status, Okuma managers must be developmental managers possessing the characteristics summarized in Table 8-1.

Okuma does not aim to develop managers only to run today's business, but also to prepare them for the future. Okuma provides opportunities for learning, to share knowledge through experience, to develop skills and to generate new ideas. There is scope for teamworking to discuss current and future problems and opportunities.

Workers are recruited straight from university and trained in-house by rotation through different departments. They do "action research" dealing with specific company problems. The early stages of rotation involve experience of working on the shopfloor. In Okuma, it normally takes 15 to 20 years for a fresh worker to rise through the rank and file, regardless of paper qualifications, before reaching the position of manager.

In the field of management development, Okuma used to offer scholarships to promising workers to pursue postgraduate degrees (MBA, MSc in technology, etc) at reputable universities. In 1990, the scheme was scrapped as top management was disappointed with these products of traditional academy. Now, Okuma places emphasis on action-learning within the work environment with the *Kaizen* concept.

- *Members of "corporate family".* Okuma is the best place to work, a place where all workers will find meaning to life. Each day, every member of the Okuma family aims to create innovative means of production as Okuma's contribution to society - this is Okuma's vocation. The "Okuma mind" (see Table 8-2) is the focus for all workers to recognise the common aim and basic thinking for a glorious twenty-first century.

In everything, Okuma aims for the top. It seeks to be number 1 in every

TABLE 8-1

CHARACTERISTICS OF OKUMA'S DEVELOPMENTAL MANAGER

<i>Strategic Orientation</i>	<i>Commitment to Customers</i>	<i>Creativity</i>	<i>Global Outlook</i>	<i>People-Oriented and Professional Approach</i>
<ul style="list-style-type: none"> • Long-term outlook • Preparedness in anticipation of change • Competitive thinking • Strategic insight • Strategic intent 	<ul style="list-style-type: none"> • Commitment to total quality satisfaction • Concern for total quality management • Putting customers first 	<ul style="list-style-type: none"> • Innovative • Adaptive • Flexible • Entrepreneurial 	<ul style="list-style-type: none"> • International awareness • Political and cross-cultural sensitivity • Concern for global environment • Willingness to learn with and from each other 	<ul style="list-style-type: none"> • Leadership • Professionalism • Passion for excellence • Integrity • Teamwork • Ethics • Discipline • Competence • Capability • Continuously learning

Source: Okuma Corporation

TABLE 8.2 THE OKUMA MIND (SHARED CORPORATE PHILOSOPHY)

Raison d'etre

Okuma exists to secure the happiness of its workers, and everyone who provides support for Okuma, while helping to create new values to build a better society in which to live.

Field of endeavour

Okuma seeks to create innovative means of production in anticipation of and in response to the needs of the time using machine and control technologies as a basis, together with the technology that combines them.

Management philosophy

Every effort shall be made to create a flexible, dynamic organization that shows respect for the dignity of each worker while encouraging individual development to the utmost.

Code of conduct

- Never be afraid to make a mistake. Act with courage and conviction at all times
- Value flexible thinking and the independent approach
- Be consistent. Fulfil our duty
- Do our utmost for self improvement with energetic zest and curiosity
- Consider every encounter as a chance to broaden ourselves
- Value opportunities to relax. Seek spiritual enlightenment

Company motto

"Challenging perfection based on principle"

Source: Okuma Corporation

sector, whether it be technology, production, sales or management. Okuma puts a high priority on the basics. "Back to the basics" is a consistent theme in operations and technology, in business and management philosophy. "Start with the basics, shoot for the star".

- *Lifetime employment.* Personnel policy emphasizes a life-long career with Okuma. There is lateral movement in the first year of employment where the employee is exposed to finance, production and marketing. At the end of the orientation period, he decides his area of work to ensure a personality-job-fit.

High precision machines need the final human touch. Precision skills can never be replaced by factory automation. Hence, skilled workers are vital for this industry. Life-time employment is, therefore, of utmost concern to the company. It allows for the learning curve effects as it reduces manufacturing costs and increases efficiency. The Okuma employee development plan (Kaizen) is shown in Table 8-3.

- *Staff welfare and benefits.* The average length of employment is 18.3 years and the employees' average age is 38.0 (including management staff). They have a duty to carry out an eighty-hour work day for 245 days per year or 1,960 hours per year. In reality, they work more than a 12-hour work day. Average monthly wage is Yen 343,928 (excluding bonus payment and overtime; excluding management staff). The absenteeism rate is 2.5 percent.

A low absenteeism rate ensures high productivity and minimal delay in the production schedule. The basic wage for workers is comparable to those paid to workers in a similar industry in the West. Okuma targets at high sales, high returns on quality machines; and profits generated will then be re-distributed to the workers. In good times, up to 15 months' bonus had been paid.

• **FIRMS: GOAL 3**

Goal 3 is *cooperation from suppliers* (value added partnership). Its capability is supply chain management.

TABLE 8.3

OKUMA EMPLOYEE DEVELOPMENT (KAIZEN)**Purpose**

To strengthen the company's total power (competitive power, potential power, etc) by all employees' participation in pursuing improvement through the spirit of teamwork.

This is done by fostering and developing employees because a company's power is determined by its human resources.

It seeks to achieve employees' autonomous development through continuous learning.

Every single employee supports the company's growth. Every single employee seeks personal mastery (continuous personal growth and learning)

Definition and examples

Kaizen is to pursue improvement in anything, ie participative management in the programme, the report of improvement done by yourself at your job is the most important aspect. Watch your present job carefully and think about how to improve it (increase efficiency, cost reduction, etc). If you feel something is inefficient, then there must be a better way. Always keep this thought in your mind. Here are examples:

- **Manufacturing area**

- Enhance quality : change improper parts, etc
- Increase productivity: check inspection method, etc
- Increase efficiency : omit a process, etc
- Better way to perform training, etc

- **Facilities, maintenance, shipping and receiving**

- Save power
- Safety standard
- Prevent incorrect shipping, etc

- **Office area**

- Design a new form
- Prevent misinformation
- Change the routine procedure, etc

Organization and committee

The Kaizen project committee is placed above the departments and is directly overseen by the President

Conduct

- The individual submit Kaizen to their supervisor
- The supervisor accepts or disapproves and comments
- The committee checks the fairness of each supervisor's judgement, makes recommendations, introduces new ideas to other sections, prepares to give an award
- The award by the committee may be acceptance or recommendation. If the Kaizen contributes significantly to the company's benefit or is useful to other sections, "execution" will be moved up to the committee's recommendation

Source: Okuma Corporation

The normal day-to-day purchasing of standard stock items is under the jurisdiction of the purchasing department (eg microprocessors, transformers, automatic-tool-change arm, etc). The manufacturing division has laid down the inspection procedures, acceptable quality level and specifications for all such items. For the more critical items (eg spindle casting, main memory board, ball-screw, etc), Okuma has designed and implemented its own quality assurance programme (including quality engineering and inspection procedures) for all outgoing items at its suppliers' or subcontractors' factories. These items will undergo inspection again at Okuma's incoming inspection quality control section. If the rejects are higher than the acceptable quality level, meetings will then be held with the suppliers to identify the root problems. However, if the situation does not improve (after the technical discussions and evaluations) for the subsequent two batches, then Okuma's director of manufacturing division will decide whether to continue with the same supplier or to seek alternatives.

The CNC machine tools are made up of the elements of: machine body (cast iron casting), digital servo drive unit; spindle control drive unit; computer controller. All the main parts, except machine casting and electronics components, are manufactured in Okuma-Japan. For machine casting and electronics components, Okuma has in-house quality assurance programmes at the suppliers' factories to ensure that the casting and electronics components are in compliance with Okuma's specifications. The machining of the machine body and its associated parts are done in Okuma's factory.

For the purchase of capital equipment, there is joint consultation with all engineering departments. The proposed specifications/budgets are submitted to the project planning department for approval. The senior managing director, administration division, is responsible for the approval of the budget. If there is adequate budget for capital equipment expenditure, the purchase will be tabled for endorsement at the board of directors' meeting. The purchasing department will then call the supplier to negotiate the final specifications and price. The technical negotiations will be done by a team of engineers headed by a team-leader who is normally one of the directors for the department where the machine will be installed. This process is applicable to both "bought-out" and "bought-

in" machines. About 60 percent of the machines used in Okuma's production shopfloor is built by Okuma.

Information output is very important. Okuma has a technical and marketing information section which extracts articles from journals and catalogues on related new products for circulation to all, including its overseas offices. Before Okuma decides on any huge capital investment expenditure, a questionnaire will be sent to every "technical centre" to get its views. The opinions/suggestions are compiled by the respective technical director or general manager in charge of the overseas offices.

At the end of every financial year, in March, every department must submit their budget (inclusive of stock replenishment and/or new items) to the purchasing department for value engineering and analysis. The overall budget will be submitted to the project planning department for final evaluation and approval.

Okuma has standardized its procedures for the purchase of both stock items and capital-intensive equipment. Such procedures have been formalized for objectivity and continuity. Depending on the nature of the purchase and size of budget, the rules for organizational buying behaviour are fixed. It is a group decision involving engineering, manufacturing, R&D, marketing, purchasing and project planning departments.

For manufacturing advantage, Okuma needs to source and develop the right connections for supplies. It believes in long-term working partnerships and shares its technical expertise with members of this "one big family".

Techniques

- *Throughput management.* Okuma and its suppliers employ the latest and most efficient production engineering techniques for shortest manufacturing lead time. (The core manufacturing production facilities are upgraded every five years). A standard Okuma CNC lathe is completely assembled on a conveyor flow-line system within two hours. For smaller CNC machines, it takes only 45 minutes. Formerly, without the JIT supply

chain management concept, it took twice as long to assemble the same machine because of less efficient throughput management system. For effectiveness, supply chain management must be combined with lean production practices.

Okuma combines the group technology and FMS concepts. CNC machines, efficient layout, automated transportation of parts and automated warehousing are all controlled by a centralized CIM computer between Okuma and its suppliers. The CIM computer monitors on a real-time basis the status of those critical parts which will have an adverse effect on the production system in the event of a stock-out. JIT supply chain management demands a very disciplined manufacturing management and control system.

- *Enabling technologies and standards/integrated information systems.* Okuma practises JIT manufacturing based on the Kanban system. As such, the manufacturing department maintains real-time on-line communications with its purchasing department with the aid of a MRP-II package for monitoring and control of stock and purchase items to balance optimal stock investment with JIT delivery of subcontractors' items . (See Figures 8.4, 8.5 and 8.6 for Okuma's planning, manufacturing and control systems, respectively).

Okuma's MRP II systems is interlinked with most of its suppliers through telephone modems. The concept of supply chain management is applied throughout - from purchasing through to manufacturing and to finished goods store. Okuma's policy is never to hold any stock machines for more than 90 days. Okuma's marketing strategy is to produce customized machines. Every staff member of Okuma is forced to think JIT and to reap the competitive leverage of supply chain management. In effect, it means taking care of the chain of customers (internal and external). Okuma's overseas branches must adhere to the weekly updated production schedule for the allocation of machines. They cannot jump the queue even for a VIP-customer. Otherwise the supply chain will be affected and chaos created for production planning and control, manufacturing and supplies.

FIGURE 8.4 OKUMA'S PRODUCTION PLANNING AND CONTROL SYSTEM

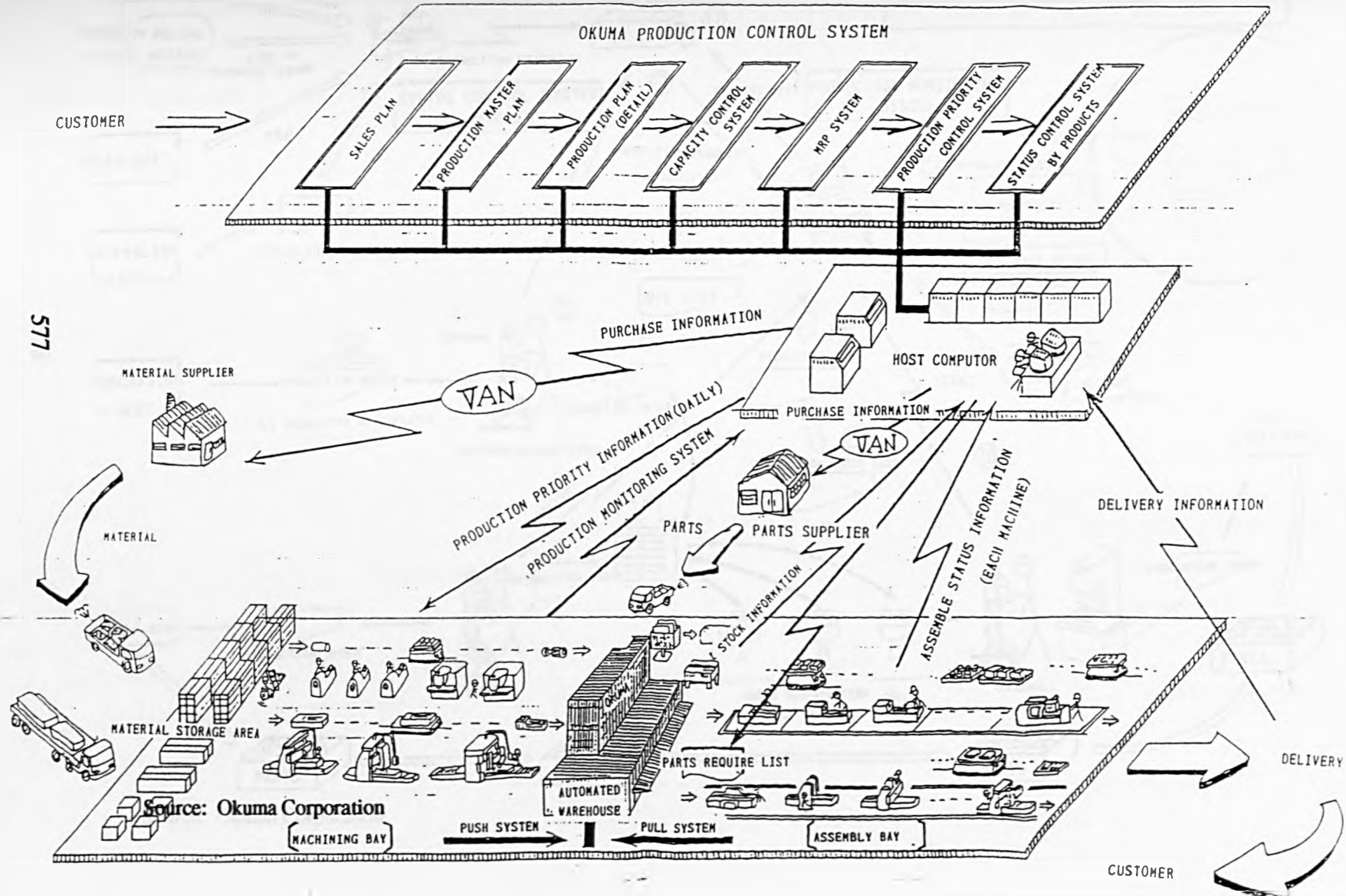
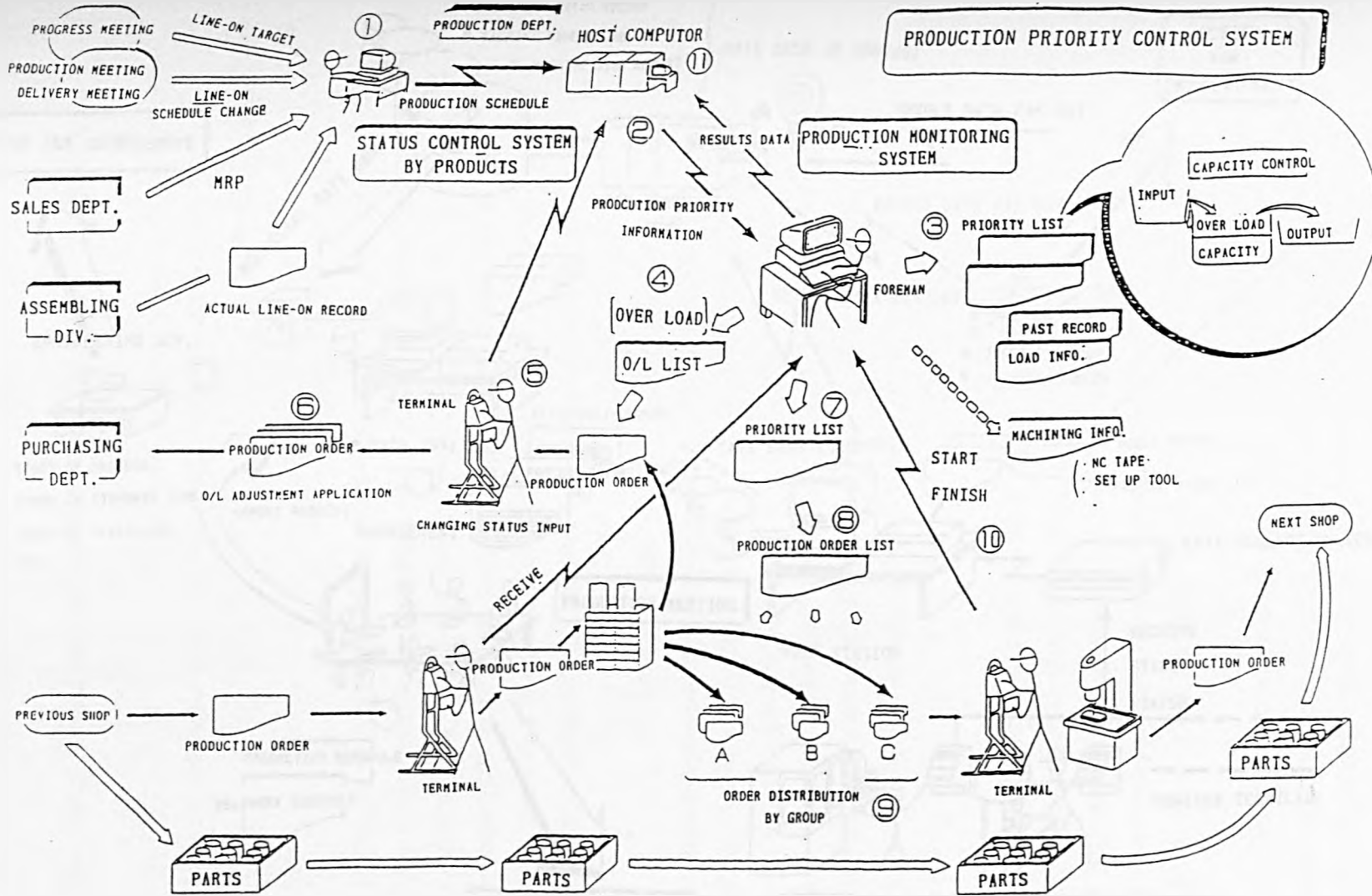


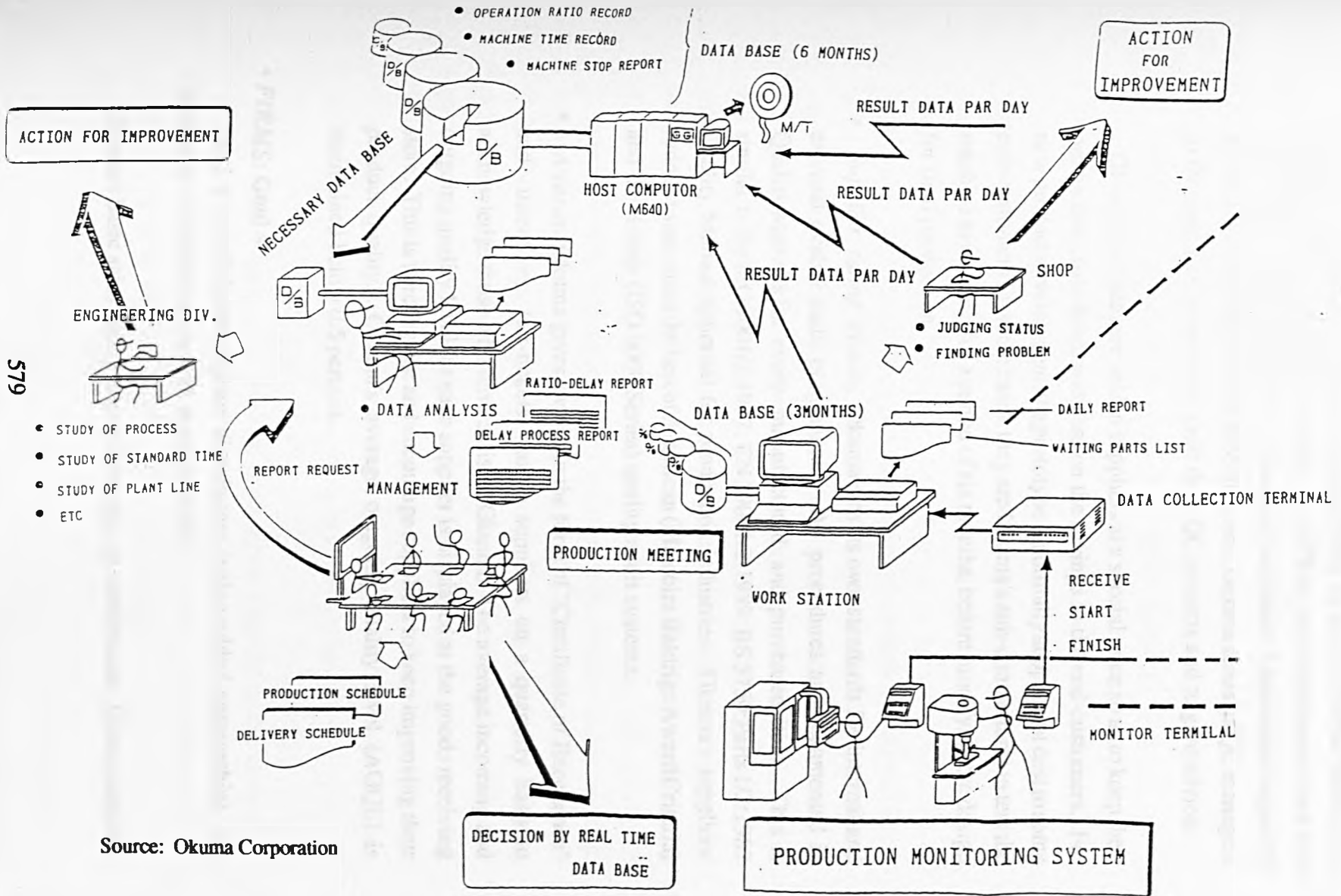
FIGURE 8.5 OKUMA'S PRODUCTION PRIORITY CONTROL SYSTEM

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Source: Okuma Corporation

FIGURE 8.6 OKUMA'S PRODUCTION MONITORING SYSTEM



Source: Okuma Corporation

- *Members of extended family/management and technological support.* Okuma assisted its suppliers by transferring its know-how to them. For example, Okuma sold its foundry in 1975 to its subcontractor and has continued to provide technical assistance ever since. Okuma also buys 100 percent of its casting from his subcontractor. Okuma sends its QC managers to the suppliers' factories to audit their QC systems and to give advice.

Okuma machines are sold to suppliers at a special price so as to keep their production costs down and pass on the savings to the end-customers. For new product development, the prototype is normally supplied at cost to some end-customers (in some cases, they are Okuma's sub-contractors) to test the machine to its limits for a period of six months, before modifying the design for final production.

- *Supplier rating system.* Okuma sets its own standards for internal and external quality audit programmes. All procedures are documented in Quality Manuals for every manufactured and purchased item. This is similar to the ISO 9001/2:1987; EN 29001/2:1989; BS 5750:Parts 1/2:1987 Quality Manual appraisal for production industries. Okuma's suppliers' rating system takes the best of American (Malcolm Baldrige Award Criteria) and the British (ISO 9000 Series) quality audit systems.
- *Awards.* Okuma gives awards in the form of "Certificate of Excellence" and incentives (air-tickets) to its suppliers on a quarterly basis to acknowledge those who have assisted Okuma. The average incoming and outgoing quality level for each supplier is displayed at the goods receiving store. This is to recognise and encourage suppliers to keep improving their product quality. Okuma's average outgoing quality level (AOQL) is maintained below 0.5 percent.

• **FIRMS: Goal 4**

Goal 4 is *collaboration from distributors* (value added partnership). Its capability is distributor network management.

Okuma's basic sales policy is to sell through its distributors. Direct sales are

done only when there are government tenders and distributors are specifically excluded. In every country, there is a sole distributor representing Okuma's complete range of products with exclusive rights to commission, even though the sales may be concluded by Okuma-Japan, as long as the machines are installed within its national boundary. Okuma believes in long-term relationship with the distributors for value added partnership and is stringent in its selection of distributors. Network management of distributors is critical.

Okuma has two categories of sales - domestic and export. Domestic sales covers solely the Japanese market. In export sales, there are four different markets: the American market (A), the European market (B), the Asia-Pacific market (C) and Others (D).

All marketing and sales activities are under the jurisdiction of the marketing and sales department. This was headed by Okuma's President, thus emphasizing the significant role and contribution of this department. In March 1992, Okuma's President delegated this role to a senior managing director as he could not afford the time to travel to each market for sales meetings with the respective distributors. It is Okuma's policy that top managers visit the four different markets at least three times a year in order to understand the changing market forces and, more importantly, distributors' problems and needs. Full support and commitment from top management is critical for success in the marketing of high technology products like CNC machines. Thus, Okuma understands the paramount importance of having the right channels (distributors) for market penetration and market development. Both parties must cooperate to lower their profit margins in order to capture more sales when the competition becomes severe. At times, for "political" reasons, sales are below the break-even point to penetrate a certain type of industry or market segment. This can be cross-subsidized from sales to another customer in another country.

Okuma also understands the need to set-up its technical centre at strategic locations all over the world to assist and boost the sales of its distributors (part of its global management strategy: "Think global, Act local"). Okuma seeks collaboration from its distributors by giving full support.

Techniques

- *Members of "extended family"*. Okuma maintains close links with its distributors. It assists in developing and strengthening the distributors' expertise in the sales of its machines. It monitors the growth/progress of its distributors very closely. For new markets, Okuma will finance open-house shows, trade exhibitions, advertisement costs, and attractive discounts for Okuma's stock machines kept by distributors. If distributors were to make enough profits from Okuma's support, then distributors can pass the savings to the customers in the form of better facilities, eg free-of-charge training programmes, wider range of stock items, adequate showroom-cum-testing facilities, time-studies, etc. For new markets, Okuma pursues a more aggressive policy of selling at the break even point to distributors for a promotional period of two years, to be reviewed at the end of each year.

The regional office in Singapore had actually assisted its distributors in Indonesia, Malaysia, the Philippines and Thailand to analyse the profile of the respective companies using "soft systems methodology". Recommendations were made to the distributor in Thailand to improve the effectiveness and efficiency of its operations in marketing and after-sales service. Essentially, the focus of the company is given through making explicit mission statements. Another study was made for their spare parts division, again using systems thinking ("Beer's viable system" mode).

Normally, the distributor's sales engineer will make the initial contact with the prospective buyer. If the machines are standard machines then he can probably conclude the order. However, for more sophisticated systems, Okuma's personnel must be involved in the technical discussions before accepting the order. This is to provide direct assurance to the end-user from the manufacturer. This is one of the major differences between consumer and industrial marketing. It is very important to the end-users that the manufacturer gives full support to its distributors and customers as the investment in CNC machines is considered high (ranging from the smallest system costing US\$75,000 to US\$40 million). Caterpillar (USA) invested US\$40 million in Okuma's Flexible Manufacturing Systems over a three-year period and it expects down-time of not longer than 36 hours from the

time Okuma is informed of the system's trouble. The assurance to honour this contract comes directly from the President of Okuma (Japan), although Okuma has a factory in the USA.

- *Consultancy service.* Okuma believes in selling application know-how, not just CNC machines. Hence, its sales staff are mostly qualified and trained engineers (minimum: postgraduate degree with over 10 years of relevant experience) who can understand the manufacturing processes of its customers and are able to advise the end-customers. Further, the distributors receive training by Okuma's specialists on a regular basis to update their knowledge and skills. This serves as a guarantee for the end-customers because they can be assured that they will not buy the wrong machines resulting in sub-optimal production methods, ie less cost-effective.
- *After-sales service and total productive maintenance.* Effective and efficient after-sales service support is the norm for all CNC machine tool builders. But, Okuma continuously strives to improve its after-sales service support and has incorporated a productive maintenance programme to minimize machine down-time. Under the first two years of warranty, Okuma schedules its engineers on a quarterly basis to monitor the performance and maintenance of customers' machines. If customers mishandle Okuma machines or do not know how to optimize cutting conditions, then Okuma or its distributors will assist at no cost. With proper maintenance, the mean-time-before-failure of an Okuma machine can be stretched to over four years (assuming 24-hours operation).
- *Market intelligence.* Feedback from distributors on economic indicators, competitors' strategies, changing customers' needs and customers' degree of expectation/satisfaction with the after-sales service support is inadequate for Okuma's lead-marketing-manufacturing approach. Okuma's regional office needs to give direct and immediate feedback to headquarters for improvements to product design and product performance resulting in better product innovation to meet customer's demands (relative to competitors' product design and performance). In industrial marketing, rapport and direct communication with distributors and customers are vital for speedy

response from the manufacturers in the age of turbo-marketing. Much valuable information about market trends and the products of competitors is also obtained by participating in domestic and world's regional meetings of machine tool distributors. This information is quickly relayed to the product development section of the Oguchi Plant, where data is acted on to create new products and modify existing products.

- *Market coverage and product availability.* Okuma's sales policy is to produce customized CNC machines within an acceptable time frame. Most standard machines can be delivered within two to three months, ex-Japanese port, after receipt of firm order. As a result, inventory of CNC machines is kept to a minimum. Normally, distributors and Okuma's regional office will keep an inventory of ten stock machines to cater to any immediate/urgent customers' needs. However, these stock machines must be sold within 90 days unless there are exceptional circumstances, eg sudden economic downturn, war, industrial strike, etc. Okuma believes in JIT marketing of its products (low inventory cost) and its distributors have to subscribe to this policy. Another reason for JIT marketing is because Okuma does not want customers to have out-dated machines. As such, Okuma never gives credit terms or consignment machines to its distributors. All payment are 100 percent irrevocable letter of credit (L/C) at sight opened in favour of Okuma, 30 days prior to shipping date (except for spare parts). However, when competitors gives credit terms to their distributors ranging from 90 to 360 days, Okuma is flexible enough to grant 30 days credit, for stock machines only, to its distributors. The rationale behind this policy is to reduce unnecessary interest since this is built into its pricing policy and to pass this saving to the customers, ie offering customers a lower price. Okuma's machines are already 10 to 15 percent higher in price than all Japanese competitors. Nevertheless, for markets in Indonesia, the Philippines, and Thailand, where the lending rates of their banks can be as high as 30 percent, Okuma can assist the customers by accepting an usance letter of credit with a flat interest rate of 0.8 percent per month up to a maximum of 36 months (part of its solid finance business management).

- *Market development and accounts solicitation.* Okuma is fully

responsible for its computer controllers and machines. For market development, Okuma attaches its mechanical and electronics engineers to their distributor to field visits. There is a schedule, each lasting for two weeks on a bimonthly basis. There are thus more possibilities where Okuma can serve its market with a comprehensive product range in line with other complementary products offered by the distributors. For example, the demand for CAD/CAM system to be integrated to CNC machines (of different manufacturers) is on the increase. Okuma can give advice to the customers on the type of software compatibility for system integration. Each market will experience different types of CAD/CAM software and hardware capabilities and Okuma's engineers can find a total solution for the communication link. As a result, Okuma managed to expand its software capabilities and introduce a "supervisory computer" in line with market development for CAD/CAM integration. Attention to the fine detail has assisted in giving software development by Okuma a reputation for unmatched performance, operability and suitability in the machining environment.

Since Okuma can only accept L/C at sight or Usance L/C for most of its sales, there is less of an accounts solicitation problem. Okuma only accepts payment through its distributors unless in exceptional cases where the customer is a government body or statutory board and has issued an L/C directly to Okuma. Okuma's outstanding debts do not exceed 90 days and outstanding debtors' accounts (mainly for spare parts to distributors) do not exceed 0.67 percent of total annual sales revenue (Okuma's guideline is 0.5 percent) for the ASEAN market.

- *Network management and control.* Network management and control in strategic markets is needed to smooth the manufacturer-distributors relationship. Machines cannot be sold through unscrupulous means to potentially hostile powers or embargoed countries. Furthermore, spare parts management is another important aspect - loss in terms of spare part values could be as high as US\$2 million for Okuma's operations in the ASEAN region. Hence, once spare parts are in the hands of a "fly-by-night" distributor then the integrity of Okuma's back-up service is at stake. It is too

costly and risky for the distributors to keep all spare parts. Thus, Okuma undertakes to keep the slow-moving, expensive and bulky spare parts while its distributors keep the fast-moving spare parts on a consignment basis, ie pay as it consumes, with a maximum credit of 90 days. This would also pre-empt loss by Okuma should it terminate the relationship with the distributor.

The range of activities in the marketing of CNC machine tools is in Table 8-4 (identical to that of Young et al., 1991).

To minimize breakdown in communication because of cultural differences, Okuma trusts that the local man can do a better job as a "corporate diplomat" between distributors and corporate headquarters. Thus, Okuma's regional office in charge of the ASEAN market has established the communication network shown in Figure 8.7.

The first team in the communication link comprises the ASEAN distributors and the local representative (the ASEAN culture); the second team comprises the local representative and the Japanese expatriate from headquarter (ASEAN/Japanese Culture); the third team comprises the localized Japanese expatriate and members of headquarters (Japanese culture). Hence, the "third culture".

Once headquarters has faith in these teams, and is reassured that Okuma's regional office understands the peculiar problem of different distributors, Okuma-Japan will delegate most authorities (except the key business/management philosophy of Okuma) to its local and Japanese expatriate senior managers so that decisions can be made speedily in response to cultural sensitivities of the region.

Further, when the localized Japanese expatriate returns to Okuma-Japan (after the three-year attachment to the regional office), communications between the second team (local representative and the new Japanese expatriate on replacement) and corporate headquarters through the medium of the localized Japanese expatriate (the "corporate diplomat" at headquarters) are facilitated.

TABLE 8-4

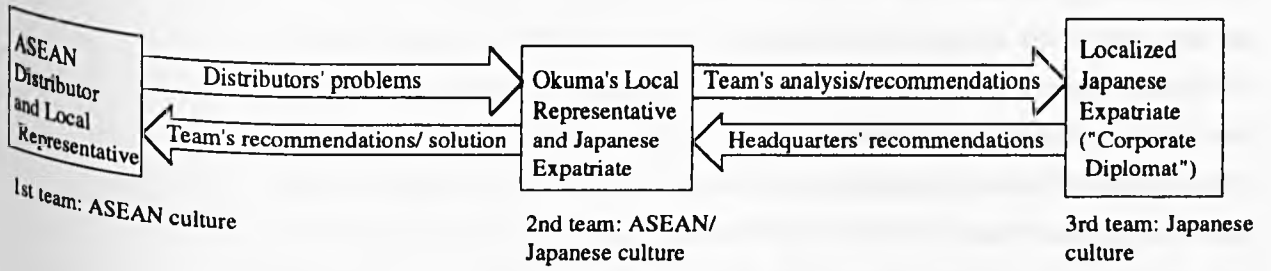
RANGE OF ACTIVITIES IN THE MARKETING OF CNC MACHINE TOOLS

Market Research and Targeting of Customers	Machine Tool Sales	After-Sales Service
<ul style="list-style-type: none"> • <i>Marketing to customers</i> - Promotional literature - Sales presentation - Demonstration of equipment • <i>Evaluation of customer requirements</i> - Production/engineering - Assessments - Production evaluation studies - Consultancy studies 	<ul style="list-style-type: none"> • Adaption/customization of products • Installation, testing, commissioning • Customer training 	<ul style="list-style-type: none"> • Management and engineering back-up • Maintenance, servicing and repairs • Warranty, claims, returns, etc

Footnote: Not all these activities may be undertaken by any distributor.

Source: Adapted from Young, Stephen, Jones, Marian and Wheeler, Colin (1991), "European Marketing & Distribution in the 1990s: The Case of the Machine Tool Industry in the UK", Academy of International Business IJK Region Annual Conference, 12 - 13 April, at South Bank Polytechnic, London.

FIGURE 8.7 OKUMA'S ASEAN-COMMUNICATION NETWORK



Source: Author

• **FIRMS: GOAL 5**

Goal 5 is *Respect from competitors* (industry/market leader working on the principle of competitive cooperation). Its capability is world-class manufacturing and world-class marketing.

For its world-class manufacturing and world-class marketing, Okuma seeks harmony by blending and fusing these separate but conflicting elements between manufacturing strategy and marketing strategy:

- *Flexibility versus focus.* For flexible manufacturing, also called "market-paced manufacturing", a premium is placed on being able to respond as rapidly as possible to market changes and demands. The ideal flexible manufacturing vision is to postpone all manufacturing and purchasing until a customer's order or replenishment order for distributor's stock machine is received. Okuma's sales policy is not to accept an order unless the customer abides by the delivery schedule allocated by the Production Department. Every order is managed by two criteria, ie the date for validity of offer and a fixed production schedule against this date. In the event that the order cannot be concluded on the date of validity of offer, then the production schedule is allocated to the incoming firm order on a first-come-first-served basis. Hence, the production schedule will not be upset. Otherwise, it cannot operate on the JIT concept. It is imperative to combine the most advanced technology/equipment in flexible manufacturing with a disciplined production schedule to achieve significant reduction in manufacturing lead time while maintaining essential economies of scale.

Contrasted with the flexible vision is the concept of focused manufacturing to realize the benefits of economies of scale (mass production) to achieve overall production cost advantage. Hence, marketing can benefit from competitive price advantage. Focused strategy concentrates on a limited number of products for a limited number of production facilities as its goal is to attain the highest possible level of capacity utilization. Okuma focuses only on the high precision market segment of metal-cutting CNC machines and does not overly expand its production capacity for product diversification. Thus, Okuma aims to

achieve a balance between flexible manufacturing and focus strategy by employing the most advanced manufacturing technology (FMS and CIM) with the principle of continuous improvement. The goal of focused strategy is lowest possible per-unit cost (easier to compete on pricing) and fail-safe quality (value for money). The basic idea is to adopt leading-edge manufacturing technology and utilize it to maximum advantage. Okuma's focused strategy is to build inventory for distributor's stock in order to achieve maximum manufacturing efficiency and to plan the manufacturing schedule whenever there is excess production capacity to keep anticipated inventory to balance anticipated market demand.

- *Quality versus continuous cost reduction.* Having achieved world-class quality advantage, the next step is to find ways and means to cut costs while maintaining the same quality standard. Controlling costs at every level of the manufacturing process is essential for profitable production without sacrificing quality. Thus, maximizing profit is achieved by minimizing cost. Okuma applies the overriding concept of Kaizen (continuous improvement) to all functional departments (marketing, engineering, R&D, manufacturing, finance) for total quality management. The single-minded objective of a continuous cost reduction campaign is closely monitored by the President.

Okuma's managers are engaged in first-line supervision, in human resource management, and in manufacturing engineering. This means Okuma's managers are more actively involved in making sure things work, and in all of the activities that go along with implementing change: people, products and processes. Every manager in Okuma and its overseas office is accountable for the continuous cost-cutting exercise which is reviewed by the President every half financial year. Another reason contributing to the success of Okuma's continuous cost reduction campaign is because every worker receives a "low" salary. However, there is a handsome bonus when Okuma is making good profit. Thus, everyone is motivated to ensure that the cost-cutting exercise is successful. Otherwise they have to survive on the basic salary (Okuma's employees practise the Confucian virtue of thrift).

Manufacturing aims for world-class quality but it will be extremely difficult for marketing to sell if the price is not right. Hence, Okuma adopts the "value for money" marketing strategy with the cooperation of every worker to cut costs across the board.

- *Just-in-time versus shorter delivery lead time.* Okuma seeks to harmonize the two "opposing concepts" to align manufacturing objectives to that of marketing objectives. Okuma's emphasis is on producing just-in-time (manufacturing objective) to meet customers' delivery schedule (two to three months for standard CNC machines). Simultaneously, it endeavours to satisfy the marketing objective of shorter delivery lead time. Okuma manages it by utilizing its spare capacity to produce a limited quantity of standard machines for stock. For the ASEAN market, the stock machines for the five countries (Indonesia, Malaysia, the Philippines, Singapore and Thailand) cannot exceed ten units (equivalent to US\$500,000) at any one time. Because of the JIT concept, both Okuma and its distributors are pressurized to sell the stock machines during the recent slow-down in world economy. While Okuma was able to sell all its stock machines before the next shipment arrived, its competitors had to hold open-house shows to sell the stock machines at mammoth discount prices. This had an adverse impact on end-customers because they observed a price difference of about 15 percent when they bought the same model during the good times.

Okuma's world-class manufacturing - marketing techniques, based on the strategic elements are examined as follows:

*** World-Class Manufacturing-Marketing Techniques**

- *Cost-driven strategy (the caretaker strategy).* In 1978, Okuma decided to improve its competitive edge in terms of consistency in quality, reliable delivery, and price reduction by adopting a GT-cell manufacturing layout. This was to reap the benefits of a more effective production planning and control system and increased overall productivity, resulting in least cost advantage. Also, Okuma stopped using integrated-circuit (IC) chips made in the Far East as they were less reliable than the ones that were made in Japan; the rejection rate of ICs dropped from AOQL of 20 percent to 4

percent. Machine casting and ballscrews were purchased from reputable suppliers rather than manufactured in-house because of quality-cum-cost advantage.

- *Market-driven strategy (the marketeer strategy).* In 1983, Okuma identified the potential for market development and growth in the ASEAN region for CNC machines. With superb products and service, Okuma was poised to penetrate the market. The growing ASEAN manufacturing sector played an important role in the economic development of the region. Countries such as Singapore, Malaysia, Indonesia and Thailand, consistently achieved a favourable annual growth rate, thus attracting foreign investments. The ASEAN countries enjoyed high *per capita* incomes, strong economic growth and low inflation and unemployment rates, as well as fast rates of urbanization and industrialization. Okuma's market-driven strategy called for market penetration, starting first with Singapore then followed by Indonesia, Malaysia, Thailand and the Philippines. In spite of the recession years of 1985 to 1986, and the additional handicap of being a latecomer to the area, Okuma secured a market niche. Okuma has one distinct competitive edge: Okuma's CNC machines are equipped with Okuma's controllers. So, Okuma's marketing ploy is "Your single source for machine and control". This highlights the convenience, effectiveness and efficiency of having one single source to ensure prompt and reliable after-sales service support. (See Table 8-5 for sales performance from 1984 onwards).

With more markets to cover, Okuma needed a more effective and disciplined production planning and control system and hence upgraded its MRP system to an "IBM-MRP II" system. Okuma had also expanded its product range ("low cost" CNC lathes and vertical machining centres) and introduced a CAD/CAM system to cope with the demand for new product development. Further, Okuma introduced flexible manufacturing by converting three of the GT-cells to form an FMS (comprising seven horizontal machining centres served by an AGV) which enhanced the productivity level by 50 percent. Further, Okuma practised the concept of TQM in order to improve the quality and

TABLE 8-5

SALES PERFORMANCE FROM 1984 TO 1994

YEAR	MARKETS					Total Quantity of Machines Installed
	Singapore	Malaysia	Thailand	The Philippines	Indonesia	
1984	16	-	-	-	9	25
1985	25	1	1	-	15	42
1986	14	4	5	-	6	25
1987	28	6	6	-	16	56
1988	14	3	3	-	8	36
1989	20	15	15	3	24	101
1990	18	44	44	5	29	160
1991	41	35	35	6	20	152
1992	11	38	38	8	10	99
1993	29	33	33	12	6	108
1994 *	2	2	2	0	1	20
Total (Cumulative)	218	182	246	34	144	824

Note: (*) January to March .

Source: Okuma Corporation

specifications of the products, better delivery performance, broaden the product lines and distribution by enhancing and extending the standards of total quality customer service to achieve total quality customer satisfaction.

- *Cost-driven and market-driven strategy (the reorganizer strategy).* By 1986, Okuma's FMS had increased from one to five FMSs to reduce customer delivery lead time and to cover a wider range of new product lines for efficient manufacture. Okuma's vision was to integrate marketing strategy with manufacturing strategy for least cost advantage coupled with a bigger market coverage for economies of scale plus scope. To reduce costs further, Okuma had changed its strategy of being self-sufficient and independent to that of interdependence, ie vertical disintegration to subcontract the non-critical parts to reliable suppliers and to assist them technically and financially (selling Okuma's prototype machines at cost to suppliers for performance tests). Okuma introduced the JIT concept with supply chain management and productive maintenance programme to achieve a synergistic effect for competitive manufacturing. Okuma adopted the "reorganizer strategy" in order to improve further the flexibility of production (CAD/CAM system linked to the five FMSs), reduce the uncertainty of the delivery lead time through better throughput control (MRP II system linked to the five FMSs), and reduce operating costs (increase production capacities through effective JIT supply chain management and productive maintenance programme). In 1986, Okuma was acknowledged by the American Machinist and Japan Machine Tool Builders' Association to be one of the top three world-class CNC machine tool companies. (The combined cost-driven and market-driven strategy could be considered as the first phase of a world-class company because Okuma could compete on price, quality, delivery performance, product range and superior after-sales service).
- *Technological-driven strategy (the innovator strategy).* In 1989, Okuma invested in a new factory (Kani Plant) and the R&D technology centre in order to maintain competitive advantage (through manufacturing) by the speed of new product development and the speed of introduction. Okuma

was aware that it could not deploy the same manufacturing strategy as in the 1980s for the 1990s. It had to utilize the potential of the engineering and manufacturing functions (technological-driven) to establish a competitive advantage, building on the learning curve effect of its previous manufacturing strategies, ie cost-driven and market-driven strategies. Simultaneously, Okuma focused its improvement on JIT and lean production which is facilitated by the technology-push approach of the five FMSs, greater integration through CIM, resolving work-in-progress and production "bottleneck" areas by OPT, and involving top management in quality decisions through TQM. (Synergy can only be achieved through the amalgamation of several production techniques.)

Okuma's technological-driven strategy aims to outperform the competition in terms of product performance and the quality of service. To attain this goal, the highest standards of design (world-class quality) and manufacturing performance (world-class manufacturing) are pursued to achieve the order-winning criteria of price, product innovation and performance, quality and speed of response to meet the demands of the customers (world-class marketing). Thus, Okuma has further invested in two strategic locations, ie West Germany and Singapore, as its regional technical centres.

8.2.6

Summary

Through its corporate history, Okuma defines itself as a socio-economic institution with responsibilities to other constituencies (customers, workers, suppliers, distributors, competitors, society, and the world at large). Strategies are established to moderate and regulate the single-minded pursuit of profit/market share. Okuma leaders take cognizance of its social responsibility, promulgate ethical policies and adhere to values for long-term win-win relationships. Okuma is a coherent and intelligent entity with a corporate strategy that defines its economic purposes and the standards of competence, capability, excellence and humanity that govern its activities by focusing on profit/market share founded on values.

In moving forward towards excellence, Okuma applies *FIRMS* to achieve world-class performance step-by-step for a sharper focus. (See Figure 8.8).

Total quality customer satisfaction is an integral part of the philosophy of Okuma. It is the single fundamental strategy that holds promise for business growth and survival. It is viewed as a long-term competitive corporate strategy with strong financial benefits. Hence, in the sales of its products and in the provision of service, Okuma people must note the fundamental difference between product and service shown in Table 8-6. It is a least-cost strategy because it requires the right philosophy/attitude on the part of workers. It is a low-differentiation strategy if quality service is not backed up by quality products.

In *human resource management*, Okuma recognises that it is Okuma people who are the driving force behind its world-class performance. It recognises the value of its human resources by investing in comprehensive staff training and development. It is a medium-cost/low-degree of differentiation strategy if workers are not imbued with the true spirit of entrepreneurship (by blurring the distinction between "the individual" and "the enterprise").

Supply chain management is a high-cost/high-differentiation strategy because of the time, energy and efforts expended on cultivating the relationship. Quality components and materials are needed to produce quality Okuma products.

Distributor network management is a medium-cost/high-degree of differentiation strategy. Good products need the right channels for distribution and the right marketing mix for the appropriate industrial market segment.

Okuma people must aim for zero defects in world-class manufacturing and zero defections in world-class marketing (see Table 8-7). This is a low-cost/high-differentiation strategy.

As customers become more sophisticated and more demanding, their needs and expectations will increase. Hence, Okuma cannot remain complacent. Okuma has to go beyond world-class status to respond to and anticipate customers'

FIGURE 8.8

GENERIC FIRMS (FLEXIBLE INTELLIGENT RELATIONSHIP MANAGEMENT STRATEGY)

Relative Degree of Differentiation	High	World-class manufacturing and world-class marketing (Innovator)	Distributor network management (Marketeer)	Supply chain management (Reorganizer)
	Low	Total quality customer satisfaction (Caretaker)	Human resource management (Reorganizer)	Uncompetitive
		Low	Relative Costs	High

Footnote: Okuma chooses to take a progressive step-by-step approach, ie moving from the least cost total quality customer satisfaction (ie *caretaker strategy*) to human research management (ie *reorganizer strategy*) which incurs relative higher cost, to supply chain management (also a *reorganizer strategy*) incurring much higher cost, to distributor network management (ie *marketeer strategy*) which again is relative higher cost; world-class manufacturing -marketing does not really incur much cost because the necessary fundamentals/foundations have been laid.

Source: Adapted from Sweeney, M. T. (1991), "Towards a Unified Theory of Strategic Manufacturing Management", International Journal of Operations and Production Management, Vol. 11, No. 8, pp. 6 - 22.

TABLE 8-6

COMPARISON OF PRODUCTS AND SERVICES

Products	Services
<p>The customer owns an object</p> <p>The goal of producing product is uniformity</p> <p>A product can be put into inventory</p> <p>The customer is an end-user who is not involved in the production process</p> <p>Customers conduct quality control by comparing output to specifications</p> <p>If improperly produced, the product can be pulled off the line or "recalled"</p> <p>The morale of production employees is important</p>	<p>The customer owns a memory; the experience cannot be sold or passed on to a third party</p> <p>The goal of service is uniqueness; each customer and each contact is "special"</p> <p>A service happens in the moment; it cannot be stockpiled</p> <p>The customer is a co-producer who is a partner in creating the service</p> <p>Customers conduct quality control by comparing expectations to experience</p> <p>If improperly performed, apologies and reparations are the only means of recourse</p> <p>The moral of service employees is critical</p>

Source: Author

TABLE 8-7

ZERO DEFECTS AND ZERO DEFECTIONS

Zero Defects is about	Zero defections is about
Technical quality	Customer quality
Precise standards and performance	Transactions that delight the customer
Treating errors as moral sins	Treating errors as opportunities to excel
Minimizing the human element	Capitalizing on the human element
Creating standards and protocols for every aspect of a transaction	Standards for technical quality; empowerment and recovery strategies for customer quality
No surprises, standard operating procedures, rote and drill	Speed, flexibility and ability to respond reliably to unique demands
Production quality	Performance quality
Developing satisfactory and mutually beneficial relationships	Building lasting, creative customer partnerships
Customer satisfaction	Customer retention
Reworking every policy and procedure to perfection, creating an absolutely seamless performance	Experimenting, leapfrogging the competition, taking measured risks, and then learning from them

Source: Compiled by Author

requirements. To sustain the competitive edge, Okuma has to implement lean production (for further cost reduction) and intelligent manufacturing systems (for state-of-the-art technology). It is in the nature of customers to seek higher and greater products and services. It is the nature of Okuma to go beyond world-class status to satisfy them, ie "Challenging perfection based on principle".

Summary sheet for business-to-business marketing mix and analysis of *FIRMS* in Okuma Corporation is in Tables 8-8 and 8-9. SWOT analysis of ASEAN market is in Annex 8.

TABLE 8-8

**BUSINESS-TO-BUSINESS MARKETING MIX OF OKUMA PRODUCTS
IN ASEAN MARKET**

MARKETING MIX	FEATURES	STRENGTHS
PRODUCT	Precision Metal Removal Machines (CNC Lathes, Machining Centers, CNC Grinders, Die Manufacturing Systems)	High quality and reliability Process capability within ± 6 sigma
PLACE	ASEAN (Singapore, Indonesia, Malaysia, Thailand, the Philippines)	Few major Japanese players Growing markets Substitute for shortage of skilled labour
PRICE	Premium price/Value for money	10 to 15 percent higher than all other Japanese competitors
PROMOTION	Through local distributors and regular visits by Okuma's Marketing/Technical specialists to each market	Good marketing and technical support from distributors Marketing and sales focus
PROCESS	Customization and cost reduction through value engineering and continuous improvement techniques	Manufacturing productivity and product innovation; reduce overall cost to offset appreciation of Japanese Yen
PEOPLE	Empower locals to manage the regional markets; Japanese to advise on technical matters and learn about the ASEAN market	Enhance staff morale; motivation to aspire to Top Management posts
PHYSICAL EVIDENCE	Show room facilities, provide applications know-how (perform process study and test-cutting), regional stock depot, stationing of specialists for training of distributors, local engineers, customers	Improve quality of services to gain customers' confidence "COMPLAINT CENTRE" for customers

Source: Author

TABLE 8-9

ANALYSIS OF FIRMS IN OKUMA CORPORATION

Strategy: Loyalty from Customers	Commitment from Workers	Cooperation from Suppliers	Collaboration from Distributors	Respect from Competitors
Capability: Total Quality Customer Satisfaction	Human Resource Management	Supply Chain Management	Distributor Network Management	World-Class Manufacturing/ Marketing
Techniques: <ul style="list-style-type: none"> • Empathy in relationship marketing • Marketing research • Effectiveness and efficiency in producing quality - quality products • Consistent delivery promise • Honest assessment • Financial system 	<ul style="list-style-type: none"> • Development manager • Member of "corporate family" • Lifetime employment • Staff welfare and benefits 	<ul style="list-style-type: none"> • Throughput management • Enabling technologies and standards/integrated information systems • Members of extended family/ management and technological support • Supplier (vendor) rating system • Awards 	<ul style="list-style-type: none"> • Members of extended family • Consultancy service • After-sales service and total productive maintenance • Market intelligence • Market coverage and product availability • Market development and accounts solicitation • Network management and control 	<ul style="list-style-type: none"> • Cost-driven strategy (the caretaker strategy) • Market-driven strategy (the marketeer strategy) • Cost-driven and market-driven strategy (the reorganizer strategy) • Technological-driven strategy (the innovator strategy)

Source: Author

8.3 Case Two: Profile of Yamazaki-Mazak Corporation

Recognised on three continents as the world's leading manufacturer of computer controlled machine tools and manufacturing systems, Mazak has been a pioneer in the development of production technology since it was established in 1919. Today, the company supplies the largest range of CNC lathes, machining centres and production systems world-wide from manufacturing plants in Japan, USA and UK. It has a global network of sales and service centers. (See Table 8-10.) The company has evolved from the Japan-based Yamazaki Machinery Works to the internationalized Yamazaki-Mazak Corporation.

It was only in the 1960s that the company began to do business in the global market, drawing on the strength of its history and tradition which spanned more than half a century. Against the backdrop of the "revolutionary" time when building machine tools using numerical control was just beginning as a result of the coming together of mechanical and electronic engineering, Mazak has grown rapidly on the strength of the company's innovative NC techniques.

The attitude and action adopted by Mazak are imbued with the "Spirit of the future" in the twin areas of technology and marketing. Although Mazak has progressed on the strength of its technological innovations and internationalization, the company also qualifies as a marketing innovator for machine tools. Aggressive investments in marketing activities is characteristic of the investment policy of Mazak. Teruyuki Yamazaki, President of Yamazaki Mazak Corporation, won the NC Marketing Award in 1988.

Teruyuki Yamazaki took part in the running of the company in the last years of his father's life, (founder: Sadakichi Yamazaki) moving to develop the USA market and make other changes based on his clear foresight. At the same time, he pushed the development of NC machines in seeming anticipation of the arrival of the age of factory automation. These seeds sown so early flowered magnificently during the oil crisis recession and enabled the company to build itself a solid position as an internationalized company in sharp contrast to the many other manufacturers which suffered from stagnant demand. The company is managed boldly and yet with tight control. It comes up with a succession of novel, decisive marketing strategies such as the conversion of its own plants to FA systems, local production in the USA and UK, and the construction of the Tokyo Tsukuda Research and Development Center.

8.3.1 Capital Assets and Manufacturing Facilities of Mazak

Mazak's objective is to build machine tools of such precision and quality that

TABLE 8-10 COMPANY PROFILE OF YAMAZAKI MAZAK CORPORATION

Start of business operation	:	March 1919
Overseas Incorporated Companies:	:	<ul style="list-style-type: none"> • USA • Canada • FR Germany • England • France • Belgium • Netherland • Mexico • Singapore • Korea • Taiwan, • Hong Kong • Thailand
Overseas Manufacturing Factories	:	<ul style="list-style-type: none"> • Florence, Kentucky, USA • Worcester, England • Les Ulis, France • Jurong, Singapore
Technical Centers	:	<ul style="list-style-type: none"> • Domestic - 30 locations • Overseas - 34 locations
Research and Development Laboratory	:	<ul style="list-style-type: none"> • Tsukuba, Japan • Jurong, Singapore
Products:	:	<ul style="list-style-type: none"> • CNC Machine Tools • CNC Laser Machines • FMS • CIM • CNC Robots • CNC Punch Presses • CNC Shearing Machines • CNC Press Brakes • Automatic NC Programming Equipment • CAD/CAM Systems • CNC Equipment

Source: Yamazaki Mazak Corporation

products can be machined by tools which are perfectly round or straight even when examined at the submicron level. It controls all the factors inside the plant that can affect accuracy or alter the dimensions of workpieces; temperature, humidity and minute airborne dust particles. Strict control of air, temperature and humidity is essential to building high-quality machine tools.

Mazak's goal is to manufacture the most productive machine tools in the world. It is dedicated to meeting standards of reliability and precision that are second to none in development and manufacturing. There are five production facilities, located in Japan, North America and Europe, manufacturing machines under uniform and exacting conditions.

