THE SUITABLE KNOWLEDGE TRANSFER MODEL IN FOOD PRODUCT RESEARCH AND DEVELOPMENT FUNCTION

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I hope that the result will be remarkable and application to industries in pursuing of improvement in their operation. The research is expected to be enhancing as recommend in the recommendation.

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ชื่อเรื่อง : รูปแบบการถ่ายทอดองค์ความรู้ที่เหมาะสมในกระบวนการวิจัยและพัฒนาผลิตภัณฑ์อาหาร

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ศัพท์สำคัญ : การถ่ายทอดความรู้ งานวิจัยและพัฒนา การจัดการความรู้ พัฒนาผลิตภัณฑ์อุตสาหกรรมอาหาร

การพัฒนาผลิตภัณฑ์อาหารเป็นหัวใจสำคัญและความได้เปรียบทางการแข่งขันขององค์การธุรกิจจะต้องลงทุนและใช้งบประมาณสูงในการทำให้การพัฒนาผลิตภัณฑ์เป็นไปด้วยความรวดเร็ว ถูกต้อง ตรงตามความต้องการของลูกค้าด้วยงบประมาณที่คุ้มค่า ประสิทธิภาพของการวิจัยและพัฒนาผลิตภัณฑ์อาหาร สามารถส่งเสริมให้มีประสิทธิภาพด้วยการถ่ายทอดความรู้ด้านการพัฒนาออกแบบผลิตภัณฑ์ที่เหมาะสม งานวิจัยนี้เป็นการศึกษารูปแบบการจัดการความรู้ในองค์การในอุตสาหกรรมอาหาร 5 แห่งในเขตกรุงเทพมหานครและปริมณฑล โดยใช้รูปแบบการจัดการคุณภาพโดยรวมเป็นรูปแบบหลักในการศึกษาการจัดการองค์การ เพื่อศึกษาหาความสัมพันธ์ต่อการถ่ายทอดความรู้ให้เกิดขึ้นและใช้ตัวแบบการตัดสินใจในการสร้างรูปแบบที่เหมาะสมในการถ่ายทอดความรู้ในองค์การ จากนั้นได้ตรวจสอบรูปแบบที่ได้นำเสนอในอุตสาหกรรม เพื่อยืนยันผลโดยการวัดสมรรถภาพเชิงปริมาณและคุณภาพ โดยนำวิธีการ Balance Scorecard มาปรับปรุง ผลการศึกษาแสดงให้เห็นว่าการจัดการที่มีรูปแบบตามที่นำเสนอสามารถทำให้ส่งผลต่อประสิทธิภาพของการดำเนินการได้ด้วยการจัดการองค์ประกอบหลักการจัดการ เช่น ภาวะผู้นำ รูปแบบการให้รางวัล รูปแบบการจัดองค์การ

ABSTRACT

TITLE : THE SUITABLE KNOWLEDGE TRANSFER MODEL IN FOOD PRODUCT RESEARCH AND DEVELOPMENT FUNCTION.

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The effective operation of quality management system has been widely renowned in recent years as a means of building sustainable competitive advantage and thereby enhancing firm performance. The quality standard and organizational performance are recognized and designed to demonstrate that the supplying organization has achieved a basic level of quality system. The purpose of this research is to study the relationships between the successful implementation of Product development process and the transfer of knowledge in product development function which will facilitate higher quality of research and development is examined as knowledge context, recipient context, interaction context, and transfer activity context. The study was done in the research and development in food industries with product development function with recognized outcomes. The model can be applied by management in organizations to create the organizational which will support knowledge transfer to stimulate and sustain success for quality management in organizations.

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CHAPTER 1

RATIONALE

1.1 Rationale

The product development in the firm is aimed to enhance profitability. New products are outcomes of Innovation process which is the process that turns an invention into sellable products (Bisalyaputra, Chansangvej, and Garrett, 2004). Therefore, the product development involves the commercialization of ideas, implementation, and the modification of existing products, systems and resources. New products from the firms are competitive advantage of firms. New Product Development is an essential part of business success (Hayes, 1988; Gupta, 1992). The global competition causes companies to design new products in shorter time (Griffin, 1997). Not only the development time is important for success, but also the change of products needs attention. Product change can make companies the leaders in the market if competitors cannot respond in time (Millson, 1992). Researchers have done studies to identify success factors for New Product Development (Maidique, 1984; Nonaka, 1988; Cooper, 1979 Griffin, 1992). Yet, previous studies focus the success factors only to a single New Product Development project.

Drucker described innovation as the specific tool of entrepreneurs the means by which they exploit change . (Drucker 1985). Assigning the role of innovator to the entrepreneur implies that successful entrepreneurs adopt and implement competitive strategies such as introducing new products and services, new methods of production, opening new markets or sources of supply, or even reorganizing an entire industry. Entrepreneurs, particularly those successful at growing an enterprise, are more innovative than non-entrepreneurs.

In a single New Product Development project, development teams discover knowledge, which includes technology, process, materials, and technique. Moreover, teams face problems during development and find the solution to the problems. The problems or information from previous solutions may be useful in the later product projects (Hughes, 1996). New product development process consists of several functions in organization such as marketing,

manufacturing, or Research and Development functions. The key responsible function for New Product Development is Research and Development function. The main responsible function for New Product Development is Research and Development function. Proper managing Research and Development function is critical to achieve cross-functional team outcome (katzenbach & Smith, 1993; Penzias, 1995). Their main mission of Research and development function is to acquire knowledge relating to new products and develop applications of knowledge for the design and development of products (Babcock, 1991). Therefore, Research and Development workers continually experience and solve problems from product design and development (Hargardon, 1998). They also, normally create new knowledge during work. The ability of research and development personnel to transfer of knowledge that already exists in research and development is more critical than other factors in New Product Development (Heller, 2000).

Research and Development investment has increased dramatically since 1980s. The shift made firms to transform from production to knowledge creation. As a result, Japanese company gains market share from new product innovation and knowledge creation. (Echeverri-Carroll, 1999).

CHAPTER 2

LITERATURE REVIEW

2.1 Knowledge Management

The expected result of Research and Development function is technical outcome (Cordero, 1999). The Research and Development end result is critical in competition for business to satisfy customer needs (Cooper, 1994). In order to achieve business success, Research and Development management became major issue (Cooper, 1994; Corcoran, 1994; Iansiti, 1993). The result of Research and Development function requires proper managing. The main concern is knowledge management in Research and Development professionals. The necessity of knowledge management in Research and Development professionals are in two forms (Henke, 1993; Turpin, 1995):

(1) Specialized technical skill

(2) Process knowledge skill

New Product development (NPD) is essential for organizational competitiveness (Ulrich, 2000). New Product development deals mainly with knowledge of emerging products and processes. The latest concept views New Product Development as Resource-based Continuous Product Innovation (CPI) instead of individual sequential product development. The continuous learning process focus on customer value (Hughes, 1996) which is uncontrollably changed of customer demand causing shorter product life cycles. It is important to learn from those mistakes from previous products and get information of new knowledge. Emerged Continuous process of New Product development views product innovation as two types: incremental or radical, and architectural innovation, which is the way to integrate the components of product. The study proposes the reconfiguration of product and also examines the failure of firms (Henke, 1993).

The concept of Continuous Product Innovation states that the knowledge generated in New Product development can be transferred within and between product development processes

in many directions (Calabrase, 1999). As a result, the New Product development process will involve both Knowledge management within and between New Product development teams.

Knowledge management is important to support successful New Product development (Hughes, 1996; Suwannaporn, 2000). In addition, the New Product development is multifunctional, involving Research and Development personnel, knowledge will be transferred between people in New Product development team constantly.