- *FMF Factory completed at Oguchi Plant (October 1981)*

The first flexible manufacturing factory (FMF) incorporating full-scale unmanned operation systems was completed at the Oguchi Plant within the grounds of the main office. Eighteen large-scale CNC machines were installed to machine 74 different types of machine component parts, both large and small, in monthly output batches ranging from 1 to 100 units. The machining activity continued around the clock with no operators on the third shift. For this reason, the number of tools used was limited to 63 and scheduling as well as tool management was simplified as far as possible.

- *The Yamazaki Mazak Minokamo Plant (May 1983)*

The Yamazaki Mazak Minokamo Plant, an ultra-modern unmanned factory:

- The entire plant is organized around a large-scale computer whose network links it to every corner of the facility. Including terminals, there are more than 250 computers in operation around the clock. CAD/CAM equipment, various large scale FMS lines, the physical distribution system, the receiving system for sub-contractors' supplied parts, and others all operate under comprehensive computer control in this almost "organic" plant
- At Yamazaki-Mazak Minokamo, the key element in the material handling system is the Parts Management Center. Delays in the assembly schedule due to late or missing parts have been virtually eliminated by the thorough

coordination between automatic guided vehicle (AGV) system and the production management computer

The scale of Parts Management Center is enormous, approximately 30,000 kinds of parts are stored on pallets in the system. Rack weight capacity goes up to a maximum of 6 tons. The parts are supplied to the machining lines and assembly plant at the required time by automatic guided vehicles (AGVs) according to computer commands

- Many of Mazak's important component parts are machined with high efficiency in this factory. Among the parts used in machine tools, there are many different types of parts which are required in small quantities and must be machined with high precision. This factory machines about 60,000 of these kinds of parts, with lot sizes ranging between 2 to 50 pieces. About 35,000 machine hours are spent each month in producing these parts

This sophisticated factory is fully operational 24 hours a day, with 25 operators on the first shift, 25 on the second and the third shift is completely unmanned. It is capable of machining a variety of workpieces to high accuracy with high efficiency

- Mazak has applied all its knowledge and expertise accumulated in the development of metal cutting FMSs and production systems to the sheet metal FMS installed at the Minokamo Plant.

This revolutionary FMS is designed specifically to process sheet metal parts. Since it is connected on-line to the CAD/CAM system, it is able to promptly respond to special orders from customers. The system can complete all processes - from design, cutting, bending, welding, painting to assembly, in only five days.

An IBM 4341 host computer oversees the control of the Minokamo Plant. Using an NTT high-speed digital line, it is in turn linked up with the large-scale IBM 4381 central computer of the main office about 20 km (12.5 miles) away.

On the basis of the stream of orders coming from the sales office in Japan and abroad, production schedules are drawn up instantaneously. At the same time, it is ensured that the materials and parts will be exactly where they are needed and that the equipment will perform precisely the machining operations required. Moreover, the computer network includes programmes that put the finished products through a series of in-depth quality controls (which include detailed inspection processes). Application software and design drawings which often differ from similar products so that they will meet the needs of each user, are transferred on-line directly from the CAD/CAM center (IBM 3090) at the main office. There are as many as 73 CAD work stations at the three plants in Japan.

The IBM 4341 is also linked with the computers at the small-parts machining factory and sheetmetal FMS. Altogether, there are 150 computer terminals distributed over the entire shop floor.

The large-scale IBM 4381 host computer at the main office, which is above the IBM 4341 in the chain of command, is linked with Mazak Corporation in Florence, Kentucky, USA through the Intelsat communication satellite and also linked with Yamazaki Mazak Europe, NV in Leuven, Belgium via international telephone lines.

In this way, Mazak's information and communication network, joins its three major production bases in the world (Japan, United States and United Kingdom) on a real-time basis.

8.3.2

Business Management Philosophy

In today's uncertain economic climate, more and more companies are undertaking advanced specialization and broadening their international interests in order to ensure continued economic growth far into the 21st century. This kind of positive thinking for the future has long been an integral part of Mazak's business philosophy. Indeed, it is due to continuous implementation of the most advanced technology that the company has maintained long-term stability, achieved substantial growth, and at the same time, overcome the problems of today's rapidly changing world economy.

Its history in the development and successful marriage of hardware, electronics, and software is testimony to Mazak's commitment to innovation in the machine tool industry. Similarly, its policy of internationalization has been designed with an eye to the future.

By making available to world-wide customers the wealth of expertise and technology gained through the establishment of new plants both in Japan and abroad, it provides the basis on which to build a successful and comprehensive international capability. The combination of Mazak's unique and innovative design and production techniques and the complementary skills of American and European colleagues allow it to significantly contribute to the economic advancement and cultural harmony required to achieve a truly international society. It is through this spirit of mutual cooperation and constant international exchange of ideas that Mazak is able to ensure the continuous distribution of high quality machine tools designed to satisfy customer requirements throughout the world.

Mazak aims to incorporate new ideas to whatever degree necessary so that it can continue to provide innovative products. It will maintain the company's creativity at the highest possible level. Mazak's goal is to properly channel the technology of Mazak to differentiate products by having superior features that will be accepted by customers all over the world and provide proper support by an extensive world-wide network.

Its policy is that it not only sells products produced both in Japan and overseas but that it also promotes the internationalization of the company by the transferring of managerial philosophy as well as technology. In doing so, it can succeed in providing satisfactory products to customers anywhere in the world at any time.

Mazak's motto is "To produce the Number 1 quality machine with the minimum delivery time". In the past, the company had noteworthy successes with its mass production technology for engine lathes and subsequently with innovations in CNC and mechatronic technologies. Today, the company is committed to developing the world's most sophisticated manufacturing systems and to the pursuit of its vision of factory automation. Mazak's list of awards is in Table 8-11.

TABLE 8-11

YAMAZAKI-MAZAK CORPORATION : AWARDS

1978	Japan Society of Mechanical Engineers Award - YMS H-30 Machining System
1979	Industrial Design Award - Micro-Center
1980	10th Automatic Machinery Development Award - Mazaki Bar Work System
1982	12th Automatic Machinery Award - Quick-Turn CNC Lathe
1982	Award for One of the 10 Best New Products of 1981 - Mazatrol T-1 CNC
1983	Ohkouchi Memorial Foundation Award for Production Engineering Achievement - FMF (Flexible Manufacturing Factory)
1985	SME (Society of Manufacturing Engineers) International Award (Presented in Detroit, Michigan)
1988	United Kingdom Metal Working Production Machine Tool Industry Awards (presented by Metalworking Production Magazine) Top awards given to the Quick Turn 10N ATC Mill Center and Multiplex 620
1988	Machine Design Award 1988 (Japan Machine Tool Builders' Association Award)
1988	Japan Society for the Promotion of Machine Industry Prize
1988	The 1988 ME Award for Manufacturing Excellence (USA)
1989	Automatic Machinery Development Award
1989	Japan Leading Business Award

Source: Yamazaki Mazak Corporation

In summary, the management principles of Mazak are:

- Refurbish production facilities
- Meet head-on the challenges of researching and developing the latest technology
- Expand sales network
- Train competent personnel for the future

The company consistently maintains a profit ratio which is above average for the machine tool manufacturing industry. Thus, it has managed to efficiently reinvest such large sums of money. Since it is an unlisted company, it is easy for Yamazaki Mazak to set its own strategy. The aggressive reinvestment in advanced equipment and research and development activities has paid off, and the company is able to increase its profit ratio even more.

Mazak does not have "top management meetings" or "executive directors' meetings". All problems faced by the management and all issues for discussion concerning the corporate strategy are brought up and decided upon at the "directors' meetings". Mazak has an extremely simple top management decision-making mechanism.

At only one of these directors' meeting they completed their debate and came to definite conclusions on a plant and equipment investment plan with a total of US\$138 million. Issues such as those causing concern in management strategy and problems needing solutions frequently pass from one to the other in their daily conversations. The method used to build a consensus at all levels of the company through the medium of routine work has now become standardized procedure. This simple process of top-level decision-making which becomes gradually more and more focused through the company's daily activities appears to be one of the most significant corporate characteristics of Mazak.

Teruyuki Yamazaki is backed up by his two brothers and Vice Presidents Yoshihiko and Tsunehiko. The three brothers form a tight-knitted group - one of the sources of the company's vitality or, perhaps, the major factor behind the successful growth of Yamazaki Mazak Corporation.

The hub of the company's global network of resources, the World Headquarters monitors all aspects of daily international operation. The future direction of all areas - technical, production, sales, and service is decided here.

8.3.3

The ASEAN Market

The users of Mazak products are not limited to major corporations in the top-ranking industrialized nations. For instance, it is possible to come across a brand-new Mazak NC machine installed in a corner of a by-no-means modern machine shop in one of the ASEAN countries. Mazak products also make a vital contribution in the Japanese affiliated automaking plants of the Philippines, in the industrial machinery works in Indonesia and in the agricultural equipment works in Malaysia.

In 1960, the Ministry of International Trade and Industry began conducting export inspections of such machine tools as engine lathes and knee-type milling machines. The inspection standards appeared to be extremely strict to the Japanese machine tool builders. Mazak machines, however, maintained a pass rate of over 90 percent from the very start.

In May 1961, three model LD-800 and LB-1500 lathes were exported to North Sumatra, Indonesia. These were the first Yamazaki lathes to cross the seas to a foreign country. This is the fledgling "international stage" of Mazak.

For the Asian region, a local affiliate has been established in Singapore while distribution networks have been set up through both direct means (involving Japanese personnel stationed in the country) and indirect means (involving the appointment of competent distributors for Yamazaki Mazak product sales) in South Korea, Taiwan, Hong Kong, Thailand, Malaysia and the Philippines.

8.3.3.1 Preparing for the Future in Southeast Asia

The Yamazaki Mazak CIM factory was opened in May 1992, following the start of operation of the Yamazaki Mazak Singapore Techno Centre in December 1991. This is the most advanced factory which incorporates the most sophisticated technology and production equipment available today in order to achieve the highest possible efficiency through automatic and unmanned operation.

The opening of this CIM factory in Singapore integrates four main Mazak's activities:

- Production
- Service
- Sales
- Research and Development

This integration allows the production and supply of parts to all over the world and, at the same time, makes it possible for customers in this region to see the state-of-the-art technology facilities producing parts in the factory. Members of the R&D staff help to solve customers' technical problems and to modernize the production equipment in their factories. Fast shipment of spare parts is ensured by the use of the on-line computer system linking Singapore with Mazak Headquarters. The convenient location of the Yamazaki Mazak Singapore facilities supports customers in Southeast Asia in a comprehensive and timely manner.

8.3.3.2 Features of the Yamazaki Mazak CIM Factory

- The Mazak Advanced Global Network (MAGNET) integrates all areas of operation of the CIM factory - from order entry to shipment plus R&D.
- Ability to produce a large variety of parts in small-size lots:

Parts to be machined:	Machine-tool component parts
Number of units :	4500 per month
Types of units :	600
Average batch size :	7 to 8
- Average lead time:

Minimum :	5 days
Maximum :	10 days
- Extended hours of unmanned operation

1st shift :	manned
2nd shift :	unmanned
3rd shift :	unmanned

- Production control system
 - Centralized production control by computer for the maximum efficiency in the operation of all production equipment

- Singapore CIM Factory
 - Production facility features:
 - FMS
 - H-60 FMS (1 line)
 - This Flexible Manufacturing System consists of 4 H-630 horizontal machining centers. Multiple operations can be performed with minimum time required for workpiece setups. A stocker with 227 pallet strong locations, an automatic tool transportation system and integral washing station enables unmanned operation to perform over extended periods of time.
 - H-500/50 FMS (2 lines)
 - These 2 FMS lines consist of 3 H-500/50 horizontal machining centers each. Both lines are served by a single tool transportation system. Each system has a pallet storage capacity of 117 with a washing station
 - Multiplex FMS (1 line)
 - This line consists of Multiplex models 620 and 630 and completes the entire workpiece processing - from raw material supply to finished part. This line has a storage capacity of 80 pallets. In order to perform unmanned operation, the line is equipped with the following equipment:
 - Automatic tool changer (124 tools)
 - Automatic chuck jaw changer (66 sets of chuck jaws)
 - Automatic gantry robot hand changer (4 sets)
 - Automatic gantry robot hand-gripper changer (6 sets)
 - Pallet ID system

- FMC
 - Multiplex 620 with cycle bar feeder (2 sets)
 - SQT 15 MS with gantry robot (2 sets)
- Other machines and production equipment
 - Grinders (cylindrical, internal, surface and center grinders)
 - Automatic Storage and Retrieval System
 - Main storage : 883 pallets
 - Sub-storage : 24 pallets (907 total)
 - Pallet size : 1100mm square
 - Weight capacity : Max. 1 ton
 - AGV system (2 units)
 - Can carry up to several pallets
 - 22 pick-up/delivery stations
 - Central chip conveyor
 - Centralized machined-chip disposal system running the length of the factory
- R&D Centre
- New Technology Development
 - Artificial Intelligence
 - Sensors
- New Machine Development
 - Next generation Factory
 - Automation equipment
- Production Engineering Applications
 - CIM/FMS Customized engineering
 - Automation equipment

- Close and Fast Customer Service and Support System
- Faster Response
- Supported by professional service staff
 - Consultation by professional engineering staff
 - Faster response by service engineers to quickly repair machine problem
 - Machine installation, operation verification and operator training
 - Service region covers Singapore, Indonesia, India, Malaysia, Pakistan, Thailand, and the Philippines
- The latest Mazak machine tools are on display in the showroom to demonstrate their advanced technology
 - CNC Turning Centers: SQT-15MS with gantry robot
Multiplex 620 with gantry robot
 - Vertical Machining Centers: VTC-41
V-515
 - Horizontal Machining Centers: H-400N
 - Laser Cutting Machine: Super Turbo X48
- In addition to providing a convenient area for machine demonstrations, the showroom is used for technical discussions with customers regarding subject such as: machining techniques, CAD/CAM software, FMS applications, and others

- Instruction classes held on regular basis
 - NC programming training using simulators
 - Machine operation instruction classroom
 - Maintenance instruction
- Faster delivery of spare parts
- Mazak Global Parts Network
 - On-line with company headquarters in Japan for the fastest possible supply of spare parts
- Singapore Parts Center
 - Extensive storage capacity
 - Vertical stocker
 - Floor space 110m
 - Capacity 450,000 parts of 8,000 different kinds

8.3.4

Analysis of *FIRMS* in Yamazaki Mazak Corporation

• *FIRMS* : Goal 1

Goal 1 is *loyalty from customers* (differential advantage through value added). Its capability is total quality customer satisfaction.

Techniques

- *Continued re-education of sales engineers.* Technological innovation surges forward in a virtually unstoppable wave. The new Mazak line-up developed over the course of a single year has typically numbered thirty hardware and software products in each of the recent years. The painstaking efforts made in the past to ensure that all will go smoothly in R&D activities and on the production floor have all been directed to achieving a line-up of this scope.

The sales engineers who take up the "new techniques" and "new products" which the company brings out year after year to introduce them to the market cannot afford to neglect their studies even for a moment. They must have an excellent grasp of the concepts behind innovative products and also

understand the technical details involved. Customers often find it hard to understand the meaning behind the steady stream of newly announced techniques and products, and they often wonder how best they may be selected and introduced.

Yet the truth of the matter is that sales engineers are so preoccupied with their daily marketing efforts that they cannot usually know everything about the latest technology right down to the last detail. In recognition of this, Mazak's top management ordered at the beginning of 1987 that the group's sales engineers throughout the world undergo further education and training which would enable them to keep abreast of the innovations from the research, development and production departments.

In that year alone, over 800 sales engineers (more than half of whom came from overseas) had visited the Oguchi and Minokamo plants. There are two courses: the two-week sales engineer course and the six-week service engineer course. Both courses are intense, with the mornings spent in the classroom and the afternoons on the production floor for hands-on training.

Most of the trainees are employees of companies in the Mazak Group but some are sales engineers of leading distributors that have been active in markets throughout the world as "Mazak-distributors".

The trainees applied themselves to observing how the technologies actually work in practice, and to being trained in these technologies in order to satisfy the specific needs of the individual market which the trainees represented. They went back bearing certificates verifying that they had completed their training, and upon their return they assumed the role of instructor for their colleagues and customers.

The total cost incurred by these programmes, including airfare accommodations, meals and personnel costs, in conducting the seminars and on-site training had exceeded US\$6.9 million. This is no small investment in human resources.

- *International service network provides fast responses to world-wide customer requests.* Hundreds of thousands of spare parts are managed by an on-line computer system connecting the main plant with the US and European subsidiary companies. The minimum inventory point for every part is stored in memory, so that when that level is reached, additional parts are automatically reordered to assure timely delivery of spare parts to customers all over the world. Spare part orders constantly coming in from all over the world by high-speed facsimile are responded to immediately so that customers may receive their parts order as soon as possible.

Parts are supplied to European customers through Yamazaki Machinery Europe N.V. and our other companies and technical centers located in West Germany, Great Britain, France, and Italy.

Parts are delivered to customers in Japan through the 34 technical centers throughout the country. The technical centers maintain a proper inventory of parts required on a daily basis.

Customers in the USA, Canada, Mexico and South America are promptly supplied with parts through Mazak Corporation's Technical Centers and service Centers throughout the Americas. If the stock at any of these centers falls below the minimum requirement, an order is automatically placed with the World Headquarters by computer. See Table 8-12.

- *Providing technical services to customers.* Working in close cooperation with many distributors, Mazak Technical Centers throughout the world can provide prompt, detailed responses to customers' requests.

In each of these technical centers, staff offers complete consultation services including machining demonstrations, time studies and test cuts of customers' workpieces. They put themselves in the customers' shoes whether explaining technical details or giving advice about equipment economic investment strategies.

In addition, a full range of after-sales service is provided on a local basis

TABLE 8-12 YAMAZAKI MAZAK GROUP

Yamazaki Mazak Europe N.V.

In 1975, Yamazaki Mazak Europe N.V. was established in Leuven, Belgium as the European sales and service facilities. Yamazaki Mazak Europe provides sales and service activities as well as the installation of peripheral FA equipment to customers.

Yamazaki Mazak GmbH

Yamazaki Mazak GmbH, established in Goppingen in 1982, provides sales and service for customers located in F.R. Germany, Austria and Switzerland. A technical center is located in Dusseldorf and Frankfurt. In 1987, the German headquarters in Goppingen was more than doubled in size so that German equipment can be mounted on Mazak machines.

Yamazaki Machinery U.K. Ltd

A service company was established in France in 1986. Using this company as a base, it established Yamazaki Mazak France S.A. in 1989 in order to carry out regionally oriented sales. Currently, it has technical centers at the headquarters and at Lyon, and opened a training school for customers which gives an introduction to machining technology and programming instruction.

Yamazaki Mazak Italia S.R.L

Yamazaki Mazak Italia S.R.L. was established in Milan in 1989 as a sales and service base. It carries out sales and service activities on a regional basis all over Italy, with the main base in the triangle formed by Milan, Genoa and Turin, the industrial heart of Italy, with branches in Florence and Bologna.

The Mazak Akasaka Technoplaza is located in Ark Hills Building

Mazak established its Tokyo branch in September 1989 and this branch now serves both as a new business center for "Eastern Japan" and as a national center for sales of FMS and CIM systems.

The Technoplaza serves to give customers a deeper understanding of FMS and CIM and to provide presentations of the optimum systems for meeting customers' requirements. It offers a comprehensive consulting service at the Technoplaza, including computer simulations to select the system which best suits the customer's needs, preparation of a system quotation, software for order processing and production management, introduction of a CIM system which is based on an FMS and integrates business and accounting information with production management, and economic justification for such a system investment.

Seminars on a variety of subjects conducted by specialists in many fields are also held at the Technoplaza.

Source: Yamazaki-Mazak Corporation

by the technical centers; programming instruction, operator training, machine installation, service and maintenance.

- *Close customer contacts.* Mazak's belief is that the machine tool builder who works closely with customers is the most familiar with their requirements, requests and problems encountered with CNC machine tools. As a result, investing an enormous amount of time and money in research and development, it developed the MAZATROL CNC system (first introduced in 1981) which incorporates extensive machining expertise in software. On a continuous basis, it collects and analyzes customers' requests and suggestions - optimize the conclusion which is later incorporated into the MAZATROL operating software. The goal is to make both machine programming and operation as fast and as simple as possible for the end-user.

The current trend for factory management is leading more and more to CIM (Computer Integrated Manufacturing) - which integrates the main computer used by a company for overall control with the CAD/CAM system, sales/marketing information, delivery information and all computers used in the factory. It is obvious that for such systems, a machine tool's CNC system will be one of the network components for communications. It will work together with customers to achieve this systematic approach to manufacturing.

- *CAD/CAM centre from concept to finished product in minimum time.* As the machining requirements of customers continue to diversify at an increasing pace, so do the specifications of machines, robots, factory automation equipment that are purchased, resulting in many special orders. Also the technology incorporated in machine tools continues to advance at an accelerated pace. In order to respond to these special requests and utilize the most advanced technology as quickly as possible, a CAD/CAM system is used for parts design.

This system can start with a design engineer's concept and provide a detailed part drawing and during the process, check part design for accuracy. Special orders which in the past typically required months, can now be designed in a fraction of the time.

To ensure machines are completed according to schedule, the comprehensive production system combines the CAD system, CAM system and computerized FMSs to minimize the total cycle time.

In their final inspection before shipment, each machine has laser measurements made of positioning accuracy. The indexing accuracy of machining center rotary tables and mill-center C-axis are checked with precision measurement instruments with a resolution of ± 1 second. Comprehensive monitoring ensures that all machines satisfy the strict Mazak high accuracy standards. Before being delivered to customers, all machines must also pass a test of a minimum of 48 hours of continuous operation.

Even though Mazak utilizes automation and unmanned operation to unprecedented levels, the spirit of craftsmanship lives on, as evidenced in the assembly, adjustment, and inspection processes. Here, expert technicians turn out individual machines with the utmost care, building the finest machine tools in the world.

• **FIRMS: Goal 2**

Goal 2 is *commitment from workers* (competitive workforce). Its capability is human resource management.

When Mazak resumed the production of engine lathes after the war, it only had about 100 workers and the annual sales were only about US\$0.6 million. Total workforce both at home and abroad reached 3,200, and its annual sales topped the US\$780 million mark as of Spring 1989.

Mazak is not trying to create a false image of quality through the deployment of high technology systems. Its aim is not only to be the proud possessor of large production facilities in the world but also to foster loyalty by becoming the world's best in quality. In order that the company may join the legendary machine tool master that Teruyuki Yamazaki envisaged, the kind of corporate atmosphere and environment which will generate respect for people is being created.

Techniques

- *Recruitment and training policy.* One aspect during this time of accumulating technological treasures that should not be overlooked is the company's development of its human assets. The company never failed to devote a great deal of its administrative effort toward training its personnel.

In 1960 and 1961, when the company had resumed the production of machine tools, the technical expertise of the employees represented the main asset. The on-the-floor technical proficiency of the employees was beyond reproach but there was a lack of innovation and logic.

Teruyuki Yamazaki set about infusing the company with new blood. In 1961, the company began recruiting college graduates particularly from engineering faculties. In 1962, it stopped employing anyone who had less than a technical high school diploma. It was not until after 1965 that these recruiting standards became wide-spread in the industry. Since 1959, when the company began regularly employing new graduates, there was no break in the continuity of this company policy no matter how serious the economic conditions.

It was through this recruiting policy that competent young people were welcome to join the ranks of the company. Furthermore, in deciding where personnel should be placed, personal ability was respected above seniority, and sincerity above academic achievement. This had the effect of creating a renewed vigour on the production floor and of rapidly changing the technological development activities of the company toward greater efficiency and innovation.

In order to obtain competent personnel, the company was totally open to accepting people with the right qualifications at any time. Today, top managers are divided almost equally between those who joined the company at the beginning of their working career and those who joined with experience acquired at other companies. Unlike what is often expected in Japan, both groups interact naturally without being aware of this difference in their backgrounds.

- *Communications.* Human relations in the "Mazak family" do not in any way become looser as the company continues to expand. Both vertical (junior/senior) and lateral (same rank, different sections) communications is excellent.

A labour association was formed in 1961, but there has never once been a labour dispute in the history of the company. Both labour and management have always respected the value of discussion and both sides have been able to move ahead in the spirit of cooperation. It continues to maintain harmonious relations between management and labour and never allows confrontation to disrupt this harmony. This good custom and tradition should be carried on. Considering that Japan has no natural resources, Japanese industry cannot afford to have labour disputes if it is to weather the storms of the world economy. This is so because Mazak's greatest strength lies in good labour-management relations and in competent personnel.

- *Corporate identity programme.* In 1985, there was an extensive corporate identity (CI) programme to remake the company's image, Yamazaki Machinery Works was given the new name of Yamazaki Mazak.

The CI campaign was not concerned merely with the creation of a new image. In fact, it was a fresh start for the company, which took on the challenge of creating a new corporate philosophy and policies. Everybody in the company was united behind this endeavour. Prior to the campaign, a survey covering all employees was conducted to discover how they felt about the company.

Over twenty questions were asked including "What is there to be proud of in our work?" and "What exactly is the corporate culture that we want to create?". The survey results were thoroughly analyzed by specialists, and the CI staff members who had been selected from each department discussed the findings at great length. In this way, a new "course of action" was written for the 21st century. The management philosophy and guidelines for action which the company finally came up with for this major campaign were given below:

- * Yamazaki Mazak provides society with advanced manufacturing systems for a wide selection of production floors
- * The highest quality leads to the maximum cost reduction. This is the conviction behind the manufacture of Mazak products
- * The company earnestly desires to take full advantage of its global production and servicing facilities in order to contribute to the development of the world's "industrial culture".
- * Yamazaki Mazak aims to open new frontiers of industrial development with thoroughgoing preparation and a spirit of bold challenge
- * The company's interest in the welfare of all Mazak employees and their purpose in life are in perfect harmony with its goal to contribute to the ultimate prosperity of mankind.
- *Guidelines for action to be followed by Mazak employees*
 - * Be creative and original, and be bold in approaching the unfamiliar
 - * Take pride in respecting the trust of customers with the best quality products in the world
 - * Be ahead of the times with sophisticated technology and systems development
 - * Be an excellent marketer by being intimately familiar with customer requirements
 - * Issue requests, relay information and make reports as accurately, quickly and clearly as possible
 - * Keep coming up with new ideas and always try to solve problems by putting yourself in the other person's shoes

- * Always take an active interest in disseminating information from sources both inside and outside the company
- * Keep studying and make other efforts to enhance and expand your own abilities

All Yamazaki Mazak employees were decked out in their brand new uniforms which incorporate the orange Mazak colour. The colour orange represents warmth in psychological terms, symbolizes an abundance of human qualities, and it expresses the passion of Mazak employees who are dedicated to the pursuit of the kind of technology that yields the highest degrees of accuracy.

The corporate symbol was also changed (see Figure 8.9).

The "Y" designed as part of the "M" signifies the evolution from Yamazaki Machinery Works into the globally active MAZAK. The three lines which make up the "Y" represent high quality, progressiveness and global orientation, and these are the very core of Yamazaki Mazak's unchanging corporate philosophy.

One middle manager in the engineering department spoke about his dreams and hopes as follows: "The 'passion' that we feel swelling up inside us when we unite gives us tremendous energy. So long as we continue to look to the total elimination of any complaints from our customers and produce machines with the highest priority given to market needs, everything will go well for our future. After this, all we have to do is mix human skills with high technology and come up with technology which is truly flexible and fluid."

This kind of goal-oriented attitude and pride are deeply embedded in the young employees of the company, who will carry the company torch into the next generation, and they serve to further inspire them onward.

- *Total quality control.* In November 1985, the total quality control was initiated on a company-wide basis. The following slogan was adopted:

FIGURE 8.9

YAMAZAKI MAZAK'S CORPORATE SYMBOL

Source; Yamazaki Mazak Corporation

"Let's make products with the highest accuracy and reliability in the world."

This is based on the following:

- Quality is more important than any other consideration
- High reliability is the best salesman and service engineer
- Every effort made to increase quality is the fastest and shortest way to decrease costs

It was then that all of the approximately 2,200 employees of the Mazak Group enthusiastically pledged their every effort to return to the basics of machine tool building.

Within a short space of time, over 200 quality control circles were formed on the shop floor of the seven Mazak factories. Not only the production side of plants in Japan and overseas but also engineering, marketing, administration and seven other divisions were included in the TQC promotion. The TQC activities thus got off the ground in a grand way so that the whole company was involved. The company was promoting TQC with the focus firmly on revolutionizing the awareness of each employee so that every detail, rather than the overview, is considered and that the personnel on each shop floor will be putting "soul" into what they are making.

Educational activities (including seminars) were repeatedly staged both inside and outside the company as a way of enlivening the circle activities for quality control, process control and engineering management. The number of improvement suggestions made on each shop floor kept on increasing every day.

In 1987, the number of these suggestions amounted to about 1,200 for the year, as compared with 2,200 for 1988. The cumulative total of the number of ideas which were actually adopted on-site for work improvements and which contributed to enhancing quality and reducing costs in some way came to over 600. The "President's Prize" (worth \$1,560 plus a supplementary prize) was awarded for the most outstanding suggestion. Also awarded were First through Fifth Prizes as well as the Endeavour Prize and Incentive Prize, and commendation ceremonies were staged at the semi-annual General Meeting for Announcing the Prize Winners.

The Yamazaki Mazak Total Quality Control (TQC) system involves the entire company and is founded on the policy "Quality Comes First". One part out of the thousands of mechanical and electronic parts that make up a machine tool can influence the total quality of a machine. Each part, whether made in-house or purchased, has its specifications finalized after involving design, manufacturing, production, assembly and purchasing departments in the decision process. At Mazak, quality is everyone's job - it is not just a matter of conventional quality control or inspection. The TQC system's goal is for every employee to realise that everyone in every department has an impact on product quality, and to continuously develop, both pragmatically and subjectively, in order to improve the quality of each job performed.

• **FIRMS: Goal 3**

Goal 3 is *cooperation from suppliers* (value added partnership). Its capability is supply chain management.

In 1987, Yishihiko Yamazaki ordered the building of a flexible foundry system (FFS) capable of producing single casting within the coming year. The company held repeated meetings with Akira Miwa, President of Izumi Foundry Company Limited, which is affiliated with Yamazaki Mazak and supplies Yamazaki with Meehanite castings. It began to study and research flexible foundry systems - something that Mr Miwa had never even heard of before - so that such a system could be developed in the future.

There are about 3,500 different Meehanite castings that Yamazaki Mazak needs. To make matters more complicated, the average lot size is only four or five pieces. The task at hand was to automate the production facilities for many different parts, each in small quantities, and to do this with great flexibility so that a system almost resembling a CIM system would eventually be built. This proved not to be an easy task. Nevertheless, it was a task that had to be carried out at all costs as far as the Miwa family, who had enjoyed a close relationship with the Yamazaki family, was concerned. Indeed, it was because of a request from Yamazaki Mazak that the Izumi Foundry began the full-scale production (through a technical tie-up) of Meehanite casting in 1970.

The personnel in charge of the research project at the Izumi Foundry tried as hard as possible to approach the question of how they could build an FFS and they looked at the matter from an many different angles as possible. They drew a blank every way they turned. But Mazak would not budge. He told them that he did not care how much it would cost in terms of R&D or equipment so long as they build a flexible foundry system.

As they continued to press on, Mazak research staff came across some information that there was a company in West Germany that was manufacturing and selling original automatic moulding and casting machines. Company President Miwa and the company's executives in charge of technology flew there immediately.

Once they had been given a briefing of the automatic foundry systems, their many years of experience in the business told them that it would be possible to automate moulding and casting operations with this system. This was the first real breakthrough along the way to solving the many difficult questions posed by their task.

In July 1988, the Izumi Foundry installed an automatic moulding and casting machine in a 9,000 meter squared (96,900 square feet) clean foundry built specially for this purpose. At the same time, all efforts were concentrated toward building a system for the processes coming before and after moulding and casting, which is the most crucial factor in flexible automation. Needless to say, the CIM techniques which now had a proven record at other factories of Mazak were fully incorporated into this totally unmanned system technology.

The Izumi Foundry had for some time been devoting a large part of its resources to research and development investments with a view to enhancing the quality of its products. Some time ago, it installed a combustion type oxygen and nitrogen analyzer, a vacuum quanto recorder and a whole line of other high-performance testing equipment in its laboratories. This represents the minimum responsibility it has as a supplier of major materials, more specifically, casting, to Yamazaki Mazak.

• **FIRMS: Goal 4**

Goal 4 is *collaboration from distributor* (value added partnership). Its capability is network management.

In 1992, Mazak first began opening up offshore markets. It all started when a US distributor specializing in machine tools expressed an interest in the Mazak lathes.

Mazak's first business transaction with an overseas buyer was not smooth sailing by any means. However, it was an invaluable experience in that it turned the company eyes to view overseas markets as part of its future business, and it led the company to acquire the ability to meet requirements for selling on a global scale.

First of all, a long-term perspective was absolutely essential. The first task that the company took on in preparing to lay the foundations for supplying exports markets in the future was to set up local sales companies. In July 1968, Yamazaki Machinery Corporation (YMC) was established in Long Island, New York. This was the first step that Yamazaki Mazak took toward internationalization.

Since that time, the company has never failed to participate in major machine tool shows held in the USA nor to make a concerted effort to promote Yamazaki Mazak. During the same time, the company felt an urgent need to establish marketing channels (a network of distributors) in the US and it spent a great deal of time in putting together a basic sales organization.

- *Mazak Club*. In 1966, measures to sharpen the company's marketing edge were in urgent need. A distributors' organization, the "Mazak Club" was formed in each of Japan's major markets. New products were also developed at an impressive speed. The Mazak Ace (5-foot) and the heavy-duty Mazak Rex (12-foot) lathes joined the product line-up in March and August, respectively, of the same year. The company now had an impressive line-up of 25 Mazak lathes, both large and small, ranging from 5 to 42 feed in bed length, to offer to the market.

- *Mazak International Machine Tool Association.* In the Spring of 1979, the Mazak International Machine Tool Association (MIMTA) was established. This association is centered on the end-users of Mazak products. It consists of distributors who exclusively market the company's products in each country, production engineers and academic experts. It is therefore an international organization for all Mazak users and distributors.

Its objectives are to attain a state of co-existence and co-prosperity for all members of the "Mazak family" and to form a global community which shares the same interests. Its headquarters is found within Mazak's main office in Japan. It has seven regional offices according to the different market areas, each has a number of branches under their umbrella. As of the end of 1988, the association had 18,000 members. It issues a bi-monthly "Mazak News," and it provides forums for technological and managerial training as well as for friendly exchanges.

For instance, from the middle to the end of March 1988, a MIMTA tour visited Japan from Europe. The tour was divided into three groups of 65 English-speaking members, 89 French-speaking members and 89 German-speaking members. Each tour had a packed eight-day schedule. Among the major events were:

- an inspection of Oguchi and Minokamo plants
- a demonstration and training of new product technology
- a visit to Japan's autoparts manufacturer

It increased trust in Mazak products and made the bonds between Yamazaki Mazak and its end-users even stronger. MIMTA tours have been repeatedly undertaken from Japan to Europe and the USA, and from the USA to Japan.

The slogan which featured in the welcoming address given by Mazak is "Together-Success". Its meaning encompasses the wish that:

- manufacturer and distributors
- distributors and customers
- managers and employees

All work together, enjoy what they do together, keep on growing together and achieve success together

• **FIRMS: Goal 5**

Goal 5 is *respect from competitors* (industry/market leader working on the principle of competitive cooperation). Its capability is world-class manufacturing and world-class marketing.

The ups and downs in the demand for machine tools which accompanied changes in the business climate were intense. If a company depends on the domestic market alone, it would be at the complete mercy of the business climate at home. Those at the helm of Yamazaki Mazak were firmly convinced that they had to develop export markets even if it took time to do so and even though demand was extremely high on the domestic scene at the time.

It was a time when the idea of diversifying management was popular in Japan's industries. This involved the strategy of developing side-lines in which the fluctuations (cyclic curves) in business would be different and stabilize management as far as possible. However, Teruyuki Yamazaki was interested solely in building machine tools. Furthermore, he believed that there were limits to the management resources as defined by personnel, equipment and funds, and that no attempt should be made to dilute their concentration. This conviction was definitely at the basis of the corporate decision to stick to machine tool building.

The policy selected in the interest of stable management was not to develop side-lines nor diversify the activities of the corporation, but rather to take the initiative in diversifying the markets (demand) for machine tools on a global basis. At the time, those responsible for sales in the home market were imploring the company to divert to the domestic market any machines that the company could afford to produce for export. But they were talked out of their requests by patient persuasion which was based on the company's long-term perspective. Those middle managers who had tasted the bitterness of the recession in 1965 were in full support of the policy of the top management, which was that, no matter how active the domestic demand, efforts would be made to secure a stable positioning export markets.

These factors help to give a picture of where the basis of the company's strategy for the global market lies. The strategy consists of two basic policies:

The first policy is premised on the experience that the demand for machine tools fluctuates drastically depending on the plant and equipment investments by the private sector and on whether the economy is in a boom or recession. Consequently, any company dependent on the demand for machine tools tends to lack stability in its performance and, as a result, repeats the patterns of plowing back during a recession all the profits that it gained during an expanding economy.

On the other hand, prior investments based on a long-term perspective are indispensable for machine tool building. A minimum of ten years is required to build up a staff of competent personnel in appropriate positions, and large amounts of funds must be expended on R&D as well as on plant and equipment investments, with the payoff projected in five to ten years ahead. What he finally came up with was a plan for internationalization, which would envisage a secure demand for the company's products through the development of markets all over the world.

The second policy involved the belief that nothing is accomplished by reliance on others alone. This belief was applied to the company strategy to diversify its markets both at home and abroad.

Many machine tool builders who were endeavouring to promote exports went through Japanese trading companies and distributors in countries where they sold their products, and they depended on these other companies for their exports. They did this for two reasons; first, they did not have sufficient human resources to develop overseas markets on their own; second, they were hedging their risks by having their foreign trade activities conducted by other companies.

Making inroads into the international marketplace through one's own efforts alone demanded more than most had to give. Needless to say, Yamazaki Mazak did not have the human resources for overseas marketing, either. Consequently, the top management visited export markets for first-hand impressions (of the

market requirements). The company considered this to be of the utmost importance.

The unending effort did, however, pay off eventually. Among the events which occurred when the company had just started its export drive on its own, the following accomplishments are of particular interest:

- The company was able to promote the sales of its products in overseas markets at a faster pace
- It was able to pinpoint the needs of the local markets without overlooking details
- It was able to train its employees at home to become more internationally minded
- It was able to secure a stable demand for its products which enabled it to incorporate long-term vision in its managerial policy

When a time of unforeseeable difficulties such as sudden changes in the exchange rates or international trade friction comes, these achievements are transformed into a more evolved form of internationally oriented policy (such as the establishment of local production bases).

If technological innovation is one wheel of a cart, then innovation in marketing is the other wheel. When these two wheels were synchronized and began rotating at full speed, the dynamism of the company was increased many times over and the company took on successive new challenges.

It is not necessarily the universal approach to try to assess a manufacturer from its marketing activities, because the vast majority of such companies stress technology or production over everything else. Yamazaki Mazak, however, is different. When the history of the company is reviewed and the factors which contributed to its phenomenal growth are analyzed, no other element stands out as so characteristic of the company as its unequalled marketing power.

Teruyuki Yamazaki said the following words in connection with marketing. "The greatest secret in promoting marketing activities efficiently is to get a grasp of exactly what the market requires and to develop and offer to the market those products which will sell even when there is a recession. The kind of sales promotion tactics which simply boost the morale of the sales personnel and stir up their desire to beat the competition to win a larger share of the market no longer work. We also once had the mistaken notion that machines which sold in Japan would be welcome in the USA and those that sold well in the USA would be well supported by the European and other world markets. Those were the days when our understanding of differences in the markets and the consequent need to differentiate our products accordingly was still half-baked".

At the root of the company's marketing activities lies this kind of basic attitude on the part of the top management that gives the greatest priority to product development strategy, and this attitude has permeated every nook and cranny of the company. The proper timing and speed of product development are two points which are particularly emphasized. Up-to-date technological information (obtained by the technological and development departments) and market information (obtained by the sales department) are put together to support and supplement each other in a variety of ways on a daily basis.

The first concept often comes from a sales person. For example, a sales person mentions that a certain user had a particular problem which he discussed with him, hoping to find a solution. This kind of request from the front-line of the market is quickly responded to, and solutions are seriously sought. As the company absorbs and assimilates the needs of the market, this necessarily pushes the company further into creating greater diversity in its product lines.

Yamazaki Mazak had already graduated from learning all there was from standard mass production systems when engine lathes were in their heyday. Today, the company is primarily concerned with building original systems. Over 80 percent of Mazak products are either made to the special specifications of individual users or they are unmanned operations systems of various levels. In other words, most of the products turned out in the unmanned plants where people are rarely seen are similar to "a la carte" selections on a menu.

To produce a series of products, each of which is like an "a la carte" menu selection, means great complications on the technical front and greater difficulty in actually selling them. From the standpoint of those in charge of production, it is definitely more efficient to produce set quantities of standard machines. Despite this, however, Mazak advocates the necessity for having a mixture of products for the maximum competitive advantage.

The most salient aspect of Mazak's marketing strategy must be the bold and aggressive actions which the company has taken as it took up the challenge of evolving into a truly international company.

In January 1989, "Metalworking Engineering & Marketing Magazine" (from News Digest Publishing Co Ltd.), the highly respected trade journal of FA industry, presented Yamazaki Mazak with the 1988 ND Marketing Award. Listed below are the main criteria which determined the reasons why the members of the screening committee (composed of top industry executives and academics) chose the company:

- The company made inroads into the US and European markets at an early date as if it had foreseen the international business environment which would prevail today. It was also quick to go ahead with production overseas. Top marks are given for the foresight behind these actions
- Ever since it started exporting to the USA around 1955, it has bridged the technological gap, and through its unflagging efforts, has evolved into one of the world's leading machine tool builders. It has a management which is extremely persevering
- The company has obviously gone beyond merely setting up production bases overseas to harmonize with the host countries and actively transfer technology to them. This proves that the company is a genuinely international corporation
- It has brought into being a large-scale computer-integrated manufacturing operation in its own plants including those located offshore. By so doing, the company provided a tangible means by which users can ascertain the efforts of factory automation. High marks were awarded for this achievement

This is confirmation that the company's unequalled marketing power and its business management have gained extensive recognition and that ever-increasing confidence and high hopes have been pinned on the company.

Hence, respect from competitors is won through the outstanding manufacturing-marketing characteristics of Mazak.

The first characteristic was the positive approach taken toward internationalization by the company. The company began its overseas operations in 1968 when it established Yamazaki Machinery Corporation (YMC) in New York (currently Mazak Corporation in Kentucky). In later years, it expanded its operation and now holds bases in seven countries; West Germany, Belgium, the United Kingdom, Mexico, France, and Canada, as well as the USA. It has a total of twenty technical service centers overseas alone. There are two production plants: one in the USA and one in the United Kingdom.

The UK machine tool production plant has created a stir of interest for being one of the world's most advanced CIM (computer integrated manufacturing) factories and has made a particularly strong impact in the UK and the rest of Western Europe. This is the first time a Japanese machine tool builder has committed to integrated production in Europe of everything from the basic materials to the finished product (Hornell, 1992).

President Yamazaki's idea of internationalization is "not just to transfer production overseas, but to transfer accumulated technology and to exchange and transfer business skills so as to achieve harmonization with other countries and build a mutually profitable industrial community".

Including the personnel of the technical centers, Yamazaki has some 3,000 employees overseas, of which about one-third are locally employed. The magnitude of scale and progress in converting to local operations reflect how truly internationalized the company has become.

The second characteristic is the extreme aggressiveness the company is taking up FA investment, in other words, the bold way it is seeking to slash costs.

President Yamazaki says, "It is the manufacturers of machine tools, who provide the means for rationalization of production, that should serve as the models for rationalization. Production facilities must always be the latest systems available so as to cut cost one must not begrudge the investment". This shows up in the way the company incorporates innovations in its equipment.

The Oguchi Plant is now completely controlled in temperature and humidity and made into a single "clean room". It has been raised in level as an FA plant and has become a base for production of high quality machine tools.

The Minokamo Corp. also caused exclamations of surprise in the industry upon its completion. Not only did it achieve complete unmanned operation from the loading of materials to the machining, but it was also fully automated in the physical distribution and transportation systems among the materials stations, FMS machining lines, plate painting factory, and assembly lines. Nestled in a green environment, this supermodern factory is constantly visited by eager learners.

The company's base for vertical MCs, Yamazaki Mazak Seiko Corp., is another outstanding factory and is comprised of advanced machining modules.

The American and European factories are also equipped with the latest systems. They are at the forefront of the wave of advanced automated production facilities of their regions. Their mission is to provide models for factory automation. They will continue to take up the challenge of automation of equipment.

The third characteristic is the steady promotion of higher grade and quality in product technology at the same time as the pursuit of mass production and mass sales. A good example of this is the speed by which the company introduces new, advanced technology.

Yamazaki Mazak released Japan's first four-axis control CNC lathe in 1970. In the following year, 1971, it developed an adaptive control lathe able to serve as the basis for unmanned technology. The YMS-30 machining system,

which brought the revolutionary new flexible machining technology into world, was released at the 8th Japan International Machine Tool Fair, held in 1976 in Tokyo.

The company has also made great strides in the development of CNC systems. It came out with the world's first interactive CNC system in 1981, CNC system with a CAD/CAM function and a colour CRT in 1982, interactive simultaneous four-axis control CNC system in 1983, and the world's first, new generation CNC system using a first 32-bit microprocessor in 1987.

The company's slant towards technical development can be seen in the "Tokyo Tsukuda R&D Center" which has been called the center for future technical development, constructed on the site of the Tsukuda Science Expo. This Center goes beyond the realm of single company laboratories and engages in joint research with outside organizations and comprehensive research into manufacturing technology through exchanges with different industries.

The fourth characteristic is the inherent strengths of the company, which derives from the toughness and drive of the management staff, led by President Teruyuki Yamazaki, the polished marketing sense which pervades the company and the energetic activity.

• *Research and Development*

- * Mazak Giken Kogyo Co. Ltd. In 1967, an unusual measure was taken for the company's technical development department, The development, design and trial manufacture departments of the company were separated and made into an independent company, Mazak Giken Kogyo Co. Ltd. An "exclusivity contract" stipulating that new product drawings and prototypes created by this separate entity would be purchased by the parent company was signed, and the foundation for a faster and more efficient system of research and development was laid.

By the spring of 1985, the company had completed six jig boring machines capable of ultra-precision machining at the submicron level and had installed them in the major machining areas. Many years of experience

in designing and developing their own special-purpose machines generated a deep-seated confidence among the engineers and technicians in the company.

What was unique about Mazak Giken Kogyo was the fact that production of the revolutionary NC machines it had developed was entrusted to Yamazaki Machinery Works, its parent company. The completed products were then bought by Mazak Giken Kogyo, which then took care of the marketing and servicing. In this way, Mazak Giken Kogyo was a "research and development company" which had not only R&D responsibilities but marketing functions as well.

One of its objectives was to establish a format to develop products which would be highly marketable. Another was to explore the economic feasibility of developing products which were difficult to justify. Product development which does not take user needs into consideration, or technology development which fails to take cost aspects into account are nothing more than entertainment for engineers. This kind of development was the pitfall that machine tool builders had to avoid above all else, since the revolution in technology known in Japan as "mechatronics" was gathering speed. The top management of Yamazaki Machinery Works formed an original task force with clearly defined duties to erect a springboard from which the company could jump into the NC age.

* Tokyo Tsukuba Research and Development Centre. In its efforts to build machines and systems from which customers can always benefit, engineers from Japan, the USA and the UK work closely together in research and development, concentrating on the development of advanced machines and production systems for customers through the compilation of their experience.

The Tokyo Tsukuba Research & Development Center opened in November 1987. An R&D staff of forty five is currently carrying on basic research in such fields as the development of advanced CAD/CAM systems (a large-scale national project initiated by the Agency of Industrial Science

and Technology of MITI). It conducts studies on machining ceramics, the application of wide-range high-speed spindles and non-contact sensor application technology.

There are over 300 people working on the technical or product development staff in the Yamazaki Mazak group of companies. Fully US\$39 million is spent each year for R&D activities in Japan and abroad.

This R&D Center is intended for intensive technical exchange regarding software for machining technology, integrated manufacturing systems employing CAD/CAM and, of course, unmanned manufacturing systems. The R&D Center also functions as a focal point for machine tool and other development activities for the future, through joint-developments with external organizations and exchanges with other industries.

8.3.5

Summary

The amazing advances made by Yamazaki Mazak today are nothing but the result of the company's managerial strategy, which is supported by the twin pillars of "technological innovation" and "global orientation" that are designed and implemented twenty years ago. Neither should it be overlooked that the persevering devotion to making things has been prime factor in the company's approach since before the war, and also that the spirit in which the company was originally founded has served as the very back-bone of the company's endeavour.

Today, preparations for a vigorous management strategy which looks ten to twenty years ahead are steadily being made. In specific terms, these preparations include, the expansion of production bases, the promotion of research and development, the development of market, the training of human resources, and other actions taken to prepare them for the future. All these stand in a state of harmonious balance.

As the world in the rapidly approaching 21st century is visualized at a point further along the road taken by the company, an image of Mazak's preeminent role in the rapidly progressing "production revolution", and in other areas as a competent member of the supporting cast in the world emerged. In order to fulfil

these roles, Mazak will get involve with all kinds of projects incorporating various machining and production technologies in the world so that it can continue to provide the most ideal advanced production systems to all these projects.

Summary of *FIRMS* in Yamazaki Mazak is in Table 8-13.

TABLE 8-13

ANALYSIS OF FIRMS IN YAMAZAKI MAZAK CORPORATION

<p>Strategy:</p> <p>Loyalty from Customers</p>	<p>Commitment from Wokers</p>	<p>Cooperation from Suppliers</p>	<p>Collaboration from Distributors</p>	<p>Respect from Competitors</p>
<p>Capablility:</p> <p>Total Quality Customer Satisfaction</p>	<p>Human Resource Management</p>	<p>Supply Chain Management</p>	<p>Distributor Network Mangement</p>	<p>World-Class Manufacturing/ Marketing</p>
<p>Techniques:</p> <ul style="list-style-type: none"> • Continued re-education of sales engineers • Internationalized service network • Providing technical services to customers • Close customer contacts • CAD/CAM centre from concept to finished product 	<ul style="list-style-type: none"> • Recruitment and training poicy • Communications within the Mazak family • Corporate identity programme • Total quality control 	<ul style="list-style-type: none"> • Member of extended family 	<ul style="list-style-type: none"> • Mazak club • Mazak International MachineTool Association 	<ul style="list-style-type: none"> • The marketeer strategy • The innovator strategy

Source: Author

8.4 Case Three : Corporate Profile of Mori Seiki Company Limited

Over forty years of production experience and a record of breakthroughs in NC machine tools have earned Mori Seiki a world-wide reputation for reliability. The goal of Mori Seiki is to continue to create the best products based on the best technology of today as it ventures into the technology of tomorrow.

Mori Seiki has been developing its own FA (factory automation) system. It strives for greater automation, precision, efficiency, and long-term continuous unmanned operation - to enable customers to produce better quality goods more efficiently. It is aiming at total automation and simplification of the production process. In short, the ultimate production system.

Mori Seiki's motto is "Challenging the Known Limits of Quality" down to the micron in its quest for greater precision.

Its corporate data is in Table 8-14

8.4.1 Capital Assets and Manufacturing Facilities of Mori Seiki

The revolution in mechatronics and artificial intelligence is changing us into a global society dependent on information. It has complicated the international market and changed the very face of production. "FA" (Total Factory Automation) is found everywhere from automatic manufacturing to the integration of production, management, and sales. This is also the blueprint for Mori Seiki's own technology and product development.

As demand increased for FA, so do the requirements for CNC machine tools. It is now developing the next generation of CNC equipment. It will become tomorrow's manufacturing standard of quality and multi-capability. Mori Seiki has always believed in the future of CNC machine tools. It has invested heavily in manpower, technology, and equipment to explore CNC possibilities. Its own factories now have some of the most advanced uses of FA in the world.

- Plant Locations equipped with FMS and/or CIM
 - Head Office, Japan
 - Nara Plant, Japan

TABLE 8-14 CORPORATE PROFILE OF MORI SEIKI CO. LTD
(AS OF NOVEMBER 1993)

Corporate Profile			
Corporate Name	:	Mori Seiki	
President	:	Yukio Mori	
Established	:	October 26, 1948	
Stock Listings	:	Tokyo and Osaka Stock Exchange	
Total Assets	:	Japanese Yen 177,200 Million (as of September 30, 1993)	
Shareholders' Equity	:	Japanese Yen 125,100 Million (as of September 30, 1993)	
Capital	:	Japanese Yen 28,200 Million	
Stocks Issued	:	97.20 Million (par value at Japanese Yen 50 per share)	
Business Operations	:	Manufacture and Sales of Machine Tools	
Closing Date	:	March 31, Annually	
Employees	:	1,968 at Mori Seiki; 95 at affiliated companies	
Domestic Sales Offices			
Domestic Sales Office	:	29 locations, Japan	
Directory of Overseas Subsidiaries			
• Mori Seiki USA, Inc.,	:	Head Office	- Texas
		Technical Centers	- Dallas
			- Los Angeles
			- Chicago
			- Detroit
			- Cincinnati
			- Boston
			- New Jersey
		Representative Office	- San Francisco, Charlotte
• Mori Seiki GmbH	:	Head Office	- Germany
		Technical Centers	- Dusseldorf
			- Stuttgart
• Mori Seiki (UK) Ltd	:	Head Office and Technical Center	- Milton Keynes
• Mori Seiki Frances S.A.	:	Head Office and Technical Center	- ORMES, France
• Mori Seiki Italiana S.R.L.	:	Head Office	- Corsico, Italy
• Mori Seiki Singapore Pte Ltd	:	Head Office and Technical Centre	- Jurong East Industrial Estate
• Mori Seiki Thailand	:	Representative Office	- Bangkok
• Mori Seiki (Taiwan) Co., Ltd	:	Head Office and Technical Center	- Taipei

Source: Mori Seiki Company Limited

- Iga Plant, Japan
- R&D Center, Japan

8.4.1.1 The Nara Plant

The Nara Plant is a model of a totally integrated, large-scale FA system.

An advanced materials handling system with 8,888 auto-storage racks and 16 automatic guided vehicles handles stock control. 180 machines tools are driven by a series of control systems. All machining and production is centrally controlled and completely computerised. To guarantee the ultimate quality and efficiency in production and distribution throughout the system, each manufacturing cell is monitored by its trained and experienced engineering staff.

The Nara Plant specializes in the production of CNC lathes, smaller machine centers, and drilling machines. The plant is well-known throughout the manufacturing world as a model of automated FA efficiency in every stage of operation, from the initial handling of raw materials to the final shipment of the finished products.

8.4.1.2 The Iga Plant

The 128,000 square metre plant at Iga operates under full FA, with more than 330 manufacturing machines controlled by state-of-the-art robots. These are connected by 51 automatic guide vehicles to a system of super-large-scale volumetric auto-storage racks in an overall transport path of more than 9,600 metre.

In the field of small-lot multifaceted production, it takes general-purpose machining centers and integrate them as the heart of a fully automatic line of its own design. Horizontal machining centers equipped with pallet pools used in this manner give the system the utmost in efficiency and flexibility. Relying on the production cell, operators are able to control production at an optimum rate.

Everything is fully equipped with all the automatic features necessary for long-term unmanned operations at every stage of the production process, from transportation to the machining of products of all sizes and shapes.

With the introduction of the latest equipment and securing large space for assembly process in the Iga Plant, safe and comfortable working environment is prepared for perfect quality control to respond to the requirement of the users for ultra-precise, ultra-high-speed and unmanned machine tools.

Mori Seiki establishes a high-technology research institute in Takayama area of Kansai technical research city as the place for research on FA technology, ultra-precise and ultra-high-speed machining technology, and new materials, etc, by joint industry-university project.

8.4.1.3 R&D Centre, Japan

The R&D Division is broadening the scope of FA technology itself as it creates new machine tools to automate production systems. Its innovations are based both on applications of new technology and on analysis of market information. And if the technology does not meet customers' needs, then Mori Seiki has the capability to develop the appropriate technology for the customers. This is the Mori Seiki's R&D policy.

At the R&D Centre quality goes in at the design stage. This is how it broadens the potential of production systems and technology to increase the power and capabilities of CNC machine tools.

Corporate-wide staff takes the long-term view in developing new technology for the future of its market. The latest data from Japan and abroad come directly to Mori Seiki research institutes and allied business fields. This is why the newest technological advances are directly reflected in Mori Seiki products.

As it pushes back the limits of advanced sensor technology - in tool breakage detection, for example - it incorporates mechatronics, interactive computer programming software, and system design technology in the development of MORI HEPS (High - Efficiency Production System).

Mori Seiki is conducting fundamental research into the parameters of the CNC machine tools. This research is centered in the large-scale CAD Center and in the Product Development Room. Here it develops new hardware and software designs to bring customers the features they will need for higher production output; expanded machining functions, flexibility, and the absolute rigidity and reliability always needed at every level of productivity.

Hand in hand with this is the awareness of the need to re-think old concepts as it integrates new developments into the CNC machine tools.

8.4.2

Sales Performance of Mori Seiki

There are more than 250 different types of machines in the Mori Seiki's range of products because every job site has its own particular needs. The production system for each job site will differ: different machining requirements, investment strategies, space limitations, levels of automation.

The focus of the manufacturing world is on FA and on CIM as Mori Seiki strives to streamline and optimize today's high-tech production systems.

Sophisticated manufacturing now calls for a greater percentage of work devoted to small-lot custom jobs and to variable-type, variable-output production runs. The result has been the development of increasingly flexible and diverse production systems able to handle a wide range of specialized manufacturing challenges.

Machine tool systems, in particular, are faced with every-increasing pressures for cost efficiency, unmanned operating capabilities, and space-saving designs, as

it seeks to satisfy the requirements of flexibility and the ability to upgrade systems - solutions that emerge from today's diverse machining needs.