Knowledge management is under increasingly attention in the literature as a key success element in organization innovation activities (Baum, 1998; Pfeffer, 2000; Spender, 1996). However, there is a lack of research, empirical results, and managerial recommendations on the effective transfer of explicit and tacit knowledge from existing to new employees in the Research and Development function for New Product development within the literature (Cummings, 2003). This may delay the effectiveness of the new personnel within the organization through their lack of understanding of key organizational Research and Development and New Product development factors (Pinto, 1990). There is, therefore, a significant gap in current knowledge management research.

Most current research concentrates on knowledge management as a whole process, and has identified many success factors (Davenport, 1998). Current research has only recently concentrated on knowledge transfer (Foss, 2002; Goh, 2002; Ladd, 2002; Schlegelmilch, 2003, Kostova, 1999; Mowery, 1996), with these predominantly focusing on inter- firm transfer of knowledge (Foss, 2002; Darr, 2000; Doz, 1996; Simonin, 1999), intra-firm project-to-project transference of knowledge (Epple, 1996; Hansen, 1999; Hind, 2001, Hu, 1995; O' Dell, 1998), with minimal attention on the knowledge transfer from existing to new R&D staff. There may also be differences in the way that different types of knowledge are transferred. Explicit knowledge, which is knowledge that is codified and tacit knowledge, which is knowledge that occurs without realization in workers, are concerned in this study.

Knowledge management can create more profit for organizations (Teece, 1998) so; research and development teams are required to develop proficient knowledge management (Lynn, 2000). Knowledge management consists of three main components: Knowledge creating, knowledge organizing, and knowledge transferring. Knowledge transferring is a component that is worth organization attention. It is efficient to improve knowledge transfer since knowledge

transfer does not require much cost to establish and implement. Still, the result can greatly support the knowledge transfer overall.

2.1.1 Knowledge management framework and applications

Various Knowledge Management definitions, frameworks, concepts, measure ments, impacts, have been described for examining the knowledge management. The functions for supporting individual and organizations in managing their knowledge. The concept from the famous article 'the knowledge-creating company's is a management paradigm for the emerging 'knowledge society', and information technology can help implement this concept (Nonaka et al., 1996). A conceptual framework presents knowledge management as consisting of a inventory of methods, techniques, and tools with four activities performed sequentially. These are also combined with another extension of KM working definitions. From the organizational perspective, corporate memories can act as a tool for knowledge management on three types of learning organizations: individual learning, learning through direct communication, and learning using a knowledge repository. Another example is innovation theory based on organizational vision and knowledge management, which facilitates development-integration and application of knowledge (Johannessen et al., 1999). Furthermore, a systems thinking framework for KM has been developed, providing suggestions for what a general KM framework should include. Also, the emergence and future of knowledge management, and its link to artificial intelligence had been discussed Knowledge inertia (KI), means stemming from the use of routine problem solving procedures, stagnant knowledge sources, and following past experience or knowledge. It may enable or inhibit an organization's or an individual's ability on problem solving (Liao, 2002).

On the other hand, the organizational impact of KM and its limits on knowledge-based systems are discussed in order to address the issue of how knowledge engineering relates to a perspective of knowledge management. These methodologies offer technological issue with qualitative research methods and explore their content by the research horizon with different perspectives on KM research issues. Some applications have been implemented using a KM framework such as: knowledge creation, knowledge assets, knowledge inertia, methods and techniques, KM development and history, organizational learning, organizational innovation, organizational impact, intellectual capital, strategy management, systems thinking, and artificial intelligence/expert systems. The methodology of knowledge

management framework and its applications are categorized in table Knowledge-based systems and its applications.

There are common objectives of researchers using knowledge-based systems, including: The opportunities of knowledge-based systems (KBS) make an organization more knowledgeable. The knowledge methods and applications used and produced within the organization. Technology that can support knowledge management and implementations.

2.1.2 Knowledge management framework and its applications

Knowledge management framework/applications	Authors
Knowledge creation	Nonaka et al. (1996)
Knowledge assets	Wilkins et al. (1997)
Methods and techniques	Wiig et al. (1997)
Organizational learning	Heijst et al. (1997)
Organizational innovation	Johannessenetal. (1999)
Intellectual capital	Liebowitz and Wright (1999)
Strategy management	Drew (1999)
Organizational impact	Hendriks and Vriens (1999)
Systems thinking	Rubenstein-Montano etal. (2001)
Expert systems	Liebowitz (2001)
Knowledge inertia	Liao (2002)

The most common definition of KBS is human centered. This highlights the fact that KBS have their roots in the field of artificial intelligence (AI) and that they are attempts to understand and initiate human knowledge in computer systems (Wiig, 1994). Four main components of KBS are usually distinguished: a knowledge base, an inference engine, a knowledge engineering tool, and a specific user interface. On the other hand, the term KBS includes all those organizational information technology applications that may prove helpful for managing the knowledge assets of an organization, such as Expert systems and database management systems (Laudon & Laudon, 2002). In addition, KBS can leverage human resource management (HRM) expertise and promote organizational development. Rule-based reasoning is the basis of KBS, including database updating rules, process control rules, and data deletion rules

for logical reference. KBS is also an example of knowledge engineering to offer methods and techniques for KM. Knowledge-based architecture integration with Intranet technology also provides a methodology for KBS (Liao, 2001).

2.1.3 The knowledge conversion model

The SECI process: four modes of knowledge conversion) by Ikujiro Nonaka and Hirotaka (Nonaka, 1995). Takeuchi propose a model of the knowledge creating process to understand the dynamic nature of knowledge conversion and to manage such a process effectively which is the SECI. An organization creates knowledge through the interactions between explicit knowledge and tacit knowledge. We call the interaction between the two types of knowledge `knowledge conversion'. Through the conversion process, tacit and explicit knowledge expands in both quality and quantity. There are four modes of knowledge conversion. They are:

2.1.3.1 Socialization (from tacit knowledge to tacit knowledge)

Socialization is the process of converting new tacit knowledge through shared experiences. Since tacit knowledge is difficult to formalize and often time- and space-specific, tacit knowledge can be acquired only through shared experience, such as spending time together or living in the same environment. Socialization typically occurs in a traditional apprenticeship, where apprentices learn the tacit knowledge needed in their craft through hands-on experience, rather than from written manuals or textbooks. Socialization may also occur in informal social meetings outside of the workplace, where tacit knowledge such as world views, mental models and mutual trust can be created and shared. socialization also occurs beyond organizational boundaries. Firms often acquire and take advantage of the tacit knowledge embedded in customers or suppliers by interacting with them.

2.1.3.2 Externalization (from tacit knowledge to explicit knowledge)

Externalizat ion the process of articulating tacit knowledge into explicit knowledge. When tacit knowledge is made explicit, knowledge is crystallized, thus allowing it to be shared by others, and it becomes the basis of new knowledge. Concept creation in new product development is an example of this conversion process. Another example is a quality control circle, which allows employees to make improvements on the manufacturing process by articulating the tacit knowledge accumulated on the shop floor over years on the job. The successful conversion of

tacit knowledge into explicit knowledge depends on the sequential use of metaphor, analogy and model.

2.1.3.3 Combination (from explicit knowledge to explicit knowledge)

Combination is the process of converting explicit knowledge into more complex and systematic sets of explicit knowledge. Explicit knowledge is collected from inside or outside the organization and then combined, edited or processed to form when tacit knowledge is made explicit, knowledge is Crystallized new knowledge. The new explicit knowledge is then disseminated among the members of the organization. Creative use of computerized communication networks and large-scale databases can facilitate this mode of knowledge conversion. When the comptroller of a company collects information from throughout the organization and puts it together in a context to make a financial report, that report is new knowledge in the sense that it synthesizes knowledge from many different sources in one context. The combination mode of knowledge conversion can also include the `breakdown' of concepts. Breaking down a concept such as a corporate vision into operationalized business or product concepts also creates systemic, explicit knowledge.