Based on long years of experience in developing the possibilities of CNC machine tools for Factory Automation - and on carefully cultivated expertise in the field - Mori Seiki is renowned for its successful application of leading-edge technology to system engineering.

It offers Factory Automation Systems on any scale - tailored specifically to customers' needs and budget requirements - from compact Flexible Manufacturing Cells (FMC) to the ultimate in large-scale Flexible Manufacturing Systems (FMS). Mori Seiki believes in providing "value for moeny machining system" couple with value added customer service as their marketing strategy as a competitive edge.

The sales performance of Mori Seiki is shown in the following figures:

- Figure 8.10 : Sales Performance from 1986 to 1990
- Figure 8.11 : Sales Performance (Export) from 1980 to 1990
- Figure 8.12 : Sales Performance: End-Users (Domestic) Year 1990/1991
- Figure 8.13 : Sales Performance : End-Users (Export) Year 1990/1991

8.4.3

Management Business Philosophy

The essence of a good machine tool is *stability within movement*. Higher speeds and greater efficiency in movement are needed everywhere - for the spindle drive, for feed functions, tool changing, and the loading of workpieces. Opposed to this is the need for absolute stability.

The greatest enemies to machining precision are vibration and distortion from heat built-up. To combat this, it needs both rigidity and an effective anti-thermal displacement design. Making superior CNC machine tools requires a mastery of the technology of both stability and movement.

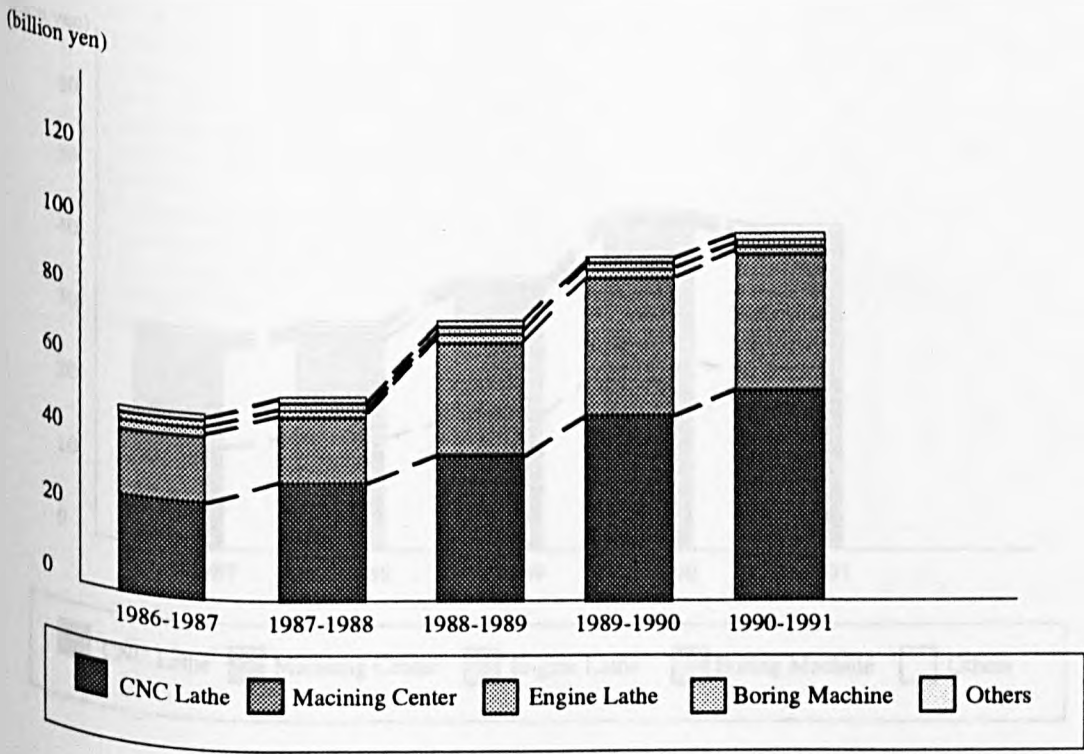
Mori Seiki uses the most advanced CAD techniques to assure quality in

FIGURE 8.10 SALES PERFORMANCE FROM 1986 TO 1990

(million Yen)

Fiscal Year	NC Lathe	Machining Center	Engine Lathe	Boring Machine	Others	Total
1986.4.1 - 1987.3.31	25,048 51.4%	19,141 39.3%	1,892 3.9%	1,182 2.4%	1,480 3.0%	48,743 100.00%
1987.4.1 - 1988.3.31	32,353 57.2%	20,749 36.7%	995 1.7%	798 1.4%	1,676 3.0%	56,571 100.0%
1988.4.1 - 1989.3.31	41,942 56.2%	27,839 37.3%	1,137 1.5%	1,137 1.5%	2,109 2.8%	74,686 100.0%
1989.4.1 - 1990.3.31	52,403 56.4%	34,794 37.5%	1,359 1.5%	1,359 1.5%	2,433 2.6%	92,863 100.0%
1990.4.1 - 1991.3.31	56,665 56.5%	37,232 37.1%	1,582 1.6%	1,582 1.6%	2,751 2.7%	100,291 100.0%

Footnote: Each amount is contained in net sales.
Each percentage is calculated according to net sales of each fiscal year.



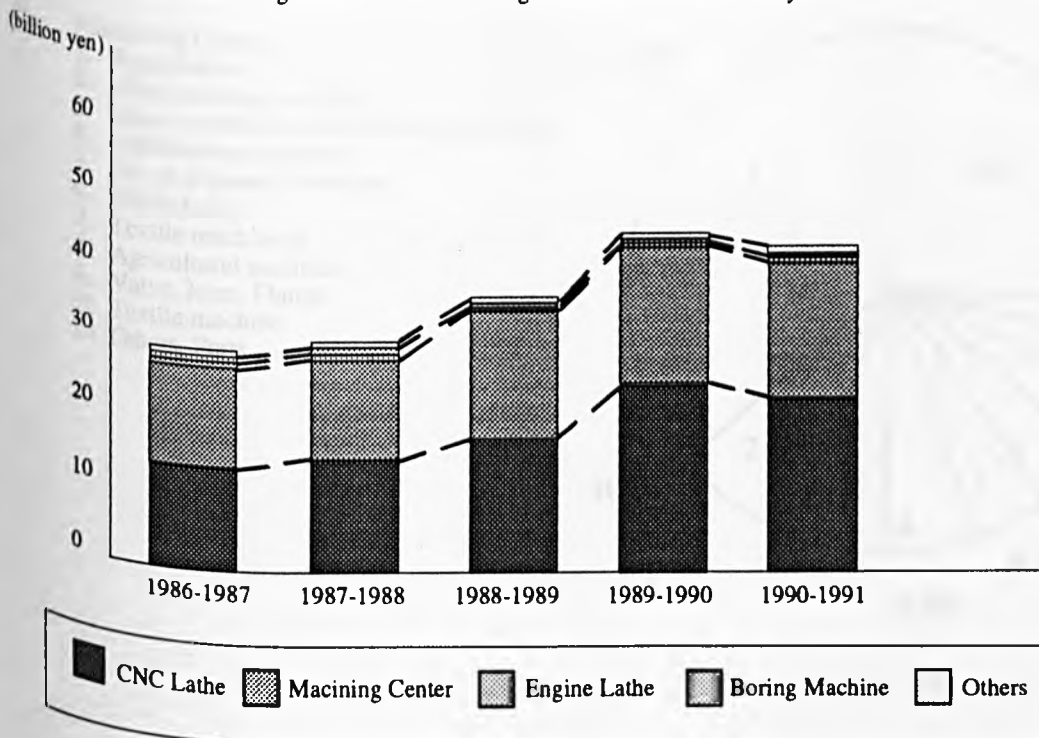
Source: Mori Seiki Company Limited

FIGURE 8.11 SALES PERFORMANCE (EXPORT) FROM 1986 TO 1990

(million Yen)

Fiscal Year	NC Lathe	Machining Center	Engine Lathe	Boring Machine	Others	Total
1986.4.1 - 1987.3.31	13,966 55.8%	12,121 63.3%	213 11.2%	39 3.3%	582 39.3%	26,821 66.2%
1987.4.1 - 1988.3.31	16,211 50.1%	10,975 52.9%	78 7.8%	63 7.9%	683 40.8%	28,011 49.5%
1988.4.1 - 1989.3.31	18,156 43.3%	11,782 42.3%	21 1.2%	10 0.9%	857 40.7%	30,827 41.3%
1989.4.1 - 1990.3.31	23,710 45.2%	14,644 42.1%	15 0.8%	27 2.0%	982 40.3%	39,378 42.4%
1990.4.1 - 1991.3.31	22,221 39.2%	14,272 38.3%	16 0.8%	14 0.9%	1,086 39.4%	37,606 37.5%

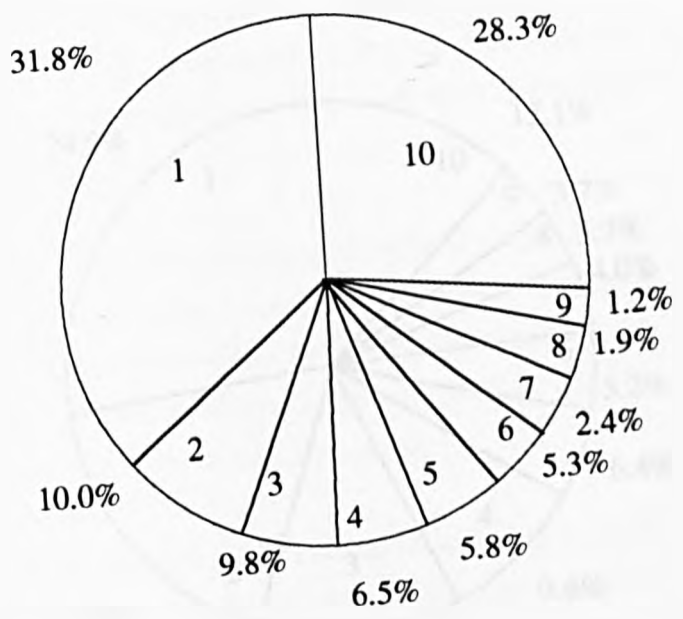
Footnote: Each amount is contained in nett sales
Each Percentage is calculated according to net sales of each fiscal year.



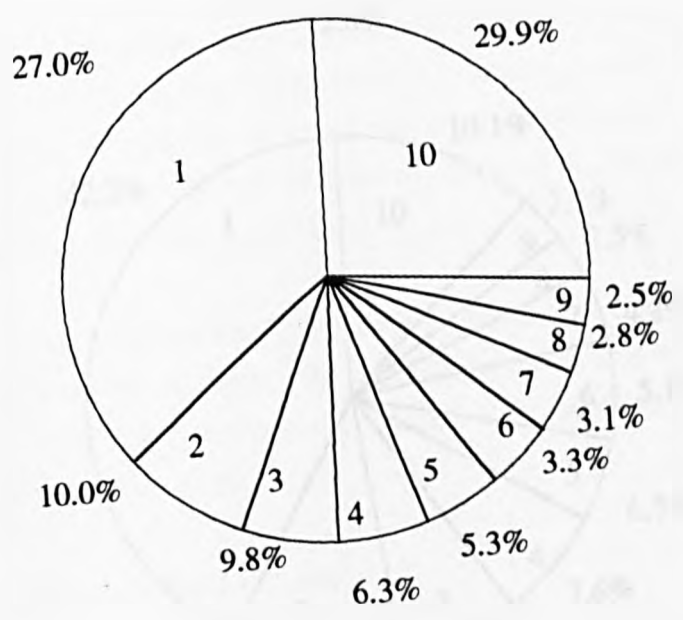
Source: Mori Seiki Company Limited

FIGURE 8.12 SALES PERFORMANCE : END-USERS (DOMESTIC) FOR YEAR 1990/1991

- I. CNC Lathe
1. Automobile
 2. Metal working machine
 3. Electrical telecommunication instrument
 4. Construction machine
 5. Valve, Joint, Flange
 6. Oil air pressure instrument
 7. Transportation machinery
 8. Agricultural machine
 9. Textile machine
 10. Others, Parts



- II. Machining Center
1. Automobile
 2. Metal working machine
 3. Electrical telecommunication instrument
 4. Construction machine
 5. Oil air pressure instrument
 6. Die industry
 7. Textile machinery
 8. Agricultural machine
 9. Valve, Joint, Flange
 10. Textile machine
 11. Others, Parts

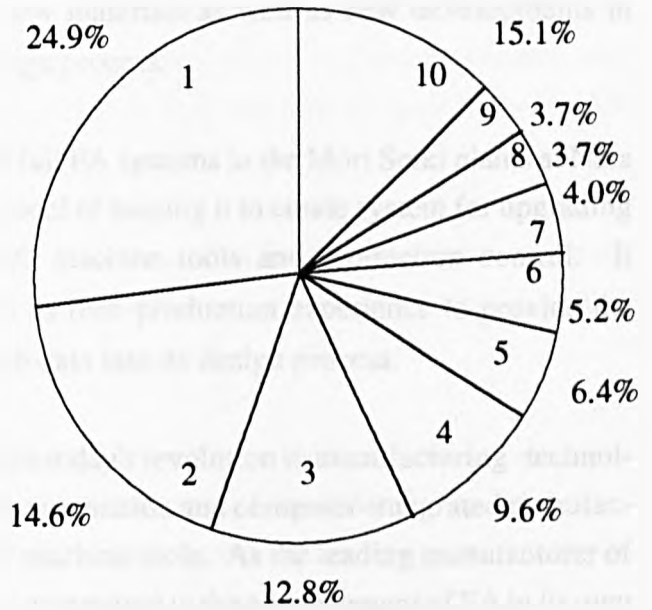


Source: Mori Seiki Company Limited

FIGURE 8.13 SALES PERFORMANCE: END-USERS (EXPORT) FOR YEAR 1990/1991

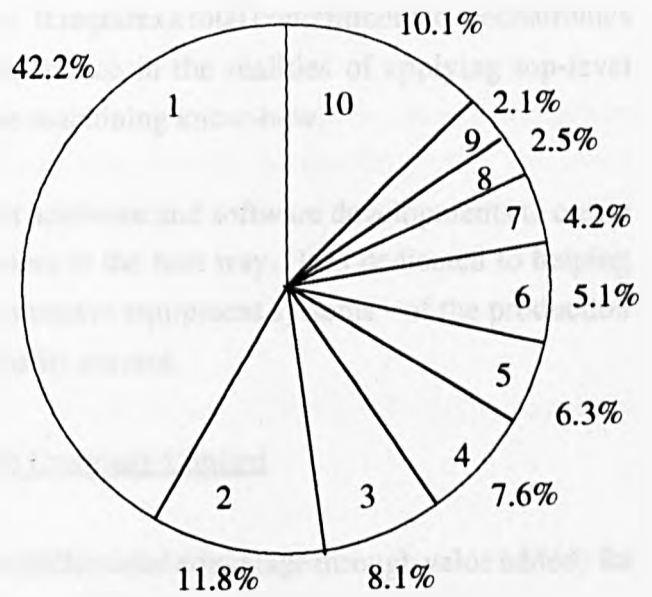
I.

- CNC Lathe**
1. Automobile
 2. Oil field
 3. Metal working machine
 4. Aircraft, Space
 5. Valve, Joint
 6. Die industry
 7. Construction machine
 8. Atomic
 9. Medical equipment
 10. Others, Parts



II.

- Machining Center**
1. Automobile
 2. Metal working machine
 3. Die industry
 4. Aircraft, Space
 5. Electrical telecommunication instrument
 6. Oil air pressure instrument
 7. Defense industry
 8. Oil field
 9. Construction machine
 10. Others, Parts



Source: Mori Seiki Company Limited

production, from the initial design stages through trial runs and final mass production. At its Research and Development Centre, it gives full consideration to the standpoint of the users, including the vital factors of cost-performance and maintenance. Mori Seiki actively incorporates advanced peripheral technology, including sensors, servos, and new materials as well as new developments in systems engineering into the design process.

The implementation of its own full FA systems in the Mori Seiki plants at Nara and Iga has been an invaluable model of helping it to create system for upgrading the operating efficiency of CNC machine tools and production control. It constantly analyzes and reviews its own production experience to provide the necessary feed-back of on-the-job data into its design process.

Key words such as "FA" describe today's revolution in manufacturing technology. What makes today's factory automation and computer-integrated manufacturing a reality is the use of CNC machine tools. As the leading manufacturer of CNC machine tools, Mori Seiki is committed to the advancement of FA in its own factories. This is reflected no more clearly than in its own manufacturing system; it is a major user of these products. It requires a total commitment to mechatronics technology with its years of experience in the realities of applying top-level technology to real problems, plus machining know-how.

It constantly monitors the latest hardware and software developments to create the best solutions for the customers in the best way. It is dedicated to helping customers in the total control of massive equipment systems - of the production process itself, and, in the end, quality control.

8.4.4

Analysis of FIRMS in Mori Seiki Company Limited

• **FIRMS: Goal 1**

Goal 1 is *loyalty from customers* (differential advantage through value added) Its capabilities is total quality customer satisfaction.

Techniques

- *Branch office/Technical centres.* . Mori Seiki has twenty-eight branch offices throughout Japan. Overseas, it is fully incorporated in the USA, Europe, and

in several locations throughout Southeast Asia, with offices in major cities around the world. This means that it is right there on the spot with valuable customer support and technical/service centres.

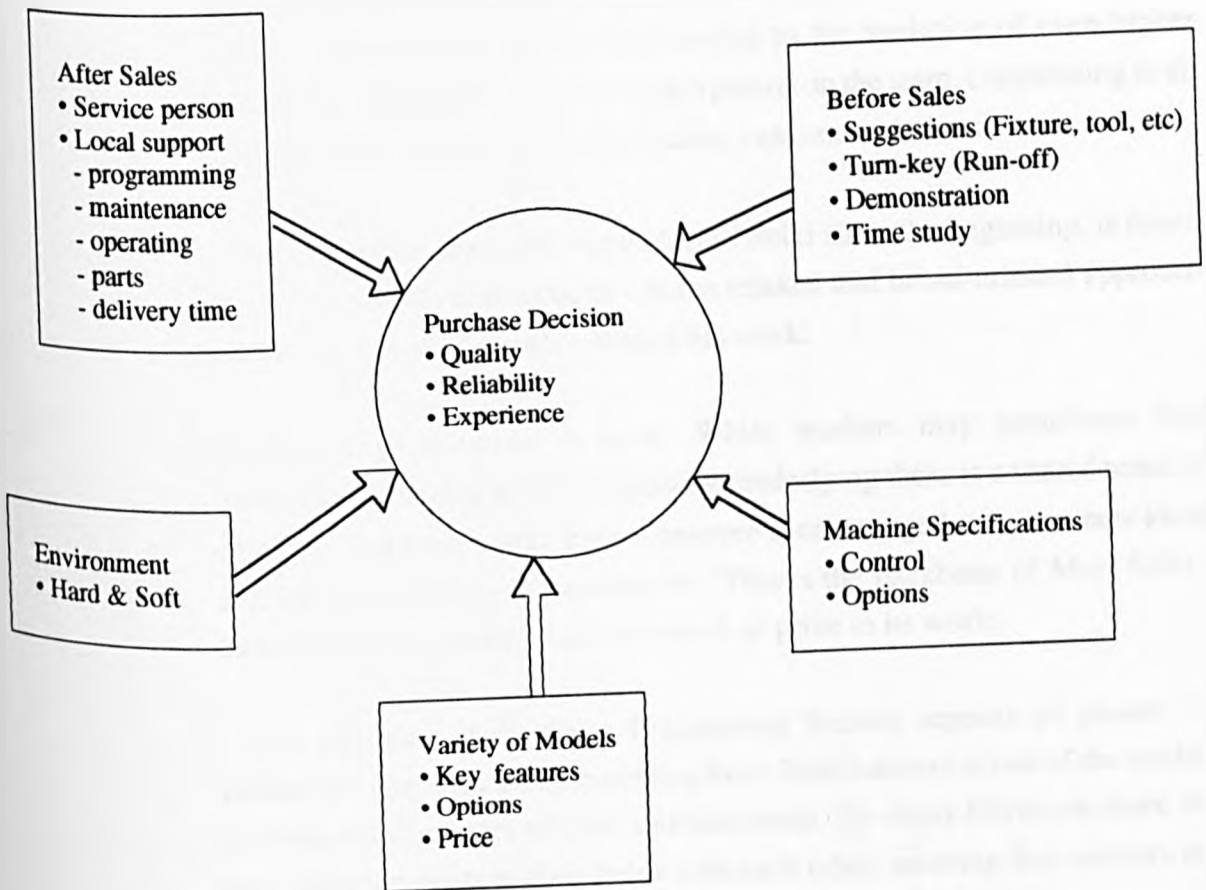
- *Technical seminars/advices.* Mori Seiki's products are backed-up with technical seminars; with maintenance and repair service for installations; with technical advice on capital investment and practical proposals for the FA implementation; and with technical consulting.
- *Customised equipment.* Each Division at Mori Seiki takes a broad overview of its industry as a whole. It anticipates the market and provide just those products for customers throughout the world.

Each of its many Division - Engineering, Materials, Production, Sales - is a wholly autonomous entity with strong areas of specialization. Yet, are all linked together by a keen sense of precision in technology and quality in service.

A good example of this can be found in the sales engineering activities of the Engineering Division. The sales Engineering staff handle the design and production of special models made to customers' orders. Custom equipment is designed reflecting customers' needs down to the smallest detail - including continued follow-up support and consulting with design and production staff after the custom equipment has been delivered, ie relationship marketing. Here also are developed all the necessary manuals and reference materials.

- *Speed of delivery.* Just-in-time techniques to honour delivery promise to customers.
- *Stages in total quality customer satisfaction..* The stages mentioned in Figure 8-14 are used for assisting customers to make purchase decision.
- **FIRMS: Goal 2**
Goal 2 is *commitment from workers* (competition workforce). Its capability is human resource management.

FIGURE 8.14 STAGES IN TOTAL QUALITY CUSTOMER SATISFACTION



Source: Mori Seiki Company Limited

Techniques

- *Creativity and broad-minded spirit of staff.* Over the centuries of machine-tool history, two things have always been behind the birth of new technology and capabilities in machine tool development: original thinking and indomitable perseverance by many people. This is just as true today, with the high levels of precision reached by CNC machine tools. What is the motivating force maintaining this quality and leading to the evolution of even higher levels? It is the spirit and mettle of each person on the team, contributing to all the processes - design, production, sales, customer relations.

This intangible asset, cultivated at Mori Seiki since the beginning, is found in all departments and sections - in the relaxed and broad-minded approach taken by every staff member toward his work.

- *Teamworking and pride in work.* While workers may sometimes find themselves in heated arguments, always underlying these is a shared sense of creativity and team-work. Each employee is encouraged to try out new ideas and use his talents to the maximum. This is the backbone of Mori Seiki's technology and quality - and the source of pride in its work.

The activities of the Sales Engineering Section support all phases of production and sales, complementing Mori Seiki's stature as one of the world's leading manufacturers of CNC machine tools. Its many Divisions share the latest developments in their fields with each other, assuring that workers are constantly growing and maturing.

- *International exposure.* Mori Seiki develops and nurtures staff by sending them to USA and Europe for training and/or further education (especially in Business Administration) Exposure to different cultures and to the high-tech industries in the West is important before posting their managers to the ASEAN market.

- **FIRMS: Goal 3**

Goal 3 is *cooperation from suppliers* (value added partnership). Its capability is supply chain management.

Techniques

- *Extended family.* Due to its excellent relationship with suppliers, even in good times Mori Seiki can supply to its customers faster than Okuma or Mazak. Suppliers are members of extended family.

• **FIRMS: Goal 4**

Goal 4 is *collaboration from distributor* (value added partnership). Its capability is distribution network management.

Techniques

- *World-wide distributor network.* Mori Seiki uses distributors to sell/provide best value-for-money machine tool package. Unlike other Japanese companies, it will sell direct to customers if distributor's price is not competitive.
- *Member of extended family.* Distributors are members of extended family. Though frictions do arise because of Mori Seiki's policies, these are ironed out especially when competition becomes keen and Mori Seiki dictates distributor(s) commission.

• **FIRMS: Goal 5**

Goal 5 is *respect from competitors* (industry/market leader working on the principle of competitive cooperation). Its capability is world-class manufacturing and world-class marketing.

Techniques

- *Flexibility of its manufacturing system.* Today's machine tools must have the flexibility to operate within the context of a full-fledged FA environment, either as the core of a high-productivity cell or within an expanded system. The industry is witnessing an overall increase in demand across the board, from improved functions and greater precision to better cost-performance indexes. Ever since it started making CNC machine tools, Mori Seiki has maintained a lead in the acquisition of the knowledge necessary to meet these demands - from machine technology and electronics to computer science. And it has used this knowledge to make one of the better machine tools in the world. The

machining centers and CNC lathes are machine tools that capture the essence of advanced technology.

Mori Seiki's FA know-how and mechatronics experience as a major producer of CNC machine tools is in use on the job in factory production throughout the world.

Mori Seiki's record in product development is respected world-wide. This record is the result of its philosophy of creative design. But even beyond innovative design, its ability to produce its own ball screws and curvic couplings gives real substance to creative engineering. This frees it from the component restrictions affecting conventional machinery design. It also makes it independent of supply shortages from outside distributors. This is evident from the new FA machines, the *Partner Series*, and in the variety of its product range, far surpassing that of other manufacturers.

The technology and the workmanship involved in the production of its own precision components is a direct reflection of Mori Seiki's fundamental policy : Precedence to on-the-job realities in product design and production.

Its own precision components are produced only in the headquarters under the strictest of quality control. And in its assembly lines, these components are carefully hand-fitted by its team of engineers.

Even though it is one of the most advanced FA manufacturers in the world, the individual experience of the engineers is vital to adjustment of precision components at the micron level. After assembly, all machine tools undergo a final tolerance check by laser and advanced inspection devices. Each component is the product of superlative workmanship and the finest equipment. This gives its products their reputation: top quality and unbeatable reliability. Mori Seiki's product quality is recognised by end-users as equivalent to those of Okuma's.

8.4.5

Summary

Analysis of *FIRMS* in Mori Seiki is in Table 8-15.

TABLE 8-15 ANALYSIS OF FIRMS IN MORI SEIKI

Strategy: Loyalty from Customers	Commitment from Workers	Cooperation from Suppliers	Collaboration from Distributors	Respect from Competitors
Capability: Total Quality Customer Satisfaction	Human Resource Management	Supply Chain Management	Distributor Network Management	World-Class Manufacturing/Marketing
Techniques: <ul style="list-style-type: none"> • Branch offices/ Technical centers • Technical seminars/ advices • Custom equipment • Speed of delivery • Stages in total quality customer satisfaction 	<ul style="list-style-type: none"> • Creativity and broad-minded spirit of staff • Teamworking and pride in work • International exposure 	<ul style="list-style-type: none"> • Member of extended family 	<ul style="list-style-type: none"> • World-wide distribution network • Member of extended family 	<ul style="list-style-type: none"> • Market-driven strategy (the marketeer strategy) • Technological-driven strategy (the innovator strategy)

Source: Author

Of the three Japanese machine tools producers, Mori Seiki achieved the highest level of profitability by offering the best value-for-money package deal to customers. This is due to its time-based business strategy (see Figure 8-15) facilitated by its excellent relationships with suppliers and distributors.

FIGURE 8.15 TIME-BASED NEW PRODUCT DEVELOPMENT TEAM STRUCTURE DRIVEN BY CUSTOMER NEEDS



Source: Compiled by Author

8.5 Case Four: Profile of Taichung Machinery Works Company (TMWC)

Founded in 1954 by two machine tool workers, TMWC has grown to become Taiwan's second largest machine tool company with sales in 1990 of NT\$1.5 billion (US\$57 million). The founders today are the company's Chairman and Managing Director, and they (and their family members) still occupy the senior management positions. The organization chart is in Figure 8.16. History of TMWC is in Table 8-16. It was the most profitable local machine tool company with a nett profit margin of 8.3 percent in 1990.

TMWC developed its first lathe in 1964. Six years later it produced its first precision high speed lathe, and 1979 saw it enter the CNC lathe market. The product line was extended during the 1980s (CNC machining centre, 1985; plastic injection machinery [PIM] 1988). It was the largest local producer of computerised CNC lathe (22.8 percent of local production). Derived 81.8 percent of 1988 sales from high-end CNC products. TMWC relies heavily on exports, especially in the European market. Importance of European market is reflected in the fact that TMWC aims to establish a manufacturing presence in the EU.

The company's development in the past ten years is shown in Figure 8.17.

TMWC will concentrate in the coming years on CNC machine tools and PIM due to the shrinking market for such traditional machine tools as PHS lathes. The company does not have any plans to diversify into other fields at present as it wishes to maintain its professional image in the machine tool industry.

Brief of products and services, range of markets, and the internationalization of operations are shown in Table 8-17.

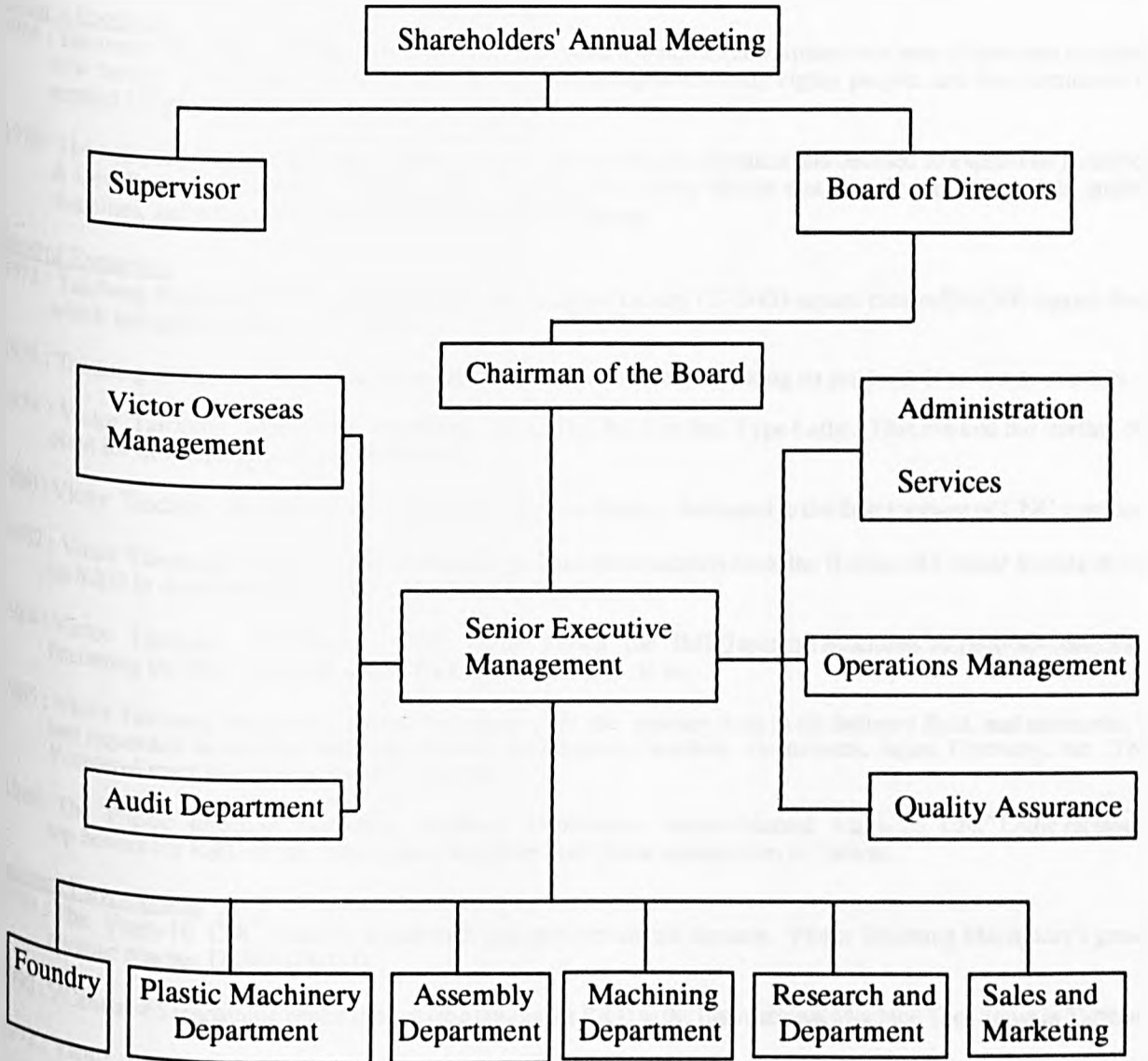
8.5.1 Capital Assets and Manufacturing Facilities of Taichung Machinery Works Company

Almost forty years have past since the beginning of Taichung Machinery Works, and now, Taichung Machinery Works has evolved into such a prosperous organization, now known as the Victor-Taichung Companies consisting of:

- Four factories
- Four trading companies
- Two production plants
- Subsidiaries located around the world

FIGURE 8.16

COMPANY ORGANIZATION OF TAICHUNG MACHINERY (TMWC)



Source: Taichung Machinery Works Company

TABLE 8-16 HISTORY OF TAICHUNG MACHINERY WORKS COMPANY

Modest Beginnings

- 1954 : Working out of a small workshop, two partners from Taichung Machinery works, and developed their first product - a Shaper
- 1960 : Taichung Machinery Works moved into larger facilities as the company's employees increased to thirty people. The company also developed a Belt Type Engine Lathe

Gaining a Foothold

- 1964 : Taichung Machinery Works purchased a 2,200 square meter/23,200 square foot area of land and erected a new factory. The company's employees now numbered approximately eighty people, and they continued to expand US product line.
- 1970 : The company had enjoyed considerable success in exporting its products and decided to expand its Research & Development capabilities. By this time, Taichung Machinery Works was already producing high quality machines, and had greatly increased its production capacity.

Period of Expansion

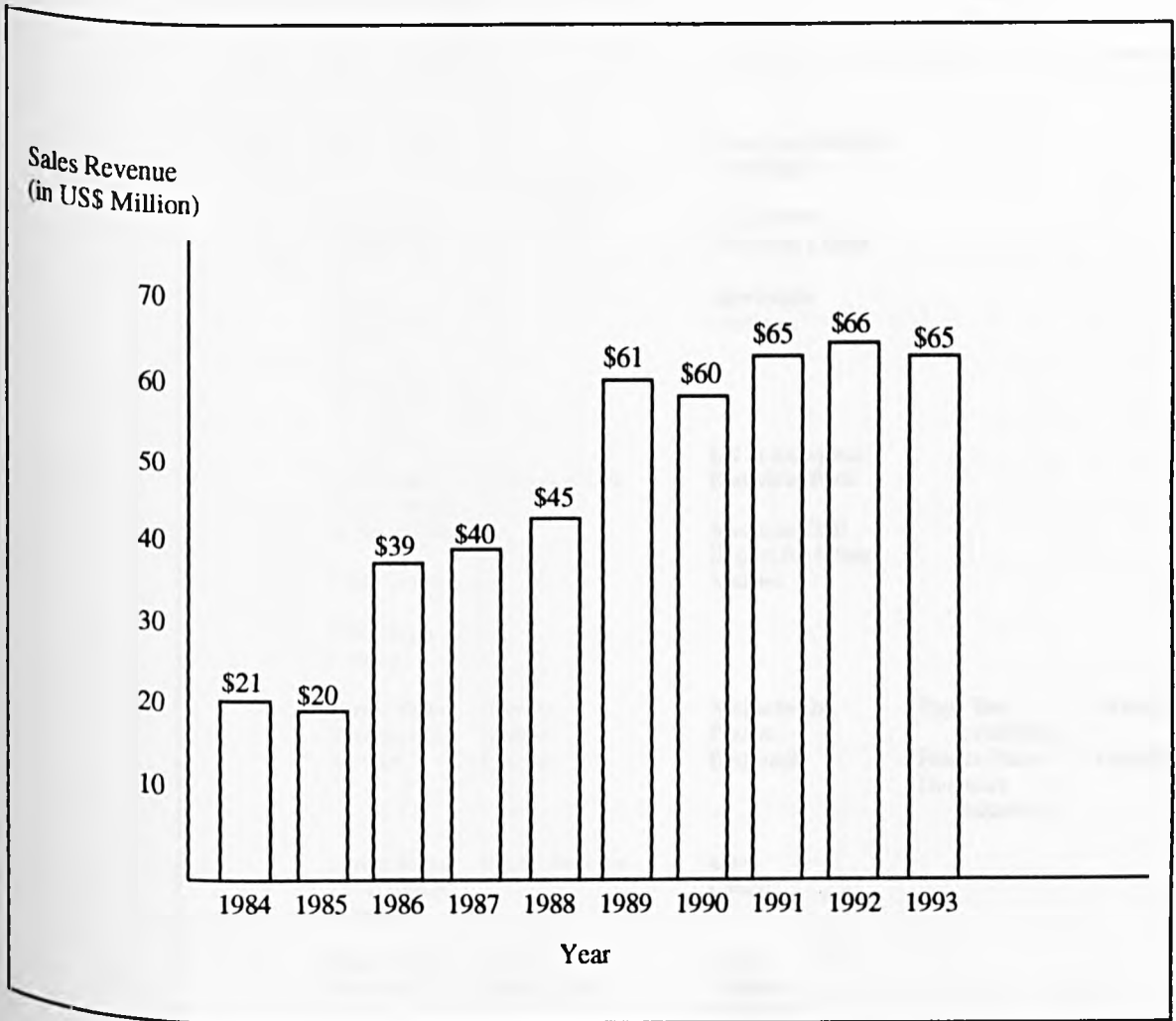
- 1973 : Taichung Machinery Works moved into a much bigger factory (23,1000 square meters/249,500 square feet) which included a complete foundry.
- 1976 : Taichung Machinery Works began using the name "Victor" in promoting its products in overseas markets.
- 1979 : Victor Taichung Machinery developed the C-16 CNC Flat Bed Type Lathe. This marked the starting off point for development of CNC equipment.
- 1980 : Victor Taichung Machinery constructed yet another factory, dedicated to the development of CNC machine.
- 1982 : Victor Taichung Machinery was awarded a special commendation from the Bureau of Central Standards for its R&D in developing the TNS-2 CNC Slant Bed Lathe.
- 1984 : Victor Taichung Machinery's CNC Lathe passed the JMI (Japanese Machines Inspection) standards, becoming the first Taiwan Machine Tool manufacturer to do so.
- 1985 : Victor Taichung Machinery established casting as the primary item in the industry field, and moreover, it had expanded its supplies into both domestic and overseas markets, for instance, Japan, Germany, etc. The Vcenter-4 machining center came to market.
- 1988 : The Plastic Injection Moulding Machine Department was established. Vturn-26 CNC Lathe received top honors for R&D at the International Machine Tool Show competition in Taiwan.

Continual Development

- 1989 : The Vturn-16 CNC Lathe is introduced, and receives instant success. Victor Taichung Machinery's gross revenue reaches US\$61,000,000.
- 1990 : VCenterr-65 machining center receives top honors for R&D at the International Machine Tool Show in Taiwan.
- 1992 : Victor CNC plaza was established based on automation demonstration testing and CNC laboratory. Victor Taichung machine developed Euro series Injection moulding machine.
- 1993 : Victor Taichung Machinery received ISO 9001 certificate for three factories, which was approved by TUV Rheinland. Valve Department was formed, introducing valve to the existing product items.
- 1994 : CIM sheet metal plant and FMS Machining Factory 's grand opening.

Source: Taichung Machinery Works Company

FIGURE 8.17 COMPANY DEVELOPMENT (IN THE PAST TEN YEARS)



Source: Taichung Machinery Works Company

TABLE 8-17

PRODUCTS AND SERVICES, RANGE OF MARKETS, AND THE
INTERNATIONALIZATION OF OPERATIONS

CNC Lathes		Precision Machine Tool Gears		
CNC Machining Centers	Manufacturing Construction	High Speed Precision Lathes		
Plastic Injection		Meehanite Casting		
Moulding Machines				
CNC Equipment Maintenance & Rebuilding	Other Services	US & European Electrical Parts		
CNC Tooling		Machine Tool Export for Other Makers		
CNC Wire Cutting				
Direct Sales Distribution Service	Europe Europe Europe	Netherlands France Denmark	Pays-Bas Rotterdam France Paris Denmark Silkeborg	Orlanda Francia
Direct Sales Distribution Service	North America	USA Canada		
Direct Sales Distribution Services	Asia and South Africa	Japan Thailand Malaysia Singapore & Hong Kong South Africa		

Source: Taichung Machinery Works Company

- **Component Supply**

Material and components accounted for 75 to 80 percent of production costs of CNC machine tools. Currently, Taiwan relies on imports (particularly from Japan) for the key components to produce CNC machine tools such as CNC controller (25 to 30 percent of production costs), roll screw, and spindle bearing. Siemens (Germany) received approval in November 1990 to establish a CNC controller production joint-venture in Taiwan, and Fanuc, the largest Japanese CNC controller producer, filed an application in January 1991 to establish an automated CNC controller production factory. Fanuc will establish the factory in two to three years when local demand for CNC controllers climbs to an economical one thousand sets per month from the current three hundred to four hundred sets per month. TMWC may invest in Fanuc's venture if the plan receives approval from the local Bureau of Industry. Although these planned production facilities and the technology would still be controlled by foreign companies, the establishment of these plants would benefit local machine tool companies in terms of both lower cost and steady supply of key components.

- **Manufacturing Capabilities**

- * **Parts Production**

More than 50 percent of the parts used in the equipment that is manufactured by TMWC is produced within its own factories.

Although there are a number of machine tool makers in Taiwan with the ability to do casting, TMWC, by far, is the largest. It covers the complete process: beginning with extraction through to making the patterns and casting the parts.

In the production process, it uses equipment and machines imported from the US, Europe, and Japan. Its first rate equipment allows it to produce parts quickly and efficiently, as well as maintaining the highest quality control standards.

- * **Assembly Capabilities**

Since a single machine can conceivably be made up of well over 1,000 parts, it is essential that great care is taken during assembly to ensure that the final product conforms to a high standard of quality.

With over forty years of experience in manufacturing standard lathes, CNC lathes and machining centers, together with plastic injection moulding machines, TMWC has developed the technology and capabilities to produce machines to this high standard quality and to meet strict safety standards.

As with any efficiently run organization, Victor Taichung Machinery is divided into a number of departments. The Manufacturing Area consists of five departments as follows:

- Casting Department

TMWC presently has two meehanite foundries with the capability of producing up to a total of 500 metric tonnes per month, and with the capability of producing a single piece weighing up to 3.6 tonnes.

- Machining Department

This department utilizes only the newest state-of-the art equipment in production machinery. It employs FMS, and included amongst its machine shop facilities are: CNC Lathes, Machining Centers, Boring Machines, Bridge Mills, and other customised machinery.

It also produces parts for a number of industries with particular emphasis on those parts which only a highly skilled work shop could produce, including aircraft parts.

- Assembly Department

Each year, it assembles about 1,600 Conventional Lathes, and about 700 CNC Lathes and Machining Centers. In order to ensure efficiency, and to maintain safety and quality control, the Assembly Department employs the Kanban Systems.

- Plastic Machinery Department

This department was set up as a separate department in January, 1988. Each year it produces about 400 Plastic Injection Moulding Machines.

- *Quality Assurance Department*

The QA Department uses the finest equipment in testing the tolerances of machines and ensuring that it delivers nothing but the highest quality products to customers. Testing equipment includes such machines as 3-D Coordinate Measuring Machine and Laser Telemetry Inspection Device.

- *Corporate Activities*

Administrative activities include the following:

- Finance
- Accounting
- Purchasing
- Investments
- Data Processing
- Planning
- Personnel
- Clerical, etc

In 1989, the Administrative Department went on-line with the HP/3000 system providing the company with a modern, sophisticated office environment.

- *Materials Management*

In order to ensure that the warehouse adheres to organizational standards, and manages the allocation and distribution of materials efficiently, it employs MRP (Materials Requirements Planning) and a total computer controlled material handling system.

8.5.2

Sales Performance of Taichung Machinery Works Company

The compound annual growth rate (CAGR) of turnover 1986 to 1989 was 16.2 percent (see Table 8-18). Sales fell 6.3 percent in 1990 due to reduced domestic demand caused by the low investment willingness of private sector. CNC lathes contributed 80 percent of sales growth from 1986 to 1989, with plastic injection machinery (PIM) accounting for the rest. Both CNC lathes and PIM were able to maintain sales in 1990, with the lower-end PHS lathes suffering reduced sales. PHS lathes will be phased out over the next five years.

TABLE 8-18 SALES BREAKDOWN FROM 1986 TO 1990

Year		Machine Models					Total
		Precision High Speed (PHS)	CNC Lathe	CNC Machining Center (CNC MC)	Plastic Injection Machine (PIM)	Others	
1986	Sales	306	398	236	0	104	1,044
	% to Total	29.3%	38.1%	22.6%	0.0%	10.0%	100%
1987	Sales	281	571	115	0	117	1,084
	% to Total	25.9%	52.7%	10.6%	0.0%	10.8%	100%
	Export	42.3%	45.4%	71.3%	0.0%	70.9%	50.1%
1988	Sales	287	634	129	67	100	1,217
	% to Total	23.3%	52.1%	10.6%	5.5%	8.2%	100%
	Export	35.9%	50.3%	73.6%	4.5%	66.0%	48.2%
1989	Sales	307	869	209	137	117	1,639
	% to Total	18.7%	53.0%	12.8%	8.4%	7.1%	100%
	Export	46.9%	59.5%	71.3%	40.9%	63.2%	57.4%
1990 * (preliminary)	Sales	240	877	202	138	109	1,566
	% to Total	15.3%	56.0%	12.9%	8.8%	7.0%	100%
	Export	42.5%	66.1%	72.3%	39.1%	64.2%	60.8%

* Sales and allowance not adjusted yet.

Source: Taichung Machinery Works Company

In 1989, TMWC sales were divided between Taiwan (42.6 percent), USA (11.5), and Europe (32.3 percent) (see Table 8-19). The most notable change in market distribution over the last 5 years was the sudden reduction in the share of sales going to the USA from 30 percent in 1986 to 10.7 percent in 1987 following the implementation of voluntary restraint agreement (VRA). This agreement restricted fast growth in sales to the USA in the following years. Growth in the European market has been impressive.

TMWC's record of good quality enables its products to command a premium price compared to other local manufacturers. As a result, the Company had maintained a steadily growing operating profit rate (5.1 percent in 1987, 12.9 percent in 1989) and its pre-tax profit rate of 8.2 percent in 1989 ranked No. 1 in the local machine tool industry.

The contribution of each item to total gross profit is shown in Table 8-20. The importance of PHS lathes will continue to decline, and the contribution from PIM will continue to increase.

8.5.3

Business Management Philosophy of Taichung Machinery Works Company

There is no better evidence of the interdependence of countries around the world than to look at the growth of a world economy over the past few decades. Moreover, this world economy relies fundamentally on the development of new technologies, such as those developments within the machine tool industry.

In this global marketplace, Victor Taichung Machinery has set itself on a course to be at the forefront of technology. The use of technology is part of the very fabric of the company, and as a result, it develops some of the highest quality machines in the market today.

Furthermore, it has reached out to the customers, by establishing facilities all around the world to provide the machines, service and support.

Globalization has created new opportunities and responsibilities. Victor Taichung Machinery has met these challenges, and will continue to do so by being responsive to technology, to the marketplace and to its customers.

TABLE 8-19 TAICHUNG'S MARKET DISTRIBUTION

Country	Year				
	1986	1987	1988	1989	1990
Taiwan	30.0%	49.9%	51.8%	42.6%	39.2%
USA	30.0%	10.7%	10.2%	11.5%	12.0%
Europe	27.0%	26.9%	25.8%	32.3%	35.0%
China	13.0%	12.5%	12.2%	13.6%	13.8%

Source: Taichung Machinery Works Company

TABLE 8-20 CONTRIBUTION TO TOTAL GROSS PROFIT

Machine Models	1987	1988	1989	1990	1991
Precision High Speed Lathe	36.0%	25.5%	21.5%	10.0%	7.0%
CNC Lathe	37.1%	44.4%	51.7%	60.0%	50.0%
CNC Machining Center	13.7%	6.4%	9.3%	11.5%	15.0%
Plastic Injection Machine	0.0%	3.2%	9.5%	3.5%	4.0%
Others	13.2%	20.5%	8.0%	5.0%	4.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Taichung Machinery Works Ltd

From 1954, when Taichung Machinery Works was first formed, the company has undertaken continuous development concurrent with the development of a global market. From the beginning, it has been determined to give customers the highest quality machines, and has never wavered from that goal.

In 1985, in order to enhance the feeling of unity throughout TMWC, the company implemented at its corporate headquarters, what is called, a Company Identification System (CIS). This encompassed setting out to design a distinctive company logo, selecting company colours, and devising unique designs for use in all aspects of media and promotion.

In 1988, after much consideration, discussions and revisions, the Company Identification System was then put into effect throughout the entire organization world-wide and so as of 1990, it has developed as the colours, logo and distinguishing characteristics that identify the Victor-Taichung Company.

The Victor-Taichung will strive to reach even greater heights, and over the coming years, it will continue developing advanced products based upon its technological skills and high standards of quality.

8.5.4

The ASEAN Market

TMWC was the largest local CNC lathe producer in 1989 with 22.8 percent of local production volume and 21.5 percent of local production value. TMWC's lower-end PHS lathe accounted for 7.25 percent of local non-CNC lathe production and made TMWC one of the biggest local players in this field. TMWC believes that it will maintain its leading position in local CNC lathe field in the near future since the No. 2 player (Leadwell) produces less than half of TMWC's production. TMWC ranked No. 4 in local CNC machining center production (No. 1 was Leadwell) with 7 percent of total production. CNC machining center was not a core product for TMWC, but the Company is making efforts to develop a new model and thus growth in this field can be expected.

A government-sponsored five-year machine tool R&D promotion project was started in July 1990 with the aim of enhancing the competitiveness of local machine tools through helping local runners to improve product quality. One goal

is to increase the contribution of CNC models to 45 percent by 1992 (27.9 percent in 1989). In 1990, 81.8 percent of TMWC's machine tool sales (excluding PIM and others) were already generated from CNC models and the Company plans to take advantage of its present CNC expertise and develop new products, particularly more advanced CNC lathes, as the industry as a whole heads towards the CNC era.

TMWC is a newcomer to the PIM field and production accounted for just 5 percent of total local production by volume in 1989. TMWC's PIM sales were 60 percent from the domestic market, but overseas markets, especially the US and ASEAN markets, look very promising (see Table 8-21). TMWC has made a commitment to the PIM field. PIM will become TMWC's second largest sales item in the near future.

CNC machine tools are estimated to have a penetration rate of 50 percent in Japan, 30 percent in USA and West Europe, and 10 percent in Taiwan and other ASEAN countries. The CNC market thus has room for sales growth. The local production of CNC controllers in two to three years time and the government's support of R&D will improve the competitiveness of Taiwanese CNC producers in chasing these markets that typically source 30 percent of their demand overseas. There will be growth in the local market, but overseas markets, particularly Europe and the ASEAN countries, will play very important role in TMWC's future plans.

• **FIRMS: Goal 1**

Goal 1 is *loyalty from customers*. (differential advantage through value added). Its capability is total quality customer satisfaction.

Techniques

- *Customer service staying in-touch with world markets*. Customer service is an essential element in the marketing mix, and has a great effect on the sales of industrial machinery.

Victor Taichung Machinery has over thirty five years of experience in proving service and training. Not only are the engineers highly trained technicians, but they are also equipped with foreign language skills. Moreover,

TABLE 8-21 LOCAL PIM EXPORTS

Unit: NT\$m	1987	1988	1989
USA	39.8	106.2	271.2
Hong Kong	18.2	95.1	234.3
Malaysia	0.8	16.2	164.3
Thailand	4.6	63.5	92.5
UK	3.3	17.6	58.3
Indonesia	2.4	39.1	46.6
Others	41.4	219.4	410.4
Total	110.5	557.1	1,277.6
Growth		404.2%	129.3%

Source: Taichung Machinery Works Company

there are few other Taiwanese companies who could provide maintenance and repair of the computerized controller electronics, in addition to maintenance and repair of the machine itself.

- *Warehouse facilities.* Victor Taichung Machinery has set up warehouse facilities in the US, Japan, the Netherlands, France, and Denmark which are staffed with qualified technicians who are on call to provide service to customers. Its commitment to providing fast, efficient, high quality service emphasizes its dedication to customers around the world.
- *Participation in International Shows/Exhibitions.* TMWC participates in international shows and exhibitions. It seeks to promote the Victor name and strives to maintain an exceptional corporate image in the eyes of customers.

- **FIRMS: Goal 2**

Goal 2 is *commitment from workers* (competitive workforce). Its capability is human resource management.

TMWC's future developing blueprint is to create an enterprise of the employees, by the employees, for the employees.

Techniques

- *Member of Corporate family.* To gain a new prospect for TMWC requires every member of this big family to share the identical recognition and willingness to commit himself in the fulfillment.

To care is to understand; understanding prompts for self-commitment. In a more concrete sense, commitment means cultivation. And, sound and solid cultivation shall finally reap good harvest. Since TMWC aims to become an enterprise of the employees, by the employees, the gained profit shall certainly be for the employees.

- *Knowledge and experience.* The absorption of new knowledge and accumulation of working experience are absolutely essential. Emphasis will be given to education and training.

- **FIRMS: Goal 3**

Goal 3 is *cooperation from suppliers* (value added partnership). Its capability is supply chain management.

Techniques

- *Share manufacturing.* TMWC formed joint-ventures with their suppliers so that they can share the cost of investments, at the same time have direct control over its suppliers' product quality. When there is spare capacity due to the economic recession, these companies can act as subcontractors for other manufacturers. However, when the economy is good, these subsidiaries will share the load to cushion the increase in demand.

- **FIRMS: Goal 4**

Goal 4 is *collaboration from distributors* (value added partnership). Its capability is distributor network management.

Techniques

- *Members of "extended family".* TMWC believes in maintaining close links with its distributors. They allow their distributors to keep spare parts at their respective market for more efficient after-sales service. Spare parts are supplied to distributors on consignment basis.
- *Value added after-sales service.* TMWC service engineers make regular service calls to their customers for preventive maintenance at no extra cost.

- **FIRMS: Goal 5**

Goal 5 is *respect from competitors* (industries/market leader working on the principle of competitive cooperation). Its capability is world-class manufacturing and world-class marketing.

Techniques

- *Strategic alliance.* One of the Japanese CNC machine tool manufacturers, ie Takisawa, has formed strategic alliance with TMWC to build machines for penetration into Taiwan market. Both companies believe that they can achieve bigger market share through this joint effort. Technical assistance is given by Takisawa whilst TMWC provides the marketing expertise.

•*Computerisation of machine design key to future development..* The R&D Department is responsible for the design of all machines developed by TMWC. The R&D Department has been using CAD systems (Computer Aided Design) since April, 1987. This has benefited the company tremendously, particularly in the development of the Vcenter-65, Vturn-26, Vturn-16 and the whole line of plastic injection moulding machines.

TMWC was, of course, very proud, that the Vturn-26 NC lathe and Vcenter-65 machining center came away with first honors in the Research and Development competition respectively in 1988 and 1990.

To ensure that staff has the best tools possible, in the beginning of 1989, it installed a HP/9000/360 minicomputer. Up to this point, the design engineers had been using CAD software on a PC network to carry out their work.. However, the HP will allow it to employ even more sophisticated CAD/CAM systems which will keep TMWC at the forefront of technological development.

8.5.5

Summary

Analysis of *FIRMS* in Taichung Machinery Works Company is in Table 8-22.

TABLE 8-22 ANALYSIS OF FIRMS IN TAICHUNG MACHINERY WORKS COMPANY

Strategy: Loyalty from Customers	Commitment from Workers	Cooperation from Suppliers	Collaboration from Distributors	Respect from Competitors
Capability: Total Quality Customer Satisfaction	Human Resource Management	Supply Chain Management	Distributor Network Mangement	World-Class Manufacturing/ Marketing
Techniques: <ul style="list-style-type: none"> • Customer service staying in-touch with world markets • Warehouse facilities • Participation in international shows, exhibitions 	<ul style="list-style-type: none"> • Member of corporate family • Knowledge and experience 	<ul style="list-style-type: none"> • Share manufacturing 	<ul style="list-style-type: none"> • Value added service • Member of extended family 	<ul style="list-style-type: none"> • Cost-driven strategy (the caretaker strategy) • Cost-driven and market-driven strategy (the reorganizer strategy)

Source: Author

8.6 Case Five: Profile of Leadwell CNC Machine Manufacturing Corporation

Founded in 1980, Leadwell CNC Machines Manufacturing Corporation is today the largest CNC machine tool maker in Taiwan. Machine tools are always considered a gauge for evaluating the development of industry. Bearing this in mind, Leadwell produces CNC machines with minds and eyes open to the latest advanced technologies, and places the most severe tests on its products. "In search of Excellence to Win Respect" has been the managing philosophy of the Leadwell group for over ten years. It has been working hard in pursuit of high quality, faster service and new hi-tech ideas. Although it is proud of its achievements, Leadwell is never satisfied and is always looking ahead for new goals to reach the peak of the machine tool kingdom.

1990 had been a very challenging year for Leadwell. First, the world economy was depressed during the first half of 1990. Second, Iraq's sudden occupation of Kuwait in August, resulting in crude oil prices soaring. Then global stock markets declined sharply; in Taiwan they dropped 80 percent from the peak to their lowest point. In addition, Leadwell faced high pressure from the appreciation of both the Japanese Yen and the New Taiwan Dollar. Leadwell machine tool sales volume fell sharply in 1990 to US\$51.80 million, down 35.81 percent over 1989's US\$80.70 million.

Even though it had suffered through a disappointing year, Leadwell still is optimistic about the future. The industrial market has rebounded after the cease of the Gulf war. Developed, developing and underdeveloped countries all stress national defence and its related industries. This, plus an especially large demand for postwar reconstruction dependent upon machine tools. In order to stimulate the Taiwanese economy, a Six Year National Development Plan has been implemented by the government. Thus, vigorous growth of both domestic and international markets is anticipated.