2.1.3.4 Internalization (from explicit knowledge to tacit knowledge).

Internalization is the process of embodying explicit knowledge into tacit knowledge. Through internalization, explicit knowledge created is shared throughout an organization and converted into tacit knowledge by individuals. Internalization is closely related to `learning by doing'. Explicit knowledge, such as the product concepts or the manufacturing procedures, has to be actualized through action and practice. For example, training programmed can help trainees to understand an organization and themselves. By reading documents or manuals about their jobs and the organization, and trainees can internalize the explicit knowledge written in such documents to enrich their tacit knowledge base. Explicit knowledge can be also embodied through simulations or experiments that trigger learning by doing. When knowledge is internalized to become part of individuals' tacit knowledge bases in the form of shared mental models or technical know-how, it becomes a valuable asset. This tacit knowledge accumulated at the individual level can then set off a new spiral of knowledge creation when it is shared with others through socialization.

The transfer of knowledge in Research and Development function has focused in providing access to existing data rather than gathering and sorting the data (Davenport, 1998). The knowledge of Research and Development is important technical knowledge for design and developing of products (Osterlund, 1997). Research and Development workers need to know technical knowledge related to products and process as well (Badawy, 1988). The use of experience from past activities in Research and Development to exploit again in the latter similar project or problems. Knowledge is most value by companies today. The value of knowledge is most advantageous through good sharing in organization (Davenport, 1998).

Knowledge transfer in organizations is the process through which one group, department, or division is affected by the experience of another (Argote, 2000). Knowledge transfer at the individual is defined as knowledge acquired in one situation applied to another. Although knowledge transfer in organizations involves transfer at the individual level, it also includes transfer in higher levels of analysis, such as the group, product line, department, or division. For example, one manufacturing group may learn from another how to better assemble a product. Knowledge transfer in organizations demonstrates itself through changes in the knowledge or performance of the recipient units (Dayasindhu, 2002). Berry and Broadbent (1984) showed that individuals could transfer their experience from one management model to another. The performance of participants with significant experience on a previous simulation was better than that of members with little or no experience. Although experienced participants performed better on a subsequent pattern, they were not able to articulate why they performed better.

Knowledge transfer researches currently focus on factors of success for knowledge management in all aspects (Inkpen, 1996; Cordero, 1999; Dixon, 1994). Another study theme is using information technology to support knowledge transfer. Szulanski (2000) analyzed characteristics of the source of knowledge, the recipient, the context, and the knowledge itself affected transfer. Research has also shown that the nature of the social bind interacts with characteristics of the knowledge being transferred to affect transfer outcomes. Hansen (1999) found in a study of new product development projects, that "Weak ties" characterized by infrequent and distant relationships between units, facilitated the search for knowledge in other units and reduced the time to complete projects when knowledge was not complex and could be

codified. The similarity across tasks in different contexts affect knowledge transfer. The more similar the number of elements across the tasks, the greater of transfer (Argote, 2000). Galbraith (1990) compared the productivity at the recipient firm to the productivity of the source at the time the technology was transferred.

Previous researchers have studied on knowledge transfer success factors. The result indicates several factors affecting the successful knowledge transfer. The summary of earlier studies are illustrated (Table 2.1):

Table 2.1 Summary of knowledge transfer success factors studies

Factor	**Gruber, 2000**	**Ribiere, 2001**	**Goodale, 2001**	**Dayasindhu, 2002**	**Foss, 2002**	**Ladd, 2002**
Openness	+	+				
Trust	+	+				
Availability of Communication channel	+		+	+		+
Top management support	+					
Reward system	+					
Similarity			+	+		+
Narrative use			+			
Relation				+		
Org structure				+		
Type of knowledge					+	
Self awareness						+
Interest divergence						+
	Case study High tech firm	Survey 58 organization	Case study	Case study of Indian software ind.	Survey 6 European Country 2107 co.	

Knowledge transfer success factors in previous researched can be arranged into four contexts as:

(1) Knowledge context

(2) Recipient context

(3) Interaction context.

(4) Transfer activity context.

The knowledge transfer takes place in organizational culture, so culture is the context of transfer (Zack, 1999). Organizational culture was proved to be great support for knowledge transferring (Gruber, 2000; Ladd, 2002; lemon, 2003). Further, the cost of improving organizational culture is not as much as using high technology for information sharing in research and development team. Understanding of organizational culture would be great support for successful knowledge transfer and the result will be beneficial for the organization (Ribiere, 2001).

2.2 Organizational culture and TQM culture

Organizational culture may be described as the shared values and assumptions that guide behavior in an organization (Bisalyaputra and Poonikom, 2006). Culture is a pattern of shared basic assumptions that the group learned as it solved its problems of external adoption and internal integration that has worked well enough to be considered valid and, therefore, to be taught to new members as the core value to perceive, think, and feel in relation to those problem (Schein, 1992; Stephen, 1995). Culture is known as patterns of *values*, ideas, and other symbolic-meaningful systems as factors in the shaping of *human behavior*. Hofstede (1980) refers to culture as "the collective programming of the mind which distinguishes the members of one human group from another includes systems of *values*". Values and norms are powerful forces for controlling and directing human behavior. Culture shapes the cognitive schema which ascribes meaning and values to motivational variables and guide choices, commitments, and standards of behavior. Further, since values are typically determined early in life (Hofstede, 1980), they tend to be "programmed" into individuals resulting in behavior patterns which are consistent with the cultural context and endure over time (Hofstede, 1980).

Thus culture, as the underlying system of values peculiar to a specific group or society, shapes the development of certain personality traits and motivates individuals in a society to engage in behaviors that is not be as prevalent in other societies.

Studies show that organizational culture supports several aspects of business functions (Goodale, 2001; Lim, 1995; Wright, 1995). Detert (2000) found from his study that improvement initiative in organization is mainly caused by organizational culture. The long term success of firms requires well-managed organizational culture (Morris, 1992; Pierce, 2001; Walsh, 1991).

Organizational culture has been identified in many studies as an important element in New Product development (Jassawalla, 2002) and knowledge management practices (O' Dell and Grayson, 1998). There are many differing elements within organizational culture that have been considered to be important for optimal knowledge management practices (Brown, 1996). These same organizational elements have not been specifically studied in the context of transference of knowledge between new and existing Research and Development employees, nor within the Thai New Product development organizational context.

2.3 Total quality management (TQM)

Total Quality Management (TQM) is ambiguous concept because the term TQM means different things to different people (Bisalyaputra and Jirapatarasilp, 2005). Deming, Juran and Crosby have proposed their own frameworks. The 14 principles proposed by Deming highlight the systematic nature of organizations, the importance of leadership, and the need to reduce variation in organizational processes.

The framework proposed by Juran (1989) focuses on three sets of activities - quality planning, control and improvement. Crosby (1979) stresses the reduction of cost through quality improvement. Regardless of the different perspectives, the underlying theme common to all frameworks is that TQM is based on a prevention work process that strives to increase quality and efficiency, improve productivity, and enhance customer satisfaction. TQM means that the organization's culture is defined by and supports the constant attainment of customer satisfaction through an integrated system of tools, techniques and training.