To meet customers' various demands and reduce investment risks, Leadwell produces more diversified goods such as laser cutting machines, CNC plastic injection moulding machines, CNC grinders, tapping and drilling machines, etc. At the same time, it continues to pursue its policy of attempting to lower costs and increase quality. In terms of a key strength, Leadwell identifies technology and allocates 3.5 percent per annum of total sales to R&D. It has its own software and design departments. Leadwell is also seen to play an important strategic role in the defence industry of Taiwan. The implications of this political consideration are likely to be reflected, one would expect, in various incentives to the company.

Leadwell is ranked Number One in the production of CNC machining centers in Taiwan and is in the top-five in the world. Leadwell believes that its motto: "In Search of Excellence to Win Respect" will bring great honour to Leadwell cooperation. Leadwell Corporation organization chart is in Figure 8.18. Its major markets and products are listed in Table 8-23.

8.6.1 Capital Assets and Manufacturing Facilities of Leadwell CNC Machines Manufacturing Corporation

Leadwell has established seven factories to handle increasing demand. Each of these factories has its own specific responsibility to fulfil.

The Taichung Factory, located in the Taichung Industrial Park, is now the head office of the Leadwell group. Its main production includes horizontal, vertical machining centers, and CNC laser cutting machines. The Yu Shin factory is responsible for the production of the CNC turning centers. The Shin Tien Factory is the processing factory. The Shen Kang and General Factories produce CNC grinders and tapping centers. The Charter Factory focuses on the production of CNC plastic injection moulding machines. The Lima Factory cooperates with a German company producing CNC column moving machining centers and wood-working machines.

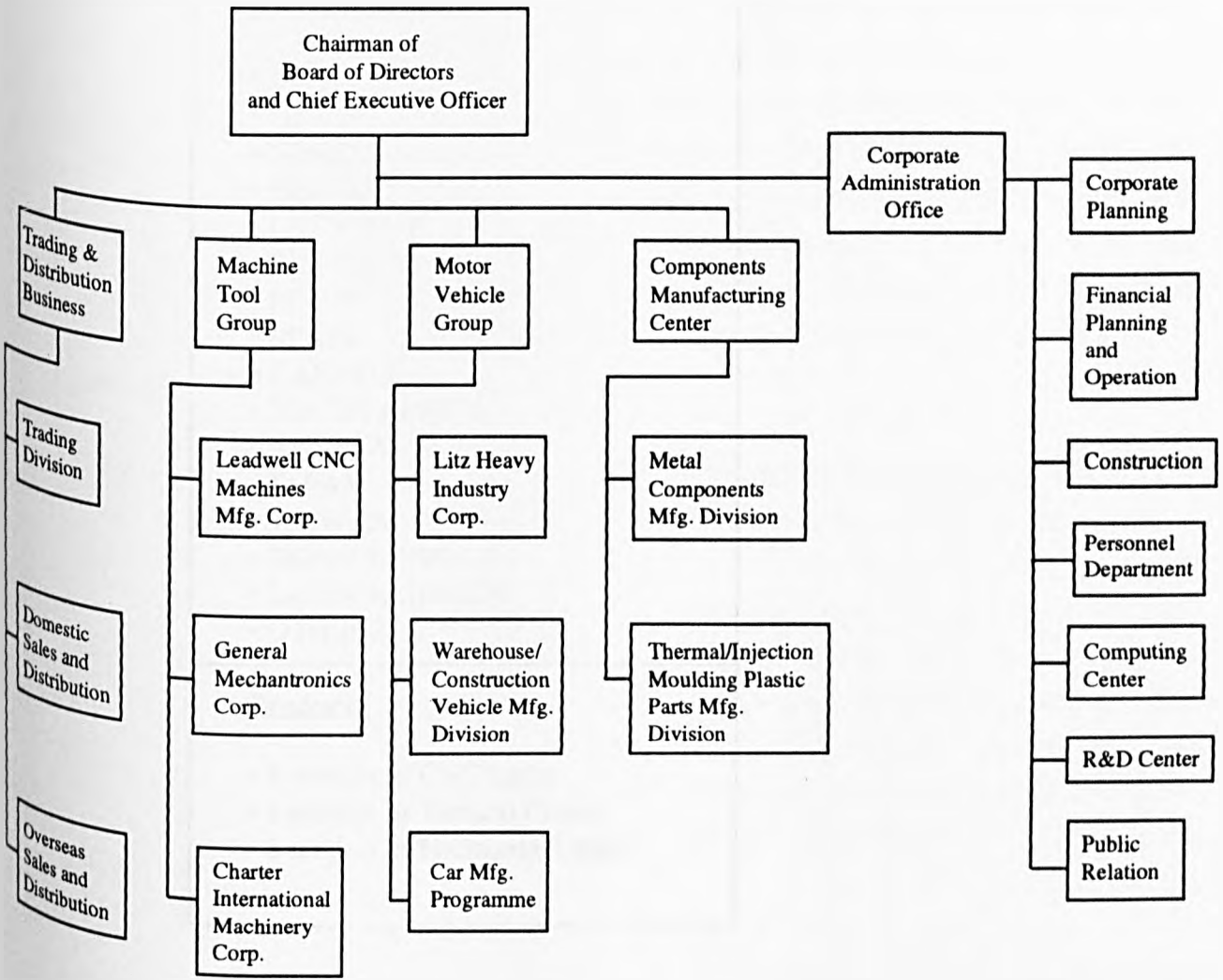
With the construction of each machine, Leadwell continues to put emphasis on a high level of precision and reliability as well as designing for more ergonomic operation. Considering the serving of advanced technological equipment is the effective and efficient route to achieve high productivity, flexibility and accuracy, Leadwell has been executing FMS factory building projects.

The fruits of these advanced facilities will put Leadwell ahead of its competitors in the race to develop faster, more accurate, and less costly CNC machine tools.

Leadwell has the most open mind to use European components:

- 100% of spindle bearing and ball screw bearing from Fafnir, UK
- 90% of ball screw from IBL, UK
- 100% of lathe turret from Italy
- Start to use numerical controllers from France
- Going to try Heidenhain CNC and Siemens CNC

FIGURE 8.18 LEADWELL CORPORATION ORGANIZATION CHART



Source: Leadwell Corporation

TABLE 8-23 MAJOR MARKETS AND PROJECTS

<p><u>Major Markets</u></p> <ul style="list-style-type: none">• USA• UK• NORDIC• FRANCE• GERMANY• BENELUX• ITALY• SPAIN• CANADA• SOUTH AFRICA• AUSTRALIA• JAPAN• TAIWAN• HONG KONG• LATIN AMERICA• OTHERS
<p><u>Products</u></p> <ul style="list-style-type: none">• 9 models of CNC Lathe• 8 models of Vertical Center• 2 models of Horizontal Center

Source: Leadwell Corporation

- All magnetic contractors will choose Telemachnic (France) very soon to replace Fuji, Japan.

In terms of technical cooperation Leadwell deals with a German company and its machinery has been approved by the German VDU organisation which monitors product standards. It also has technical operational agreements with Taylor Hobson in the UK and Hewlett Packard for laser machinery tools. Its focus is on hi-tech automation. It is working on the development of CNC multiple function units and flexible production systems. Its motto is "Quality is our nature". Taiwan is now seen as expensive and often minor technical problems arise with product quality. Moreover, cast iron has to be imported from Japan and in terms of controlling devices it relies on Fanuc, Alan-Bradley, Siemens and Mitsubishi. This device is very hi-tech intensive and very important and the industry is becoming increasingly capital intensive.

8.6.2

Sales Performance of Leadwell CNC Machines Manufacturing Corporation

Leadwell seeks to indulge in a win-win type situation through the pursuit of perfection. It now has sold to more than forty five countries, selling more than 10,000 machine tools. 80 percent of output is exported with more than 50 percent going to the EU market. On a country basis, the USA and UK are its main markets (see Table 8-24), and these are the only international markets where it has established marketing subsidiaries, using distributors in the other markets (see Figure 8.18). Among Taiwanese machinery manufacturers, Leadwell is the most likely foreign investor in the EU for a number of reasons:

- It has the strongest engineering capacity
- It has avoided simply mimicking Japanese products, and instead has developed its own design capabilities
- It has successfully developed its own brand name (ie Leadwell), with OEM sales now accounting for less than 30 percent of total sales.

Given the general attractions of the UK to inward investors from Asia (eg English language, economic and political stability, infrastructure etc), and also its specific attractions for Leadwell (ie the importance of the UK market and the location of its sole European marketing subsidiary), Leadwell is most likely to prefer the UK for its EU manufacturing base.

TABLE 8-24

WORLD-WIDE SALES OF LEADWELL CORPORATION
(UP TO DECEMBER 31, 1992)

EUROPE (over 5,000 sets):	Austria	(over 22 sets)
	Denmark	(over 154 sets)
	England	(over 2,732 sets)
	Finland	(over 22 sets)
	France	(over 431 sets)
	Germany	(over 630 sets)
	Holland	(over 298 sets)
	Norway	(over 55 sets)
	Portugal	(over 77 sets)
	Italy	(over 331 sets)
	Spain	(over 66 sets)
	Sweden	(over 127 sets)
Switzerland	(over 55 sets)	
AMERICA (over 3,410 sets):	Canada	(over 300 sets)
	Mexico	(over 123 sets)
	Costa Rica	(over 10 sets)
	USA	(over 2,672 sets)
	Argentina	(over 95 sets)
	Brazil	(over 40 sets)
	Colombia	(over 40 sets)
Venezuela	(over 40 sets)	
ASIA (over 2,092 sets):	Hong Kong	(over 284 sets)
	India	(over 4 sets)
	Indonesia	(over 43 sets)
	Israel	(over 115 sets)
	Japan	(over 305 sets)
	Singapore	(over 301 sets)
	Taiwan	(over 852 sets)
	Thailand	(over 4 sets)
	Turkey	(over 106 sets)
	Malaysia	(over 331 sets)
China	(over 120 sets)	
AFRICA (over 200 sets):	South Africa	(over 188 sets)
	Nigeria	(over 12 sets)
OCEANIA (over 140 sets)	Australia	(over 100 sets)
	New Zealand	(over 40 sets)

Source: Leadwell Corporation

8.6.3

Business Management Philosophy of Leadwell CNC Machines Manufacturing Corporation

In order to continuously grow in the highly competitive global market place, Leadwell has to succeed as a first-class company in the world. A first-class company has to have right concept, produce high quality products, provide an excellent service, employ capable people, and develop a highly effective management system:

8.6.3.1 Concept

- Leadwell has to achieve customers' satisfaction based on customers' concerns and their view points.
- Leadwell must work closely with customers, dealers, suppliers, and its employees to form a large Leadwell family. Any family member's effort and trust is the key element for the entire family to succeed. Leadwell's future is inseparable from any family member.

8.6.3.2 Product

A first-rate world-class product must have:

- Highly quality
- Reasonable cost
- Delivered in time

Leadwell will make every effort to improve its product quality. Only quality can promote sales volume so as to acquire reasonable profit.

8.6.3.3 Service

A world-class service quality implies that customers purchase not only a product from Leadwell, but its early experience, technique, reputation, and sincere service. Leadwell stands behind its customers.

8.6.3.4 People

People are the most valuable assets and resources of Leadwell.

Along with growth, Leadwell will continue to train its people to sharpen its employees professional skill and knowledge, Leadwell demands its management to be active and responsible. They must achieve their goals with an open, fair, reasonable, and trusting attitude to coordinate their subordinate's mission. Leadwell respects its employees' feelings and the value of their culture. It will continue to improve its organization and management to provide an environment so that employees can reach their maximum potential and enjoy satisfaction of accomplishing a mission.

8.6.3.5 Management

Leadwell emphasizes a sensible management philosophy. The management system will be standardized, integral, consistent, and executable. This is to apply the principles of Computer Integrated Manufacturing in its management system. Equipped with the computer network system, Leadwell will process updated business and production information more accurately, fluently, and authoritatively. This will lead to the achievement of integration, automation, and high efficiency of Leadwell's business functions such as planning, design, production, sales, service, and finance, etc.

8.6.4 The ASEAN Market

Because Taiwan is a small island and lacks natural resources, Leadwell's export volume makes up around 90 percent of its total sales. In marketing, the traditional emphasis has been on international markets. However, in 1987 the USA concluded a Voluntary Restraint Agreement with Taiwan. To survive in the machinery industry, Leadwell began trying to develop other products and markets which were not limited by VRA. At present, Europe has become the largest export market for Leadwell. For the future, European Oceania and ASEAN markets have been identified as those with the best potential.

• **FIRMS: Goal 1**

Goal 1 is *loyalty from customers*. (differential advantage through value added). Its capability is total quality customer satisfaction.

Techniques

- *Market intelligence.* To display Leadwell's products, it takes full advantage of international fairs; visiting exhibitions such as the Chicago International Machine Tool Show, the European Machine Tool Show, the Japan International Machine Tool Fair and the Taipei International Metalworking Machine Show, etc. These exhibitions are a vital part of its marketing strategy. There it can demonstrate its machines and exchange opinions, experiences and advanced technologies with its global distributors who come from every corner of the whole world. It is also a place where it can get first-hand information, in addition to information coming from periodicals, regular visits and daily communication via fax.
- *Competent service system.* Leadwell provides a competent service system with customers at home and abroad. Its service system is divided into two parts; the domestic position is served by Leadwell, the overseas is cared for by global distributors on behalf of Leadwell. In order to offer more efficient service independently, the distributors have trained technicians and some inventory of spare parts. Leadwell is also able to fully support their before-sales service and after-sales service by means of telephone or fax. In addition to communication with world-wide distributors face to face at regular intervals, its wide range of service training is also a very important link in the service system. The ultimate purpose is to help customers within the shortest time to become familiar with Leadwell's machines through installation, operation to maintenance.
- *World-wide sales network.* In the beginning, Leadwell built the CNC milling machines for its American customers. Though it was the first model, it was well-received and business gradually expanded. With confidence in its employees, and with the encouragement of its American customers, Leadwell began to produce its own machining center in 1982. In a very short time, Leadwell became a brand name well-known around the world. It quickly established a solid sales network supported by distributors on the five continents. In 1986, it launched lines of new products - the CNC turning centers. With this, new distributors in different countries joined the world-wide sales network of Leadwell. These distributors not only shared in the growth of Leadwell, but also offered Leadwell their best support and

technology. Due to Leadwell's boarder line of products, the sales network has become more competitive and compact.

• **Honest Assessment**

If one were to do a SWOT analysis of Leadwell then technology is seen as a major strength while China is seen as representing a major opportunity. The company is considering transferring machine tool production to China because of the following factors:

- language
- costs
- access to technology

In terms of location, Shanghai appears a particularly attractive situation. A major threat at the moment is the recession in the EU market, principally the UK, France, Germany and Italy. Another major threat has been the recent pricing policy of Japanese companies resulting in price cuts. The main competitors are identified as Mori Seiki, Hitachi and Okuma, all of whom are pursuing a strategy of differentiation. Leadwell by contrast competes on low price while offering good quality.

In the near future, Leadwell is likely to establish a European Regional Office to oversee international distribution in that market. Germany or Netherlands is the most likely locations. Moreover it may set up a plant for sheet metal machines in 1993/1994. A decision will be made after the European Machinery Exhibition which takes place in Hanover in September of this year. The critical determinants of the plant location decision shall be:

- labour costs
- technology
- material costs

The importance of the EU market to Leadwell arises from the imposition of the VRA by the USA in the mid 1980s. Leadwell indeed was the first Taiwanese company to sell a CNC machine in the market. In this regard it is likely to establish a warehouse office or bonded warehouse in Singapore because of the tax environment, the technological environment, and the high quality transportation network available there.

• **FIRMS: Goal 2**

Goal 2 is *commitment from workers* (competitive workforce). Its capability is human resource management.

Techniques

- *Training and education.* Leadwell's employees have the characteristic features of youth, optimism, enterprise and professionalism; qualities which are the driving force in keeping the company moving ahead. Because human resources are the guarantee for a strong enterprise, Leadwell stresses on-going training and education for employees. In addition to formal on-the-job training, it also provides opportunities for overseas training and make it a point to reward outstanding individual achievements. To further develop employees' talents, Leadwell permits people to move from one department to another. This provides employees with channels for promotion and opportunities to exercise their talents and develop their interests.

- *Employees' welfare committee.* The Employee's Welfare Committee is set up to take care of employees' needs more fully. The members of this committee are elected from different departments and arrange various kinds of leisure activities during each season to help them relax, and also provide gifts for festivals and subsidies for special occasions. Other benefits include:
 - Year-end bonuses
 - Five working days per week
 - Transportation fees; Dormitory rooms
 - lunch compensation, etc

- *Non-union policy.* The company has a non-union policy and is a cocktail of Japanese style and Chinese style management.

• **FIRMS: Goal 3**

Goal 3 is *cooperation from suppliers* (value added partnership). Its capability is supply chain management.

Techniques

- *Evaluation policy.* Vendors and suppliers' evaluation and management policy

- *Production Control.*

- Implementation of bar code system in manufacturing factory that helps to keep better production control.
- Implementation of an automatic job shop order system to issue job orders
- Recalibrate inventory record that have confused production planning.
- Establishment of an internal technical advisory committee that collects hundreds of man-years technical experience. This committee has already helped to make several technical decisions.

- *Quality Assurance*

- Standardization of the finished products inspection procedure.
- Aggressively working on ISO 9000 accreditation program. To pass accreditation in 1994.
- Establishment of a better parts quality inspection system to assure better parts.

- **FIRMS: Goal 4**

Goal 4 is *collaboration from distributors* (value added partnership). Its capability is distributor network management.

Techniques

- *Joint venture.* Leadwell has joint venture with Fong Lee Company in Singapore.
- *Technical support.* Leadwell gives technical support to Fong Lee Company to develop one model of machining center under Fong Lee brand though it provides direct competition as Leadwell also sells machining centers.
- *Technical showroom.* Leadwell assists its distributors to set up technical showrooms.

- **FIRMS: Goal 5**

Goal 5 is *respect from competitors* (industries/market leader working on the principle of competitive cooperation). Its capability is world-class manufacturing and world-class marketing.

Techniques

- *Promote own brand name.* Leadwell has been investing more and more in the promotion of its own brand and has become a member of the Brand International Promotion Association (BIPA) of the Republic of China. More than 80 percent of sales is under the Leadwell brand name and in CNC machine tools the Company is equally dependent upon its own brand. It promotes its own brand name through professional magazines and in order to stay close to customers, it is setting up its own subsidiaries internationally.
- *Towards the ideal system..* In the 21st century, factory automation systems will be necessary to cope with increased demand without significantly increasing employment levels. In 1986, Leadwell cooperated with Industrial Technology Research Institute to develop a factory automation system for the purpose of education in the school. The system included two machining centers linked to one turning center with automatic robot and transport systems controlled by computer.

At present, its GTC-10, GTC-20 and LTC-20TM can be equipped with an optional robot to work more efficiently; the FMC-760A, FMC-1P and all computer numerical control horizontal machining centers with automatic pallet changers are an embryonic form of the flexible manufacturing cell and flexible manufacturing system. Furthermore, it has set up a factory automation center and imported highly advanced equipment to speed up the FA systems.

After FMS is designed and installed, a series of similar or dissimilar machines can be linked and coupled to a system of computers and tool transportation systems to give maximum production flexibility. If further coupled to computer-aided manufacturing and host computers, the concept of computer integrated manufacturing will be a reality.

Leadwell has every prerequisite to become an even stronger enterprise capable of dealing with the rapid changes in the world's economy, thereby positioning it to lead the competition throughout the 1990s.

- *Efficient management system.* As computer system technology has improved, all business activities can be recorded, controlled, analysed and used as support for top level management in decision-making and problem-solving. Based on this, Leadwell has invested both money and manpower in developing computer-controlled processing.

So far, it has set up two mini-computer systems (one multi-user 486 workstation with a UNIX operating system and the other Hewlett Packard 3000/900 series with an MAE-XL operating system) on which financial accounting, personnel management, production control and purchasing order processing software systems have been running, in addition to numerous personal computers used for text-editing, desk-top publishing, graphics design and data base processing.

Though Leadwell's several factories and affiliated companies are physically separated, through the medium of the modem and the multiplexer, it can all share the same information through personal computers or terminals. With a long-term view, it anticipates a networking of management of requirement planning (MRP) II systems, and factory automation (FA) creating an office automation (OA) system. After this network is connected, it will greatly promote efficiency and increase both productivity and competitiveness.

- *Responsible manufacturing process.* Research and development is the foundation for the growth and strength of Leadwell. Leadwell's emphasis on R&D is reflected by its noticeably increasing annual expenditures in this area. In the fiscal year 1991, R&D expenditures had exceeded NT\$50 million, compared with over NT\$30 million in 1990, NT\$26.6 million in 1989, and a remarkable increase from NT\$13.8 million in 1988. This accounted for 3.37% of total sales in 1991, compared with 2.39% in 1990, 1.32% in 1989 and 0.93% in 1988.

This department assumes the responsibility for overall planning from market surveys to finished products. To fulfil top-down planning and bottom-up implementation, Leadwell introduced a computer-aided design (CAD) system in the R&D department. This has proven useful for developing and designing technically superior and innovative components. Other similar systems will be employed in production control, assembly and other departments. When the integration of the engineering management system (EMS), the materials management system (MMS) and the production management system (PMS) is completed, Leadwell will have made great strides toward computer integrated manufacturing.

This mission of the R&D department is to improve products and launch new models. During the past ten years, it has worked hard to bring forth new ideas in Leadwell's products and has received "The Good Product Design Award" many times as well as other awards both in Taiwan and overseas.

In R&D, Leadwell's main licensing partner is a German company called Norte but it is currently looking for Japanese partnerships. It currently has four hundred and eighty employees engaged in R&D and more than twenty of these are Japanese qualified engineers. It already has recorded more than ten patents.

From the initial design stage through trial runs and mass production, the following three departments play a major role:

- Research and Development
- Quality assurance
- Manufacturing

The experienced engineers provide total support from the planning stage through development - and give full consideration to the standpoint of users, including the vital factors of cost-performance and maintenance. When a prototype is developed, it is operated by the manufacturing department, and engineers make any improvements in accordance with the shortcomings that may be discovered. Then, it is returned to manufacturing to run again, till it is faultless. Then Leadwell begins production. Usually there are two or more stages before final mass production.

To ensure the stability and durability of the finished products, the quality of castings is extremely important. The high-precision factory is responsible for the precision-testing of castings and assembly of the automatic tool changer (ATC), the automatic pallet changer (APC) and the Spindle. All need stringent tests and analysis before being transported to general assembly lines. Therefore, it is very important to use state-of-the-art processing machineries which include CNC turning centers, vertical machining centers, horizontal machining centers, cylindrical grinders (exterior and interior grinding), surface grinders, radical drilling machines, jig borders, super precision boring machines and a 5-face machining center (with vertical and horizontal spindle), etc.

Constant checks are made to assure that quality is maintained. From casting to final assembly, workers are responsible for checking the quality of their own process before passing on. The whole manufacturing procedures are made under standardized processes with strict quality control.

- *Competent quality control system.* Quality is Leadwell's Nature. Leadwell's integrated quality assurance begins with design and continues through material incoming to product shipment. To assure the quality of purchased parts, it inspected them with three-dimensional coordinated measuring devices, roundness measuring instruments and other inspecting devices such as electronic level gauges, electronic roughness meters, electronic altimeters, inside diameter gauges, outside diameter gauges, marble inspection tables, shore hardness meters, check masters, optic rules and angle rules, etc. Before products are delivered, all machines undergo thorough static inspection, dynamic inspection and full function tests by laser measuring equipment and advanced inspecting devices. This insures the quality and reliability of all Leadwell products. In order to strengthen the standard of weights and measures, a laboratory was also established. In addition, Leadwell regularly communicates with its sub-contract factories to help them improve their quality control systems so as to increase the productivity of the suppliers.

Leadwell has been awarded the CNS mark of quality by the Ministry of Economic Affairs in the CNC turning center category and its quality

management has also earned Leadwell the award of "Grade A Manufacturer", which are all guarantees to customers. To meet the requirement of 1992 EU-based firms, ISO 9000 quality is recognised as the most important task.

Leadwell's ultimate aim is to produce zero-defect products. With the aid of more and more intelligent technology for automatic quality control, it believes that ideal will be realized very soon.

8.6.5

Summary

Analysis of *FIRMS* in Leadwell CNC Machines Manufacturing Corporation is shown in Table 8-25.

TABLE 8.25 **ANALYSIS OF FIRMS IN LEADWELL CNC MACHINES MANUFACTURING CORPORATION**

Strategy: Loyalty from Customers	Commitment from Workers	Cooperation from Suppliers	Collaboration from Distributors	Respect from Competitors
Capability: Total Quality Customer Satisfaction	Human Resource Management	Supply Chain Management	Distributor Network Management	World-Class Manufacturing/ Marketing
Techniques: <ul style="list-style-type: none"> • Market intelligence • Competent service system • World-wide sales network • Honest assessment 	<ul style="list-style-type: none"> • On-going training and education of workers • Employees' welfare committee • Non-union policy 	<ul style="list-style-type: none"> • Production control • Evaluation policy • Quality assurance 	<ul style="list-style-type: none"> • Joint venture • Technical support • Technical showroom 	<ul style="list-style-type: none"> • Cost-driven strategy (the caretaker strategy) • Cost-driven and market-driven strategy (the reorganizer strategy)

Source: Author

8.7 Case Six: Profile of Fair Friend Enterprise Company Limited.

Every since Fair Friend Enterprise was founded, it has been adhering to the business principle of "Sincerity, Responsibility, and Sustained Management" and dedicating to the research & development for highest product quality and customer satisfaction.

Over the years, Fair Friend has successfully transformed itself from one single business to several different businesses. The operation has expanded from domestic distribution to international venture.

Establishment : March 15, 1979

Headquarters : 186 Yung Chi Road, Taipei, Taiwan, ROC

1979 : Established in March 15 as the exclusive agent for Japan's Kobe Steel Ltd, to distribute KOBELCO excavators and wheel loaders.

1981 : Rank No. 68 within the nation's Top 500 private and government own trading companies by China Information Services.

1983 : Granted as the sole agent for Japan's Ryobi Ltd to distribute RYOBI power tools and winches.

1984 : Started to manufacture CNC machine tools

1986 : Established RYOBI Tech Corp., the joint-venture between Fair Friend and Ryobi Ltd of Japan, to manufacture door closers, floor hinges and other builder's hardware.

1987 : Merged Bearing Casting Corp. to manufacture bearing housings and power transmission components.

1988 : Established Fairskq (Taiwan) Co., the joint-venture between Fair Friend and SKF Mekan AB of Sweden, the largest bearing housings manufacturer in the world, to manufacture bearing housings and other power transmission components.

1990 : Established Taiwan Iwata Industrial Co., the joint-venture between Fair Friend and Iwata Air Compressor Manufacturing Co., Ltd. of Japan to manufacture spray guns and accessories.

Established Fair Friend (Thailand) Co., Ltd., the joint-venture between Fair Friend and SKF Mekan AB to manufacture bearing housings and pulleys.

1991 : Completion of machine tools factory, computer factory, FSQ (Thailand) factory, and Taichung office building, CNC machining center received the Gold Dragon Award in the third ROC Fine product Exhibition.

1992 : Acquired the membership of "Central Satellite System" sponsored by Ministry of Economic Affairs.

Established elevator division and parking garage equipment divisions to manufacture and distribute elevators and automobile parking garage equipment.

CNC machining center received the honourable award in 1992 Innovative Products Competition.

Successfully implemented Flexible Manufacturing system (FMS) for Yu-Long Automobile Company in break drum production line. Acquired Cheer Electronic Corp. and Excellence Electronic Co., Ltd.

1993 : Participated in "FMS Experimental Program" sponsored by Mechanical Industry Research Laboratory of Industrial Technology

Invested in SNS Kanemitsu Corp. in Japan.

Machine Tool Division granted CNS and ISO-9002 approval.

Machine Tool Division received special award of "Symbol of Excellence" and "National Award of Excellence".

Organisation of Fair Friend Enterprise Company Limited

- Group Administration Division

The advancement of the enterprise relies on the individual to report the potential problems within the organization. Group administration division is responsible in taking care of all the claims and making all the necessary adjustment.

Group administration division includes personnel, finance, accounting, public relation, MIS, project management, as well as business administration. Fair Friend Group is in the process of integrating its information system among divisions in order to be more effectively using its resources and man power. The management team is constantly adjusting business strategies and production schedule to meet the market demand.

Group administration division has adopted the principle of 3 S's: Simplification, Standardization, and Systematization together with Computer Integrated Manufacturing System (CIMS), to meet the challenges in the future.

- Corporate Identity System (CIS)

The contemporary styling of the corporate logo symbolizes high quality and high precision of its products and services. The duplicated boomerangs represent reliability, continuous advancement, and sustained management. The corporate colour, verdant green, symbolized wisdom, harmony, progress and aspiration.

- CNC Machine Tool Division

FEELER machine tools have been distributed world-wide. The quality of FEELER machine tools is granted CNS approval and ISO-9002.

Machine tools are vital in the productivity of manufacturing industry and nation's economy. Machine tool division has implemented the most advanced CAD/CAM systems in design and manufacturing travelling column CNC Vertical Machining Centers, stationary column CNC Vertical Machining Centers, High Precision CNC Turning Centers, and CNC Horizontal Machining Centers. The quality of the products have been highly regarded among different sectors of the industry around the world.

To meet customers' demands, the division is now concentrating their efforts in developing more sophisticated machining centers and turning centers. The completion of its first Flexible Manufacturing System (FMS) in Yu-Long Automobile Company is one step forward in its technical pursuit.

- Overseas Branch Offices

Overseas branch offices not only serve as sales network but also provide easy access to overseas customers. These are:

- Mainland China: Beijing branch office
Shanghai branch office
Huangzhou branch office
Guangzhou branch office
Shenzhen branch office
- Asia: Japan branch office
Korea branch office
Hong Kong branch office
Thailand branch office
Singapore branch office
- North America: USA branch office (East Region)
USA branch office (Midwest)
- Europe: Germany branch office
Holland branch office

8.7.2

Business Management Philosophy

Over the last 15 years, through the ethics of "sincerity, reliability, and sustained management", the enterprise has successfully diversified itself and undertaken the challenge as it moves toward the year 2000 and beyond.

It has voluntarily taken the responsibility of promoting the quality of lives. As the focus of the society changes, so do the tasks and the organization of the enterprise. It greatly appreciates experience, practical knowledge and innovative

solutions that Fair Friend's overseas partners have brought. The future of the enterprise holds great promises as staff members are dedicated in improving its skills in R&D, manufacturing, services as well as marketing strategies. Fair Friend is committed to provide the products and the essential services to the community. Its venture is not complete, but the direction of the enterprise is crystallizing as the process continues. Its commitment and the ultimate sense of honour is illustrated in its Corporate Identify System (CIS) and its heritage.

Together with dedicated staff, Fair Friend looks forward to growth of the enterprise and the prosperity of Society.

At the present stage, Fair Friend's management will lay stress on the following strategies:

- To develop mirror surface machining technology and improve assembly efficiency
- To improve popular machine models for competitive marketing
- To accelerate the upgrading of machinery manufacturing by means of technology cooperation, and set up a brand-new image in the machinery industry.
- To establish overseas manufacturing satellite plant and explore potential export markets (especially in the ASEAN region)

8.7.3

The ASEAN Market

Regarding its projected manufacturing plant abroad, in compliance with the foreign country's developing policy of local machinery industry, Fair Friend is to produce high quality machines for expanding potential export markets to the ASEAN region. Besides this, it has to help improve the upgrading of local industry by means of technology or management transfer. Under mutually beneficial conditions, it shall gradually achieve its main objective as an international company. It is agreed that in the 90s countries in Southeast Asia shall become the most ideal choice for Fair Friend to establish its overseas manufacturing satellite plant, especially in Malaysia.

Fair Friend seeks to do business in the sphere of a global economic cooperation and world-wide trade relationships.

• **FIRMS: Goal 1**

Goal 1 is *loyalty from customers*. (differential advantage through value added). Its capability is total quality customer satisfaction.

Techniques

• *Quality Assurance*

- Standardisation of finished products and inspection procedure.

• *Sales and Service*

- Establishment of product maintenance and service parts

- Customer service quality survey

- study of maintenance and service technician ranking policy

• *Customer contact*

- Meetings with customers from around the world

• *Service teams*

- Part of its quality assurance programme

• **FIRMS: Goal 2**

Goal 2 is *commitment from workers* (competitive workforce). Its capability is human resource management.

Techniques

- *Fair Friend staff all cherish the opportunity to work together, to encourage one another, and to make collective efforts in fulfilling Fair Friend's dreams. Fair Friend staff have cultivated a sense of mutual consensus and unity through a variety of activities, and by doing so, it has further established its unique corporate culture-sincerity, enthusiasm, unity, and innovation. Continuous challenges and training will stimulate individual potential; and it is all ready to face whatever challenges come its way.*

- **FIRMS: Goal 3**

Goal 3 is *cooperation from suppliers* (value added partnership). Its capability is supply chain management.

Techniques

- *Vendors and suppliers' evaluation and management policy.* Fair Friend inspects all its products components with high-tech , precise instrument to assure superior quality and reliability.

- **FIRMS: Goal 4**

Goal 4 is *collaboration from distributors* (value added partnership). Its capability is distributor network management. Fair Friend sets up branch office under the same roof as its distributor.

Techniques

- *Technical support.* Station one engineer in Singapore to train distributor's sales people. The engineer is also responsible for giving after-sales service support to the ASEAN market.

- **FIRMS: Goal 5**

Goal 5 is *respect from competitors* (industries/market leader working on the principle of competitive cooperation). Its capability is world-class manufacturing and world-class marketing.

Techniques

- *World-class manufacturing, world-class marketing.* It was the innovative product design that made Fair Friend the first Taiwanese manufacturer producing Travelling Column Vertical Machining Center. As of today, Fair Friend is still the only Taiwanese manufacturer which makes this type of machining center. Fair Friend has 90 percent market share of the Travelling Column Vertical Machining Center. The data evidences its leading position. According to TOYOTA'S report, the Travelling Column Vertical Machining Center is the fifth-generation product of CNC machining centers while the Stationary Column is only the third-generation product. Furthermore, it would like to emphasize that all the machines it developed were not copies of other domestic or foreign made, but were the fruits of its own investment in R&D.

Because Fair Friend Ent. Co., Ltd. is determined to take the lead in product development, the company budgets annual R&D expenditure accounted for 18 percent of its annual sales while other manufacturers, on the average, only 3 to 4 percent of their sales are set for R&D's budget. A major breakthrough in the development of Flexible Manufacturing System was made possible by its commitment to the large amount of R&D capital outlay and by the dedication of the strong R&D team. In 1993, it installed the FMS in YU-LON automotive factory. The system was specially designed for the automatic production of disk breaks. It was also the FMS in Taiwan. The system is composed of FEELER CNC machining centers, lathes and robots. Again Fair Friend took the leading position in the integration of stand-alone CNC machines to form a Flexible Machining System.

In addition to the factories established under the joint venture agreements, Fair Friend Ent. has set up many other overseas branches engaging in selling and servicing its brand-name products in the global markets. In the USA, there are branches in the States of New Jersey and Missouri selling Power Transmission products, PC Monitors, and Machine Tools. In Europe, there are branches in Germany and Netherlands selling PC Monitors. Machine tools will be another major product sold in the European market. In Asia, there are more branches in Japan, South Korea, Hong Kong, Thailand, Singapore, and in the major cities of China such as Beijing, Shanghai, Guangzhou, Shenzhen. The reason why Fair Friend Ent.'s products can be marketed in the global markets is because Fair Friend devotes to research & development and customer's satisfaction. It is the devotion, the only way, to make its sustained business operation a reality.

Fair Friend's strict quality control and commitment of investing larger portion of capital in the R&D have not only won the confidence of world-class joint venture partners but also earned the recognition of "FEELER" brand among world-wide customers. Due to FEELER's advanced products and superior quality, FEELER machinery can be marked at a price 15 percent higher than similar model of all other Taiwanese makes. Based on its past experience, it realises that the only way to be the leader in the market is constantly monitoring the quality system, conducting continuous research and

development. To be the leader in the market is the ultimate goal. Fair Friend shall keep pursuing this goal by its sustained efforts.

8.7.4

Summary

Analysis of *FIRMS* in Fair Friend Enterprise Company Limited is in Table 8-26.

TABLE 8.26

ANALYSIS OF FIRMS IN FAIR FRIEND ENTERPRISE COMPANY LIMITED - MACHINE TOOL DIVISION

<p>Strategy:</p> <p>Loyalty from Customers</p>	<p>Commitment from Workers</p>	<p>Cooperation from Suppliers</p>	<p>Collaboration from Distributors</p>	<p>Respect from Competitors</p>
<p>Capability:</p> <p>Total Quality Customer Satisfaction</p>	<p>Human Resource Management</p>	<p>Supply Chain Management</p>	<p>Distributor Network Mangement</p>	<p>World-Class Manufacturing/ Marketing</p>
<p>Techniques:</p> <ul style="list-style-type: none"> • Quality assurance • Sales and service • Customer contact • Service teams 	<ul style="list-style-type: none"> • Staff activity and welfare 	<ul style="list-style-type: none"> • Vendors and suppliers' evaluation and management policy 	<ul style="list-style-type: none"> • Set up branch office under same roof as distributor • Technical support 	<ul style="list-style-type: none"> • Cost-driven strategy (the caretaker strategy) • Cost-driven and market-driven strategy (the reorganizer strategy)

Source: Author

8.8 Survey Research on the Wheel of Competition

The author administered the set of Questionnaire A on the Wheel of Competition and conducted in-depth interviews with the six machine tool producers.

8.8.1 Data Analysis for the Wheel of Competition of Producers

- *Target population and sample size*

The sample responses were collected from case studies of machine tool manufacturers in Japan and Taiwan. The target population from each country comprised of senior management executives of machine tool manufacturing companies. A target sample size of three companies was chosen for each country.

- *Statistical tests*

The ordinal data collected was tested for validity and consistency using statistical tests available in SPSS Release 5.0.2. The following tests were carried out:

- **Kolmogorov-Smirnov Goodness of Fit Test**

The Kolmogorov-Smirnov test was carried out to test the distribution of the data and to determine the degree of agreement between the distribution of observed values and expected frequencies.

Test sequence

- H_0 : (null hypothesis) that there will not be any differences in the observed frequency distribution of a variable

H_1 : (alternative hypothesis) that there are differences in the frequency distribution of the variable

- Level of significance of 5 percent, critical value = $\frac{1.36}{\sqrt{n}}$

(In this case, $n = 133$, critical value = 0.12)

- Kolmogorov-Smirnov test statistics (absolute value for most extreme differences) for the variable as generated by SPSS
- If the absolute value of the variable exceeds its critical value, the H_0 is rejected.

The Kolmogorov-Smirnov test findings showed that the sample data is normally distributed, The test also indicated that there are no differences between the distribution of the observed values for each variable compared to theoretical distribution (expected frequencies). The test showed that the absolute values (for most extreme difference) for each variable does not exceed the critical value 0.56 (tested with a level of significance of 5 percent).

For example, for the variable component WCLASS (labelled characteristic for world-class brand/image), the absolute value or the goodness of fit index (*0.40736) generated is below the critical value (0.56). The null hypothesis that there is no difference in the observed frequency distribution of this variable among the two countries surveyed is therefore accepted. The test findings therefore showed that the observations obtained for each variable are consistent in the sample data collected from both countries. Results of the Kolmogorov-Smirnov's Goodness of Fit test is shown in Annex 9.

- Cronbach's Alpha Reliability Test and the Chi-Square Test

The Cronbach's alpha reliability test was not conducted because of the small sample size. The Chi-Square test was not undertaken since the assumption that at least 80 percent of the expected frequencies should be five or more cannot be assumed.

- One-Way ANOVA (Analysis of Variance) Test

The one-way ANOVA test was used to test for differences among sample data collected from the two countries surveyed. The test would show whether the means of the various variables (characteristics) would be significantly different.

Test sequence

- H_0 : (null hypothesis) that the means of variable WCLASS are equal in Japan and Taiwan
- H_1 : (alternative hypothesis) that the means of variable WCLASS are not equal in the both countries
- Level of significance of 5 percent, with 1 degree of freedom between groups and 4 degrees of freedom within groups, critical value: $F_{0.05, 1, 4} = 7.71$
- F ratio test statistics generated by SPSS software package
- If F ratio is below the critical value, then H_0 is acceptable

The one-way ANOVA test was carried out on all the variables in the sample data. The test indicated that the means of all the variables are consistently similar among the two countries surveyed. Table 8-27 is a summary of the results of the test. Annex 10 shows a summary of the results of the one-way ANOVA test.

Using the variable COUNTRY as the dependent factor variable, the results of the test showed that all the variables tested have F ratios below the stated F critical value of 7.71 (using a 5 percent level of significance). The results generated showed that in all cases, the null hypothesis are accepted. It can therefore be concluded that the mean responses given for each variable (average ranking of the degree of agreement given by the respondents from Japan and Taiwan) does not differ statistically in two countries surveyed (see Figures 8.19 to 8.33).

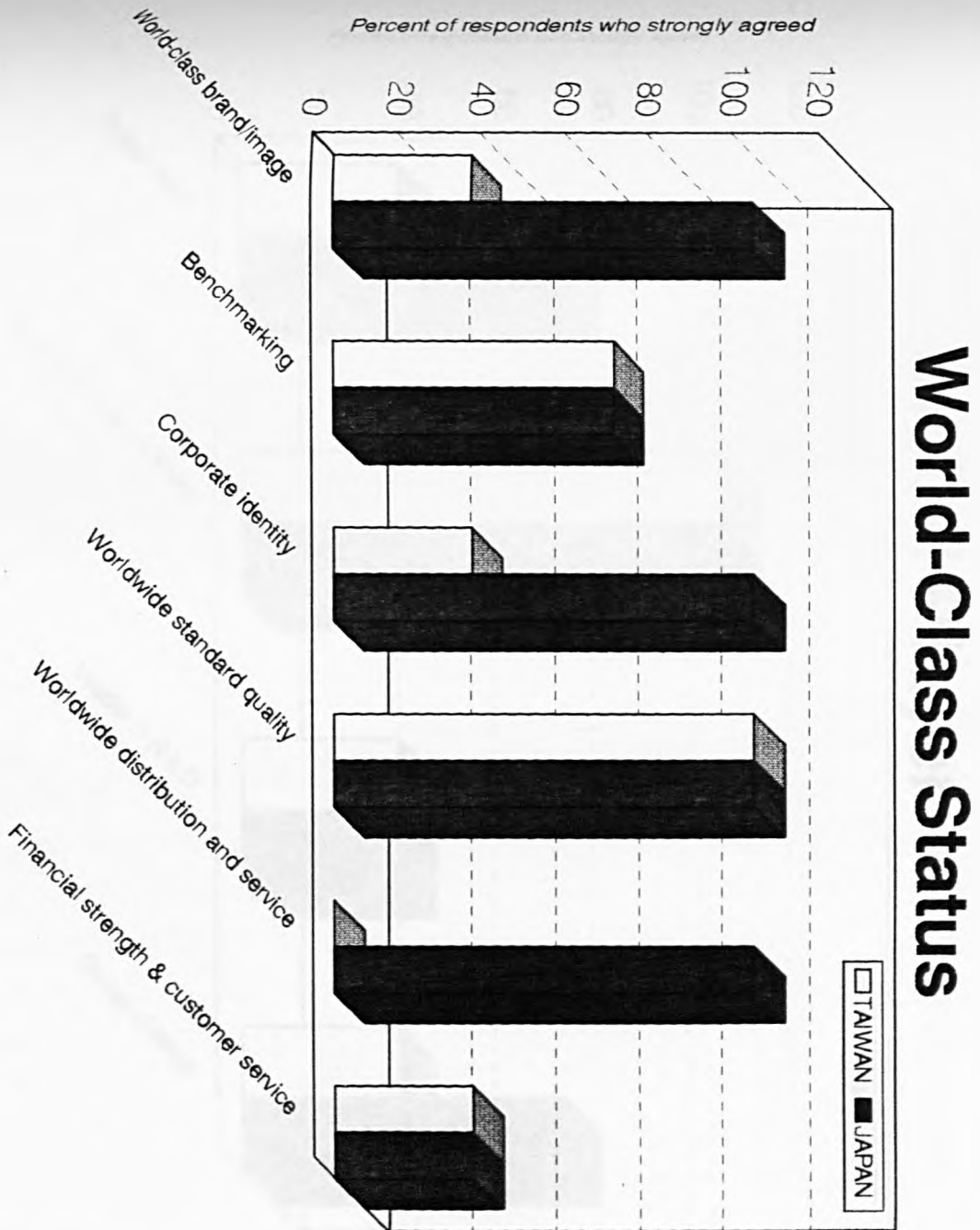
TABLE 8-27

SUMMARY OF THE ONE-WAY ANOVA TEST

Degree of Freedom Between Groups : 1 Within Groups : 4 Level of significance at 5% F _{0.05, 1, 4} = 7.71		Dependent Variable	:	Countries surveyed	
		H ₀ (null hypothesis)	:	means of characteristics are equal amongst the countries surveyed	
		H ₁ (alternative hypothesis)	:	means of characteristics are not equal amongst the countries surveyed	
Elements in the Wheel of Competition:		Mean	F Ratio	F Prob.	H ₀
(A)	World-Class Status				
	World-class brand/image	4.67	4.00	0.12	accepted
	Benchmarking	4.50	0.20	0.68	accepted
	Corporate identity	4.50	3.00	0.16	accepted
	World-wide standard quality	5.0	NS	NS	accepted
	World-wide distribution and service	4.50	NS	NS	accepted
	Financial strength and world-wide customer service	4.00	0.80	0.42	accepted
(B)	Global Player				
	Global reach	4.50	0.50	0.52	accepted
	Significant market share	5.00	NS	NS	accepted
	Leader in R&D/ Innovation	4.67	4.00	0.12	accepted
	Global Strategy	5.00	1.00	0.37	accepted
(C)	Commonsense Nations				
	Political stability	4.50	0.50	0.52	accepted
	Economic development	4.17	1.00	0.37	accepted
	Social harmony	4.17	1.00	0.37	accepted
	Takes the best from others	4.50	0.50	0.52	accepted
	Reverse engineering/innovativeness	4.33	4.00	0.12	accepted
	Trade surplus	3.00	4.00	0.12	accepted
	Competitive cooperation	5.00	4.00	0.12	accepted
	Enhanced standard of living	3.67	1.00	0.37	accepted
(D)	Communitarianism				
	Equality of results/hierarchy	4.50	0.50	0.52	accepted
	Consensus	4.67	0.00	1.00	accepted
	Community needs	4.00	2.00	0.23	accepted
	Active planning state	4.17	1.00	0.37	accepted
	Hollism	5.00	NS	NS	accepted
(E)	Confucianism				
	Thrift	5.00	NS	NS	accepted
	Reverence to elders	4.00	8.00	0.05	accepted
	Hardwork	4.83	1.00	0.37	accepted
	Social responsibility	4.33	4.00	0.12	accepted
	Hierarchy	4.50	0.50	0.52	accepted
	Loyalty	5.00	NS	NS	accepted
	Sacrifice	5.00	NS	NS	accepted
	Education	4.83	1.00	0.37	accepted
(F)	Art of War				
	Principle of Detailed Planning through SWOT Analysis	4.17	0.50	0.52	accepted
	Principle of Intelligence and Security	4.33	0.00	1.00	accepted
	Principle of Swiftness	4.33	4.00	0.12	accepted
	Principle of Adaptability	4.67	0.50	0.52	accepted
	Principle of Deception	3.67	0.14	0.72	accepted
	Principle of Priority (of Goals) and Proactivity	5.00	NS	NS	accepted
	Principle of Alternatives in Strategy	5.00	NS	NS	accepted
(G)	Business and Management Ethos				
	Superordinate goals (vision/mission)	4.17	4.50	0.10	accepted
	Strategy (profit/market share)	4.33	NS	NS	accepted
	Systems (performance appraisal)	4.00	0.80	0.42	accepted
	Structure (hierarchy/cross-functional teams)	3.83	0.25	0.64	accepted
	Skills (engineering/marketing/sales/service)	4.17	1.00	0.37	accepted
	Staff (education/experience/local/expatriate)	4.00	NS	NS	accepted
	Style (customer delight/exceeds expectation)	4.67	4.00	0.12	accepted