The core values and beliefs that are essential in implementing a TQM process include the following elements (Bisalyaputra and Jirapatarasilp, 2005):

(1) quality information must be used for improvement, not to control people;

(2) authority must be equal to responsibility;

(3) there must be rewards for results;

(4) cooperation, not competition, must be the basis for working together;

(5) employees must have secure jobs;

(6) there must be a climate of fairness;

(7) compensation should be equitable; and

(8) Employees should have an ownership stake (Sashkin & Kiser, 1993).

Although TQM was pioneered in the United States by Deming (1986), its principles were better supported by the Japanese than the Americans. An important factor that helped Japanese organizations to quickly adopt TQM was their national culture and has effect on the operation of the firms. Japanese organizations are far more collectivistic and cohesive than firms in other countries, such as Canada and the United States. Similarly, research has shown that Mexico has a collectivistic culture (Hofstede, 1980). Since there are congruencies between Japanese and Mexican culture with respect to the individualism/collectivism dimension, one might expect that Mexico will successfully adapt to the TQM philosophy as readily as Japan. Research on the implementation of Japanese practices indicates that the United States have had some problems implementing Japanese practices. Similarly, Pegels (1991) shows that some Japanese practices, such as quality circle participation during the employee's own free time, a no-layoff policy, or socializing after work were not easily implemented in the United States. These TQM-oriented practices were not implemented in an American organization because they were viewed as too object able to the American culture. Despite the problems that may exist when implementing Japanese management strategies in other cultures, a great deal of literature illustrates that some elements of Japanese management can be successfully adopted abroad. The literature illustrates that a number of collectivistic countries such as India,, Colombia.

Economical stability and low levels of educational attainment in Brazil, firms in this collectivist culture have been successful at introducing Japanese management techniques. Research has also shown that certain organizations adopting Japanese practices have made

significant progress in reforming their work organization, information sharing, skill formation and training. The successful implementation of Japanese practices abroad can be very beneficial for organizations.

The implementation of culture of TQM from the above mention reason will support the knowledge transfer by the nature of organization that have TQM characteristics.

2.3.1 TQM culture

Researchers have proposed several cultural dimensions to study national culture (Hofstede, 1980). In comparison to other dimensions, the individualistic/collectivist cultural orientation has profound implications for how individuals work (Hofstede, 1989). Specifically, studies have shown this dimension to affect work values (Hofstede, 1980), cognitions and behaviors (Earley, 1993). The individualism/collectivism cultural dimension will be utilized as a theoretical basis of the cultural implications involved in the implementation of TQM in Canada and Mexico.

Individualism/collectivism reflects the extent to which people emphasize their individual goals over those of their clan or group (Hofstede, 1980). Individualism refers to a loosely knit social framework in which people are supposed to look after their own interests. Its opposite, collectivism, is characterized by a tight social framework in which people do not distinguish between themselves and their collective. Research has shown that countries such as Canada and the United States are highly individualistic, while countries such as Mexico are collectivistic (Hofstede, 1980).

2.3.2 TQM elements

2.3.2.1 Information is used for improvement purposes. The first element states that in order to ensure that information is used for improvement purposes, a process approach, as opposed to a results approach must be adopted. A process approach advocates the use of performance and quality data by those who can apply it directly to identify problems, solve them, and make improvements rather than only assessing the final results. Unfortunately, in most Canadian and American organizations, emphasis is placed on final results (Sashkin & Kiser, 1993). Often, performance and quality information is not used to improve performance, but it is utilized to control employees. Perhaps due to the individualistic culture in Canada and the US, quality control tools are often not given to all employees. Since it is believed that quality tools are

for management use only (Deming, 1986), the tools are usually used solely by managers. Due to their adoption of a results approach which is short-term oriented, most Canadian organizations do not interactively use information for improvement purposes. Consequently, quality problems are rarely found during the process, and corrective actions cannot be used for improvement purposes.