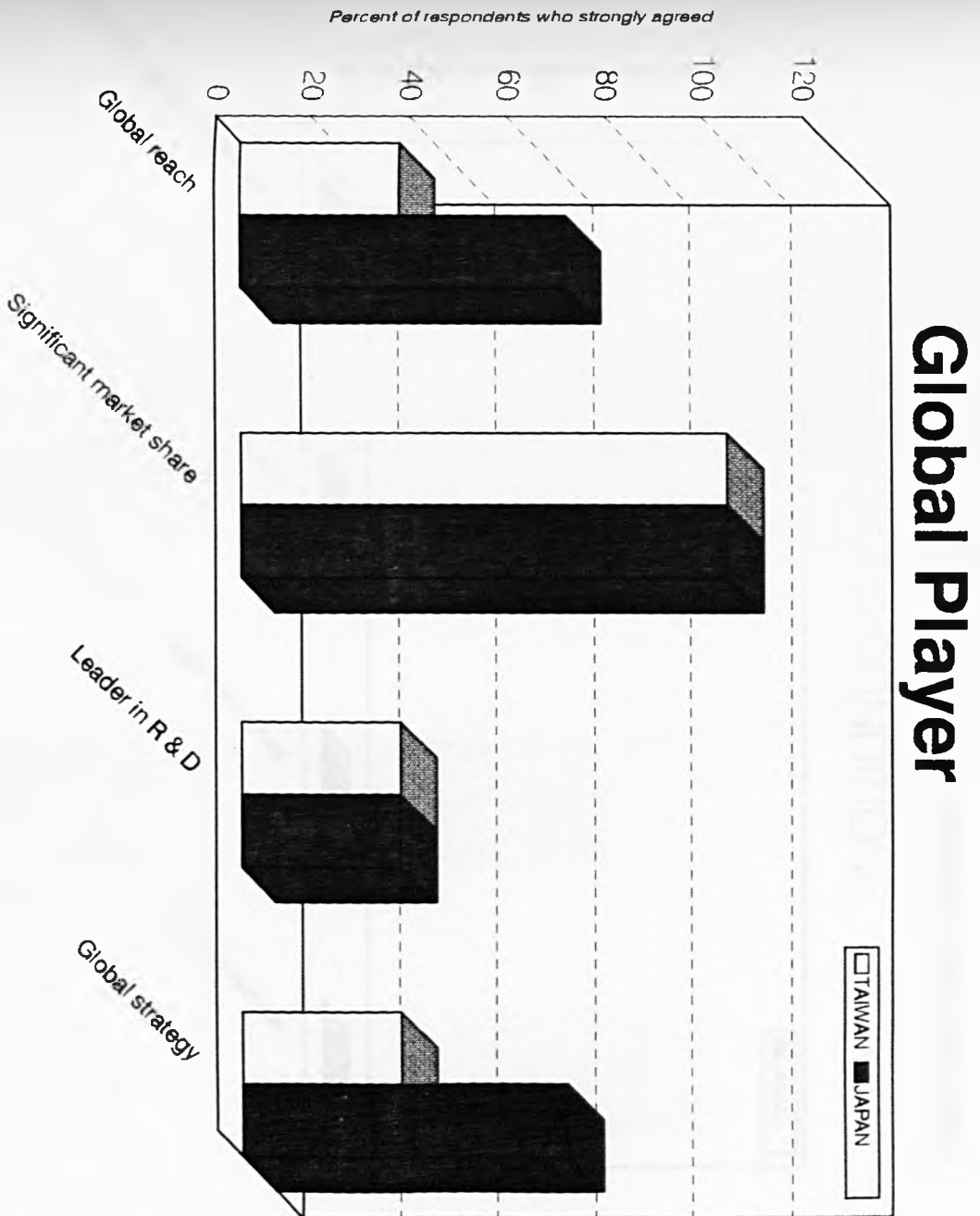
Source: Author

FIGURE 8.19



Source: Author

FIGURE 8.20

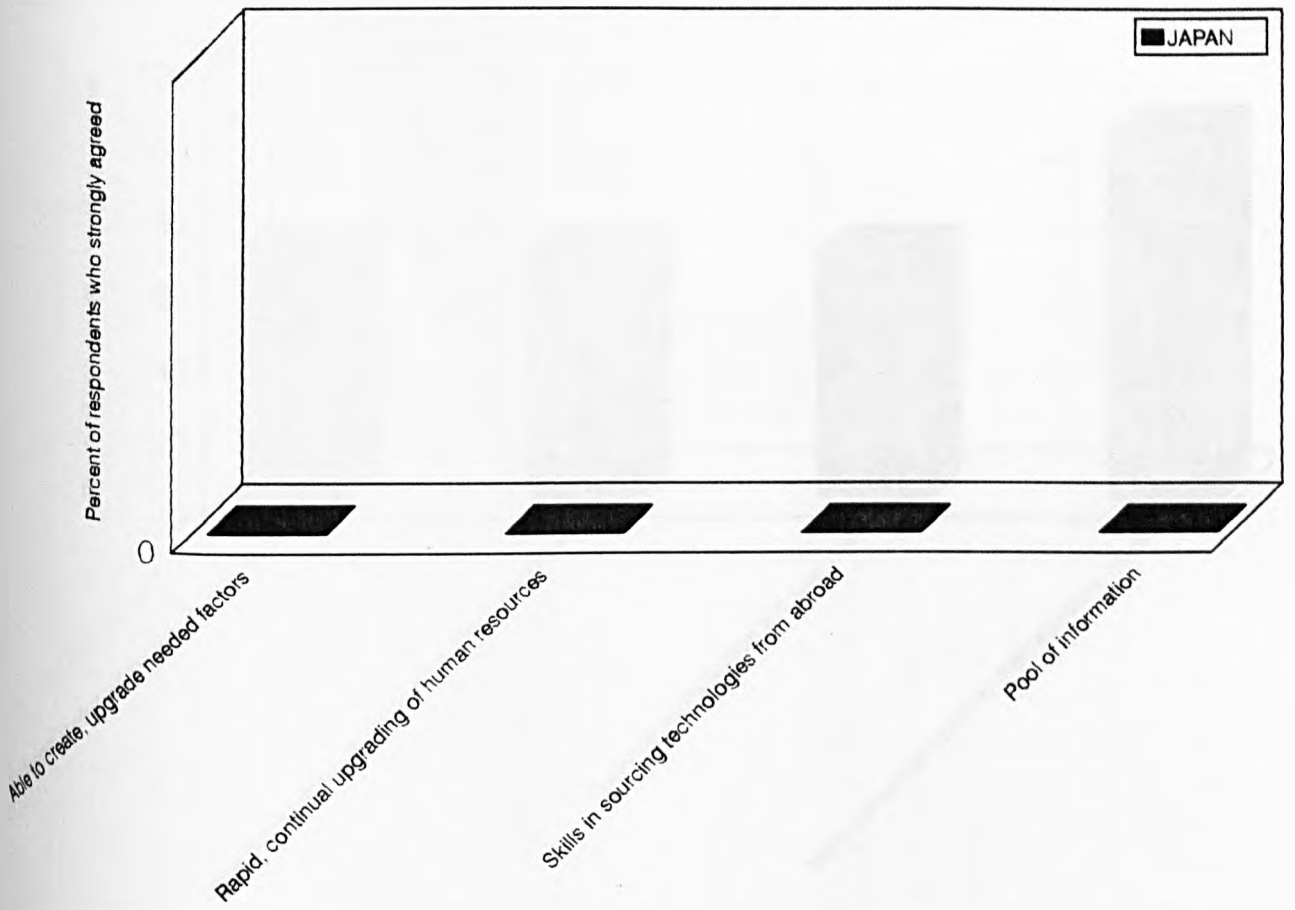


Source: Author

FIGURE 8.21

National competitiveness of Japan in the machine tool industry

FACTORS CONDITIONS

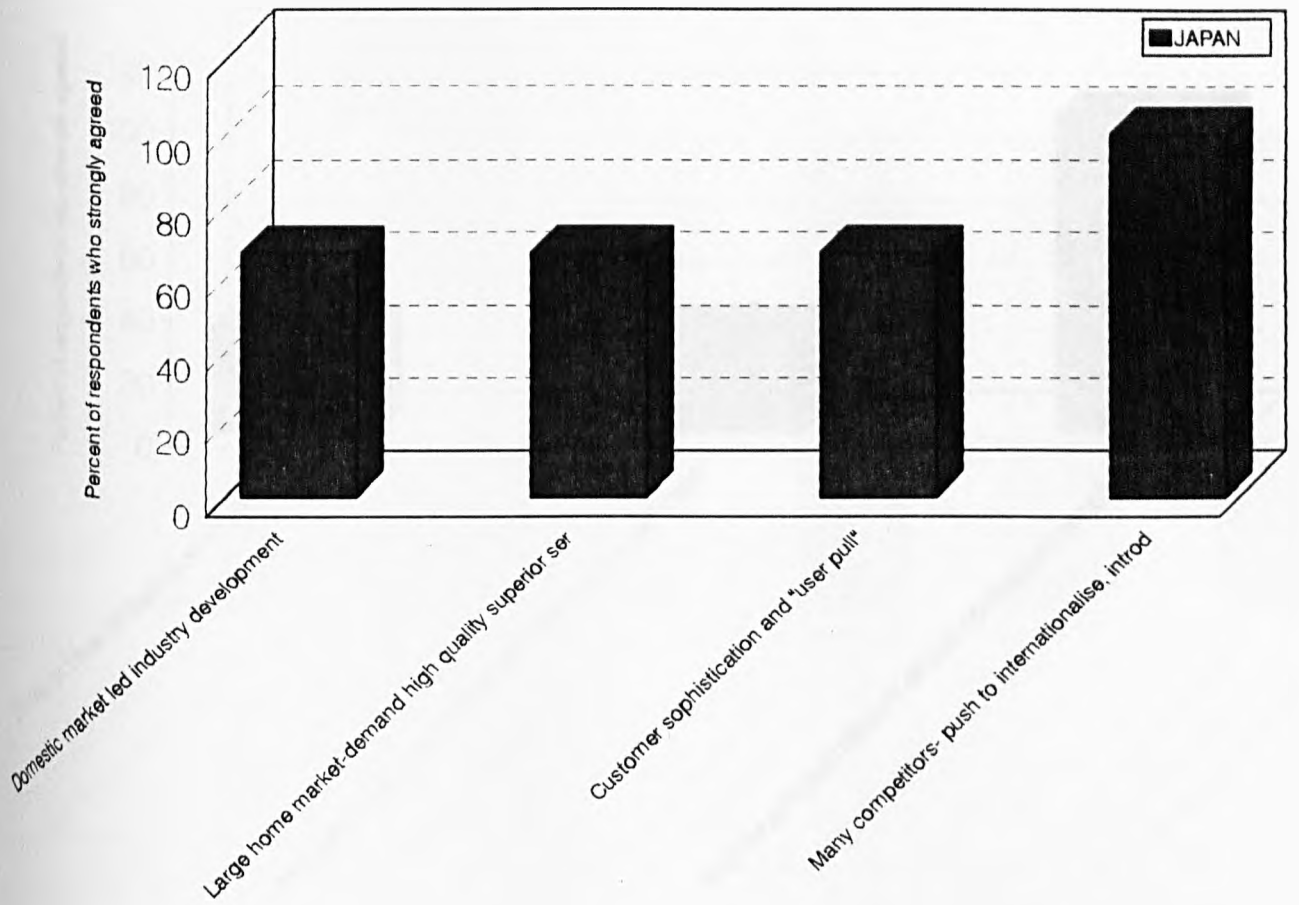


Source: Author

FIGURE 8.22

National competitiveness of Japan in the machine tool industry

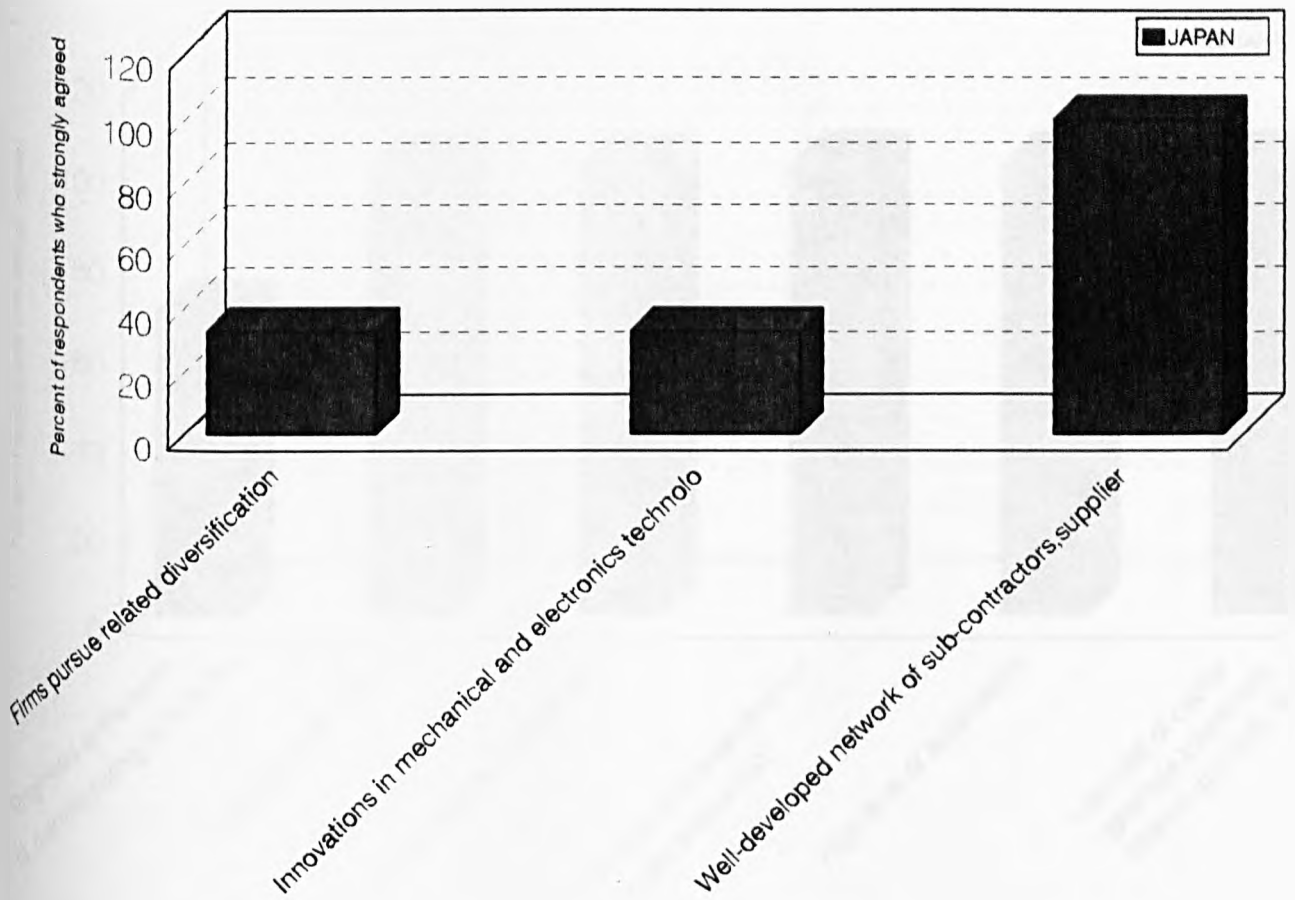
DEMAND CONDITIONS



Source: Author

FIGURE 8.23

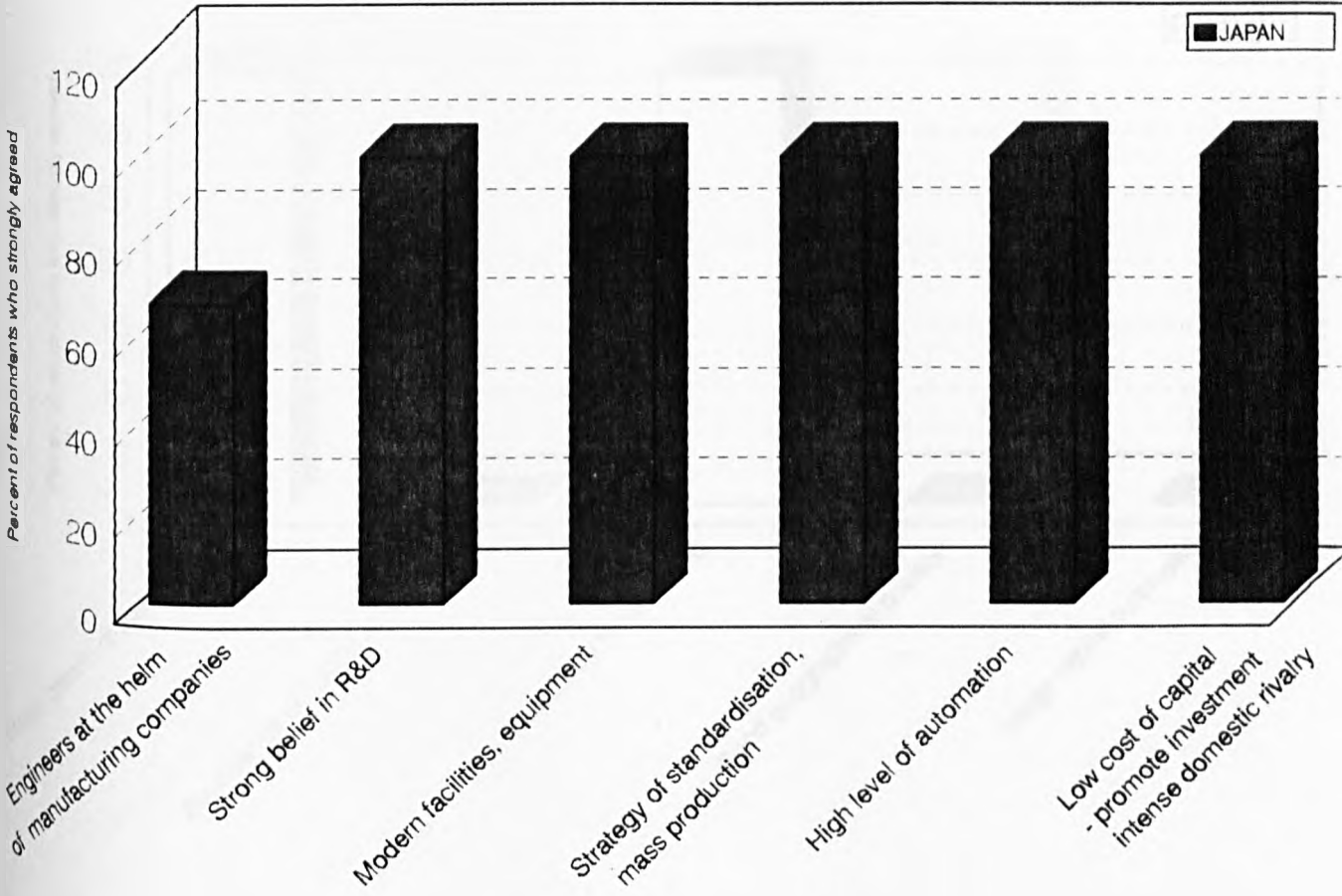
National competitiveness of Japan in the machine tool industry RELATED AND SUPPORTING INDUSTRIES



Source: Author

FIGURE 8.24

National competitiveness of Japan in the machine tool industry FIRM STRATEGY, STRUCTURE AND RIVALRY

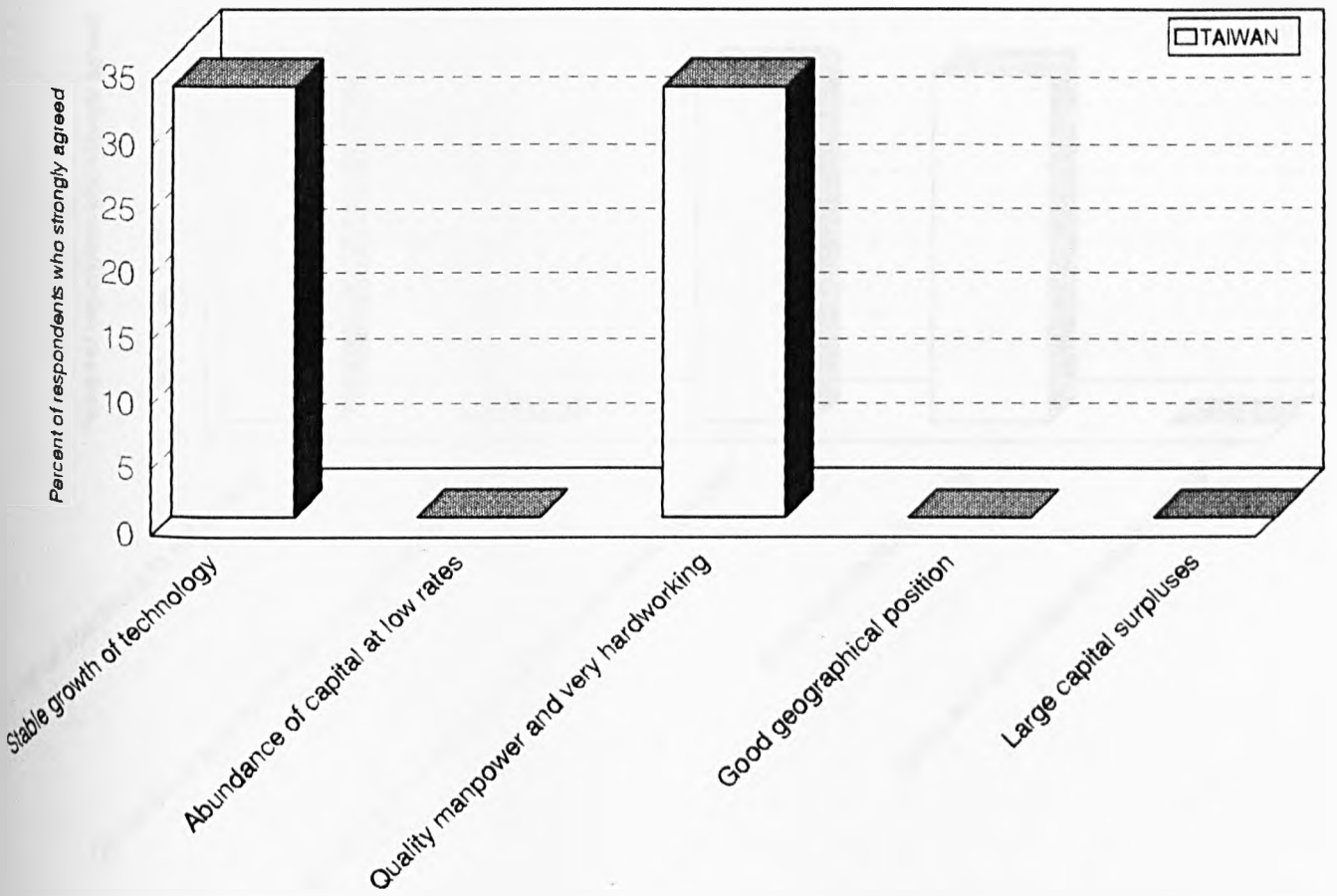


Source: Author

FIGURE 8.25

National competitiveness of Taiwan in the machine tool industry

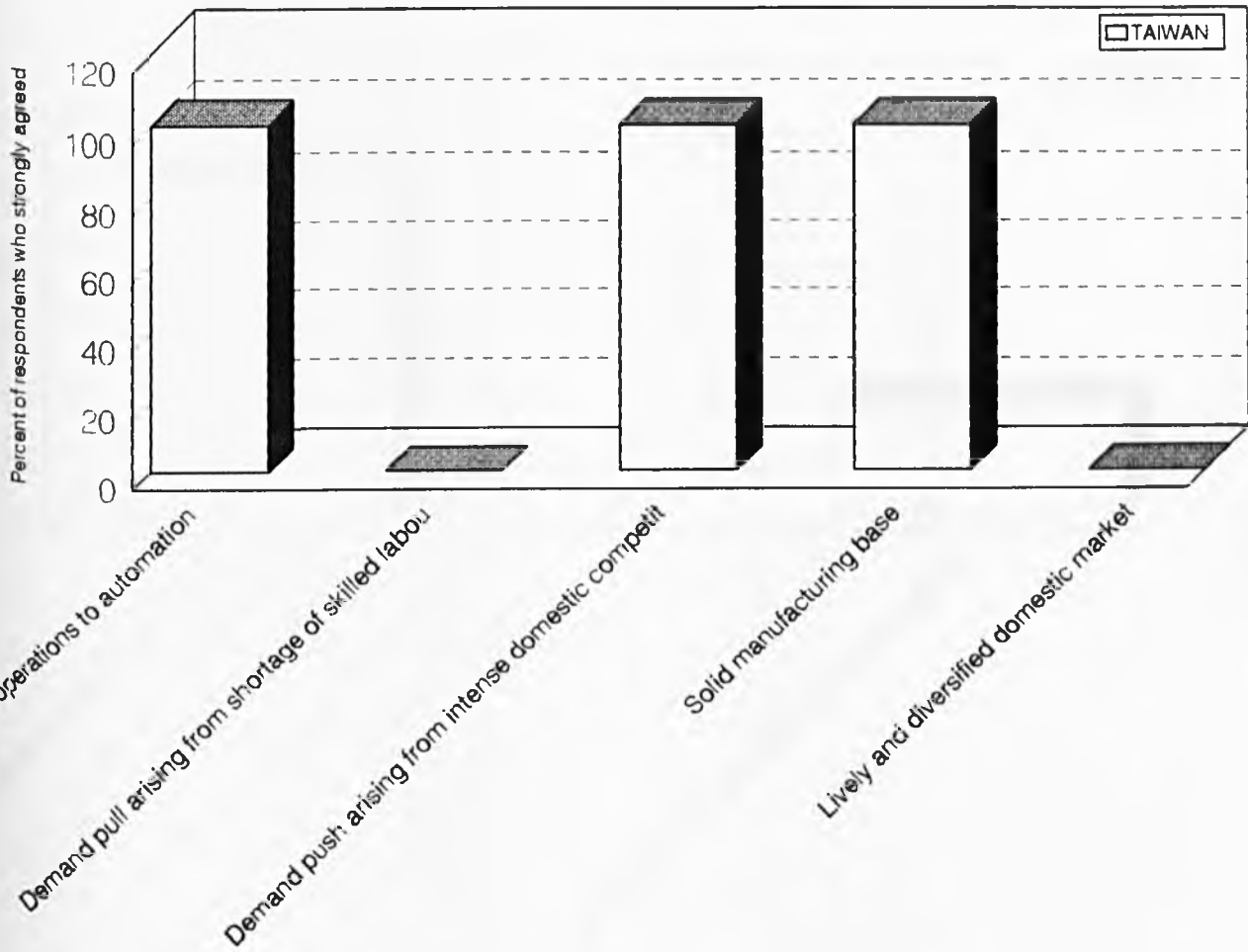
FACTORS CONDITIONS



Source: Author

FIGURE 8.26

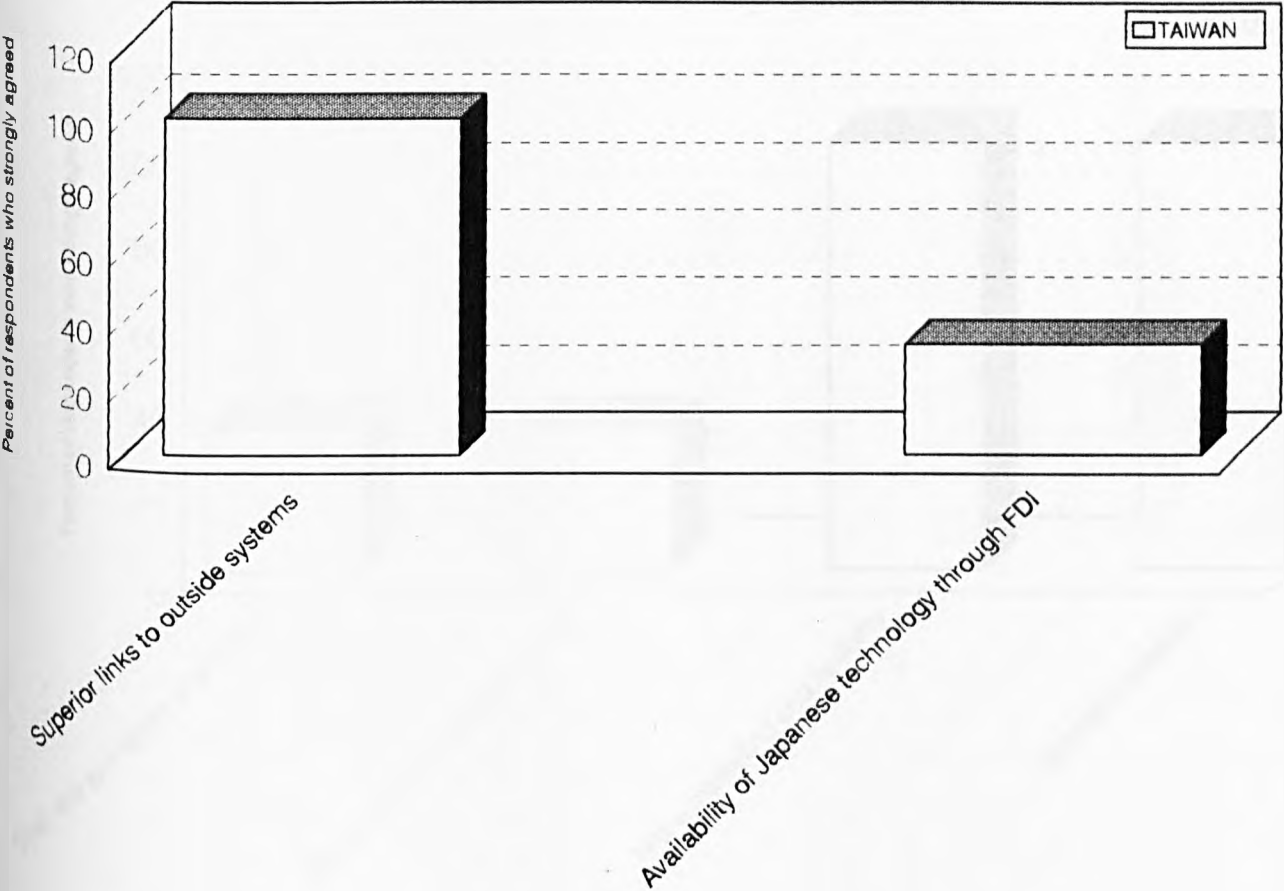
National competitiveness of Taiwan in the machine tool industry DEMAND CONDITIONS



Source: Author

FIGURE 8.27

National competitiveness of Taiwan in the machine tool industry RELATED AND SUPPORTING INDUSTRIES

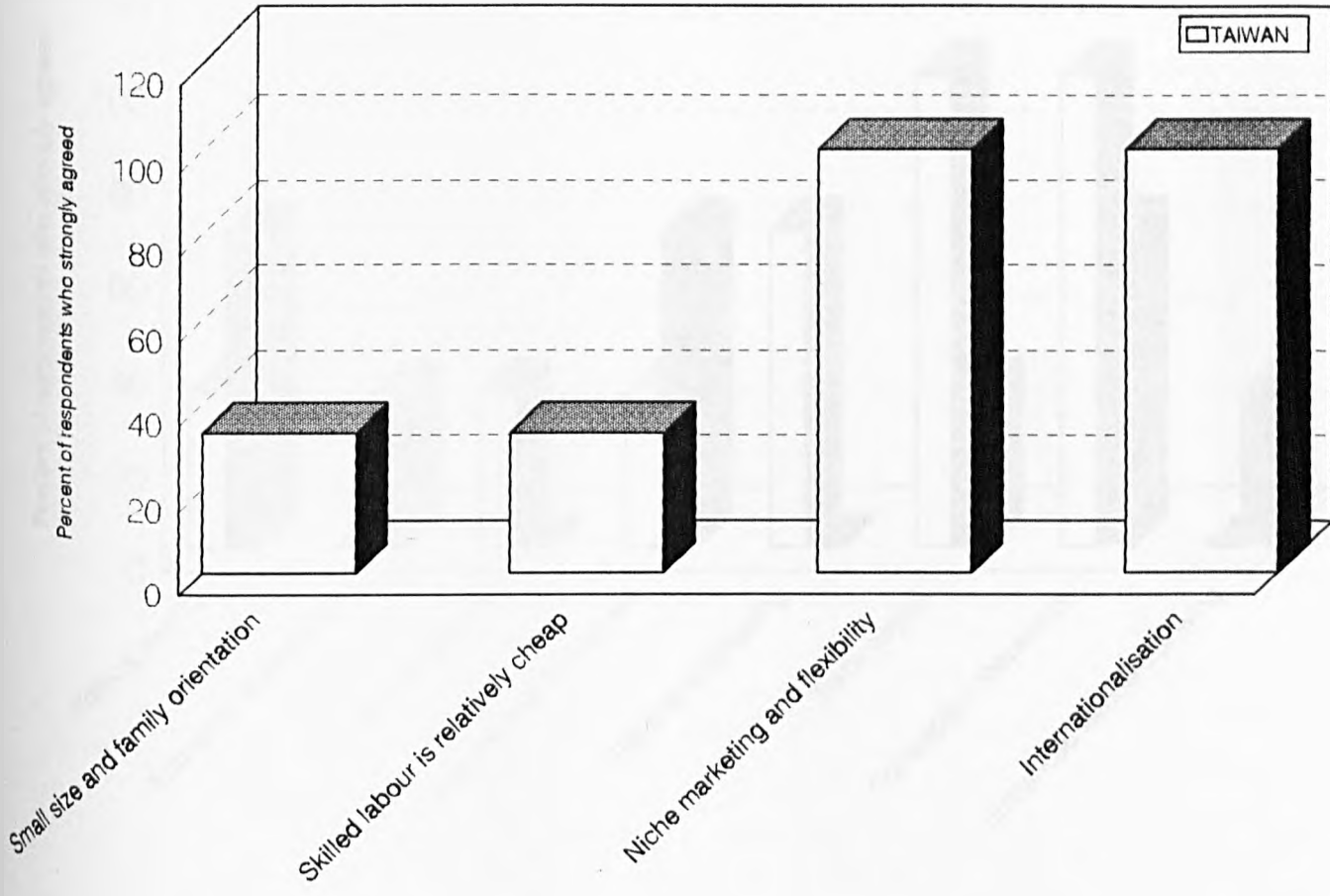


Source: Author

FIGURE 8.28

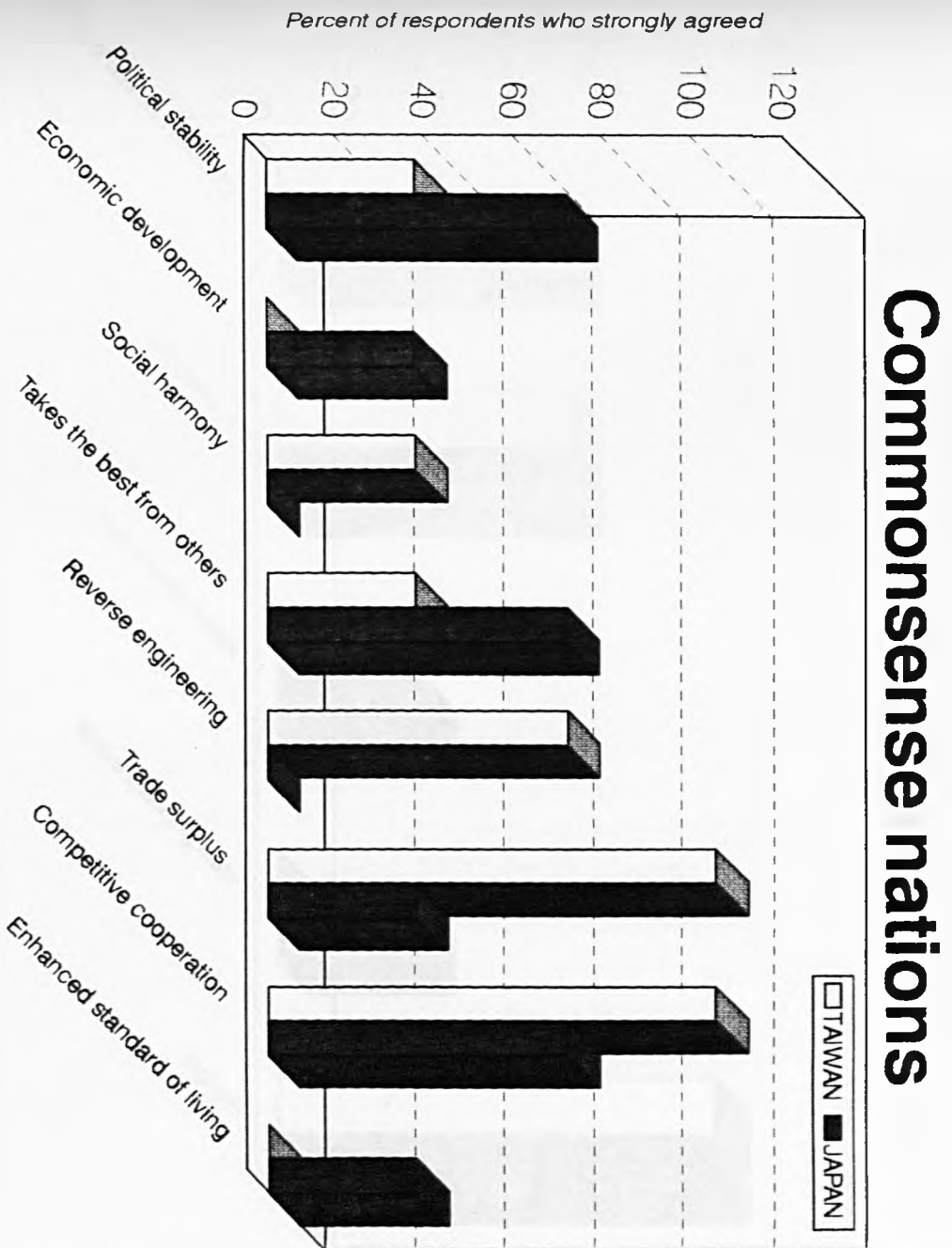
National competitiveness of Taiwan in the machine tool industry

FIRM STRATEGY, STRUCTURE AND RIVALRY



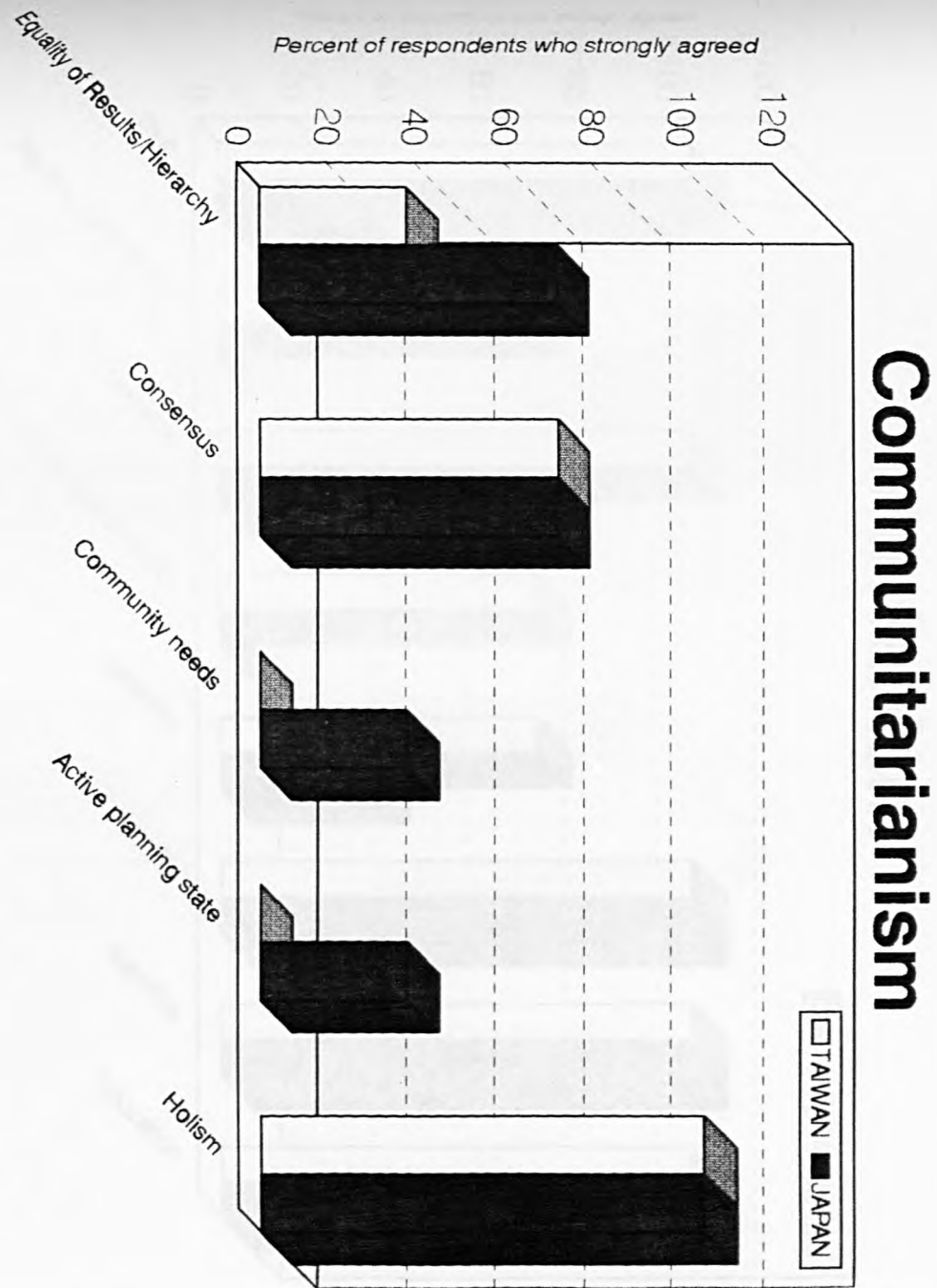
Source: Author

FIGURE 8.29



Source: Author

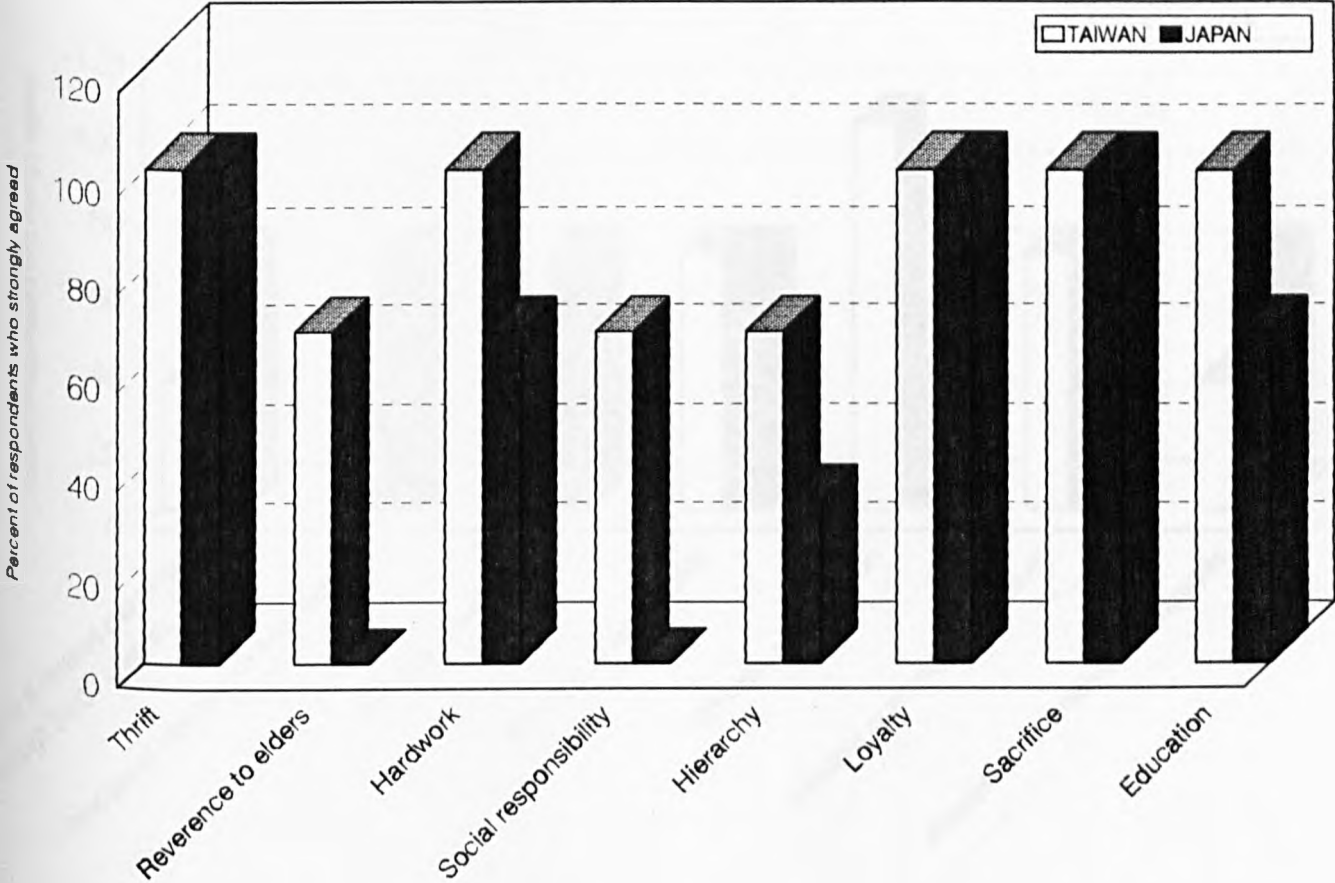
FIGURE 8.30



Source: Author

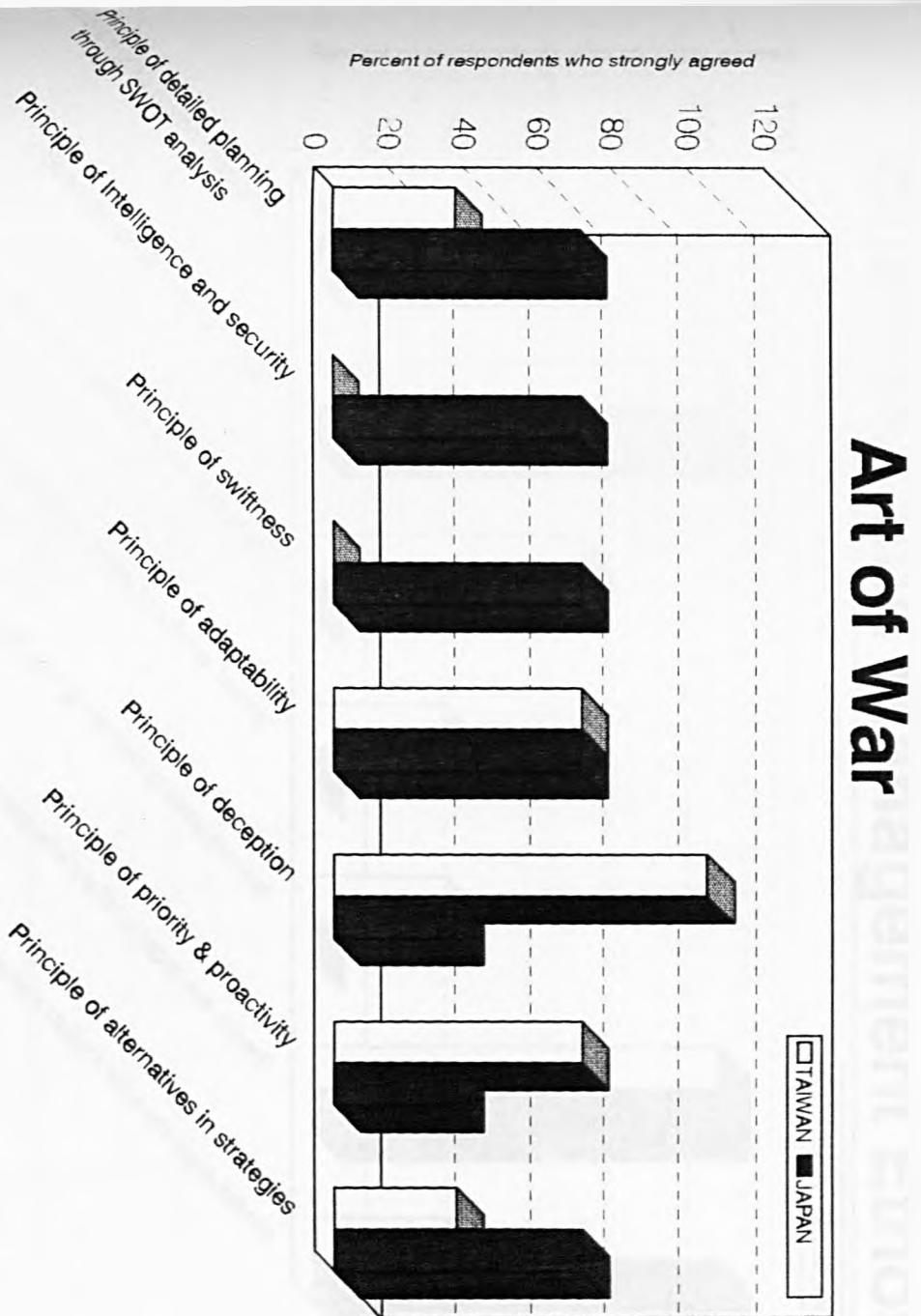
FIGURE 8.31

Confucianism



Source: Author

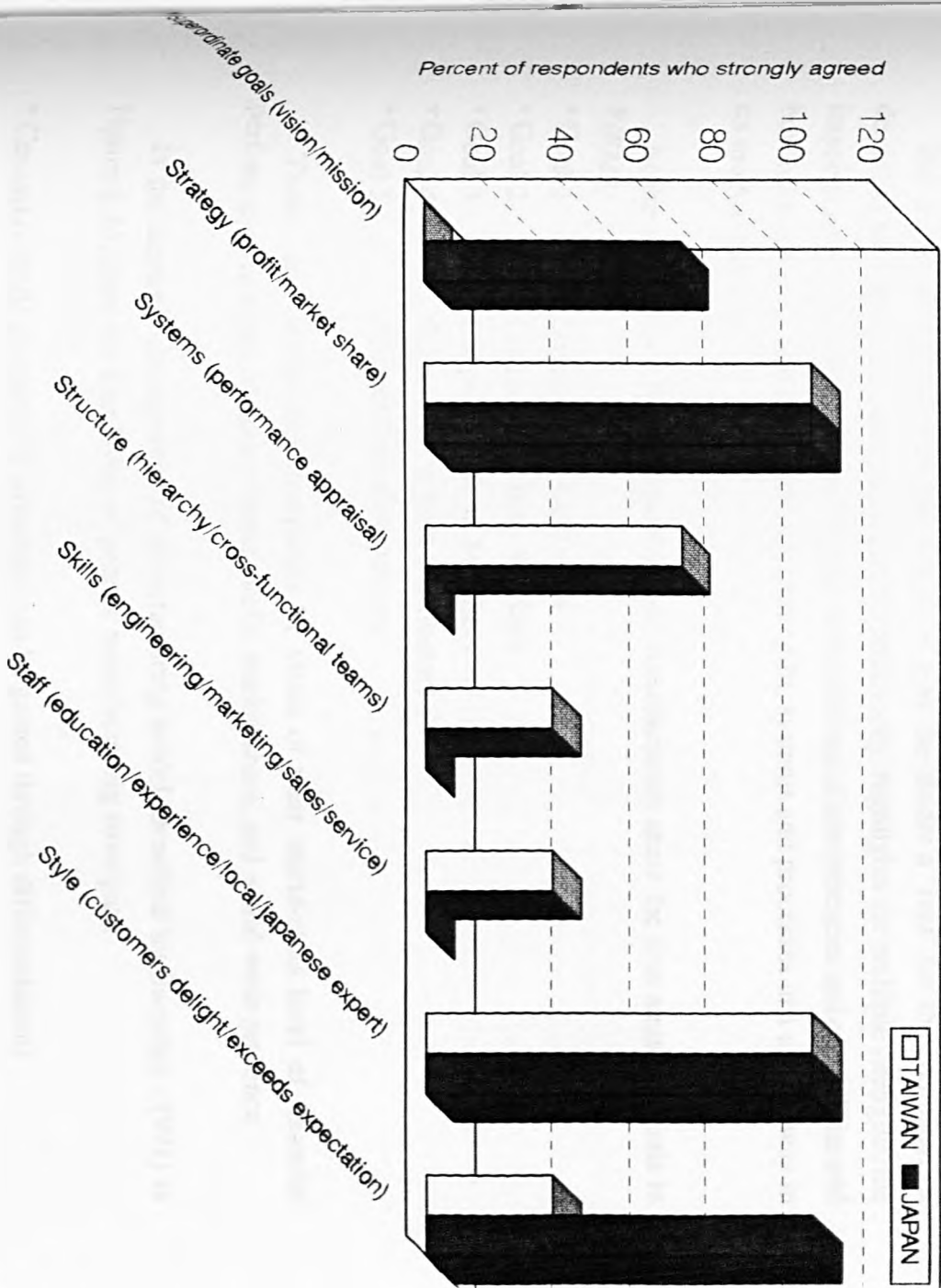
FIGURE 8.32



Source: Author

FIGURE 8.33

Business and Management Ethos



Source: Author

8.9 Summary and Conclusion

The micro model of *FIRMS* and the macro model of the *Wheel of Competition* were applied to the three Japanese producers and three Taiwanese producers through case study for *FIRMS* and questionnaire/depth interview for the *Wheel of Competition*. In the case write-up, the author sought to retain the original and peculiar expressions of manufacturers' aspirations through minimal editorial work.

The narrative style of each case sought to give the reader a "feel" for the company. It describes the corporate values, management philosophy, highlights the multiple strengths, the importance of systems and processes to the successful use of competencies and capabilities and how each develops and integrates these strengths, systems and processes in a unique way in its *modus operandi*.

At the micro level, the six machine tool manufacturers share the five strategic goals in *FIRMS*:

- Goal 1 : Loyalty from Customers
- Goal 2 : Commitment from Workers
- Goal 3 : Cooperation from Suppliers
- Goal 4 : Collaboration from Distributors
- Goal 5 : Respect from Competitors

These are world-class companies by virtue of their world-class level of financial performance in terms of sales volume, profit, market share, and world-wide presence.

In the strategic management of manufacturing model identified by Sweeney (1991) in Figure 8.34, there are four levels of generic manufacturing strategies:

- *Caretaker* (little competitive advantage can be gained through differentiation)
 - to produce efficiently, to provide reliable delivery service to the customers. This adopts the least cost producer competitive strategy. Typical strategy is cutting excesses and subcontracting or investing in new technology to increase manufacturing productivity. The order-winning criteria are:
 - Price
 - Reliable delivery
 - Quality consistency

FIGURE 8.34 STRATEGIC MANAGEMENT OF MANUFACTURING MODEL

Customer service criteria

- Quality consistency
- Reliable delivery
- Product range

- Price
- Reliable delivery
- Quality consistency

<i>Marketeer</i>	<i>Innovator</i>
<i>Caretaker</i>	<i>Reorganizer</i>

- Quality consistency
- Product performance
- Delivery speed
- New product development/
introduction speed

- Quality consistency
- Product performance
- Manufacturing flexibility
- Delivery speed

Traditional

(New product,
cellular or JIT
organization)

*Manufacturing process
design*

Source: Sweeney, M.T. (1991), "Towards a Unified Theory of Strategic Manufacturing Management", International Journal of Operations and Production Management. Vol. 11, No. 8, pp. 6 - 22.

- *Marketeer* (strategy of differentiation through improved customer service)
 - to broaden product lines, seek to obtain broader distribution or to improve the quality and specifications of the products offered to the market, in response to competitors' actions. The emphasis of the marketeer strategy is to strengthen the manufacturing function through infrastructural changes such as TQM and delivery performance reporting. (Typical strategy is an investment in MRP II system, redefinition of quality standards or a specific training programme for the production workforce.) The objective is to attain the continuous improvement of all value added activities and the operational flexibility of the manufacturing unit to cope with increased complexity. The order-winning criteria are:
 - Product range
 - Reliable delivery
 - Quality consistency

- *Reorganizer* (phase one world-class manufacturing)
 - to enhance the quality and the performance of products and to change manufacturing operations to reduce customer delivery lead time. Greater emphasis is placed on developing new production process for new products and on efficient manufacture, eg GT, CAD/CAM, FMS or Cellular JIT method of production. The reorganization of the production process is part of a longer-term strategy leading to world-class manufacturing. The reorganizer strategy is appropriate to adopt in order to improve the flexibility of production, reduce the uncertainty of delivery lead time through better throughput control, and reduce operating costs. The order-winning criteria are:
 - Product performance
 - Manufacturing flexibility
 - Delivery speed
 - Quality consistency

- *Innovator* (phase two world-class manufacturing)
 - it is the synthesis of the marketeer and reorganizer strategy to use manufacturing capabilities to gain a competitive advantage for the company. The objective is to outperform the competition in terms of product performance and the quality of service to the customers with the highest standard of design and manufacturing performance. Thus, emphasis is given to improving the integration of the design, manufacturing and manufacturing support to achieve a time-based competitive edge. (For example, integrated manufacturing, CIM, IMS, etc) However, fast-response manufacturing capability is only

part of the time-based competitive strategy. Such a strategy could be considered as phase two on the path to world-class manufacturing, ie rapid design and introduction of new products which is a capability sought by the innovators. The order-winning criteria are:

- Product innovation
- Product performance
- Price
- Speed of response to demand of customer
- Quality of world-class standard

Integration of Sweeney's model (*Caretaker, Marketeers, Reorganizer, Innovator*) into the architecture of *FIRMS* is in Figure 8.35.

The relative core competencies and key capabilities of the six machine tool producers are:

- Okuma Corporation : *Caretaker, Marketeer, Reorganizer, Innovator*
- Yamazaki Mazak : *Marketeer, Innovator*
- Mori Seiki : *Marketeer, Innovator*
- Taichung Machinery : *Caretaker, Reorganizer*
- Leadwell : *Caretaker, Reorganizer*
- Fair Friend : *Caretaker, Reorganizer*

Overall summary of the achievement of the five goals in *FIRMS* by the six companies is in Table 8-28.

Customers' requirements are multi-dimensional. It is therefore foolhardy for a company to aim simply at becoming a world-class manufacturer. This status by itself confers absolutely no advantage unless the company is also a world-class marketing company. **World-class companies are by definition world-class at manufacturing and marketing.** These are the twin pillars. Human Resource Management, Supply Chain Management and Distributor Network Management are the reinforcements. The case studies clearly show that in the world-class league of producers, the Japanese have built the twin-pillars of world-class manufacturing-marketing on the strong foundation of state-of-the-art technology with a vision to the factory of the future. This vision is promoted, sold, and bought through coordinated and sustained marketing efforts. Hence, they outperformed their Taiwanese counterparts who cannot match their level of sophistication in high value added manufacturing and marketing.

FIGURE 8.35 INTEGRATIVE MATRIX OF GENERIC MANUFACTURING STRATEGY IN THE MODEL OF FIRMS

	High		
Relative degree of differentiation	World-class manufacturing and world-class marketing <i>(Innovator)</i> (e)	Distributor network management <i>(Marketeer)</i> (d)	Supply chain management <i>(Reorganizer)</i> (c)
	Total quality customer satisfaction <i>(Caretaker)</i> (a)	Human resource management <i>(Reorganizer)</i> (b)	Uncompetitive
	Low	Relative costs	High

Footnote:

- (a) It is a least-cost strategy because it requires the right philosophy/attitude on the part of workers. It is a low-differentiation strategy if quality service is not backed up by quality products.
- (b) People are the driving force behind world-class performance. It recognizes the value of its human resources by investing in comprehensive staff training and development. It is a medium-cost/low-degree of differentiation strategy if workers are not imbued with the true spirit of enterprise.
- (c) Supply chain management is a high-cost/high-differentiation strategy because of the time, energy and efforts expended on cultivating the relationship. Quality components and materials are needed to produce quality products.
- (d) Network management of distributors is a medium-cost/high-degree of differentiation strategy. Good products need the right channels for distribution and the right marketing mix for the appropriate industrial market segment.
- (e) Aim for zero defects in world-class manufacturing and zero defections in world-class marketing. This is a low-cost/high-differentiation strategy.

Source: Author

TABLE 8-28 SUMMARY OF THE SIX WORLD-CLASS CNC MACHINE TOOL PRODUCERS IN SEARCH OF FIRMS FOR PROFIT/MARKET SHARE

Competitive Advantage (Strategy)	Management Capabilities (Cause)	Result (Effect)	How Do You Know You Are There ? (Measurement)					
			Okuma	Mazak	Mori Seiki	Taichung	Leadwell	Fair Friend
Customer Delight	Total Quality Customer Satisfaction	Loyalty from Customer	Company Status					
			Public	Private	Public	Private	Private	Private
			Gross Profit					
			18%	10%	30%	23%	19%	20%
			ASEAN Market Share					
			22%	12%	20%	6%	4%	5%
			Total CNC Machines Installed in ASEAN To-date					
842	449	755	225	150	187			
Competitive Workforce	Human Resource Management	Commitment from Customer	Manpower Turnover					
			0.5%	0.8%	0.4%	10%	12%	8%
Manufacturing/Service Advantage	Supply Chain Management	Cooperation from Suppliers	Long Term Relationship (Suppliers)					
			25 years	28 years	22 years	15 years	12 years	8 years
Market Penetration	Distributor Network Management	Collaboration from Distributors	Long Term Relationship (Distributors)					
Market Development			11 years (one distributor for five markets)	7 years (one distributor for each market)	5 years (one distributor for three markets)	2 years (one distributor for each market)	8 years (one distributor for two markets)	8 years (one distributor for each market)
Beyond World-Class: • Industrial Leader • Market Leader	World-Class manufacturing World-Class marketing	Respect from Competitors	Competitive Cooperation/Strategic Alliance					
			Okuma-Howa Kraus-Maffei Alfred H. Schuette	Mitsubishi	OKK	Takisawa	Weinmer Alan Bradley Taylor Hobson	China Machine Tool Factory No. 2
			Average Monthly Production Output					
			650 machines	800 machines	720 machines	110 machines	135 machines	80 machines
			World-wide Breakdown of Market Share					
			Japan (45%) USA (25%) Europe (10%) China (5%) ASEAN (12%) Others (3%)	Japan (35%) USA (28%) Europe (13%) China (11%) ASEAN (8%) Others (5%)	Japan (40%) USA (28%) Europe (12%) China (5%) ASEAN (11%) Others (4%)	Taiwan (30%) USA (15%) Europe (21%) China (26%) ASEAN (6%) Others (2%)	Taiwan (30%) USA (20%) Europe (15%) China (25%) ASEAN (4%) Others (6%)	Taiwan (26%) USA (25%) Europe (12%) China (22%) ASEAN (5%) Others (10%)
			R&D as a Percentage of Total Sales Revenue					
			21%	18%	15%	10%	8%	15%
			Price Difference Amongst Rivals					
			15 - 20% higher than Mazak	Mazak is used as the basis for comparison	10 - 15% higher than Mazak	20 - 25% cheaper than Mazak	25 - 30% cheaper than Mazak	20 - 25% cheaper than Mazak
			Core Capabilities/Differential Advantage					
			Single Source for Machine and Control	User-Friendly Controller	Value for Money for Package Deal	Fastest Delivery	" Lowest Price "	Value Added Customer Service

Source: Author

Obviously, world-class manufacturing companies must aim to improve upon the current specifications to go beyond world-class status as it is important to recognise that core competencies and capabilities, which currently qualify one to be in the world-class league may not become order winners at some future date. These companies take cognizant that the strategic nature of relationship management in a complex web of relationships is a major contributor to sustainable competitive success. The concept of relationship management as the major route to better than world-class performance is deeply felt and understood in Japanese, mutual obligational business relationships and in the Chinese "Guanxi" ties that bind parties to an obligation to assist each other (Chan and McDermott, 1994).

At the macro level, there is consistency in the results with a general agreement that the elements in the *Wheel of Competition* are responsible for their competitive success:

Generic Category	Specific Characteristics
• World-class status	World-wide standard quality World-wide distribution service Benchmarking
• Global player	Significant market share Leader in R&D
• Communitarianism	Holism Consensus
• Confucianism	Loyalty Thrift Sacrifice
• Art of War	Principle of Adaptability
• Business and Management Ethos	Strategy (Profit/Market share) Staff (Education/Experience/Local/Expatriate)

The **Japanese** producers identified the following variables in the national competitiveness of Japan in the machine tool industry:

Demand Conditions :	<ul style="list-style-type: none"> • Many competitors - push to internationalise, introduce new products • Domestic market-led industry development • Large home market demand • High quality superior service • Customer sophistication and "user-pull"
Related and Supporting Industries :	<ul style="list-style-type: none"> • Well-developed network of sub-contractors, suppliers • Innovations in mechanical and electronics technologies • Companies pursue related diversification
Firm, Strategy, Structure and Rivalry :	<ul style="list-style-type: none"> • Low cost of capital • Promote investment • Intense domestic rivalry • High level of automation • Strategy of standardization, mass production • Strong belief in R&D • Engineers at the helm of manufacturing companies

The **Taiwanese** producers identified the following variables in the national competitiveness of Taiwan in the machine tool industry:

Factor Conditions:	<ul style="list-style-type: none"> • Quality manpower and very hardworking • Stable growth of technology
Demand Conditions :	<ul style="list-style-type: none"> • Switch from manual operators to automation • Demand push arising from intense domestic competition • Solid manufacturing base
Related and Supporting Industries :	<ul style="list-style-type: none"> • Superior-links to outside systems (networking with customers, suppliers, distributors, etc) • Availability of Japanese technology through FDI
Firm, Strategy, Structure and Rivalry :	<ul style="list-style-type: none"> • Internationalisation (create overseas sales network, achieve cost reduction, market access, secure technology) • Niche marketing and flexibility • Skilled labour is relatively cheap • Small size and family orientation of Chinese business

Finally, a summary of the attributes of Commonsense nations from the perspective of their nationalities is tabulated below:

Japan	Taiwan
<ul style="list-style-type: none">• Competitive cooperation• Trade surplus• Takes the best from others• Political stability• Economic development• Enhanced standard of living	<ul style="list-style-type: none">• Competitive cooperation• Trade surplus• Takes the best from others• Political stability• Social harmony• Reverse engineering

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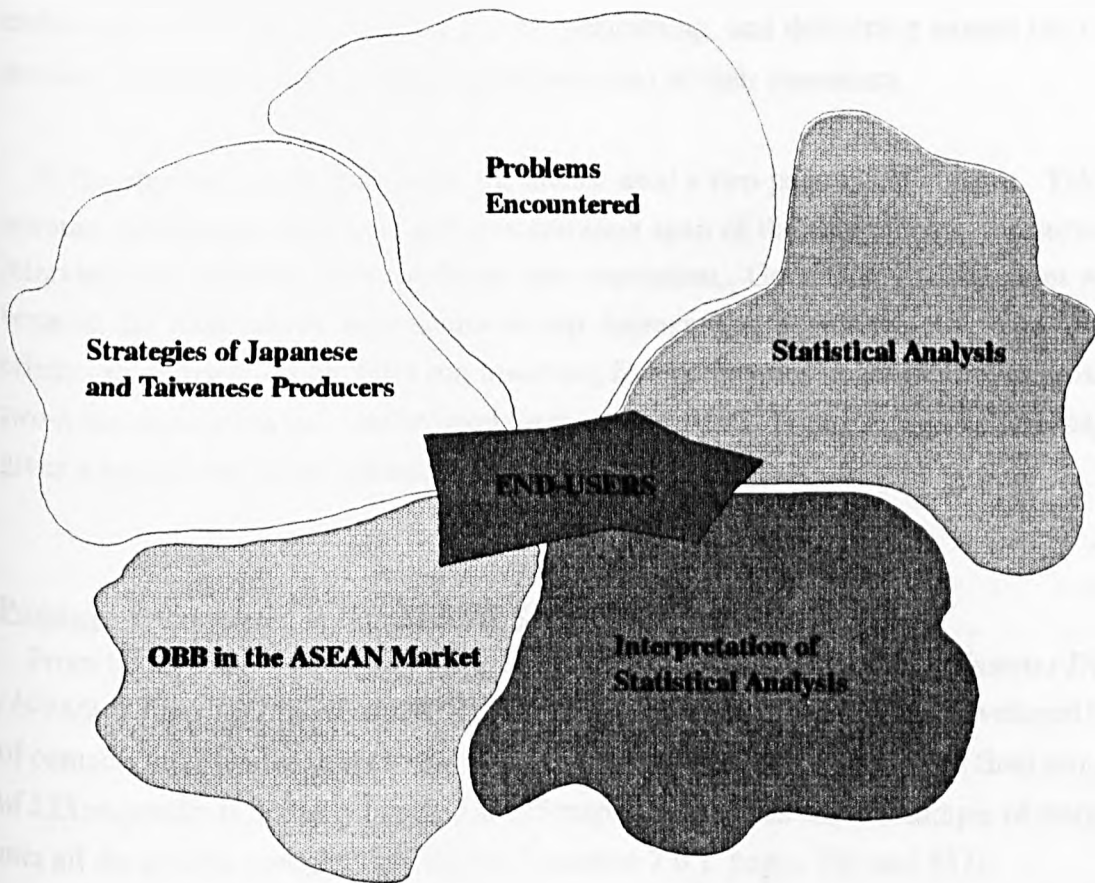
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CHAPTER NINE

PHASE TWO EMPIRICAL RESEARCH:

SURVEY OF THE END-USERS IN THE ASEAN REGION



PHASE TWO EMPIRICAL RESEARCH: SURVEY OF THE END-USERS IN THE ASEAN REGION

9.1 Introduction

The survey research involved in-depth interviews with one hundred and thirty-three end-users (ie purchasers of machine tools). One objective was to ascertain the characteristics which they would associate with a world-class CNC machine tool manufacturer. Moreover, it is important to compare customers' perceptions with those of the producers' in order to identify whether a gap exists and the means of harmonising both perspectives. Hence, producers must endeavour to close the perception gap by performing and delivering around the needs (ie product) and expectations (ie value added service) of their customers.

In his approach to the end-users, the author used a two-page questionnaire. Taking into account the element of fatigue and concentration span of the respondents, the survey-cum-interview was scheduled for two hours per respondent. Good time management was vital because the respondents were senior or top management personnel; time had to be very effectively utilised. In the pilot run involving five companies in Singapore, approximately two-hour session was the comfort level for the respondents. Figure 7.5 (Chapter 7, page 546) gives a breakdown of the utilisation of time.

9.2 Problems Encountered in International Survey Research

From listings in the *Industrial Buyers' Guide*, *Precision Engineering Industries Directory (1993/94)*, *Board of Investment (BOI)*, *Yellow Pages*, and due to his highly developed network of contacts after twelve years in the machine tool industry, the author had a final sample size of 133 respondents, initially targeted at 125 respondents. This random sample of respondents met all the criteria specified in Chapter 7 (section 7.6.1, pages 536 and 537).

In a multi-country, multi-cultural and multi-linguistic environment, some of the difficulties which arose in performing the research are highlighted below:

• *Communication*

In each ASEAN country, several dialects are spoken, ie:

- Singapore : Chinese dialects (predominantly Mandarin, Hokkien, Teochew and Cantonese)

- Malaysia : Bahasa Malaysia, Chinese dialects (predominantly Hakka, Cantonese and Mandarin)
- Indonesia: Bahasa Indonesia, Chinese dialects (predominantly Hokkien and Mandarin)
- Thailand: Thai, Chinese dialects (predominantly Teochew, Hainanese)
- The Philippines: Tagalog, Chinese dialects (predominantly Hokkien and Mandarin)

Communication was hindered through the author's lack of command of the national languages and some of the Chinese dialects. The Chinese in the ASEAN countries do not form a homogeneous group. The most pronounced differences stem from their identification with various dialect groups based on geographical roots traced to mainland China (Tan, 1986). As a Cantonese, it was difficult for the author to communicate with the other dialect groups. Differences in idiom and the difficulty of exact translation create problems in eliciting the specific information desired and interpreting respondents' answers.

A pragmatic solution was to enlist the help of the local distributor of Okuma Corporation in each market who acted as interpreter. Unfortunately, translating a questionnaire from one language to another is far from easy. Ultimately, the questionnaire in the local language or dialect should accurately reflect the questions in the original English questionnaire.

• ***Levels of Educational Achievement***

Only five percent of the respondents had obtained an MBA degree. The author recognised that many of the questions were inevitably couched in scholarly terms according to academic strictures. Hence, they had difficulty with these specialised terms which impeded comprehension. Some of these terms had no equivalent in Bahasa Indonesia, Bahasa Malaysia or Mandarin. Nevertheless, to establish common understanding, respondents were asked for their interpretations of the questions to get to the root meaning or essence of the questions for purpose of consistency. It is interesting to understand academic terminology in common parlance (see Table 9.1). Thus, data analysis would be based on customers' perceptions and expectations of world-class machine tool builders. This is the technique of empathy, ie to understand respondents' meaning and feeling; to be at one intellectually and emotionally; to think and feel from the respondents' frame of reference or perceptual map.

TABLE 9-1

RESPONDENTS INTERPRETATIONS OF THE CHARACTERISTICS OF A WORLD-CLASS MANUFACTURING COMPANY

CHARACTERISTICS OF A WORLD-CLASS COMPANY	RESPONDENTS' INTERPRETATIONS
<ul style="list-style-type: none"> • Sells product worldwide • Has a significant market share in its industry • Is a leader in innovation • Makes critical components in the country of origin 	<ul style="list-style-type: none"> • International company • Global player • Continuous improvements to product every year • Worldwide guarantee
<ul style="list-style-type: none"> • Is technologically superior to competitors • Produces high quality products (accuracy/repeatability/process capability) • High reliability of products (mean-time-before-failure/few breakdowns) • Cost-efficiency (value-for-money) 	<ul style="list-style-type: none"> • Win many prestigious awards • Machine accuracy better than tolerance required (± 6 sigma) • Seldom breakdown • Although initial cost is more expensive but breakeven after 2 to 3 years
<ul style="list-style-type: none"> • Produces customized products • Has state-of-the-art technology (never obsolete) • Has strong marketing and sales strategies • Has excellent customer service • Is financially stable and profitable 	<ul style="list-style-type: none"> • Tailor-made in accordance with customer's specifications • Software can be upgraded indefinitely • Sometimes sells at a "lost" to penetrate market to capture core customers • Prompt response to service calls • Will not easily go bankrupt (or discontinue supply of spare parts)
<ul style="list-style-type: none"> • Has strong and consistent corporate image/brand • Has commitment to R&D • Has flexibility to respond to market, political, and competitive changes • Always meet delivery promise 	<ul style="list-style-type: none"> • If cause of defects is due to manufacturer's design fault, pay all costs • Always improving products and introducing new product lines • Under-value or help customers to overcome government regulations on documentations (eg SGS , BOI, MITI Export Licence, etc) • Meet minimum expectations of delivery schedule (not more than 2 weeks delay from agreed delivery promise)
<ul style="list-style-type: none"> • Has high standards of ethics • Has integrity in dealing with people • Is sincere in approach to people • Builds trust in business/marketing relationship • Sells benefits/solutions rather than empty promises 	<ul style="list-style-type: none"> • Do not pay "under table" when about to lose to competitors • Never change mind once order is signed even if price is below costs • Never recommend machine that is unsuitable for its purpose • Regularly visit customer to find out performance of machine • Use factual data for comparisons instead of creating rumours and badmouthing competitors
<ul style="list-style-type: none"> • Is a well-managed company • Has low turnover of staff • Is a company that cares for its people 	<ul style="list-style-type: none"> • Employees always pay compliments to their company • Always deal with same sales/technical people • Employees look happy and highly motivated
<ul style="list-style-type: none"> • Global Player • Manufacturing Strategy • Marketing Strategy • Corporate Strategy • Corporate Values • Human Resource Strategy 	<ul style="list-style-type: none"> • World-wide market share held by machine tool manufacturer • Quality and reliability of machine tools • Price and after-sales service of machine tools • Manufacturer's brand name/image • Sincerity, integrity, trust of manufacturer/distributor's sales personnel • Employees' opinion of their employer (Manufacturer/ Distributor)

Source: Author

- ***Fears and Suspicions***

Many respondents had never been asked before to participate in an academic study. Understandably, initially they had reservations about participating and providing accurate and detailed responses. Hence they tended to harbour fears and suspicions about the possible leakage of company secrets. Some were unable to overcome their fears as they considered it improper to divulge and/or discuss company matters with a third party. Consequently about 15 percent (twenty three out of one hundred and fifty six respondents) of the sample was void. Final sample size for analysis was one hundred and thirty-three respondents.

9.3 Results of Statistical Analysis using SPSS Software Package

- ***Kolmogorov - Smirnov Test*** (Luck and Rubin, 1987, Churchill Jr, 1991)

The Kolmogorov-Smirnov's goodness of fit test findings showed that the sample data is normally distributed. With the Two-Tailed Probability of less than or equal to 0.0020 for all the variables tested, the data collected would therefore be statistically significant as the normally distributed observations would fall within 95 percent confidence level (ie with ± 2 standard deviations). The test findings therefore showed that the observations obtained for each variable is statistically significant.

The Kolmogorov-Smirnov test also indicated differences between the distribution of the observed values of each variable compared to theoretical distribution (expected frequencies). The test showed that the absolute values (for most extreme difference) for each variable exceeds the critical value of 0.12 (tested with a level of significance of 5 percent). For example, for the variable component GLOBAL1 (labelled characteristic for Global Player), the absolute value (0.18) generated exceeds the critical value (0.12). Table 9-2 gives a summary of the test. The null hypothesis that there are no differences in the observed frequency distribution of this variable among the five countries surveyed is therefore rejected. Annex 11 shows the results of the Kolmogorov-Smirnov's goodness of fit test.

- ***Cronbach's Alpha Test*** (Sekaran, 1992)

The test for reliability of the entire sample (133 respondents) using Cronbach's alpha reliability coefficient showed an reliability alpha coefficient of 0.9091. With the reliability coefficient greater than 0.80, the internal consistency reliability of the data was considered good (Knox et al., 1994). The responses to all the variables in the survey are consistent. Full details of the results of the test can be found in Annex 10.

TABLE 9-2

SUMMARY OF THE KOLMOGOROV-SMIRNOV (K-S) TEST

	<u>Goodness of Fit</u>	<u>K-S</u>	<u>Significance P<</u>
<u>Characteristics of world-class manufacturing company:</u>			
(A) Global player	0.18	2.09	0.003
Sells product world-wide	0.16	1.85	0.002
Has a significant market share in its industry	0.16	1.87	0.0018
Is a leader in innovation	0.16	1.90	0.0015
Makes critical components in the country of origin	0.16	1.80	0.0030
(B) Manufacturing strategy	0.29	3.32	0.0000
Is technologically superior to competitors	0.17	2.01	0.0006
Produces high quality products (accuracy/process capability)	0.23	2.61	0.0000
High reliability of products (mean-time-before-failure/few breakdown)	0.25	2.88	0.0000
Cost efficiency (value-for-money)	0.20	2.31	0.0000
(C) Marketing strategy	0.26	3.05	0.0000
Produces customized products	0.15	1.69	0.0063
Has state-of-the-art technology (never obsolete)	0.15	1.72	0.0054
Has strong marketing and sales strategies	0.18	2.12	0.0003
Has excellent customer service	0.34	3.93	0.0000
Is financially stable and profitable	0.17	1.99	0.0007
(D) Corporate strategy	0.16	1.84	0.0023
Has strong and consistent corporate image/brand	0.20	2.36	0.0000
Has commitment to R&D	0.17	2.02	0.0006
Has flexibility to respond to market, political, and competitive changes	0.19	2.28	0.0001
Always meet delivery promise	0.17	1.99	0.0007
(E) Corporate values	0.19	2.24	0.0001
Has high standard of ethics	0.18	2.14	0.0002
Has integrity in dealing with people	0.18	2.04	0.0005
Is sincere in approach to people	0.17	1.93	0.0012
Builds trust in business/marketing relationship	0.20	2.33	0.0000
Sells benefits/solutions rather than empty promises	0.20	2.34	0.0000
(F) Human resource strategy	0.28	3.26	0.0000
Is a well-managed company	0.21	2.42	0.0000
Has low turnover of staff	0.19	2.16	0.0002
Is a company that cares for its people	0.22	2.57	0.0000

Source: Author

In assessing the reliability of the rating scale when applied to the key variable components (Global Player, Manufacturing Strategy, Marketing Strategy, Corporate Strategy, Corporate Values and Human Resource Strategy), the Cronbach's coefficient alpha was calculated based on each key variable component's sub-variables. These reliability coefficients are shown in Table 9-3. The reliability coefficients calculated are good.

- *Chi-Square Test*

The chi-square test was carried out to examine the frequencies of the responses given by respondents from the various countries surveyed. The test, a test for homogeneity, was carried out to ascertain whether the populations that corresponded to the samples from each country are homogeneous, or alike, with respect to the responses given for each variable (characteristic) component. The null hypothesis is that the samples from the five countries surveyed are homogeneous for each variable. The alternative hypothesis is that they are not homogeneous for each variable. As in Table 9-4, with the observed significance level ($P <$) for each variable being very small or negligible, it can be concluded that the hypothesis that the samples from the five countries surveyed are homogeneous should be rejected. Annex 13 shows the detailed output of the chi-square test generated by SPSS software package.

- *ANOVA Tests*

The one-way ANOVA test indicated that a majority of the means of the variables tested are statistically different among the countries surveyed. Table 9-5 shows a summary of the results of the one-way ANOVA test. Using the variable COUNTRY as the dependent variable, the results of the test showed that most of the independent variables tested have F ratios exceeding the stated F critical value (using a 5 percent level of significance). It can therefore be concluded that the mean (average) responses for a majority of variables (characteristics) given by respondents from the five countries survey differ in terms of their preference or ranking of importance of the attributes associated with world-class manufacturing companies. The only variable where the test revealed that the null hypothesis should not be rejected include GLOBAL1, RELIAB1, SERVICE1, COSTEFF1, STRAT1, VALUES1 and ETHICS1.

Results from Friedman's two-way ANOVA test confirmed that based on a five percent level of significance, the means from the key variables (with the exception of variable component MKT1 and STRAT1) are different among the five countries surveyed. With

TABLE 9-3 CRONBACH'S REALIBILITY MEASURES

Characteristics of World-Class Manufacturing Company	Alpha Value
• Global Player	0.7038
• Manufacturing Strategy	0.7653
• Marketing Strategy	0.7704
• Corporate Strategy	0.7694
• Corporate Values	0.8452
• Human Resources Strategy	08627

Footnote: Nunnally (1967) argued that for basic research, reliability coefficients of 0.7 to 0.8 are sufficient

Source: Author

TABLE 9-4

SUMMARY OF THE CHI-SQUARE TEST

	<u>Mean</u>	<u>Chi-Square</u>	<u>Degree of freedom</u>	<u>Significance P<</u>
<u>Characteristics of world-class manufacturing company:</u>				
(A) Global player	4.05	16.37	5	0.0059
Sells product world-wide	7.45	61.68	8	0.0000
Has a significant market share in its industry	7.47	63.59	8	0.0000
Is a leader in innovation	7.86	60.62	7	0.0000
Makes critical components in the country of origin	7.03	64.82	9	0.0000
(B) Manufacturing strategy	2.14	115.79	5	0.0000
Is technologically superior to competitors	8.38	76.95	6	0.0000
Produces high quality products (accuracy/process capability)	9.01	70.57	4	0.0000
High reliability of products				
(mean-time-before-failure/few breakdown)	9.09	82.15	4	0.0000
Cost efficiency (value-for-money)	8.73	71.23	5	0.0000
(C) Marketing strategy	2.96	86.74	6	0.0000
Produces customized products	6.50	56.09	9	0.0000
Has state-of-the-art technology (never obsolete)	7.80	75.62	8	0.0000
Has strong marketing and sales strategies	8.17	75.78	7	0.0000
Has excellent customer service	9.21	190.77	5	0.0000
Is financially stable and profitable	7.95	75.06	7	0.0000
(D) Corporate strategy	3.52	41.99	5	0.0000
Has strong and consistent corporate image/brand	8.04	39.89	6	0.0000
Has commitment to R&D	8.17	57.05	6	0.0000
Has flexibility to respond to market, political, and competitive changes	7.95	79.511	7	0.0000
Always meet delivery promise	8.41	42.26	5	0.0000
(E) Corporate values	3.62	25.93	5	0.0001
Has high standard of ethics	8.38	75.37	6	0.0000
Has integrity in dealing with people	8.35	66.10	6	0.0000
Is sincere in approach to people	8.44	77.89	6	0.0000
Builds trust in business/marketing relationship	8.61	57.06	5	0.0000
Sells benefits/solutions rather than empty promises	7.91	92.68	8	0.0000
(F) Human resource strategy	4.85	115.34	5	0.0000
Is a well-managed company	7.95	64.47	7	0.0000
Has low turnover of staff	7.39	78.80	9	0.0000
Is a company that cares for its people	7.61	87.94	8	0.0001

Source: Author

TABLE 9-5 SUMMARY OF THE ONE-WAY ANOVA TEST

<p>Degree of Freedom Between Groups : 4 Within Groups : 128 Level of significance at 5% F_{0.05, 4, 128} = 2.37</p>	<p>Dependent Variable : Countries surveyed H₀ (null hypothesis) : means of characteristics are equal amongst the countries surveyed H₁ (alternative hypothesis) : means of characteristics are not equal amongst the countries surveyed</p>
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		F Ratio	F Prob.	H ₀
<u>Characteristics of world-class manufacturing company:</u>				
(A)	Global player	1.38	0.2430	accepted
	Sells product world-wide	18.82	0.0000	rejected
	Has a significant market share in its industry	17.13	0.0000	rejected
	Is a leader in innovation	8.18	0.0000	rejected
	Makes critical components in the country of origin	5.39	0.0050	rejected
(B)	Manufacturing strategy	5.94	0.0020	rejected
	Is technologically superior to competitors	13.26	0.0000	rejected
	Produces high quality products (accuracy/process capability)	2.59	0.0390	rejected
	High reliability of products (mean-time-before-failure/few breakdown)	0.81	0.5220	accepted
	Cost efficiency (value-for-money)	1.79	0.1340	accepted
(C)	Marketing strategy	2.38	0.0550	rejected
	Produces customized products	5.59	0.0004	rejected
	Has state-of-the-art technology (never obsolete)	9.26	0.0000	rejected
	Has strong marketing and sales strategies	4.22	0.0031	rejected
	Has excellent customer service	0.66	0.6202	accepted
	Is financially stable and profitable	4.59	0.0017	rejected
(D)	Corporate strategy	1.17	0.3290	accepted
	Has strong and consistent corporate image/brand	8.58	0.0000	rejected
	Has commitment to R&D	3.99	0.0044	rejected
	Has flexibility to respond to market, political, and competitive changes	2.26	0.0661	rejected
	Always meet delivery promise	4.16	0.0037	rejected
(E)	Corporate values	1.77	0.1390	accepted
	Has high standard of ethics	1.33	0.2640	accepted
	Has integrity in dealing with people	6.26	0.0001	rejected
	Is sincere in approach to people	6.15	0.0001	rejected
	Builds trust in business/marketing relationship	7.25	0.0000	rejected
	Sells benefits/solutions rather than empty promises	13.32	0.0000	rejected
(F)	Human resource strategy	4.12	0.0036	rejected
	Is a well-managed company	18.82	0.0000	rejected
	Has low turnover of staff	8.57	0.0000	rejected
	Is a company that cares for its people	12.93	0.0000	rejected

Footnote: Null Hypothesis (H₀) = $\mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_5$ (where μ is the mean value of each country's sample)
= there is no difference in the mean rating of each country's sample.

Source: Author

chi-square values of each of the variables tested exceeding the critical value of 3.841, the null hypothesis for each variable is rejected. Annex 14 shows the detailed output from the one-way ANOVA test and Friedman two-way ANOVA test as generated by SPSS software package.

- **Descriptive Statistics**

Using SPSS, descriptive statistics were generated. Key statistics such as Mean, Standard Deviation, Variance and Skewness of each variable component characteristic were tabulated. Frequency Counts and Cumulative Percentages of responses given on each variable were also generated. These statistics can be found in Annex 15. Table 9-6 shows the mean attribute importance and ranking of key characteristics of world-class manufacturing companies from each of the five countries surveyed.

9.4 Interpretation of Statistical Analysis

The statistical analysis of the survey findings involving end-users in the five ASEAN countries is interpreted in section 9.3. The reliability in results (Cronbach's reliability measures) from five different markets indicated shared expectations of end-users in the region. A market-by-market summary is as follows:

- **Malaysia Market**

The ranking in descending order (see Figure 9.1):

- Manufacturing Strategy; Corporate Values (equal weightage)
- Corporate Strategy
- Global Player
- Human Resource Strategy

End-users in Malaysia are influenced primarily by the sincerity, integrity and trust of distributor/manufacturer's sales personnel in promoting quality and reliable machines. In other words, a premium would be placed on *relationship marketing*. Machine quality and reliability together with rapport with the distributor/manufacturer are the most important criteria influencing end-users' organizational buying behaviour (OBB).

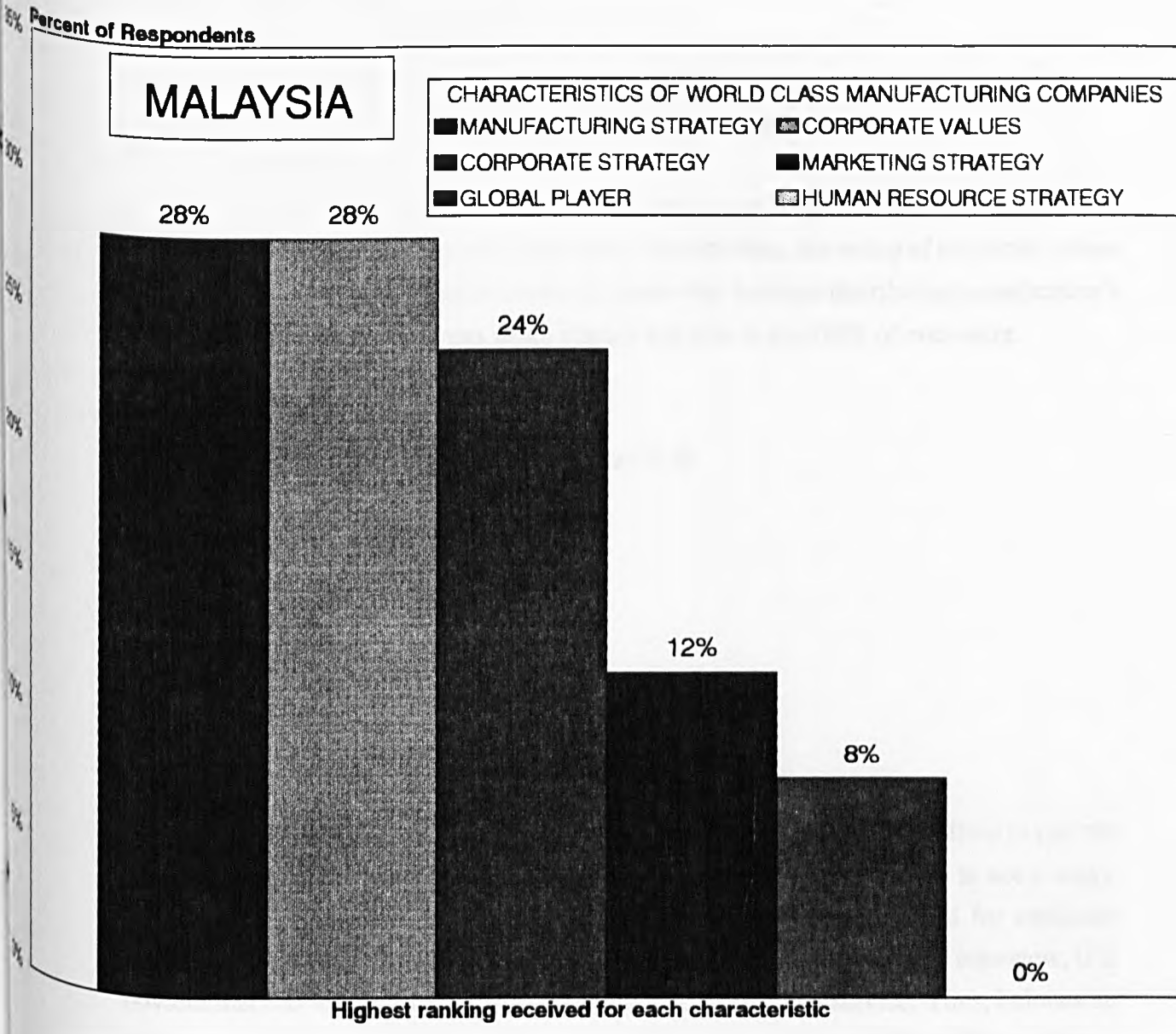
TABLE 9-6

**MEAN ATTRIBUTE IMPORTANCE OF KEY CHARACTERISTICS OF
WORLD-CLASS MANUFACTURING COMPANIES**

Key Attribute	Indonesia		Thailand		Malaysia		The Philippines		Singapore	
	Mean	Highest Ranking (percent of respondents)	Mean	Highest Ranking (percent of respondents)	Mean	Highest Ranking (percent of respondents)	Mean	Highest Ranking (percent of respondents)	Mean	Highest Ranking (percent of respondents)
Global Player	4.5	6.5%	4.0	8%	3.6	8%	4.3	12%	3.7	20%
Manufacturing Strategy	1.4	77.5%	1.6	68%	2.8	28%	2.5	36%	2.5	50%
Marketing Strategy	2.5	6.5%	2.7	16%	3.2	12%	3.6	8%	2.8	13%
Corporate Strategy	3.8	3%	3.3	8%	3.2	24%	3.7	8%	3.4	10%
Corporate Values	3.9	6.5%	4.1	-	3.3	28%	3.2	24%	3.6	14%
Human Resource Strategy	4.9	-	5.3	-	5.2	-	8.8	12%	8.8	2%
Total		100%		100%		100%		100%		100%

Source: Author

FIGURE 9.1 SURVEY OF END-USERS IN MALAYSIA MARKET



Source: Author

- **The Philippines Market**

The ranking in descending order (see Figure 9.2):

- Manufacturing Strategy
- Corporate Values
- Global Player; Human Resource Strategy (equal weightage)
- Marketing Strategy; Corporate Strategy (equal weightage)

It is apparent that for end-users of CNC machine tools in the Philippines, quality and reliability of machine is of utmost importance. Nevertheless, the rating of corporate values is relatively high implying that *relationship marketing* between distributor/manufacturer's sales people and their customers again plays a key role in the OBB of end-users.

- **Indonesia Market**

The ranking in descending order (see Figure 9.3):

- Manufacturing Strategy
- Global Player
- Corporate Values
- Marketing Strategy
- Corporate Strategy
- Human Resource Strategy

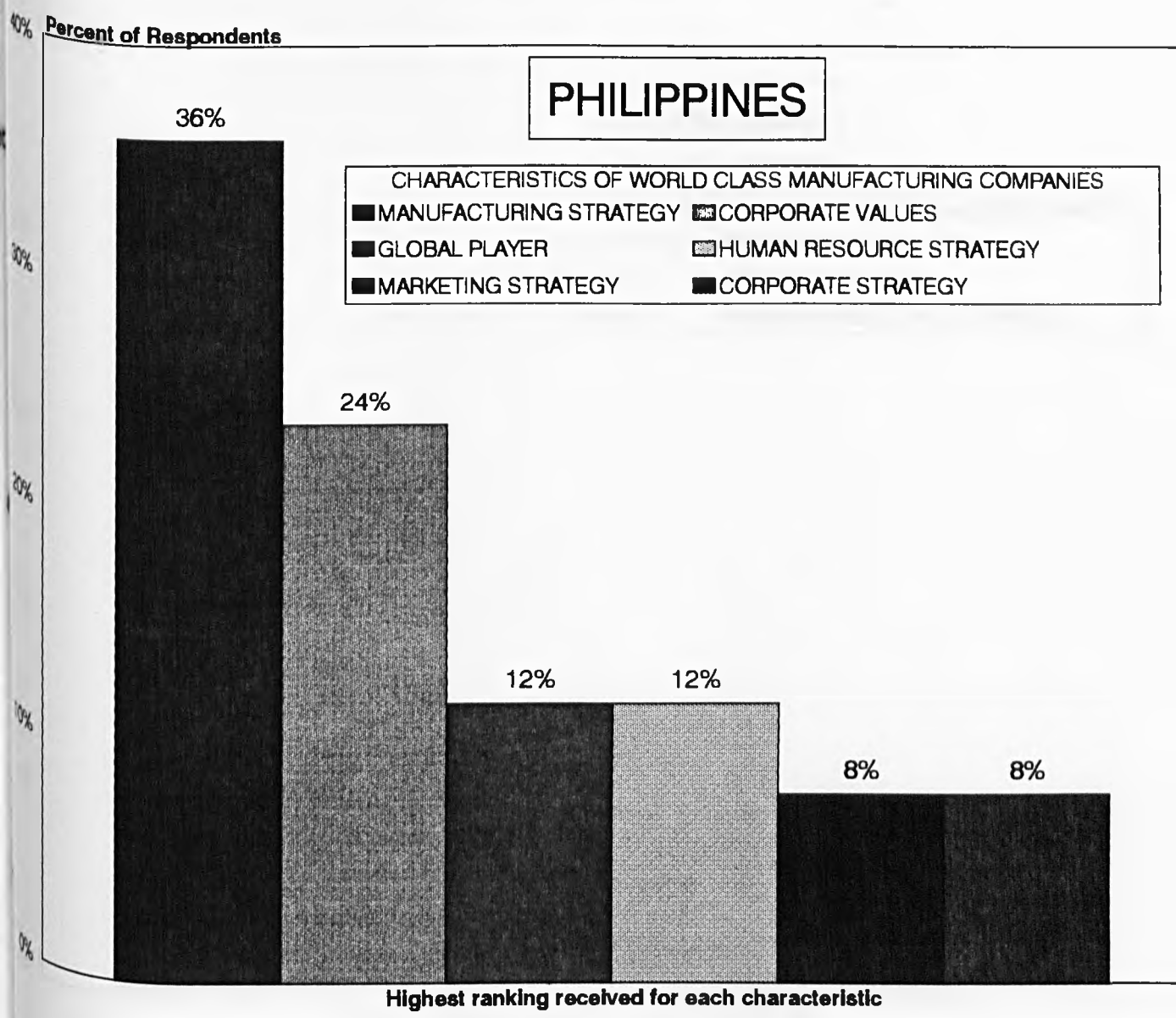
Customers' desire is for quality and reliability of machines. They are willing to pay the price because there will be less breakdown and hence after-sales service is not a major consideration. However, a quick response to service call is still critical for customer satisfaction (although this is not reflected in the ranking). From the depth interview, it is obvious that end-users share common expectations on after-sales service. Thus, Indonesian end-users of CNC machines are not directly influenced by price or relationship marketing of distributor/manufacturer's sales people.

- **Singapore Market**

The ranking in descending order (see Figure 9.4):

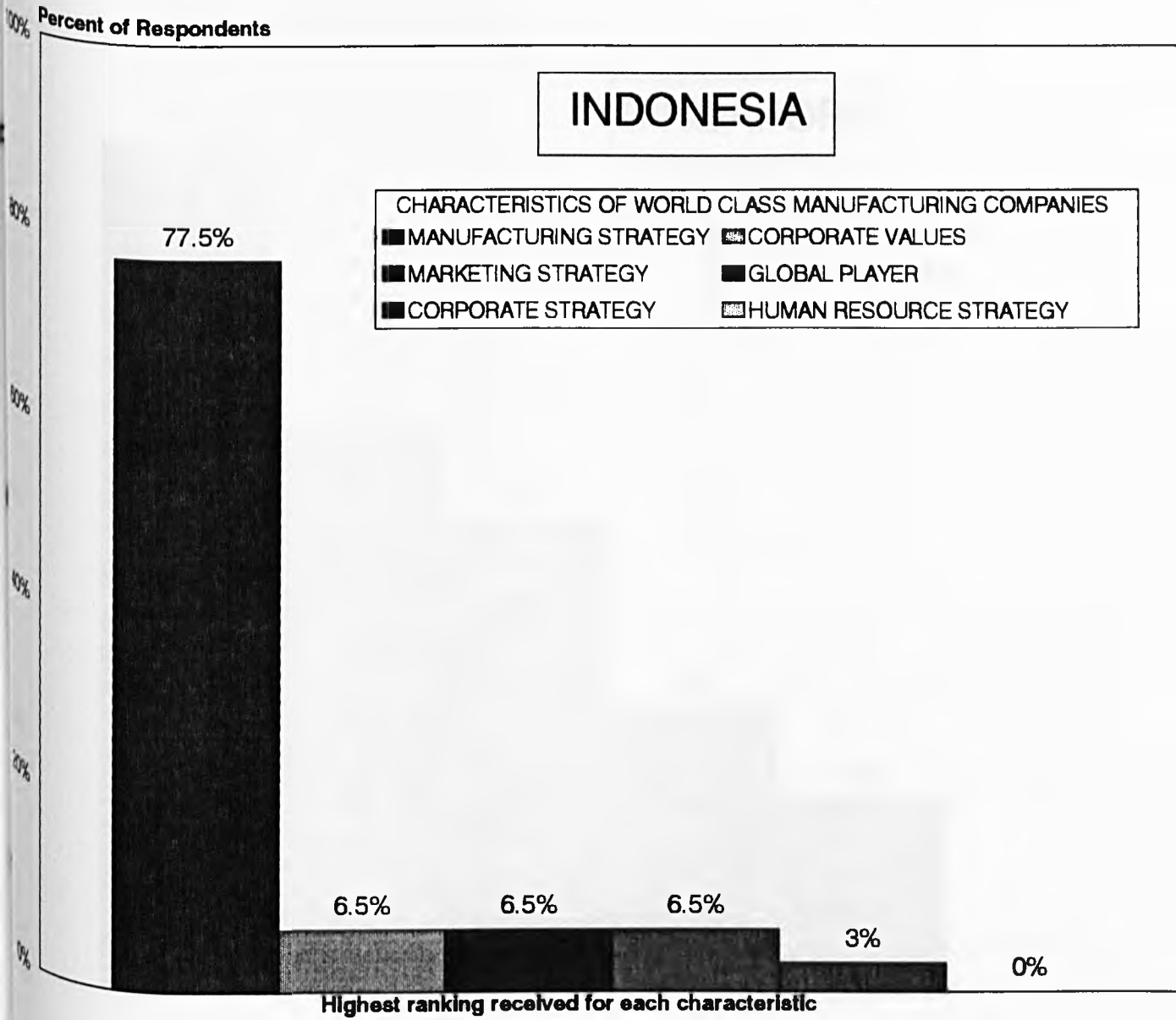
- Manufacturing Strategy

FIGURE 9.2 SURVEY OF END-USERS IN THE PHILIPPINES MARKET



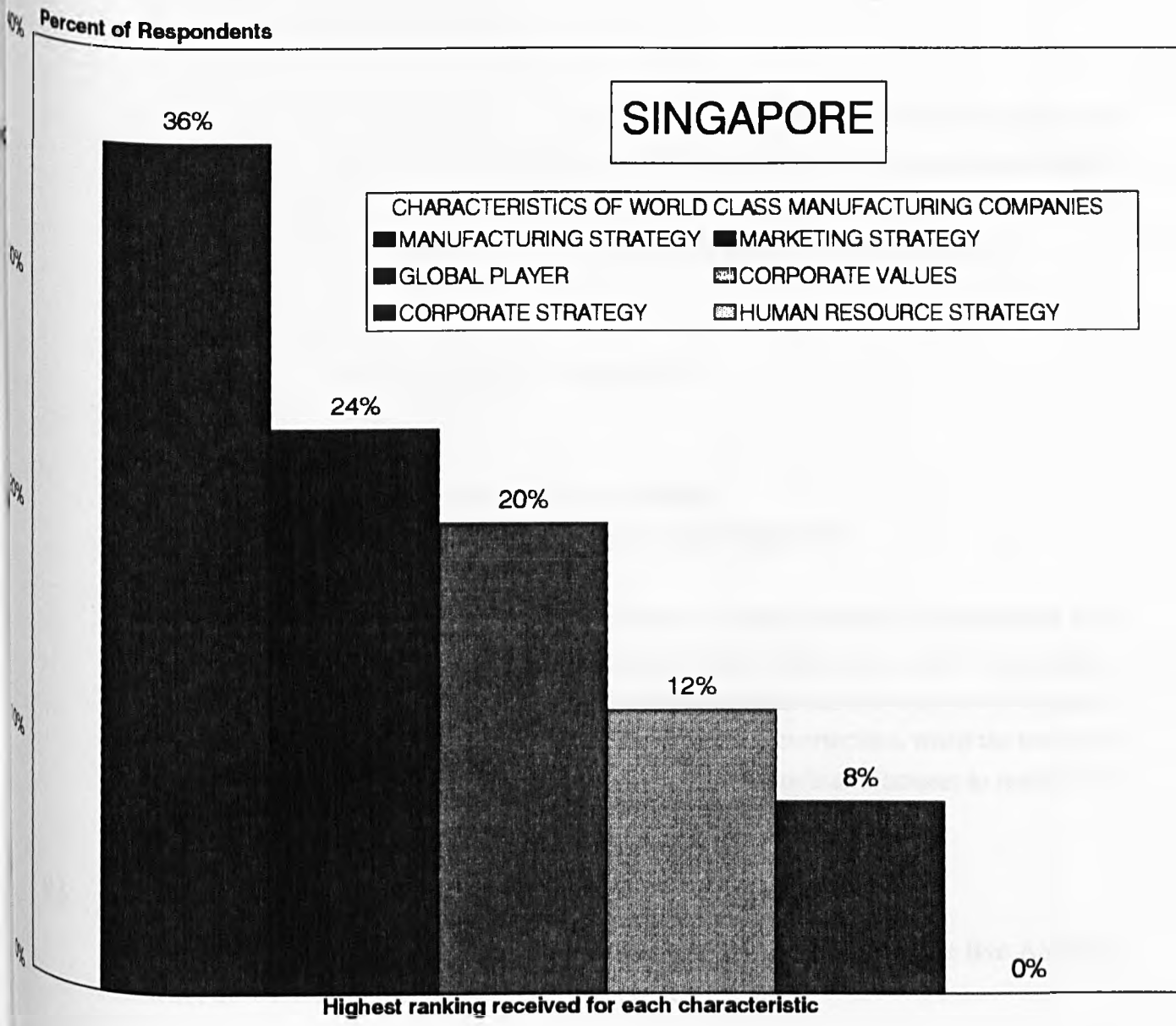
Source: Author

FIGURE 9.3 SURVEY OF END-USERS IN INDONESIA MARKET



Source: Author

FIGURE 9.4 SURVEY OF END-USERS IN SINGAPORE MARKET



Source: Author

- Marketing Strategy
- Global Player
- Corporate Values
- Corporate Strategy
- Human Resource Strategy

It is obvious that end-users' preference is for quality and reliability of machines, followed by price and after-sales service, and dominance of the manufacturer in terms of market share. Hence, customers in Singapore require a quality product at a reasonable price, and one which inspires confidence through the producer's strong position in the global market.

• **Thailand Market**

The ranking in descending order (see Figure 9.5):

- Manufacturing Strategy
- Marketing Strategy
- Global Player; Corporate Strategy (equal weightage)
- Corporate Values; Human Resource Strategy (equal weightage)

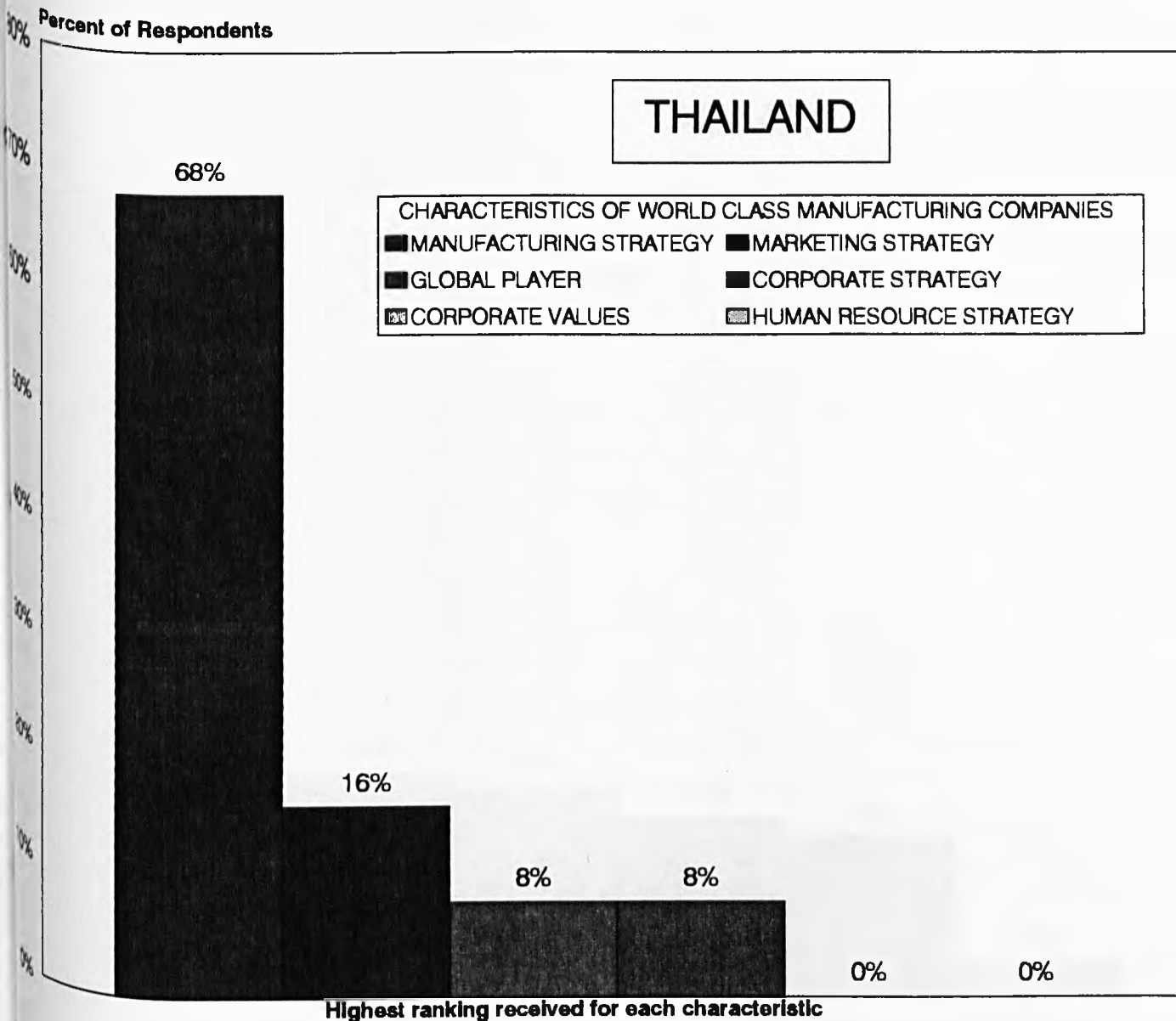
In Thailand, the distinctive trait of customers is their emphasis on the quality and reliability of the CNC machine tools. Price and after-sales service are of secondary importance. After-sales service is not so highly valued because the end-users are of the view that a high quality, reliable machine does not break down. Nevertheless, when the machine breaks down, they expect quick response from the distributor/manufacturer to rectify the problem.

9.5 Summary of the ASEAN Market

With a sample size of one hundred and thirty three respondents from the five ASEAN countries, the cumulative ranking is as follows (see Figure 9.6):

- Manufacturing Strategy
- Corporate Values
- Marketing Strategy
- Global Player
- Corporate Strategy
- Human Resource Strategy

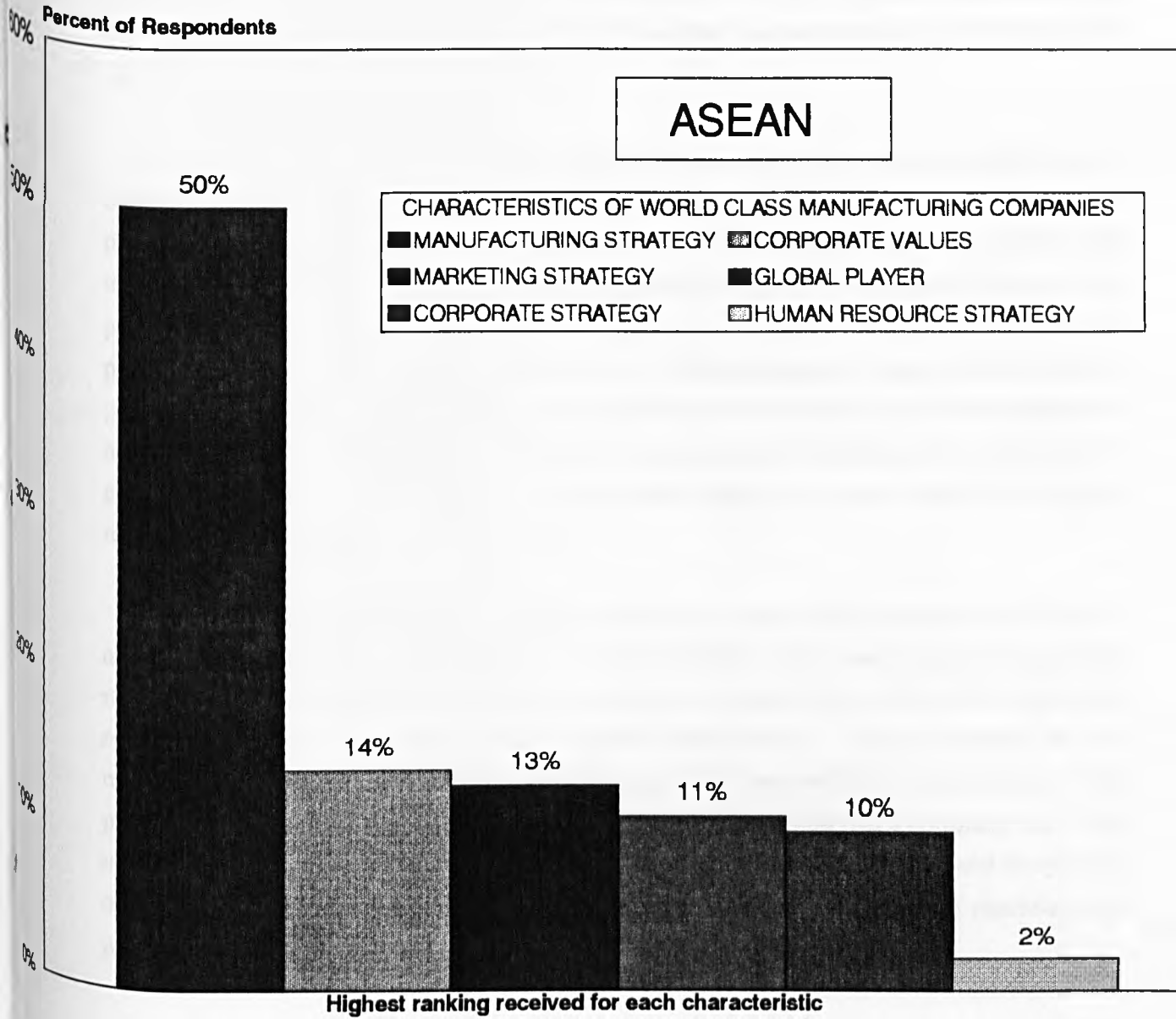
FIGURE 9.5 SURVEY OF END-USERS IN THAILAND MARKET



Source: Author

FIGURE 9.6

SURVEY OF END-USERS IN THE ASEAN MARKET
(ONE HUNDRED AND THIRTY-THREE RESPONDENTS)



Source: Author

To the end-users in the region, quality and reliability of the world-class CNC machine tool producers override the other characteristics. They understand that all electronics are very reliable. Their concern is with the hardware of the machine tool itself which is responsible for producing parts within the tolerance limit, ie repeatability. This is accurately reflected in the overall result, manufacturing strategy outranked the other characteristics by a wide margin of 50 percent.

For the next four characteristics (ie corporate values, marketing strategy, global player, corporate strategy), there is no significant difference in percentage to indicate distinct preference for one characteristic over another. In other words, corporate values (ie relationship marketing) may not play a critical role in influencing the OBB of end-users because it is a percentage point above that of marketing strategy (ie price and after-sales service). For global player (ie market share) and corporate strategy (ie brand/company image), there is also a percentage point gap. These two characteristics are interrelated because if a product has a good brand image, it should have market share due to its popularity. Generally, there is no marked preference for any one of these four characteristics unlike the lowest ranking for human resource management.

To the end-users, human resource management of the world-class machine tool builder is not a concern to them because, ultimately it is the reliability of the machines and the penalty that influence their decision, not how the manufacturer treats their workers. However, this result must not be interpreted literally by the manufacturer. This is because for the manufacturer, it is the quality of the workforce which is responsible for the quality of the products. Human resources are probably the most precious capital that a company has. The main challenge is to get all workers buying into the ownership of the company and the quality of the products and services they deliver (see Chapter 8 on the case study of machine tool producers).

End-users are very rational and objective in the purchase of CNC machines because it is high-technology/ high-investment decision making. Hence, a distinct concern for quality and reliability before other factors like price, after-sales service, brand/company image, market share, sincerity, integrity, trust of manufacturer/distributor.

Insights to the ranking on the characteristics of the world-class machine tool manufacturing company by the end-users in the ASEAN countries can be better grasped with an analysis of the organizational buying behaviour given in the section 9.6.

9.6 Organizational Buying Behaviour (OBB) in the ASEAN Market

The author's finding are tabulated as follows:

	Singapore	Malaysia	Indonesia	Thailand	The Philippines
Criteria for buying decision	<ul style="list-style-type: none"> • Quality & reliability • Price & after-sales service 	<ul style="list-style-type: none"> • Quality & reliability • Relationship marketing 	<ul style="list-style-type: none"> • Quality & reliability 	<ul style="list-style-type: none"> • Quality & reliability 	<ul style="list-style-type: none"> • Quality & reliability • Relationship marketing
End-users preference (by country of origin) (see Figure 9.7)	<ul style="list-style-type: none"> • Japan • Germany • USA • Taiwan 	<ul style="list-style-type: none"> • Japan • Germany • Taiwan • USA 	<ul style="list-style-type: none"> • Japan • Germany • USA • Taiwan 	<ul style="list-style-type: none"> • Japan • Germany • Taiwan • USA 	<ul style="list-style-type: none"> • Japan • Taiwan • Germany • USA
Influence of brand on OBB (in order of preference) (see Figure 9.8)	<ul style="list-style-type: none"> • Mori Seiki • Okuma • Mazak • Hitachi Seiki 	<ul style="list-style-type: none"> • Mori Seiki • Okuma • Mazak • Hitachi Seiki 	<ul style="list-style-type: none"> • Mori Seiki • Okuma • Mazak • Hitachi Seiki 	<ul style="list-style-type: none"> • Okuma • Mori Seiki • Hitachi Seiki • Mazak 	<ul style="list-style-type: none"> • Mazak • Okuma • Mori Seiki • Hitachi Seiki
Influence of distributors/manufacturers on OBB	<ul style="list-style-type: none"> • Manufacturers 	<ul style="list-style-type: none"> • Distributors 	<ul style="list-style-type: none"> • Manufacturers 	<ul style="list-style-type: none"> • Manufacturers 	<ul style="list-style-type: none"> • Distributors/manufacturers

The Japanese machine tool builders were quick to establish a foothold in the region, viz

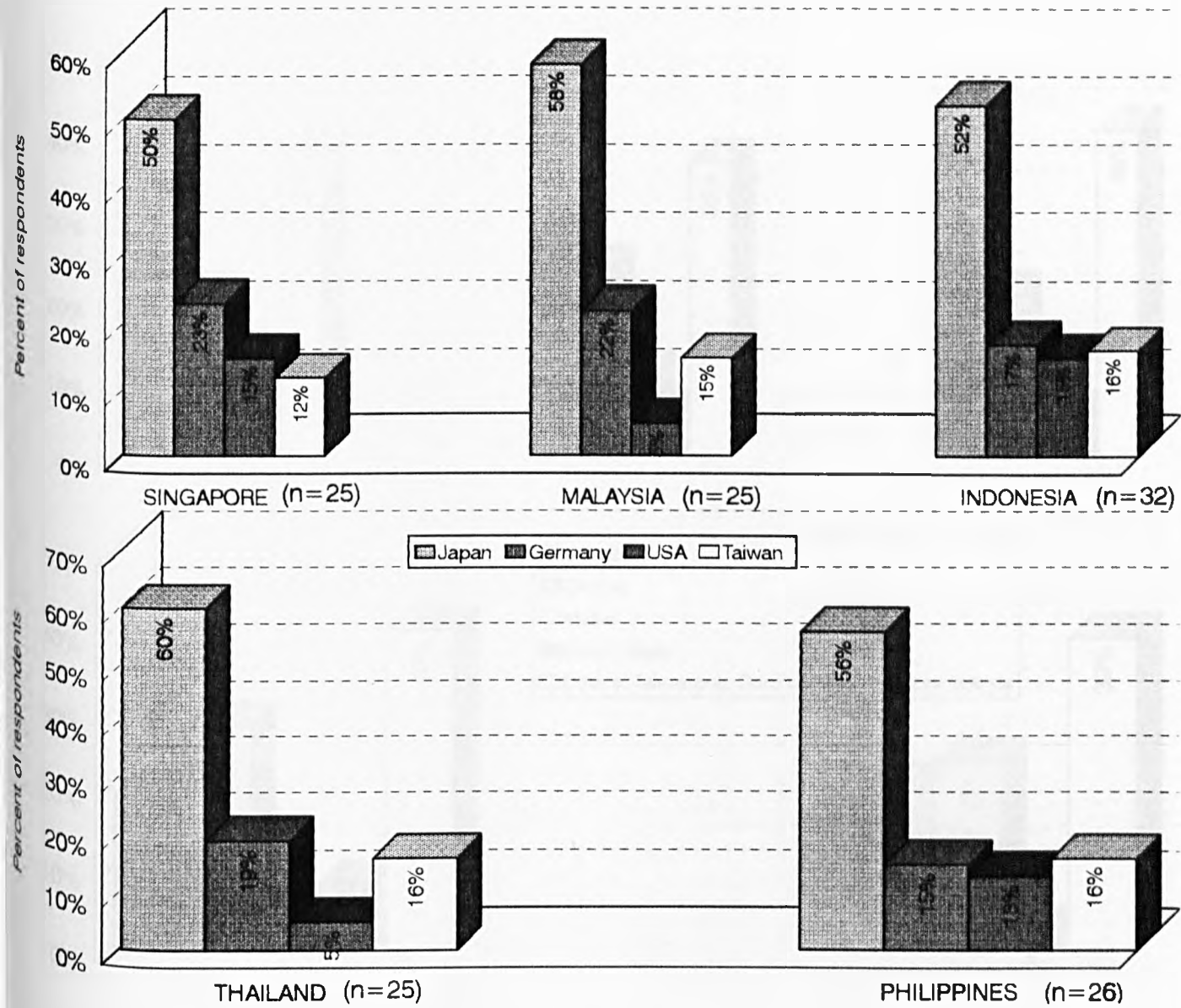
	Singapore	Malaysia	Indonesia	Thailand	The Philippines
Okuma	1981	1985	1983	1987	1989
Mazak	1979	1983	1982	1980	1986
Mori Seiki	1979	1979	1988	1979	1992

Accumulation of years in the usage of Japanese CNC machines by the end-users to-date is tabulated as follows:

	Singapore	Malaysia	Indonesia	Thailand	The Philippines
Okuma	13	9	11	7	5
Mazak	15	11	12	14	8
Mori Seiki	15	15	6	15	2

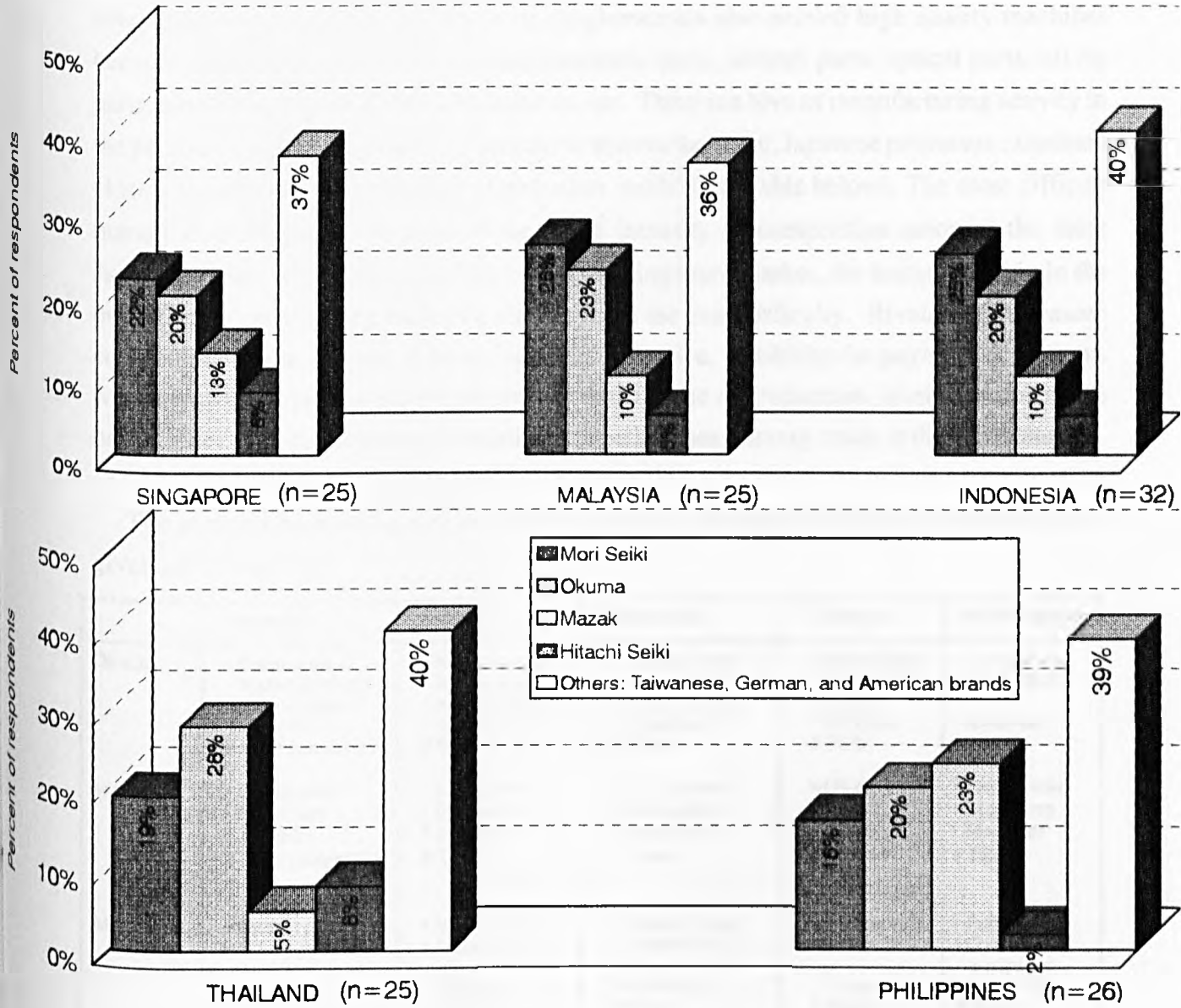
The *Art of War* strategy deployed by Japanese machine tool builders display characteristics of planning, intelligence, swiftness, adaptability, deception, proactivity and alternatives in

FIGURE 9.7 END-USERS' PREFERENCE FOR MACHINES BY COUNTRY OF ORIGIN



Source: Author

FIGURE 9.8 INFLUENCE OF BRANDS ON ORGANIZATIONAL BUYING BEHAVIOUR



Source: Author

strategies (see survey results in Figure 9.9). Their strategic intent was to win market share in the region and so they entered the market prior to opposing forces mobilising a strong presence. They were thus well-positioned to take advantage of the rapidly expanding market as the region attracted unprecedented levels of inward investment and indigenous companies serviced these investors. Further, sub-contractors of conglomerates also needed high quality machines because parts produced were hydraulic/pneumatic parts, aircraft parts, optical parts, oil rig parts, mould and die for automotive industry, etc. There is a hive of manufacturing activity in the precision engineering industry. In order to win market share, Japanese producers examined closely the relative sophistication of end-users needs' (see Table below). The most difficult market is in Singapore because of the fierce intensity of competition amongst the three Japanese rivals. Using the experience from the Singapore market, the battle is fought in the other four countries. The Malaysia market poses the next difficulty. Rivals have to ensure competitiveness in pricing, delivery, after-sales service, flexibility (in payment conditions, warranty period), productivity (guarantee accuracy, rate of production, minimum downtime of machine). See Table below for relative competitiveness among rivals in different markets.

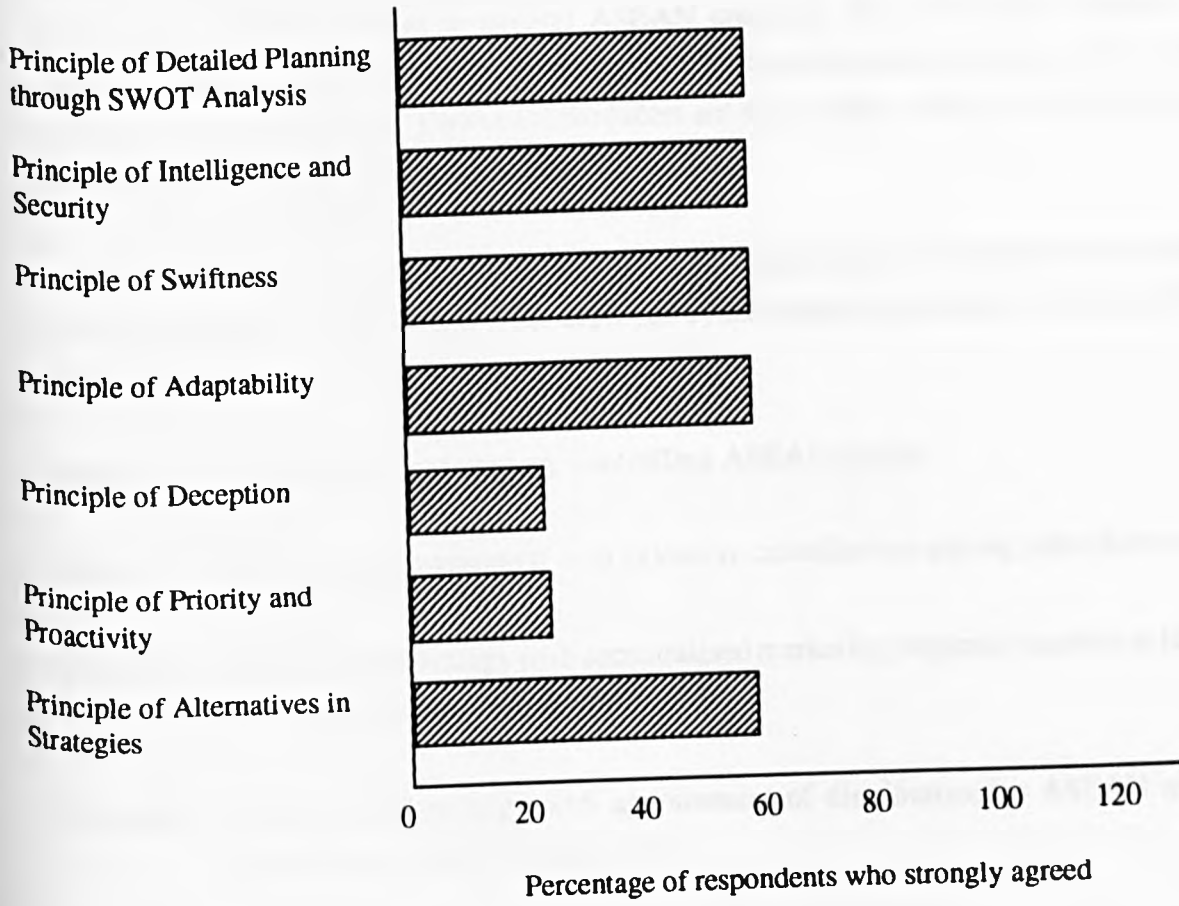
The regional positioning and market segmentation of Okuma, Mazak and Mori Seiki is given as follows:

	Singapore	Malaysia	Indonesia	Thailand	The Philippines
Okuma	<ul style="list-style-type: none"> • Institutions of higher learning • Aircraft parts * <i>Complex</i> # Most competitive 	<ul style="list-style-type: none"> • Institutions of higher learning • Automobile * <i>Moderate</i> # Second 	<ul style="list-style-type: none"> • Aircraft parts • Automobile • Mould & die * <i>Moderate</i> # Third 	<ul style="list-style-type: none"> • Automobile • Mould & die • Pumps * <i>Complex</i> # Fifth 	<ul style="list-style-type: none"> • Automobile • Machinery * <i>Moderate</i> # Fourth
Mazak	<ul style="list-style-type: none"> • Oil rig parts • Machinery * <i>Complex</i> # Most competitive 	<ul style="list-style-type: none"> • Oil rig parts • Electronics * <i>Complex</i> # Third 	<ul style="list-style-type: none"> • Oil rig parts • Automobile * <i>Moderate</i> # Fourth 	<ul style="list-style-type: none"> • Oil rig parts • Pumps * <i>Complex</i> # Second 	<ul style="list-style-type: none"> • Automobile • Machinery * <i>Moderate</i> # Fifth
Mori Seiki	<ul style="list-style-type: none"> • Optical parts • Oil rig parts * <i>Complex</i> # Most competitive 	<ul style="list-style-type: none"> • Mould & die • Machinery * <i>Moderate</i> # Second 	<ul style="list-style-type: none"> • Aircraft parts • Automobile • Mould & die * <i>Moderate</i> # Fifth 	<ul style="list-style-type: none"> • Automobile • Mould & die * <i>Complex</i> # Fourth 	<ul style="list-style-type: none"> • Pumps • Construction equipment * <i>Moderate</i> # Third
Relative Percentage of Precision Engineering Industry	75%	60%	45%	45%	30%

Footnote: * Sophistication of parts is related to the percentage share of precision engineering industry
 # Relative ranking of competitiveness among rivals

FIGURE 9.9

ART OF WAR STRATEGY BY JAPANESE MACHINE TOOL MANUFACTURER



Source: Author

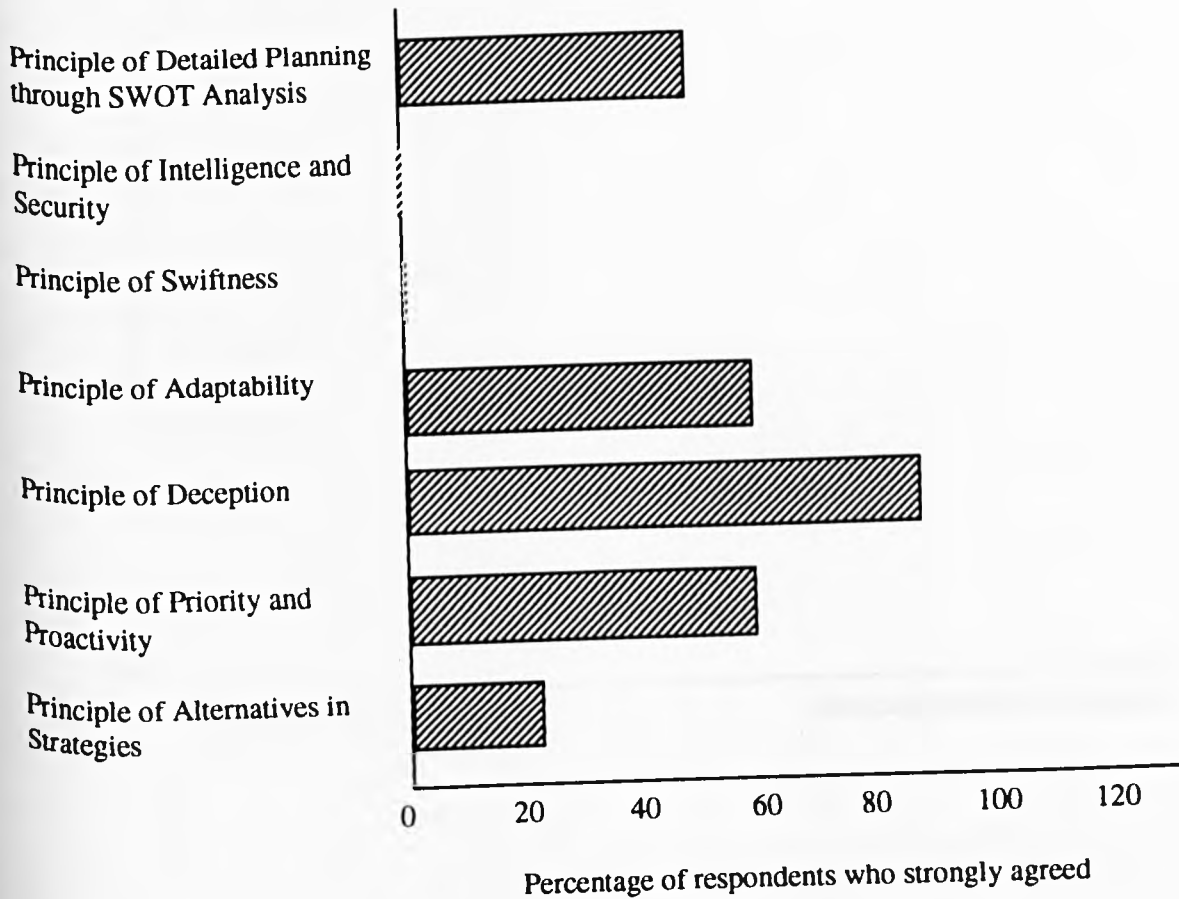
Hence, the overall strategy of the Japanese is to offer quality and reliable products to the end-users. They established contacts and built rapport with the manufacturers in the high precision industry (potential demand). They install their machines in the institutions of learning used for the training of students (latent demand). They invest in the region by setting up a representative office, a technical centre, an R&D centre, a production base. These acted as fortifications and reinforcements making it difficult for US and European rivals to penetrate their strongholds. Nevertheless, with Taiwanese companies overtaking the Japanese as the major source of foreign direct investment in several ASEAN countries, the Taiwanese machine tool producers had a favourable point of market entry which their Japanese rivals could not easily defend. Comparatively, the Taiwanese producers are not as adept in the Art of War Strategy as their Japanese rival (see Figure 9.10).

Regional positioning (micro-level) among machine tool builders of different nationalities is shown in Figure 9.11. The strategies deployed by the Japanese and Taiwanese competitors are:

- Okuma : Regional-centred strategy controlling ASEAN market
- Mazak : High foreign investment with extensive coordination among subsidiaries
- Mori Seiki : Export-based strategy with decentralised marketing; regional warehouse to serve immediate delivery needs
- Taichung : Export-based strategy with appointment of distributors for ASEAN market. Centralised control in headquarters.
- Leadwell : Joint venture with Singapore company. Regional company to serve ASEAN market.
- Fair Friend: Branch office in Singapore. Regional-centered strategy controlling ASEAN market

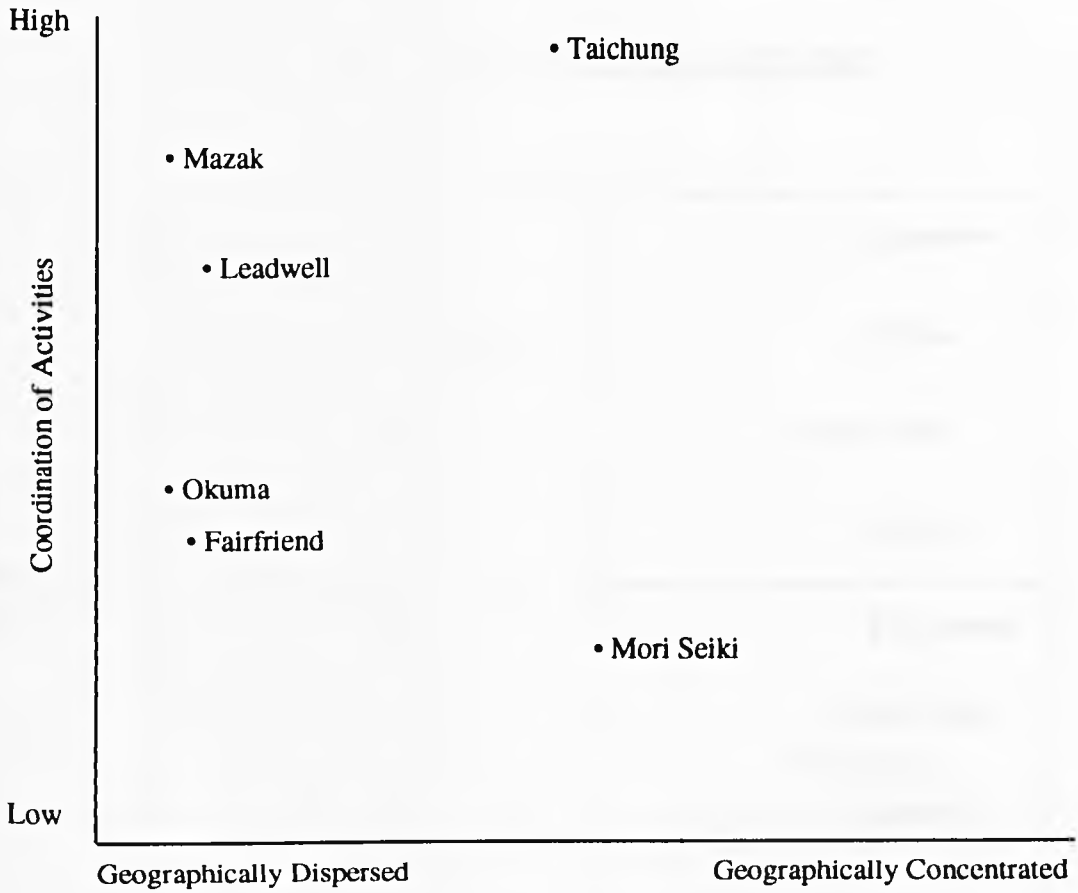
Regional positioning (macro-level) is depicted in Figure 9.12.

FIGURE 9.10 ART OF WAR STRATEGY BY TAIWANESE MACHINE TOOL MANUFACTURER



Source: Author

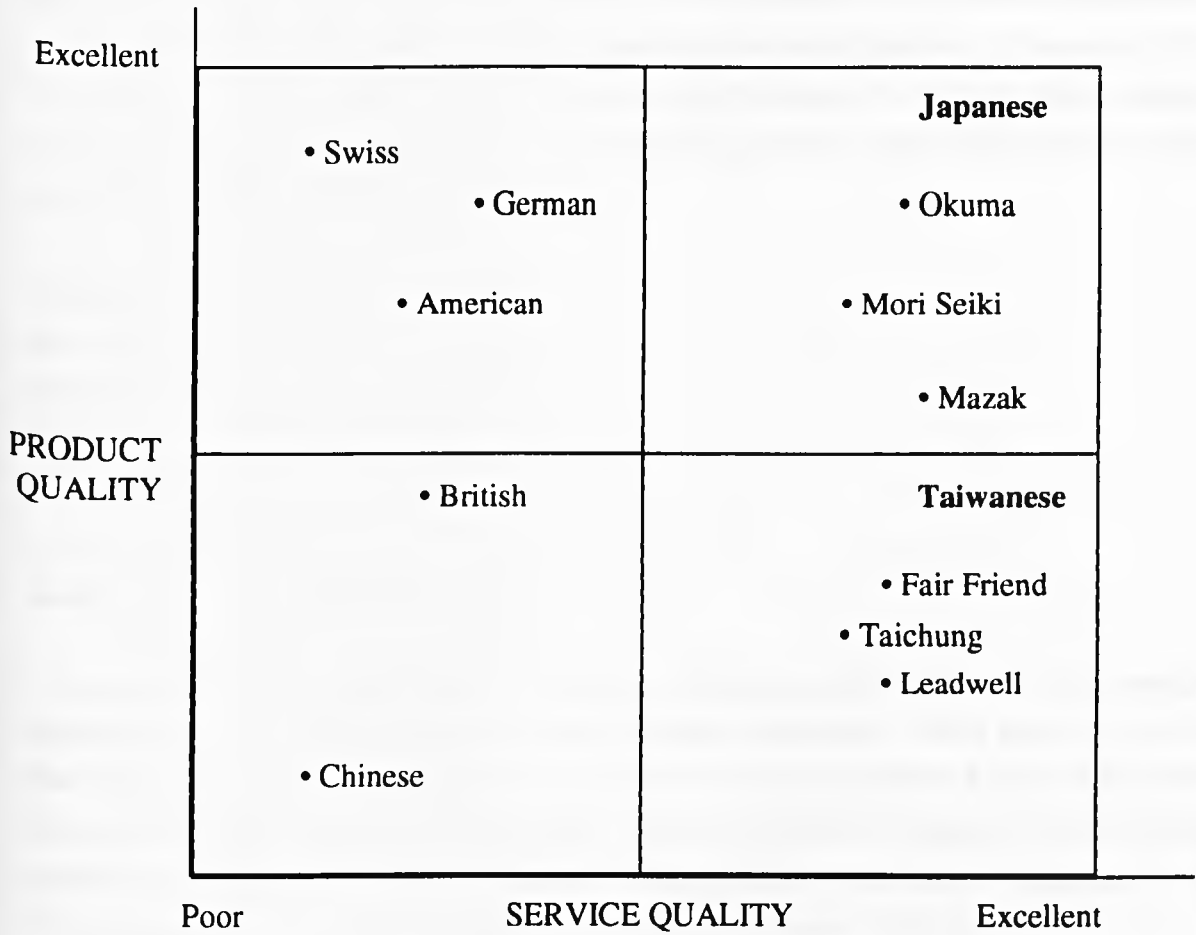
FIGURE 9.11 REGIONAL POSITIONING (MICRO LEVEL)



Source: Author

FIGURE 9.12 REGIONAL POSITIONING (MACRO LEVEL)

CUSTOMER-FOCUSED QUALITY GRID



Source: Author

In the two surveys of European business professionals carried out by *Time Magazine* in 1988 and 1993, general perceptions about the quality of Taiwan-made products vastly improved compared to other Asian rivals. Whilst Taiwan's industrial prestige surged ahead of its rival, South Korea and Hong Kong, significant progress was also made in catching up with Japan's strong image in the European market (see Figure 9.13). Taiwan, like Japan, is included in the quality league according to the world-wide quality poll (see Figure 9.14). Japan's position at the top of the league table confirms impression that its manufacturers are now considered the world's best in producing both consumer goods and industrial products (*Financial Times*, February 11, 1994). In 1992, the ASEAN market imported about 13.2 percent of total machine tool production from Japan which dominated about 50 percent of total ASEAN market share (JMTBA, 1993), ie:








Thailand	6.4%
Singapore	3.3%
Indonesia	2.2%
Malaysia	1.2%
Philippines	0.1%
<hr/>	
<u>Total</u>	<u>13.2 percent</u>

It is apparent that Taiwanese machine tool manufacturers need to change their competitive strategy from one of price leadership to that of quality leadership. This is shown by the fact that only 32 to 33 percent or one-third (forty-four out of one hundred and thirty-three) of the respondents would consider switching from Taiwanese to Japanese brands at 30 percent price difference. A summary of the comparative strengths and weaknesses of Japanese versus Taiwanese world-class CNC machine tool producers is given in Table 9-7.

9.7 Summary/Conclusion

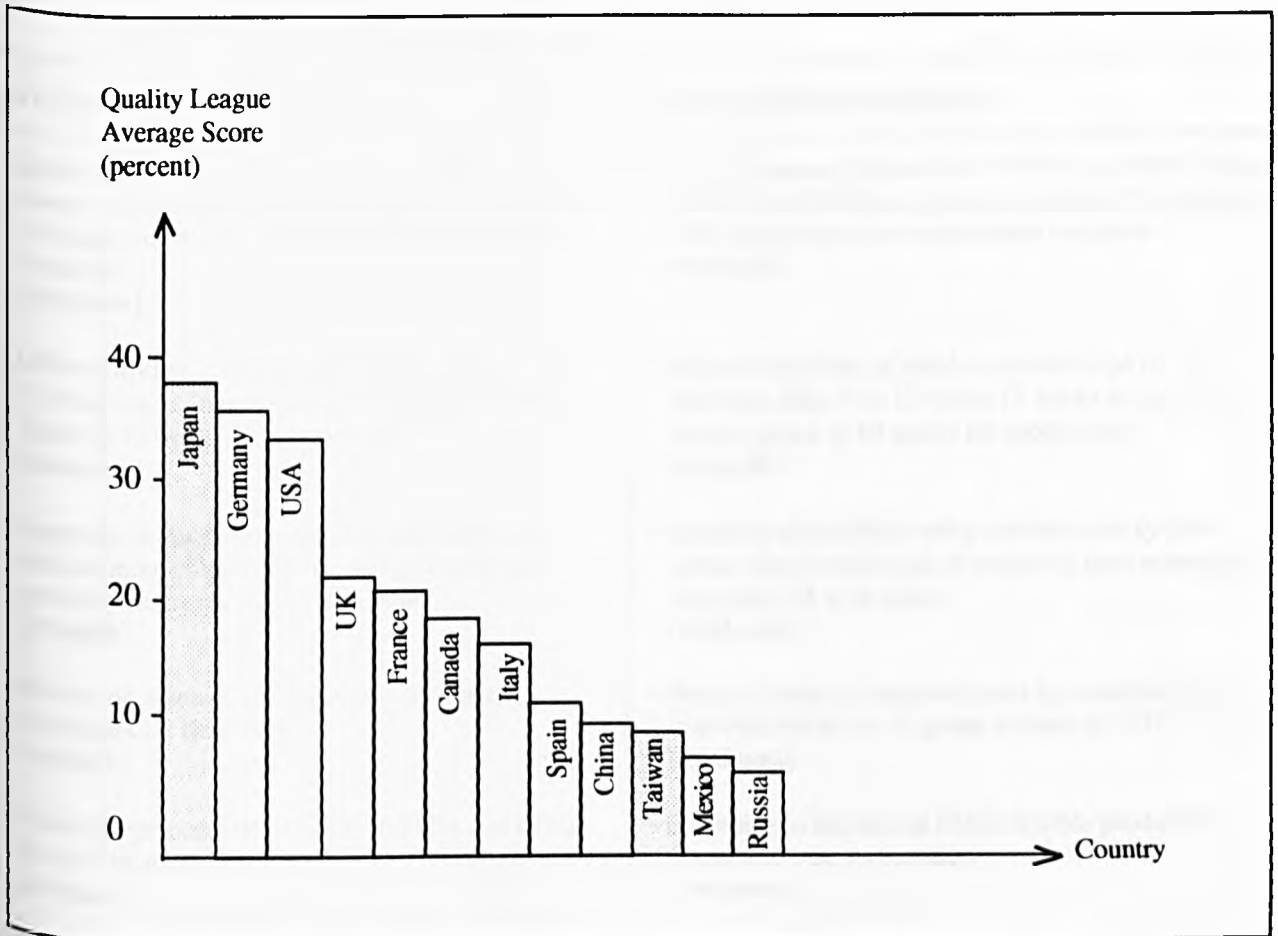
The author visited one hundred and thirty three end-users of CNC machine tools in the ASEAN region (Indonesia, Malaysia, the Philippines, Singapore, and Thailand) in order to discern end-users' perceptions of the characteristics of a world-class CNC machine tool manufacturer. The end-users' ranking in descending order of importance is as follows:

FIGURE 9.13 TIME MAGAZINE PAN-EUROPE PRODUCT IMAGE SURVEY

1988		71% behind Japan	 JAPAN
			TAIWAN
		6.4% behind South Korea	SOUTH KOREA
		2.5% behind Hong Kong	HONG KONG
1993		28% behind Japan	 JAPAN
			TAIWAN
		30% ahead of South Korea	SOUTH KOREA
		29% ahead of Hong Kong	HONG KONG

Source: *Time Magazine* (1994), January.

FIGURE 9.14 CONSUMERS' RATING OF TWELVE COUNTRIES IN THE QUALITY LEAGUE



Footnote:

Gallup, a US-based market survey company, carried out the poll by asking more than 20,000 people in 20 countries how they rated the quality of manufactured goods produced by each of the 12 countries named. Ratings were given on a five-point scale ranging from poor to excellent. Some 38.5 percent of interviewees thought Japan's products were very good or excellent. Germany was second with 36 percent, and the USA was third with 34.3 percent. Next, after a big gap, came Britain, France, Canada, Italy, Spain, China, Taiwan, Mexico and Russia.

Source: Bozell-Gallup Worldwide Quality Poll, Bozell Worldwide, 40 West 23rd Street, Room D-140, New York

Table 9-7 HIGHLIGHTS OF COMPARATIVE STRENGTHS/WEAKNESSES OF JAPANESE VERSUS TAIWANESE WORLD-CLASS CNC MACHINE TOOL PRODUCERS

JAPANESE PRODUCERS	TAIWANESE PRODUCERS
<ul style="list-style-type: none"> • Export Licence (imposed by COCOM and MITI) takes about 6 to 8 weeks before approval is obtained for shipment of CNC machines to non-communist countries [weakness] 	<ul style="list-style-type: none"> • Export Licence (imposed by COCOM and MOE) takes about 2 weeks before approval is obtained for export of CNC machines to non-communist countries [strength]
<ul style="list-style-type: none"> • Delivery lead time of standard CNC machines takes 12 to 20 weeks (6 to 8 weeks to get export licence plus 6 to 12 weeks for production) [weakness] 	<ul style="list-style-type: none"> • Delivery lead time of similar standard type of CNC machines takes 8 to 12 weeks (2 weeks to get export licence plus 6 to 10 weeks for production) [strength]
<ul style="list-style-type: none"> • Assembly of machines using flow-line conveyor system (most efficient production method); total assembly time only takes 2 to 4 hours [strength] 	<ul style="list-style-type: none"> • Assembly of machines using conventional system (unnecessary movement of workers); total assembly time takes 24 to 36 hours [weakness]
<ul style="list-style-type: none"> • Pioneer of Kanban (JIT) and lean production techniques for flexibility [strength] 	<ul style="list-style-type: none"> • Plenty of room for improvements by switching from conventional layout to group technology (GT) layout [weakness]
<ul style="list-style-type: none"> • One of the pioneers (after USA) in FMSs and CIMs flexible production system [strength] 	<ul style="list-style-type: none"> • Beginning to implement FMSs flexible production systems to reap its benefits [weakness]
<ul style="list-style-type: none"> • Technological leader in CNC systems (eg Fanuc, Okuma, Mitsubishi) for CNC machines [strength] 	<ul style="list-style-type: none"> • All Taiwanese producers retrofit their CNC machines with Japanese CNC controllers (eg Fanuc, Mitsubishi) [weakness]
<ul style="list-style-type: none"> • Market leader in terms of total production value of CNC machines (ranked No. 1 in the world) [strength] 	<ul style="list-style-type: none"> • In 1993, ranked No. 8 in the world to overtake British CNC machine tool industry [strength]
<ul style="list-style-type: none"> • Quality leadership in terms of end-users preference [strength] 	<ul style="list-style-type: none"> • Price leadership in terms of end-users preference [strength]

Source: Author

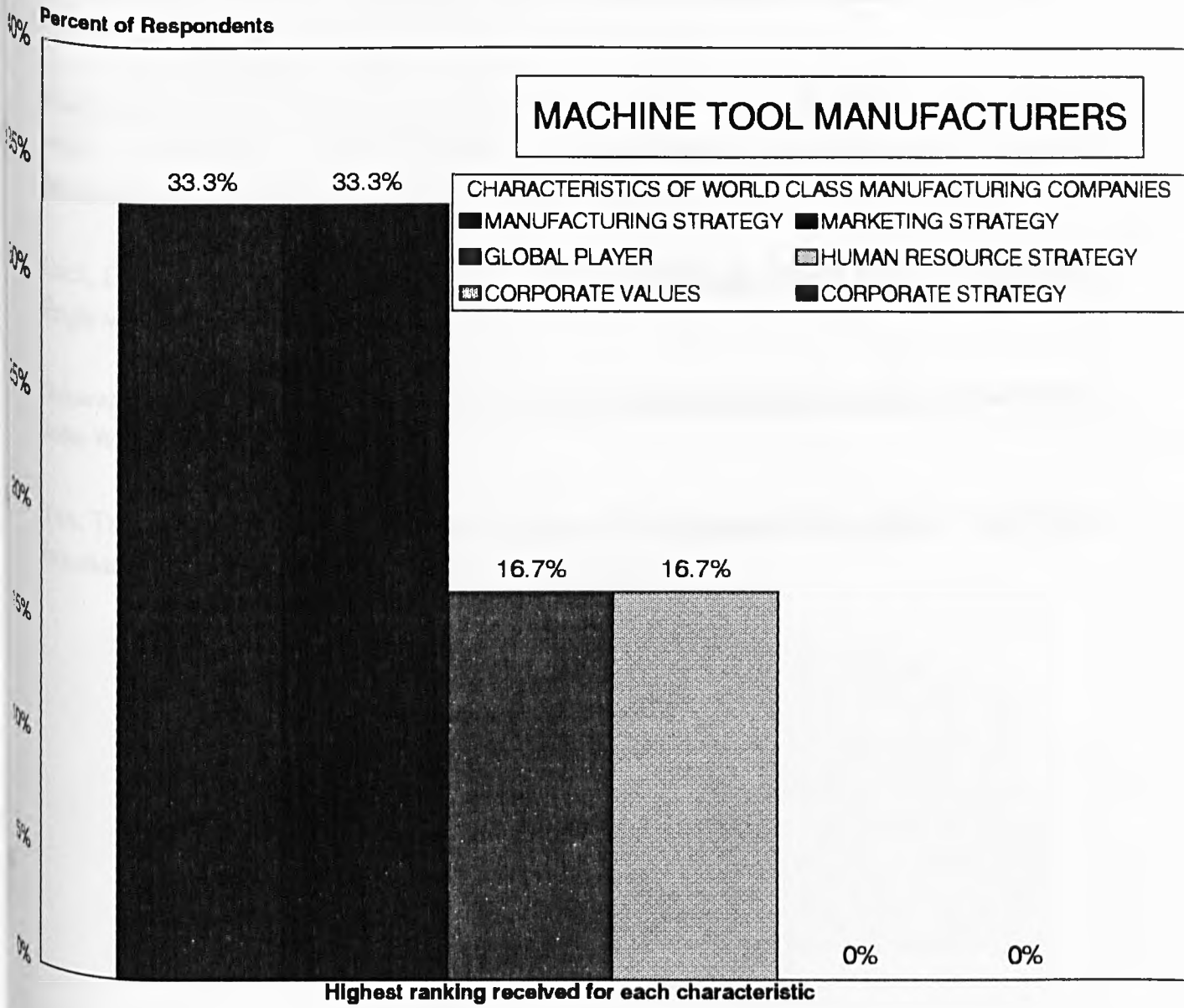
Characteristics of World-Class Manufacturing Company	End-Users' Interpretation
• Manufacturing Strategy	• Quality and Reliability of Machine Tools
• Corporate Values	• Sincerity, Integrity and Trust of Manufacturer/Distributor's Sales Personnel
• Marketing Strategy	• Price and After-Sales Service of Machine Tools
• Global Player	• World-wide Market Share held by Machine Tool Manufacturer
• Corporate Strategy	• Manufacturer's Brand Name/Image
• Human Resource Strategy	• Employees' Opinion of their Employer (Manufacturer/Distributor)

In a similar survey of the six machine tool producers, the ranking in descending order of importance is as follows (see Figure 9.15):

- Manufacturing Strategy/Marketing Strategy (equal weightage)
- Global Player/Human Resource Management (equal weightage)
- Corporate Strategy/Corporate Values (equal weightage)

Obviously, for a manufacturing company, the twin pillars are manufacturing strategy and marketing strategy as indicated by respondents' equal weightage. World-Class manufacturing-marketing strategy would qualify them to be players in the global market for profit/market share. Supporting human resource management plays an equally important role in the achievement of world-wide profit/market share. However, the manufacturers would have to pay heed to corporate values as indicated by the ranking of customers which give second priority to corporate values after manufacturing strategy. In other words, in the sale of quality and reliable machine tools, the manufacturer/distributor's sales personnel would have to display sincerity, integrity and trust. Thus, the paramount importance of relationship marketing to capture and retain loyalty from customers would impact the bottom line of profit/market share.

FIGURE 9.15 SURVEY OF THE SIX MACHINE TOOL PRODUCERS



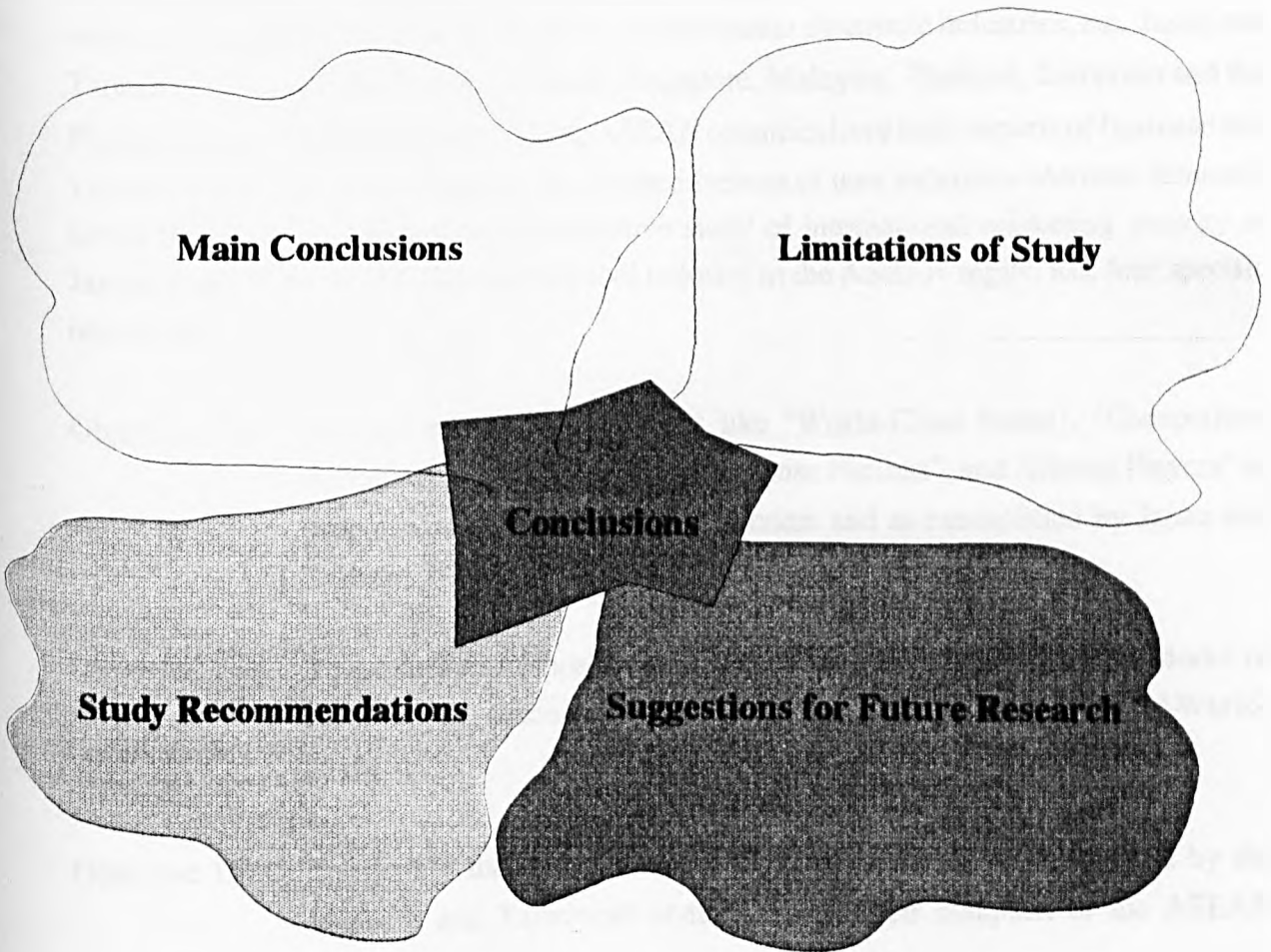
Source: Author

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CHAPTER TEN

**SUMMARY AND RECOMMENDATIONS OF
THE STUDY RESEARCH OBJECTIVES AND MAIN CONCLUSIONS**



SUMMARY AND RECOMMENDATIONS OF THE STUDY'S RESEARCH OBJECTIVES AND MAIN CONCLUSIONS

10.1 Main Conclusions

Manufacturing of machine tools is a key industry. The machine tool industry occupies a unique position as the supplier of the basic equipment needed to make all other machines and parts. Ever since the industrial revolution, machine tools have underpinned industrial expansion. From an industrial policy perspective, the choice is either to create a machine tool industry to reap the linkage effects to the other sectors or promote the importation of the best machine tools the world over to enhance the competitiveness of user industries such as automobiles, general machinery, electrical and consumer electronic industries, etc. Japan and Taiwan have chosen the first option while Singapore, Malaysia, Thailand, Indonesia and the Philippines have chosen the latter. These ASEAN countries have high imports of Japanese and Taiwanese machine tools to sustain the competitiveness of user industries (derived demand). Given this scenario, the author's comparative study of international marketing strategy of Japanese and Taiwanese CNC machine tool industry in the ASEAN region had four specific objectives:

Objective One: To explore and link concepts like "World-Class Status", "Competitive Advantage of Nations", "Commonsense Nations", and "Global Players" as propounded by academics/practitioners and as exemplified by Japan and Taiwan

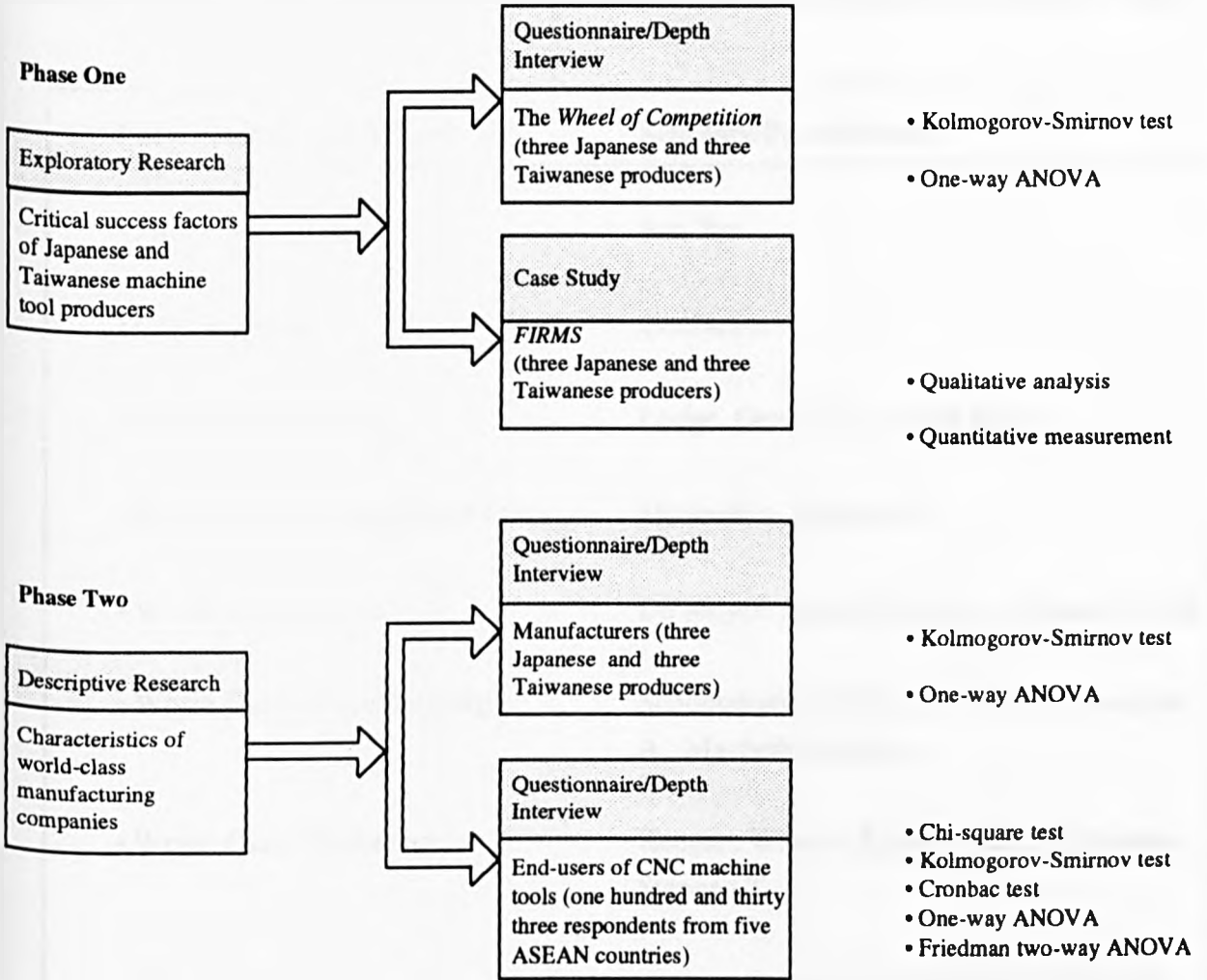
Objective Two: To explore the Wheel of Competition of Asian Producers and Model of *FIRMS* in the success of CNC Machine tool business to go beyond World-Class Status

Objective Three: To identify the critical success factors as subscribed and applied by the Japanese and Taiwanese contributing to their conquest of the ASEAN market

Objective Four: To identify common values and practices in the socio-cultural belief systems which are the driving forces behind the Japanese and Taiwanese competitiveness in the machine tool industry in the ASEAN market.

A summary of the empirical research methodology is depicted in Figure 10.1.

FIGURE 10.1 EMPIRICAL RESEARCH: PHASE ONE AND PHASE TWO



Source: Author

Firstly, the author explored concepts like "World-Class Status", "Competitive Advantage of Nations", "Commonsense Nations" and "Global Players" propounded by Western Scholars and exemplified by Eastern practitioners like Japan and Taiwan:

Pioneers of the Theoretical Concepts in the *Wheel of Competition* and the Model of *FIRMS*

Parameters in the Wheel	Scholars/Practitioners
• Art of War strategy	Sun Tzu
• Confucianism	Confucius
• Communitarianism	Lodge, George C.; Vogel, Ezra F.
• Business and Management Ethos	Matsushita, Konosuke
• World-Class Status	De Meyer, Arnoud; Coulson-Thomas, Colin
• World-Class Manufacturing	Schonberger, Richard J.; Voss, Christopher A.; Macbeth, Douglas
• World-Class Marketing	Keegan, Warren; Kotler, Philip; Parkinson, Stephen T.
• Global Player	Ohmae, Kenichi; Yip, George S.; Bartlett, Christopher; Daniels, John and Caroline
• Competitive Advantage of Nations	Porter, Michael E.
• Commonsense Nations	Lee, Kuan Yew

Tenets of Management	Management Gurus	Architecture of <i>FIRMS</i>
• Self-Directed Work Teams	• Fisher; Wellins; Byham	• HRM
• Benchmarking	• Watson; Camp; Zairi; De Meyer	• WCM-M, TQCS
• Business Process Reengineering	• Hammer; Morris; Johansson	• HRM, SCM, DNM, WCM-M
• Simultaneous Engineering/ Concurrent Engineering/ Time-Based Manufacturing Competition	• Shunk; Bockerstette; Stalk Jr.	• WCM-M
• Outsourcing	• Macbeth; Voss; Christopher	• SCM
• National Vocational Qualifications	• Fletcher	• HRM
• Competence-Based Training and Development	• Fletcher	• HRM
• The Learning Organization	• Lessem; Senge	• HRM, SCM, DNM, WCM-M
• Empowerment	• Marchington; Myers	• HRM
• Organizational Architecture	• Nadler	• HRM, SCM, DNM, WCM-M
• Core Competencies	• Prahalad; Hamel	• HRM, SCM, DNM, WCM-M

Footnote:

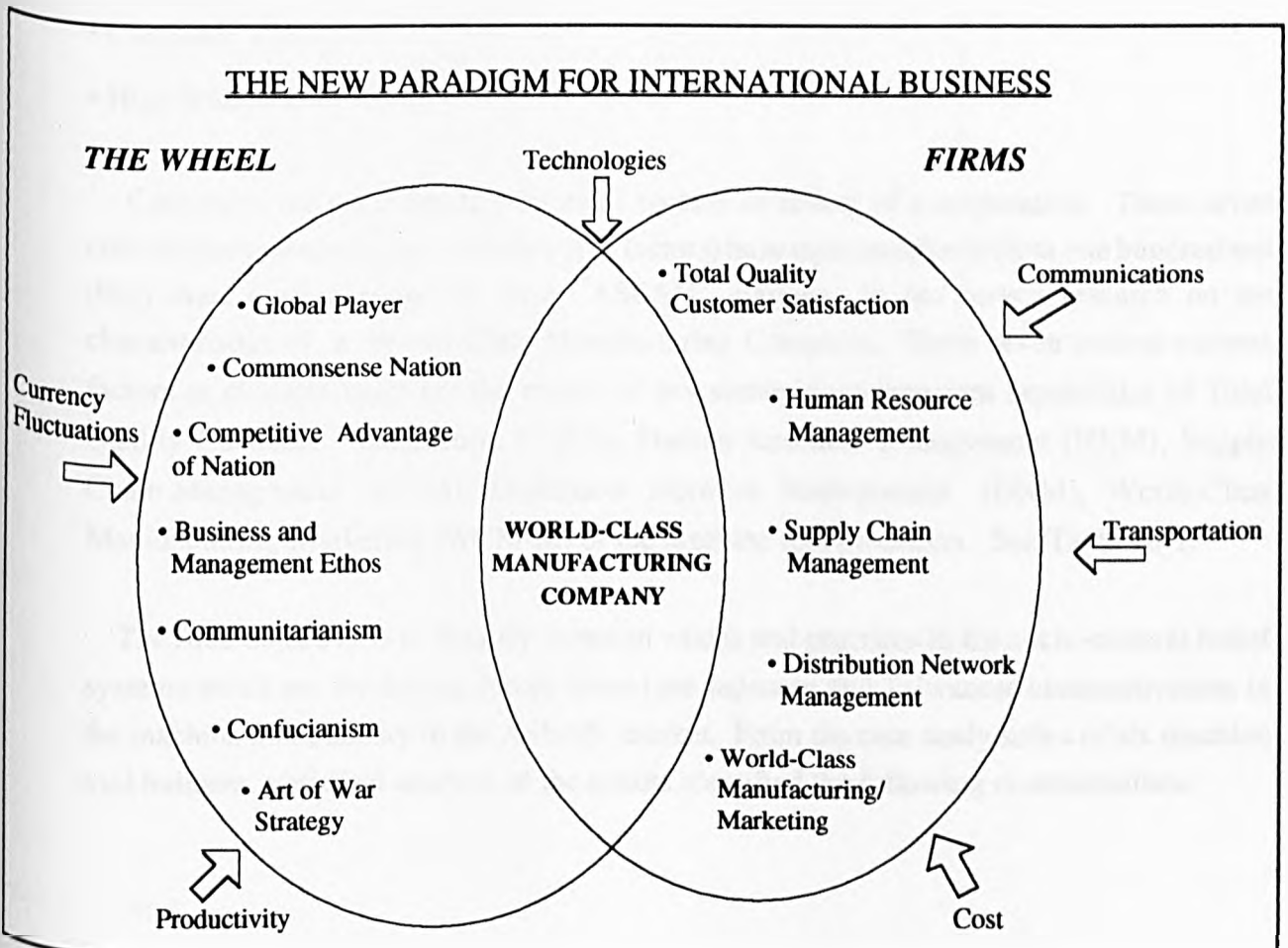
- TQCS = Total Quality Customer Satisfaction
- HRM = Human Resource Management
- SCM = Supply Chain Management
- DNM = Distributor Network Management
- WCM-M = World-Class Manufacturing-Marketing

Eastern Practitioners

Japanese Machine Tool Producers	Taiwanese Machine Tool Producers
<ul style="list-style-type: none"> • Okuma Corporation • Yamazaki Mazak Corporation • Mori Seiki Company Limited 	<ul style="list-style-type: none"> • Taichung Machinery Works Company • Leadwell Machine Manufacturing Corporation • Fair Friend Enterprise Group - Machine Tool Division

The criteria for selection of these world-class machine tool producers were based on their performance in the ASEAN region in terms of volume of sales, profitability and market share.

Secondly, these concepts were linked and given a macro framework in "The Wheel of Competition of Asian Producers in the CNC Machine Tool Industry in ASEAN Region" and a micro framework in "The Model of Flexible Intelligent Relationship Management Strategy":



The author also discussed the changing international business environment, tracing developing trends in geo-politics, geo-economics and the socio-cultural-technological environment impacting the machine tool industry.

With these conceptual frameworks, Objective Three is to identify the critical success factors as subscribed and applied by the Japanese and Taiwanese contributing to their conquest of the ASEAN market. Statistical analysis of results from end-users identified seven critical success factors:

- Global Player
- High Reliability of Products (mean-time before failure/ few breakdowns)
- Cost-Efficiency (value for money)
- Excellent Customer Service
- Corporate Strategy
- Corporate Values
- High Standards of Ethics

Customers are the ultimate arbiters of success or failure of a corporation. These seven critical success factors (out of twenty five factors) have equal emphasis from one hundred and thirty-three customers in the five ASEAN markets in the survey research on the characteristics of a World-Class Manufacturing Company. These seven critical success factors or characteristics are the results of key strategic management capabilities of Total Quality Customer Satisfaction (TQCS), Human Resource Management (HRM), Supply Chain Management (SCM), Distributor Network Management (DNM), World-Class Manufacturing-Marketing (WCM-M) of the machine tool producers. See Table 10-1.

The final objective is to identify common values and practices in the socio-cultural belief systems which are the driving forces behind the Japanese and Taiwanese competitiveness in the machine tool industry in the ASEAN market. From the case study series of six machine tool builders, statistical analysis of the results identified the following commonalities:

TABLE 10-1 RELATIONSHIP BETWEEN CRITICAL SUCCESS CHARACTERISTICS OF WORLD-CLASS MANUFACTURING COMPANY AND STRATEGIC MANAGEMENT CAPABILITIES IN *FIRMS*

Critical Success Factors of World-Class Manufacturing Company	Strategic Capabilities in <i>FIRMS</i>				
	TQCS	HRM	SCM	DNM	WCM-M
Global player	X	X	X	X	X
High reliability of products (mean-time-before failure/ few breakdowns)	X	X	X	X	X
Cost efficiency (value for money)	X	X	X	X	X
Excellent customer service	X	X	X	X	X
Corporate strategy	X	X	X	X	X
Corporate values	X	X	X	X	X
High standard of ethics	X	X	X	X	X

Source: Author

Generic Category	Specific Characteristics
• World-class status	<ul style="list-style-type: none"> World-wide standard quality World-wide distribution service Benchmarking
• Global player	<ul style="list-style-type: none"> Significant market share Leader in R&D
• Communitarianism	<ul style="list-style-type: none"> Holism Consensus
• Confucianism	<ul style="list-style-type: none"> Loyalty Thrift Sacrifice
• Art of War	Principle of Adaptability
• Business and Management Ethos	<ul style="list-style-type: none"> Strategy (Profit/Market Share) Staff (Education/Experience/Local/Expatriate)

This comparative study of the international marketing strategy of Japanese and Taiwanese CNC machine tool industry in the ASEAN region has identified some congruence of successful international competitors.

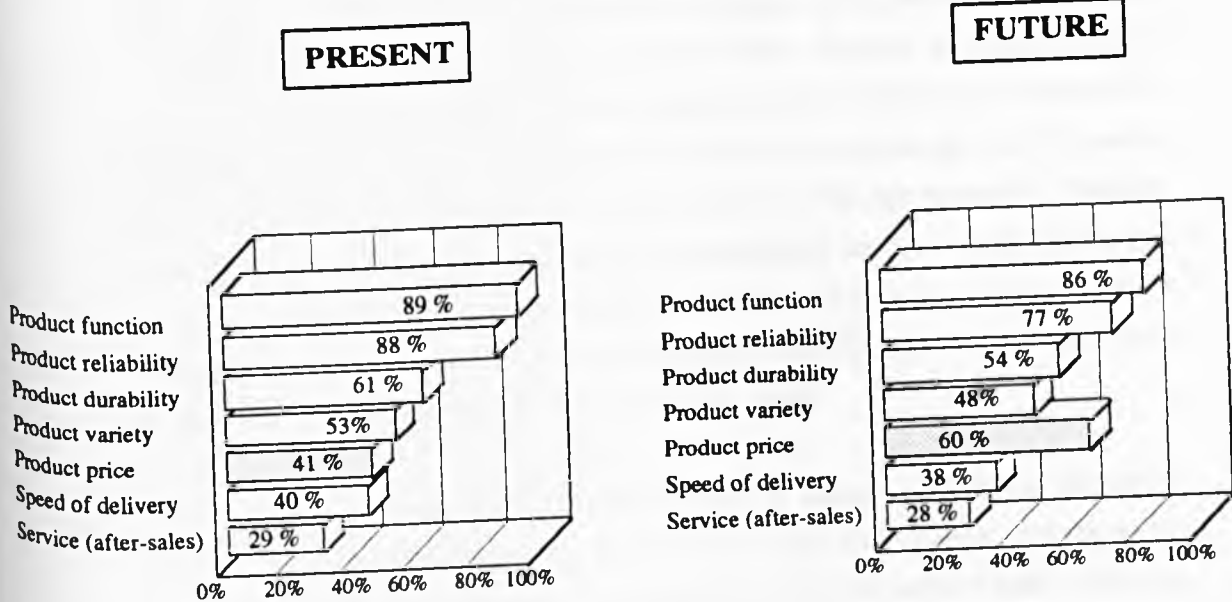
In summary, the author's *Total Quality Business Paradigm* offers a unique contribution to the academic literature in areas like competencies and capabilities, competitive advantage, corporate strategy, strategy implementation and corporate values. It gels these concepts into two theoretical models of the *Wheel of Competition* at the national level and *Model of FIRMS* at the company level. It shows how world-class companies can obtain profit/market share through a coherent approach to strategic business management which accepts the best of "world classness" but pushes forward to integrate a wider range of important competitive issues. It does so utilising a cooperative paradigm rather than an adversarial one inside its own influence network and this is being recognised by enlightened Western organizations - before the networks form without them.

10.2 Study Recommendations

Several implications and recommendations emerge from this study:

- In order for nations and companies to stay competitive, the government and people should focus on those aspects of cultures which do not impede or retard growth/progress but promote economic development and prosperity
- A company needs more than relationship marketing to gain competitive advantage. Corporate values are the foundation of a strong organization and the way multiple strengths are managed has as much of an impact on success as the strengths themselves. In most industries and in most countries, one cannot gain a competitive edge unless the company develops multiple points of advantages and integrates those advantages in a unique and valuable way. Further, in the management of competencies to attain competitive advantage, companies should recognise the importance of systems and processes to the successful use of competencies
- The study recognises that organizations must ally to other capabilities to satisfy their customers. Positioning within a network of relationships allows learning about and development of key capabilities to be "embedded" inside and through relationship management and allows a holistic, strategic approach to be used
- Recognising the organization's position in the network context and the ways in which a partnering approach can modify the industry positioning concept of Porter (1980) produces a realisation that relationship management along the supply chain modifies Porter's power based approaches in a more mutually beneficial way while producing significant barriers to market entry by competitors. For example, enhancing supplier capability through partner development can also create a capability to cope with the threats of substitute products.
- Specifically for the Japanese producers, they should note that customers are placing increasing priority on product price (see Figure 10.2). According to *American Machinist* (April/May 1993), Taiwan's machine tools ranked ninth in the world at US\$980 million (4 percent increase from 1990). Most of the Taiwanese CNC machine tools use Japanese controllers and key components. This makes the machine more or less similar to Japanese machines in terms of normal quality and functions but at lower price.

FIGURE 10.2 PRESENT AND FUTURE ORDER OF PRIORITIES OF CUSTOMERS' NEEDS



Source: Furukawa, Yuji and Kubota, Howard T. (1993), "How Japan Develops New Machine Tools?", Metalworking Engineering and Marketing, Vol. 15, No. 4, July, pp. 34.

10.3 Limitations of the Study

This study has examined the performance of leading Japanese and Taiwanese machine tool producers in the context of the ASEAN market. Models have been developed which aim to explain partially the critical success factors in the macro and micro environments of these producers. The focus is upon the manufacturing and marketing strategies of these companies and the impact of the home country culture in contributing to the success of machine tool producers from each country. However, a number of important factors, while worthwhile in themselves, are not considered here. Themes such as the impact of government policy upon the performance of the industry are beyond the scope of this thesis, as is the whole question of technology and financial management. Each of these is a suitable topic for further research. Though, this thesis provides a contribution to understanding Japanese and Taiwanese success in the machine tool industry in ASEAN, it is not a comprehensive explanation of the success of the Japanese and Taiwanese machine tool industry. This was never the objective of the thesis.

Given the emphasis on home country culture in Japan and Taiwan, clearly it would be worthwhile comparing these cultures and their impact with those of other leading machine tool producing countries in other parts of East Asia (e.g. People's Republic of China, Republic of South Korea) and the West (e.g. the USA, Germany, Switzerland).

In appraising the study findings, it is important to note that the author is also a player in the industry, based in the ASEAN region. Hence, he tends to adopt the perspective and stance of a manufacturer. His presence in and familiarity with the industry may influence participants' responses. The author recognises that he is operating from his paradigms of FIRMS and the Wheel of Competition which shapes his research assumptions and propositions and influences the study's findings. Furthermore, for each company and country the same range and depth of information and data is not easily or readily available. This complicates comparative analysis. For example, due to his privileged position in Okuma Corporation, the author has complete access to information regarding the company. Obviously this does not apply to the other five case study companies.

This study is basically a cross-national study. As such, a major methodological barrier is the author's lack of facility in the various languages

and dialects which hinders the progress of the empirical research. Therefore, it is imperative that the researcher has some experience in the CNC machine tool industry to ensure effective communication.

Also, it is important to note that the period of analysis coincided with the boom time in Japan where capital spending accounted for 55 per cent of real growth in GNP between the last quarter of 1986 and mid-1990 (*The Economist*, June 27, 1992). Disturbingly for the Japanese economy, there is no sign of any revival in orders for machine tools since 1992. On average, companies have already cut production levels by around 30 per cent. Before it is over, many smaller machine tool makers are likely to go bust. Hence, the study findings have to be read in the context of expansion and growth in the economy in general.

Notwithstanding these limitations, the research findings provide inputs to practitioners in charting their international marketing strategy. Simultaneously, fellow researchers may find it provides an Asian perspective which may prove valuable in further investigation.

10.4 Suggestions for Further Research

In the machine tool industry, a replication of this research using the German machine tool producers instead of the Taiwanese machine tool producers could further illuminate elements of successful national and organisational management values and practices as the author's models investigate both the macro and micro cultures at the same time. The Germans are proving to be very competitive in the ASEAN market.

A whole gamut of research possibilities from the macro level of the *Wheel of Competition* to the micro levels of FIRMS is open to further investigation through the permutation and combination of variables in the conceptual models. For example, the author concluded that relationship marketing is necessary but not sufficient for business success. It is merely a sub-set of value-oriented marketing. It is no accident that the emergence of "Relationship Marketing" as a key concept has coincided with the "discovery" of business ethics, not least by companies themselves which are endowing universities with chairs on the subject.

The concept of relationship management as the major route to better than world-class performance may seem somewhat novel to American and European

managers but is deeply felt and understood in Japanese mutual obligational business relationships which can be described as "soft integration" or "Quasi Vertical Integration" (Contractor and Lorange, 1988). Great importance is placed on building long lasting business relationships and friendships for mutual trust (Brunner and Koh, 1988; Kirpalani and Robinson, 1989) and is the key to business success. Increasing focus on the importance of relationship management is perceivable in the West where Kanter (1994) is a strong proponent of this theme and John Kay's Foundations for Competitive Advantage (Kay, 1993) argues strongly that they are a significant part of the recipe for success. The RSA is due to publish its final report on the *Inquiry into Tomorrow's Company in 1995*, but its interim report has already reached the conclusion that "to achieve sustainable success tomorrow's company must take an inclusive approach with customers, suppliers, employees, investors and the community" (RSA, 1994, pp 2).

These are worth of serious investigation before success further eludes the Western Companies. Given the existing trade imbalance between Japan and the USA, priority should be accorded to the automotive industry.

ANNEXES

ANNEX 1

A1.1 Absolute, Comparative And Competitive Advantages

Theories of international trade attempt to provide explanations to these questions:

- why does trade occur?
- what should countries produce?
- what are the gains from trade?
- what are the reasons for the changes in trade patterns?

Answers to these concerns require an understanding of the various advantages, viz:

- Absolute Advantage - Adam Smith¹ proposed that nations should produce those goods that made the best use of its available and acquired resources and its climatic advantages, ie each country should produce the good that it could manufacture at minimum costs. For example, resources required by America and France to produce cars and wine:

	<u>America</u>	<u>France</u>
Cars	1 unit	10 units
Wine	5 units	2 units

Therefore, America should concentrate to produce cars and France, wine.

- Comparative Advantage - Ricardo² suggested that even when one country has an absolute advantage in the production of two goods, it can still benefit from trade if the stronger country specialise in the good that it has the greatest absolute advantage while the weaker country specialise in the good that it is comparatively less inefficient. For example:

	<u>Japan</u>	<u>Vietnam</u>
Rice	1 unit	2 units
Computer	5 units	20 units

Since Vietnam require 2 times as much resources as Japan to produce rice and 4 times that of Japan to produce computer, Vietnam should specialise in rice (it has the least disadvantage) and Japan concentrate in computer (it has the greatest advantage).

However, this may mean that countries which are not endowed with high value resources will never catch up with the rich countries. For example, developed countries have the

necessary technology and should specialise in manufactured and industrial goods (which produce high profit margins) while poorer developing countries should concentrate in agricultural or lower value-added goods because they do not have the expertise. Thus the rich will get richer and the poor, poorer (the vicious cycle).

- **Competitive Advantage** - Porter³ argued that countries should focus on competitive advantage rather than on comparative advantage. Comparative advantage refers to advantages in production costs while competitive advantage can be derived from any number of sources (eg government, factor endowment, industry structure, chance). Moreover, factors that are most important to industry today are not inherited, but are created. In the case of Singapore, it was once a fishing village; it did not remain so forever. Instead it created competitive advantage through education, investment in technology and government support. It is now richer than many Western countries.

A1.2 Characteristics of Comparative Advantage : Classical Definition of Economic Success

A country is said to have a comparative advantage over another in the production of a particular good relative to other goods it can produce if it produces that good least inefficiently as compared with the other country¹. It is the law of comparative advantage or the theory of comparative cost advantage between countries. The Ricardo version assumed that costs are determined only by the amount of labour time. The modern version takes all factors of production into account on the cost side and defines costs in terms of opportunity cost². The Heckscher-Ohlin theorem attributes differences in comparative costs to differences among countries in factor endowments. Countries have a comparative disadvantage in and tend to import these goods whose production requires the factors in relative scarcest supply in the country⁴. Thus, comparative advantage is an advantage arising out of relative efficiency, which follows from scarcity of resources. The classical definition of comparative advantage is the advantage measured in terms of other goods that could be produced, not in terms of factor inputs⁵. By specialising in the production of the goods which it manufactures most efficiently, a country can benefit from international trade⁶.

The author defines comparative advantage as an advantage arising out of relative efficiency in terms of factor inputs which determine its economic success, ie the economic strength one country has relative to others based on natural resources, industrial technology, cost-effective production.

In effect, comparative advantage of nations is derived from optimization of the following resources:

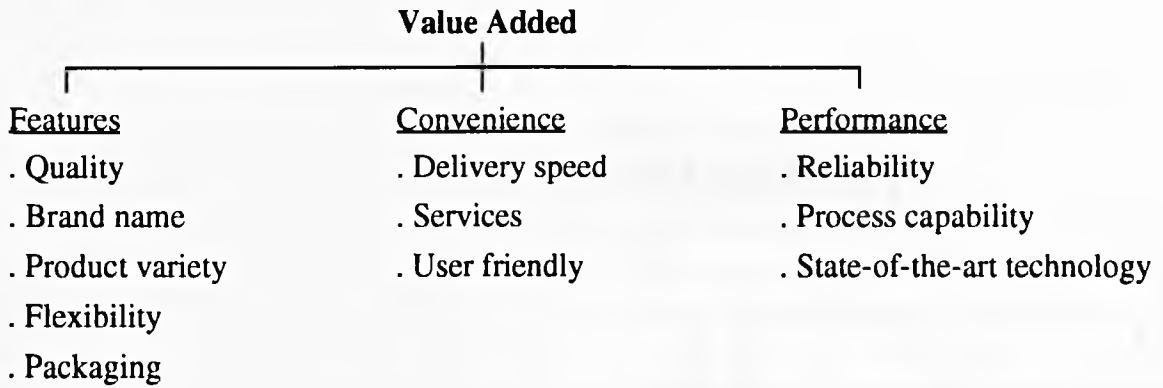
- **Manpower:** sex, age, education, skilled labour, low wages, labour intensive, productivity of manpower
- **Methods:** technological know-how, technology intensive, high technology, second-hand technology transferred from advanced countries, productivity of methods
- **Machines:** capital intensive, energy conservation, productivity of machines
- **Money:** domestic (inflation), foreign (rate of exchange), interest rate, costs of funds
- **Materials:** raw materials, land, minerals, rainfall, productivity of materials

A1.3 Comparative Advantage of Nations into Competitive Advantage of Companies

Competitive advantage enables a company to outperform its rivals. A company may utilise comparative advantage to further its own strategy, by obtaining inputs and products in locations where they are least expensive. That is, a company may use imports to obtain low-cost factors of production - or it may set up a sourcing investment in the low-cost country to produce the inputs for itself - or it may move its entire production to a low-cost location. If the location is in another country, then the company is using comparative advantage (an endowment/resource) to improve its competitiveness (a capability/skill)⁷.

A1.4 Characteristics of Value Added: Marketing Success

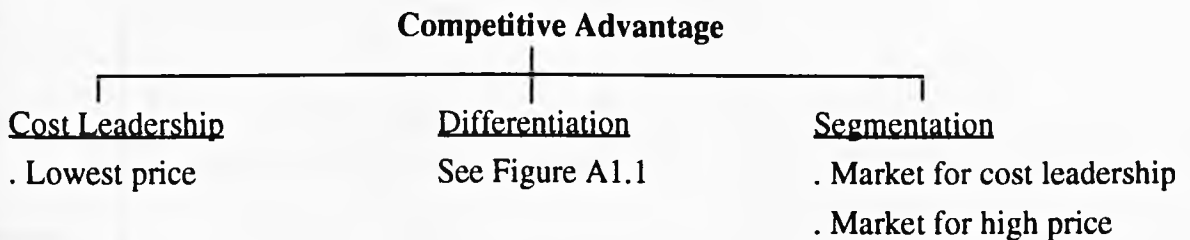
The concept of "value added" is seen from the only viewpoint that ultimately counts - the customer's perspective. The more value is added by convenience, features or performance, the higher the price the customer will be prepared to pay. It can be summarised thus:



For example, the Japanese aim for products where they can "add the greatest value", ie those which, because of their market appeal and technological content, achieve the highest mark-up over the bought-in costs (value is added by brains). This is fundamentally important to the strength of the company's stance in the market place⁸. Increased value does not come from material changes so much as from new intangibles. Choice, variety, and service embedded in traditional products create smart products and new market opportunities. The value of any product can be increased by incorporating intelligence, information content, and services. Hence these elements would define its marketing success⁹.

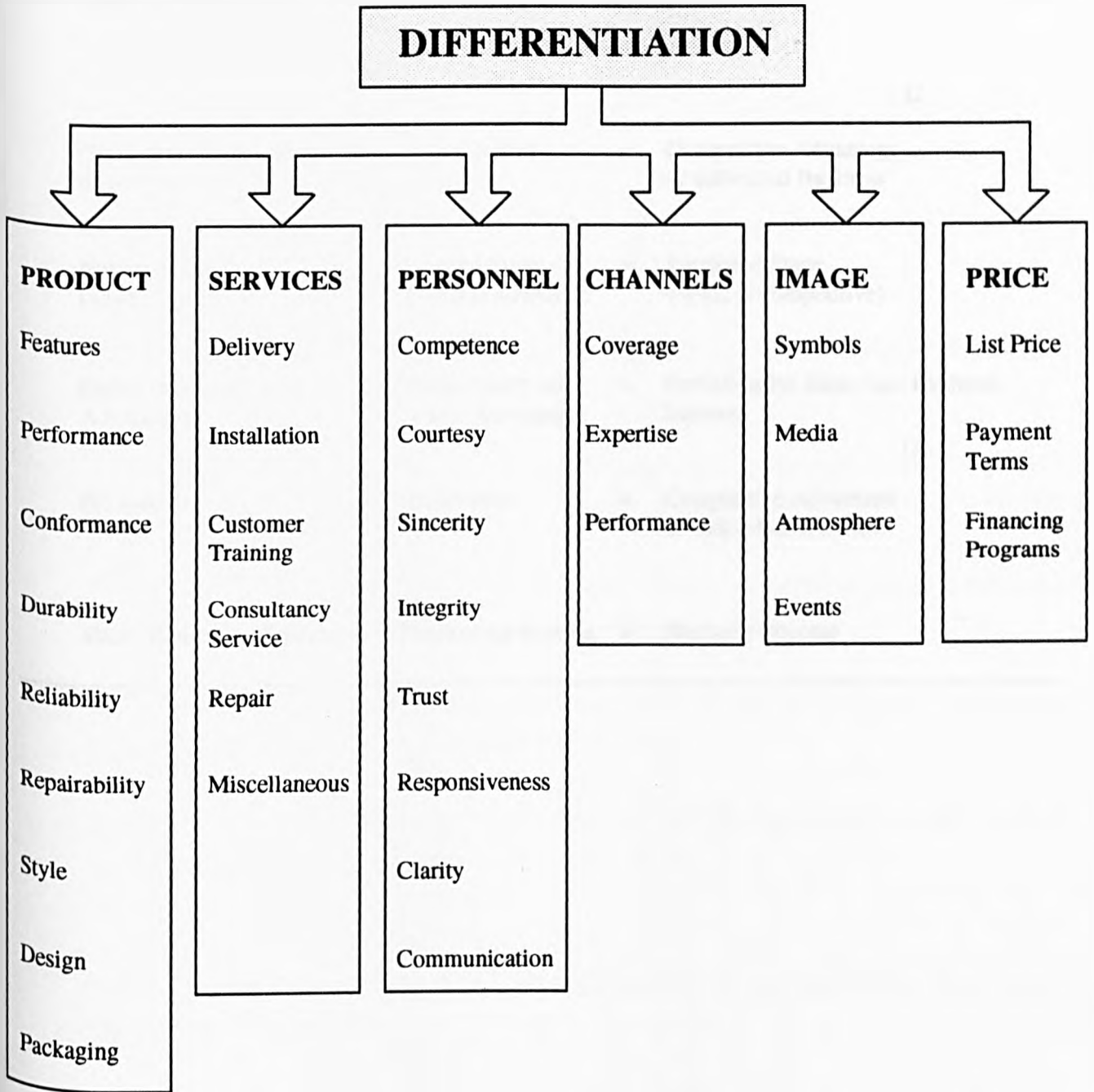
A1.5 Characteristics of Competitive Advantage: Business Success

Competitive advantage arises from the value that a company is able to create for its buyers (value added) in excess of the cost of creating it (comparative advantage). It is the single most important factor for business success. Competitive advantage can be derived from¹⁰:



It is a concept used to compare companies' abilities to compete in the same business based on lower costs, higher revenues or lower risk⁷. It is the ability of a company to add more value than another company in the same market. Competitive advantage is necessarily relative - competitive advantage is something one company has over another¹¹.

FIGURE A1.1 DIFFERENTIATION



Source: Adapted from Kotler, Philip (1994), Marketing Management: Analysis, Planning, Implementation, and Control, Eighth Edition, Prentice Hall, Englewood Cliffs, New Jersey, pp. 295.

A1.6 Relationships of Comparative Advantage, Value Added, and Competitive Advantage

The equation based on *classical* definition of economic success, viz:

12

Comparative Advantage of Nations + Value Added Chain = Competitive Advantage of Individual Business

Natural Stage (what is given) + Created Stage (What is added) = Recreated Stage (What is competitive)

Factor Inputs into Cost Advantage + Brain Power into Value Advantage = Profit/Market Share into Business Success

13

Productivity + Intelligence = Competitive Advantage of Individual Business

Thus: Economic Success + Marketing Success = Business Success

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International Business Environment

1. Demographic

- Size of population
- Rate of population growth
- Degree of urbanisation
- Population density
- Age structure
- Racial composition
- Educational attainment:
 - Level of education
 - Specialised vocational training
 - Management training
 - Attitude toward education
 - Educational match with company requirements
 - Higher education
 - Skill levels of the workforce
 - Employment trends

2. Geographic

- Physical size of a country
- Topographical characteristics
- Climate conditions

3. Economic

- GNP per capita
- Income distribution
- Rate of growth of GNP
- Ratio of Investment to GNP
- Monetary and fiscal policies
- Factor endowment: capital, labour and land
- External dependency
- Balance of payments
- Demand conditions
- Cost conditions
- Inflation

4. Technological

- Level of technological skills
- Production technology
- Existing consumption technology

5. Socio-Cultural
 - Dominant social values
 - Life style patterns
 - Ethnic groups
 - Religions
 - Linguistic fragmentation
 - Class structure and mobility
 - Cultural institutions

6. Political/ Legal/ Government
 - Political organisation
 - Foreign policy
 - "Rules of the games"
 - Flexibility of law and legal changes
 - Government attitude toward businesses: domestic, regional, global
 - Administrative efficiency and competence
 - National goals and plans
 - Industry priorities
 - Infrastructure investment plans
 - Political risks
 - Industrial relations
 - Government attitudes and actions
 - Competitive cooperation among nations on a regional basis (AFTA, EEA, NAFTA)

7. Industry and Competitors
 - Number, size and location of competitors
 - Number, size and location of suppliers
 - Bargaining power of suppliers
 - Bargaining power of buyers
 - Entry and Exit barriers

8. Ecological
 - Pollution-land, air, sea (eg global warming, acid rain, ozone depletion)
 - Conservation
 - Protection of wild life
 - Preservation of flora and fauna
 - Waste water treatment
 - Solid and toxic waste processing

Source: Author

A5.1 Introduction to Machining Systems

In the design of a machine tool, it must always be remembered that the machine is part of a system so that the design and the resulting performance can be considered in relation to the other parts of the system, which is then the machining system.

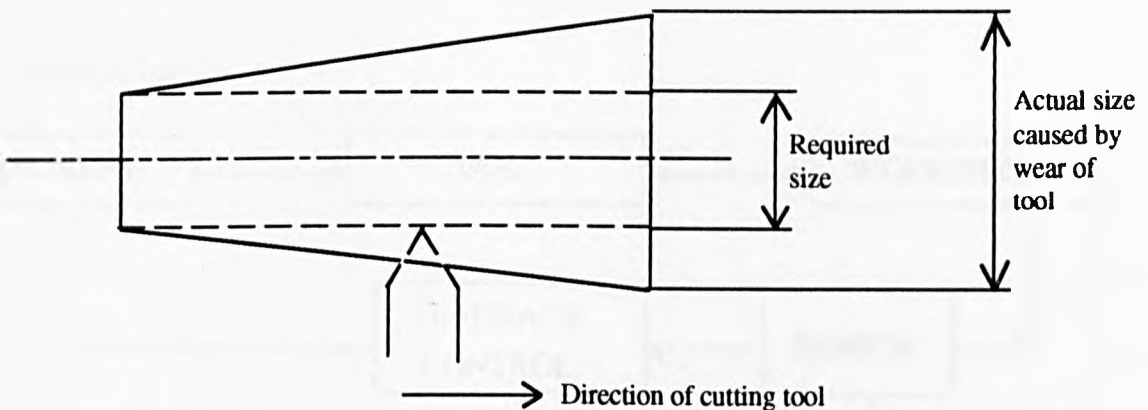
The simplest machining system is as follows:-



For example, in the case of a lathe, the finished size of the workpiece will depend not only on the accuracy of the machine movements but will also depend on the wear of the tool and also on the deflection of the workpiece due to bending under the action of the cutting forces.

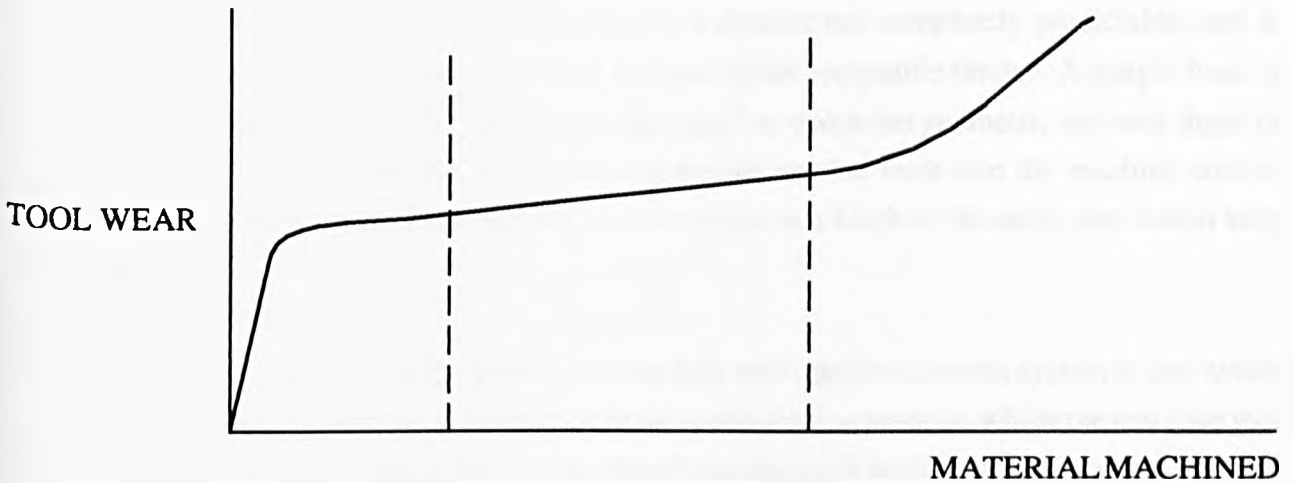
Again when considering the vibration and chatter of a machine tool, the characteristics of the tool and the workpiece will influence the factors causing vibration and chatter.

In some cases, it may be possible to modify the programme of the machine tool control system to correct for changes in other parts of the system. In the case of a CNC lathe, wear of the tool will result in errors of shape of the workpiece.



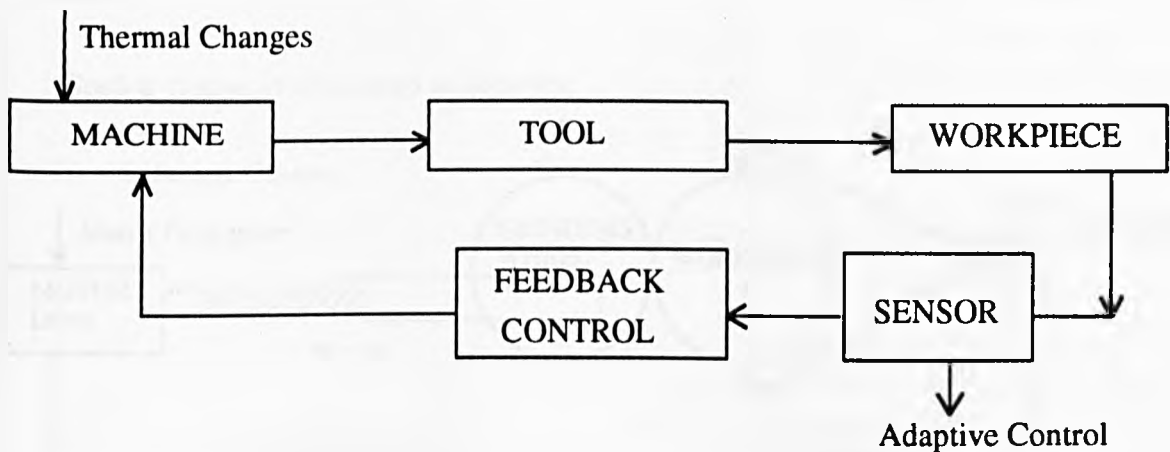
If the wear rate is constant, then the shape of the workpiece is a taper and it would be fairly easy to modify the programme if the wear rate could be predicted.

But the wear rate of cutting tools, including grinding wheels is not constant - it is rapid after the initial sharpening or dressing, decreases to a lower rate until the tool needs reshaping or dressing when it rises again to a rapid rate.



This wear rate curve varies for different workpiece materials, different machining rate, different tools, different tool geometry and generally it is not practicable to predict the wear rate curve to include so many factors.

In such a case, the simplest machining system shown previously is modified by including additional units as follows:



The feedback control unit responds to the sensor's analysis and continuously varies the master programme of the machine in order that the performance of the overall machining system meets stated requirements. This concept is usually known as "Adaptive Control".

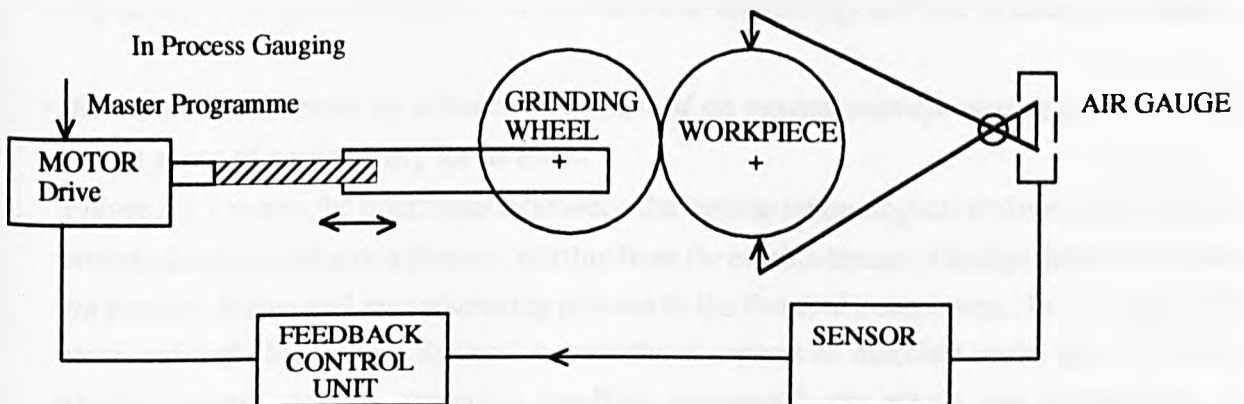
There is no single definition of adaptive control agreed but one of the most recent which seems to be particularly appropriate and practical is as follows:

Adaptive control provides a potential solution to problems in controlling a system in which the conditions encountered vary with time in a manner not completely predictable, and in which those conditions cannot therefore be kept within acceptable limits. A simple form of adaptive control is known as "in-process gauging" in which the geometric size and shape of a workpiece is continuously monitored and signals are fed back into the machine control system in order to maintain a number of workpieces in a batch to the same size within very narrow limits.

In the case of a machining system - "A machine tool adaptive control system is one which continuously measures the performance of the metal-cutting process, which the machine tool is carrying out, relative to a given index of performance such as tool wear rate, metal removal rate, surface finish, geometric accuracy, vibration and chatter, etc and then continuously modifies the machining parameters such as cutting speed, feed rate, static and dynamic stiffness, etc so that the system performance approaches an optimum set of values such as maximum production rate, minimum workpiece cost, minimum tool cost, etc.

Thus, "an adaptive system is one which measures its performance relative to a given index of performance and can continuously modify its parameters to approach an optimum set of values".

Such a system is illustrated as follows:



This system will adapt itself to wear of the grinding wheel and also to thermal distortion of the machine.

In a more advanced system, on a 3-axes milling machine, cutting deflection and cutter torque are continuously measured and the adaptive controller computes optimum spindle speed and optimum feedrate and also ensures that the power capacity of the machine is not exceeded. The application of an adaptive control system to a machining system is likely to produce a 50 percent increase in productivity. The vibration of a machine tool is being continuously measured and corresponding signals are fed back into the feed drive mechanism so as to regulate the level of vibration to a pre-determined magnitude and thus ensure the required degree of surface finish, which is dependent on the machine vibration.

Congruent with the System Concept, the machining system is part of the "manufacturing system". Figure A3.1 shows the Machine Tool is the "Production Machine" in the "Machining System" which is part of the complete "Manufacturing System". New materials require development of new machining processes, which may require new cutting tools and tool materials which in turn lead to new developments in machine tools. Similarly, newly designed products may contain workpieces beyond the capacity of available machine tools and hence new machine tools have to be developed. This system then is the context of machine tool technology. In general, advances are made by the development of new processes leading to the creation of new machines capable of carrying out these processes.

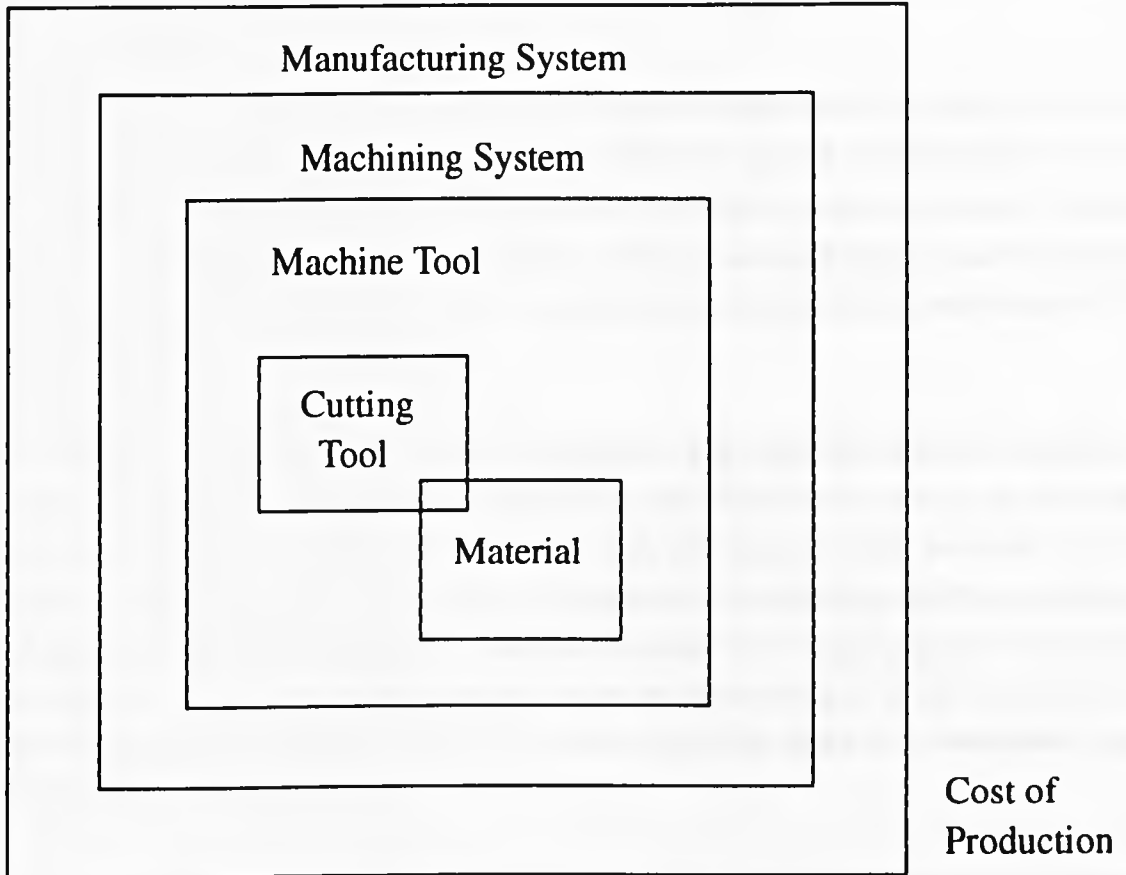
Specific Features of Machine Tool Technology

The machine tool enables economically and technically efficient manufacture consistently of products/components to pre-determined units in terms of shape, accuracy and surface quality. When manually operated machines are used, the operator's skill is important and hence achieving consistency becomes more difficult resulting in inefficient production due to high scrap levels. The specific features of machine-tool technology are due to three main facts:

•The machine tool must be considered as part of an overall manufacturing system rather than a piece of engineering on its own.

Figure A3.1 shows the interrelation between the various technological and economic factors in the industrial production process, starting from the establishment of design data and leading via product design and manufacturing process to the finished component. In this figure the block entitled "Machining System" covers those aspects of machine tools, jigs, fixtures, gauges, control devices, materials handling equipment, etc which are contributing to efficiency and progress.

FIGURE A5.1 SYSTEM CONCEPT OF A MANUFACTURING SYSTEM



The introduction of new workpiece materials may require the development of new machining processes, as well as the corresponding tools and machines. Similarly, the advent of new tool materials and cutting tools may lead to progress in the field of machining processes and machine-tool design. If newly designed products contain workpieces of sizes and shapes beyond the capacity of available machine tools, then new machine tools must be designed. Moreover, the characteristics of a specific process and the performance of a particular machine tool may affect the quality of the product.

Technical efficiency is thus obtained through the development and application of suitable processes and tools and by creating machines which are capable of using these effectively. Technical efficiency is based on the application of suitable processes and tools. Economic efficiency depends upon the speed and quality of the actual machining operation, the cost of handling the workpiece material, and the installation, setting up and maintenance of the machine.

A further important aspect is that of plant utilization. High time utilization of a machine tool is achieved only if its idling time are dictated by operational needs (setting up, loading and unloading, inspection, planned maintenance) and, obviously, if these are kept as short as possible. Whilst the utilization problem may be less serious with cheap machinery it becomes of great importance when expensive machines are needed for large-quantity or high-quality production. The use of machine capacity plays an important part in the consideration of optimum machine loading, and may in fact lead to a change in the long established designs of standard machine tools.

The greater the versatility of a machine tool the more easily it can be fitted into any part of a production process. On the other hand, the more versatile the machine, the more difficult is its employment with a high factor of utilization - in terms of available time, power, dimensional capacity, operational facilities and qualitative performance - because all available functions of such a machine tool are rarely needed in each of its applications. A means of overcoming this problem may lie in the use of "modular" design methods. These consist in sub-dividing the machine into relatively simple functional units which can be assembled, dismantled or rearranged in different combinations as the need arises.

All these factors will in the end have their effect upon productivity and upon the cost of the finished component. In recent years these mutual effects have influenced not only the

capacity, operation and control of machine tools but have also led in turn to progress in the fields of metallurgy, machining processes, electrical and electronic engineering, in measuring and control techniques, etc.

•*The performance of a machine tool cannot be measured merely by comparing the input and output energies. In this it differs from other types of machinery, such as internal combustion engines, turbines, pumps, compressors, etc.*

A concept of functional efficiency must be introduced in terms of quantity and quality of output related to the input expressed in terms of human and financial effort. In other words the ability to manufacture workpieces of specific shapes, sizes and surface finish must be equated with the economics of productivity and cost. This means that the units for measuring input and output are not identical, as they are in other fields of engineering, where performance can easily be expressed in the form of an efficiency percentage determined by the ratio between output and input.

•*The concept of machine tool technology comprises technological, economic and human aspects.*

In addition to the variety of technological and economic aspects which have previously been mentioned, the fact must not be overlooked that machines are built, installed, set up, operated and maintained by human beings. Ergonomic factors (eg an optimum arrangement of control panel, a clear field of vision, if needed, for observing the machining processes, ease of access for maintenance and cleanliness of the working conditions) must be considered.

Hence, in the design of a manufacturing system the character of the problems which arise is subject to a wide variation and it is almost impossible for any one person to cover the whole field in detail. Consultation and cooperation between specialists thus becomes essential. It is, however, interesting to observe that the very trend towards ever-increasing specialization, which was initiated by the rapid and sophisticated developments in various fields, is now being followed by a demand for men and women who are able to correlate the work of the various specialists and who, in addition to a good understanding of detail, possess a clear appreciation of how this detail must fit into the overall picture. There exists, therefore, not only the problem of interrelation between science and technology on the other hand and economics and ergonomics on the other, but also that of collaboration between all concerned. Hence, the total systems approach becomes essential in the design of a manufacturing system (Chan, 1991).

Whilst this close cooperation is very important for developing the advanced methods, techniques and machines which can lead to higher standards of production and productivity, it is vital to successfully introduced these developments into industry. For example, FMS has many advantages but due to the economics of investment, the introduction of these technologies usually lag behind the R & D. This is one of the main reasons why to-date there are not so many FMSs implemented around the world. Similarly, CNC machines became popular after it was proven economically viable due to mass manufacturing which makes it economically justifiable by manufacturing companies. Hence, FMS and CIM will face less resistance by manufacturing industry once there is a breakthrough in total price advantage.

• *Matsushita Electric*

To Konosuke Matsushita, business exists because it is necessary to society - because it responds to people's needs - therefore, learn what the people want and respond accordingly. One must be conscientious in his effort to serve the people and do his best to satisfy them. The spirit of "co-existence and co-prosperity" between the corporation and society should be reflected in day-to-day business operations.

Matsushita's philosophy to contribute to the "well-being of mankind by providing reasonably - priced products and service in sufficient quantities to achieve peace, happiness and prosperity for all" made him an outstanding industrialist and earned him the title of "humanistic entrepreneur" (*Straits Times*, October 24, 1988). Matsushita Electric's mission lies in manufacturing commodities that contribute to a better life, commodities in such abundance and so reasonable that no one can say he cannot afford them. Matsushita had sought to strengthen the sense of mission among his staff and made that attitude a creative, permanent element in the company ethos. In order to provide principles to guide daily activities and to encourage everyone in the company, he set forth the following code in July 1933:

- Spirit of service through industry
- Spirit of fairness
- Spirit of harmony and cooperation
- Spirit of striving for progress
- Spirit of courtesy and humility
- Spirit of accord with natural laws
- Spirit of gratitude

(The last two points were added in August 1937)

These seven principles remain today, as they have been since that time, the basic watchwords for the daily work of tens of thousands of Matsushita Electric employees (Matsushita, 1978, 1984, 1988, 1989).

Pana-management (1991) specially spells out ME's **corporate obligations** which fall basically into four categories:

- *To the Customer* : The corporation is obliged to give satisfaction to its customers for

products and services purchased at a fair price. It can consider itself successful when the customer says he is glad he bought the product or service.

- *To employees* : Naturally, pay is an important factor in the way a company fulfils its obligations to its employees, but other factors such as fringe benefits, a good working environment, job satisfaction, and responsibilities for promotion are equally important.

There are exceptions, but most Japanese stay with the same company all of their working lives. Because of this system, workers develop a strong bond with the company. They learn their jobs thoroughly which improves the quality of their work. If the employees are stable, they can be entrusted with much of the work, and the business will be more efficient. Managers, therefore, have an obligation to provide pleasant working conditions and to keep employee motivation high.

- *Obligations to Stockholders* : A company is obliged to give the stockholders a fair return on investments in the form of dividends, but more importantly, it must maintain long-term prosperity.
- *Obligations to the Nation and Society* : A company operates smoothly and efficiently when the nation and society of which it is a part is stable. In fact, national stability is crucial to a company's well being.

The benefits Japanese companies receive as a result of the law and order that prevails in the country, and the high quality of the transportation, communications, and education systems, are incalculable. Companies naturally have a responsibility to make up for these benefits, the basic method being through taxes. The source of taxes is profit, so if a company does not make a reasonable profit, not only is it unable to fulfil its obligations to society, it becomes a parasite, receiving for free the benefits made possible by the taxes others pay. That is a crime against society.

A number of companies work to recycle profits not only through taxes but also through social and cultural programs, but unfortunately many others seem to take pride in the clever ways to which they avoid paying taxes. Such people should not be entrusted with the responsibilities of management.

- ***Honda Motor***

Honda Motor's "Company Principle" reads, "Maintaining an international viewpoint, we are dedicated to supplying products of the highest efficiency at a reasonable price to worldwide customer satisfaction."

The company's fundamental management policy, based on its "Company Principle, can be explained in four parts:

- *Creating New Markets* : We should not try to sell things just because the market is there, but rather we should seek to create a new market by accurately understanding the potential needs of customers and of society, and fully utilize our technology to develop and manufacture products satisfying such needs.
 - *Employee Participation in Management* : Good corporate management must be based on trust. The management and employees should share a sense of pursuing a common goal, so that each individual will play a specific role and the corporation as a whole will be working in unison to achieve that goal. And this thinking is both understood and supported by our work force, as a way to enhance their individual capabilities and *raison d'être*.
 - *Internationalization and Local Community Relations* : As our activities expand internationally, as a prerequisite to successfully establishing our overseas operations, we must not only make our products acceptable but also make ourselves well accepted as good corporate citizens in the communities where we operate.
 - *Direct Approaches* : In achieving goals and solving problems, we have made it a cardinal rule to make direct approaches with straight thinking - free from precedents, customs, or popular views. Thus we have pursued methods different from those of other companies, based on our own way of thinking, and by reinforcing this difference, we have consolidated our own corporate identity.
- ***Asahi Breweries' Corporate Philosophy:***
 - *Consumer orientation* : Work to make products that conform to contemporary tastes and to give our customers what they want and hope for. We must learn to stand in the customer's shoes and see things as the customer sees them.

- *Quality Orientation* : Humbly accept the consumer's judgement on quality, will study and work on new techniques to improve quality, and will produce the best products in the industry.
 - *Respect for Humanity* : Conduct its business based on the conviction that it is people who make a business work. We shall promote fair employment practices, personnel training and education, and work to build a corporate environment that allows each employee to fully utilize his or her individual talents.
 - *Cooperation between Labour and Management* : Support and strengthen relations between labour and management, based on mutual understanding and trust. Together they will work to enhance the development and welfare of the corporation.
 - *Mutual Prosperity* : Build strong cooperative relations, based on mutual confidence and a spirit of mutual prosperity, with all of our customers, suppliers, and affiliated companies, in order to carry out our mission and responsibilities as the central organization of the Asahi Group.
 - *Social Responsibility* : Repay its stockholders and the local community through the stabilization and expansion of its management base, and conscientiously adhere to business ethics and social mores.
- *Isetan Co., Ltd.*
 - Isetan takes pride in its endeavour to become "international", always looking to the future with the hope of enriching the lives of the people in our community.
 - *Make Work Creative* : Bring youthful enthusiasm and originality to every job you do
 - *Service with Sincerity* : Always show the customers our gratitude for their patronage
 - *Ever Onwards* : The work you do tomorrow should never be just a repetition of the work you did today.
 - *Teamwork in the Workplace* : Create a healthy work environment through teamwork.

- *Ambition* : Throw all of your energy into your job. Work positively and energetically in carrying out your responsibilities.

- *Pride* : Take pride in the Isetan name, both as an employee and as a member of the society.

• ***The Nippon Denso Spirit***

- To be trustworthy and responsible
- To cherish modesty, sincerity, and cooperation
- To be pioneering, innovative, and creative
- To create quality products and services

• ***The Matsushita Spirit***

- S ----> Struggle for Betterments
- T ----> Technological Breakthrough
- R ----> Reach for New Heights
- I ----> Innovative Approach
- V ----> Vision to Succeed
- E ----> Endeavour to Achieve

Steps for Becoming a Truly Global Company within five years.

Step 1: Create a clarity of vision and mindset

Every company going global must clearly articulate and widely disseminate its global vision and aspirations to all employees. Creating a global business vision will require a disciplined process of three phases: discovery, which entails validating and internalizing the rationale for undertaking the globalization process; visualization, which involves describing the shared concepts upon which the global vision can be built; and actualization, in which a global vision statement is created and driven through the organization.

Action Checklist:

- Has your company's management team articulated its global vision and broadly disseminated it across the organization?
- Do you explore your company's sphere of influence and search for ways to leverage relationships?
- Do you understand which parts of your company have to be the same so everything else can be different?
- Do you allow parts of your company to erect walls which isolate their activities from the rest of the business?
- Do you have programs across the organization which nurture the development of relationships based on trust?
- Are you accepted as a "local" company wherever you do business?
- Does your company constantly seek out ways to better share its intellectual capital?
- Is your company's global vision supported by a long-term investment program?

Step 2: How is your company position today

Three approaches to International Business.

Companies attempt to become global from three fundamentally different starting positions.

Global exporters get their advantage from being low-cost producers and have great difficulty being highly responsive to local customer differences. Multilocals get their advantage from being highly responsive to the local customers, but pay a penalty by having more costly products. Multinationals rely on strong central coordination to share innovations across their distributed manufacturing, sales, and service organizations. They are positioned between the global exporter and multilocal in both cost and responsiveness. Regardless of the starting position, most companies today aspire to being global (both low-cost and highly customer responsive). Well-formulated global strategic initiatives help companies move from today's position toward their global aspirations.

Action Checklist:

- Have you defined how each of your company's major lines of business (LOBs) are positioned on the globalization matrix?

- Have you developed benchmarks of progress towards your globalization goals?

- Have you defined global strategic initiatives (for each LOB) which focus the company on achieving its global vision?

- Are your global strategic initiatives founded upon a thorough understanding of your global customer requirements?

- Have you defined global performance measures to encourage global behaviour?

Step 3: Understand your global customer's demand and needs

Every company that sells products or services on a worldwide basis has global customers. Few companies have a good understanding about the product and service requirements of these global customers. Global companies develop the ability to achieve cultural fit with the customers. A global product/service architecture provides a blueprint for the company's business processes. A global company develops valuable insights by focusing on the needs and wants of its customers' customers. Every company going global should be conducting extensive market research on the product, information and service requirements of its global customers.

Action Checklist:

- Have you conducted market research on the product and service requirements of your global customers?
- Have you built cultural maps to better understand the variety of demands?
- Do you invest in and promote affinity with the various local cultures in which you operate?
- Is your global product/service architecture kept dynamically up-to-date to reflect changing customer taste and company capabilities?

Step 4: Balance global/local activities

Achieving global/local balance requires the ability to dynamically monitor global business, to identify which aspects of the corporation need to be globally planned for and managed on a worldwide basis, and to develop ways to carry out global strategic initiatives. Top management has the responsibility to create this superordinate organizational design. Successful companies attempting to go global identify strategic alliances patterns to fill in the gaps in their base capabilities and look for opportunities to pool resources with business partners. The ability to rapidly transfer knowledge is another critical success factor. A company can begin to transform traditional business functions into global business functions by focusing on product development.

Action Checklist:

- Is top management focusing efforts on creating the global organizational design?
- How many means of monitoring global business activity does your firm have? How widely shared is this global intelligence information?
- Have you defined your firm's core activities? Have you identified partners to perform non-core activities?
- Does your firm have globally accessible knowledge repositories?
- Do you create partnerships with other companies (perhaps even competitors) to push the frontiers of the company's knowledge?

- How broadly do you leverage the value of breakthroughs in one part of the business elsewhere in the business?

Step 5: Build global teams and individuals

As a company transforms into a global organization, all employees are affected. Just as top management's role is organizational design, the knowledge worker's role is self-work design, ie constantly creating better work processes and doing things better. A global organization nurtures a shared global culture. One key aspect of the global culture is trust. It is not possible to pay lip service to trust and expect the global network to work. Global companies need to constantly create programs that encourage the sharing of cross-cultural experiences.

Action Checklist:

- Is work redesign encouraged in your company?
- What kind of programs do you have to keep the cultural stew mixing?
- Does the top management team set the example for the rest of the organization in terms of trusting their peers?
- Do you have incentive systems that encourage global behaviour?
- Does your company manage its global skills' portfolio?

Step 6: Global I.T. - connecting the world

Top management is convinced that you cannot become global without making excellent use of a wide variety of information technology. Today, information technologies offer great potential. Few companies have made real inroads in developing effective global information technology capability. New global I.T. should be implemented in conjunction with transformed business process for maximum benefit. Global I.T. portfolios help describe the market for I.T. in the global organization.

Action Checklist:

- Is I.T. one of your company's top global strategic imperatives?

- When you implement a global I.T. change is it made in conjunction with some form of organization or process change?
- Do your global I.T. initiatives align to your company's global business initiatives?
- Do you have a way to sort out the wide variety of global I.T. investment opportunities into meaningful portfolios to facilitate decision making?

Step 7: Take steps toward creating global strategic advantage with I.T.

A company's global I.T. strategy reflects the company's position on the global matrix. Global I.T. architectural blueprints describe the alignment between the business vision and the I.T. investments. Three important business variables (processes, locations, and information) provide the necessary design platform for developing the global business architects. Managing global I.T. infrastructures is one of the key responsibilities of top management that cannot be delegated. The I.T. organization needs to be the exemplar in the use of global technologies as they oil the way to the future.

Action Checklist:

- Does your global I.T. strategy reflect the company's position(s) on the globalization matrix?
- Is global business process modelling an integral part of your global I.T. architecture activity?
- Do your global I.T. architecture activities include the use of dynamic simulations?
- Does your CIO take the lead in identifying key global I.T. infrastructure requirements and championed their funding and evolution? Do members of the executive team champion projects or play key roles?

Step 8: Accelerate and streamline the globalization process

As companies strive towards their global visions they will benefit from their major trends which are making global visions more and more realizable. These steps should become incorporated in the globalization process; creating a clear global vision and mindset, knowing your global customer, understanding the global/local balance, moving from isolation to partnership, nurturing global employees, and developing global I.T.

Action Checklist:

- Use the global strategic ingredients checklist (see Figure 5.19) to assess the status of your company (and its competitors). Plot today's position and where you need to be in five years' time.
- Identify strategic actions which will move you to your desired position.
- Measure progress on an on-going basis.

ANNEX 6

I) SWOT ANALYSIS OF OKUMA SINGAPORE BRANCH (OSB)

a) Distributors

Strengths

- Centralise control and coordination
 - Distributor controls all other subsidiaries
 - Coordination of payment and documents for export of machines, etc are less tedious
- Accept low profits when competition becomes severe
- Distributor in Malaysia is relatively stronger than competitors' distributors
 - Ratio of machines to service engineers is 100 machines per engineer
 - K.L. is covered by 1 Director, 1 Sales Manager and 2 salesmen
- Distributor in Thailand is relatively stronger than competitors' distributors
 - Ratio of machines to service engineers is 100 machines per engineer
 - Bangkok is covered by 1 General Manager, 2 salesmen and 2 salesladies

Weaknesses

- One-man show without capable assistant
- Limited bank facilities (letter of credit)
- Weak connections with Japanese multinationals
- Limited Okuma's spare parts kept in Kuala Lumpur
- Johor Bahru is only covered by one salesman with limited knowledge of Okuma; no service engineer
- Penang is covered by two salesmen with limited knowledge of Okuma; two service engineers
- Limited Okuma's spare parts kept in Bangkok
- Salesmen and salesladies have limited knowledge of Okuma's products
- Distributor in Indonesia is relatively weaker than competitors' distributors.
 - Ratio of machines to service engineers is 100 machines per engineer
 - Limited Okuma's spare parts kept in Jakarta
 - Jakarta has 1 General Manager, 1 Sales Manager and 1 salesman. Other territories in Indonesia have no branch offices

Strengths

- Penta represents Singapore with Okaya and maybe CMT
 - Low overhead because only 1 salesman
 - After-sales service by OSB
 - Accept low commission (5%); Okuma's offer becomes competitive
- Distributor in Malaysia (K.L., JB, and Penang) and Thailand (Bangkok) will have showroom facilities facilities, effective from Aug '93; enhance Okuma's physical evidence if Okuma engineers are attached to the respective markets

Weaknesses

- Distributor for the Philippines is relatively weaker than competitors' agent
 - Ratio of machines to service engineers is 100 machines per engineer
 - No spare parts
 - Manila has 1 sales Manager; 2 service engineers
- Customers get confuse if approach by 3 or more representatives
- Limited coverage for Singapore because OSB has limited manpower (1 salesman)
 - Late payment of spare parts resulting in unnecessary chasing for payment from distributors and Singapore customers
 - Feedback on current economy, market intelligence/conditions, and competitors' strategies on an irregular basis; lack of competitors' analysis
- Distributor Agreement not yet approved by Okuma's top management; further investments by Distributor for Okuma franchise is being hold back

b) Price

Strengths

- Customer willing to pay 5 to 10% higher than Mori-Seiki or Mazak price

Weaknesses

- For ASEAN countries, Okuma has only less than 10 years of history; customers' loyalty very rare
- To combat the appreciation of the YEN to ASEAN currencies, competitors have fixed the exchange rate (eg Yen 100 = M\$2.30)
- Competitors offer customers payment after 60 days from commissioning of machines; Excel does not even collect deposit
- Low profit margin for Numac Malaysia and RMC Philippines; unable to increase manpower and other facilities to improve customer satisfaction
- Quotation and time study takes long time, much to the discontentment of customers

c) Promotion

Strengths

Weaknesses

- Okuma has poor PR; this is customers' feedback
- Okuma has no budget for promotion media; advertisements, exhibitions, souvenirs, etc are under the jurisdiction of distributors
- Customers and distributors must pay for their own accommodation even though Okuma has Kenshu Center; competitors invite potential customers to Japan on a regular basis and bear all charges
- Okuma's history and development is not known to distributors and customers; competitors have well-documented evidence of their success in the world markets, eg Mazak published the book "Master of Manufacturing Technology" and is read by both industrialists and academics throughout the world (the impact is tremendous)
- Competitors have regular open-house shows and give special discounts to new machine models
- Okuma has limited global mindset; competitors are international orientated; overseas attachments and courses/seminars are not encouraged
- Courtesy visits to each market is not carried out on a regular basis; competitors, eg Toshiba, sent their engineers to check on alignment of their machines every year although machine warranty has expired
- Inadequate transport for local service staff; no service to customers during weekends; poor service image

d) **Products**

Strengths

- **Quality and reliable products; comprehensive range but weak in oilrig experience**
- **Single source for machine and control; less maintenance cost**

Weaknesses

- **Inadequate detailed product comparison with competitors'**
- **Delivery time much longer than competitors**
- **Actual training on new model of machines for distributors sales personnel not given**
- **No showroom machines; no development on interface between personal computer and OSP; lack of cutting tools; jigs and fixtures**
- **Competitors' machines can be retrofited in ASEAN countries**
- **Competitors' machines come with more standard features compare to Okuma, eg qualified turret, touch setter, alarm and operation end lamp**

II) Action Plan

a) Formal Analysis of:

- Competitors' products
 - Detailed technical comparisons of machine design, features, control functions
- Competitors' marketing strategies (Product, Price, Promotion, Place, Physical Evidence, People, Process)
- Competitors' market share
- Competitors' overall strengths and weaknesses

b) Improve Inventory Control Policy for:

- Stock machines
 - Numac Malaysia showroom to have 2-3 machines in K.L., 1 machine in Penang, and 1 in JB
 - Numac Thailand showroom to have 2 to 3 machines in Bangkok
 - Numac Indonesia showroom to have at least 1 machine in Jakarta
 - RMC Philippines to have showroom facilities to keep at least 1 machine in Manila
- Spare parts
 - OSB to increase stock of consumption parts with long delivery lead-time, eg filter, drive belt, sheer pin, etc
- OSB Showroom must have at least one permanent machine for test cutting and training

c) Review Special Price Promotion for Popular Machines:

- Lathes - LCC15, LB9C, LB15IIC (all must have qualified turret)
- Machining Centers - VR40, MC40VA
- Fix exchange rate of Yen to Singapore Dollars (YEN 100 = S\$ 1.30) because competitors are already practising this payment condition

d) Shorten Quotation and Time Study Leadtime:

- Newly created Engineering Section can be fully exploited to improve the efficiency

- e) **Improve Technical Capabilities of OSB Technical Centre:**
- Purchase a personal computer (IBM compatible) to test popular software used by ASEAN customers for interface with Okuma's machines
 - Increase budget for the purchase of toolings (consumption tools, jigs and fixtures, etc) to cope with customers' requirements
- f) **Enhance Efficiency and Effectiveness of After-Sales Service:**
- Purchase of personal computer for stock control, monitoring of spare parts, invoicing for parts
 - Purchase a service station-wagon to enable engineers who need to attend to service call during weekends and to travel Johor Bahru, Malacca, etc. Also to transport heavy and bulky parts
 - Set up duty roster for service engineers to attend to weekend calls
 - Okuma Corporation Japan to compile spare parts price list and OSB to fix exchange rate Yen to S\$
 - Improve communication between Japanese and International staff, also marketing and service sections
 - Increase international service staff gradually to replace Japanese engineers so that there is transfer of technology
- g) **Improve Sales Performance**
- Increase the autonomy of branch office by changing to private limited so that direct sales can be concluded; Okuma needs to bring in other complementary product lines to subsidise the overheads so that total operational cost can be spread to achieve lower selling price for Okuma's products
 - Increase sales staff to cover more areas for Singapore market; eventually OSB should be independent and not rely on agents
 - Provide proper training for distributors' sales personnel on selling and marketing skills
 - Provide more incentives/benefits for sales staff