In Japan, a highly collectivistic culture, a process approach is widely adopted. Quality tools are available to all Japanese first line employees and foremen. By comparing data with the quality goal during the process, corrective actions are taken immediately. Therefore, firms with TQM culture are expected that all employees will use information for improvement purposes. A firm in a collectivistic culture will be more likely to interactively use information for improvement purposes than a firm in an individualistic culture. The result will be sharing of more knowledge than other companies.

2.3.2.2 Authority must equal responsibility. The second element, authority must equal responsibility, is also essential in the successful implementation of a TQM process. Employees should have the authority to control their own work activities. In individualistic cultures such as Canada and the United States, managers do not want to give authority to their subordinates. Managers fear that they will lose their jobs in the process when they will lose their formal authority (Sashkin & Kiser, 1993). As a result of their fears, many managers are hesitant to empower their lower-level employees. Conversely, in collectivistic cultures, group memberships are viewed as long-term and permanent. Thus, many of the actions of collectivists in the workplace center on the long term aspects of their workgroup memberships. Since job security is often not a concern, collectivistic managers are comfortable with the notion of empowering employees. In other words, they give employees the authority to make quality decisions. For example, in Japan, since quality tools are available to all first line employees and foremen, employees are given the authority to improve their performance and quality during the process. Similarly, in Mexico, hourly employees who work on assembly lines are given the authority to control the speed of the line (Peak, 1993). In influencing to the knowledge transfer, a firm in a collectivistic culture, such as Mexico, will be more likely to make authority equal responsibility than a firm in an individualistic Culture to the propose that empowered individual will have enough knowledge to perform the tasks.

2.3.2.3 Rewarded for results. The third element is being rewarded for results. When implementing a TQM process, individuals, teams and all members of the organization must be rewarded for results. In Japan, employees will often receive a large bonus when their organization performs well because organizations recognize their employees' achievement at the organizational level. In the United States and Canada, employees will rarely receive a large bonus when their organizations achieve good results. In collectivistic cultures a high level of personal interdependence exists together with a great sensitivity towards other people's needs. Since organizations in collectivistic cultures are more sensitive to their employees' need for reinforcement than individualistic cultures, organizations in collectivistic cultures reward their employees for results.

The organization must create and maintain a reward system that is based on the team. Teams provide a structural basis for cooperation, which is a necessity in a TQM culture. Highly individualistic cultures, organizations design reward systems using mostly or solely individual rewards. Group-based rewards are more appropriate because the jobs are often designed as team structures and accomplishments are team-based. Employees will prefer group-based rewards rather than individual-based rewards because individual rewards may lead to comparisons between employees which may lead to competition, in the negative sense. In conclusion of rewording, a firm in a collectivistic culture will be more likely to regularly reward their employees for good results than a firm in an individualistic culture, such as Canada. A firm in a collectivistic culture, such as Mexico, will be more likely to give group-based rewards than a firm in an individualistic culture.

2.3.2.4 Cooperation. The fourth element, cooperation is the basis for working with others. Members must cooperate to accomplish their work with the common aim to ensure quality for the customer. People are more likely to use competitive behaviors in western culture but in eastern country such as Japan, teamwork and consensus are an important part of the Japanese work ethic. The cooperation found in Japanese firms is not just a "management practice" but it is deeply rooted in the collectivistic culture. Similarly, the importance of cooperation is considered in the workplace and also includes the relations between unions and management. Cooperation is found in collectivism than a firm in an individualistic culture. It is the foundation of people willing to work together and share knowledge to success in job.

2.3.2.5 Job security. The fifth element is job security. For TQM to be implemented successfully, a feeling of job security must propagate throughout the organization. If employees do not feel secure in their jobs; they may not take risks to make improvements. Consequently, these feelings of uneasiness may translate into the inability to achieve high quality. Deming (1986) states that a concern for quality requires that employees feel secure. High quality cannot be attained unless managers operate in a culture of openness. Research has shown that there is an importance of loyalty between bosses and subordinates or peers (DeForest, 1994). It is believed that this loyalty will translate into job security.

Job security is more widespread in collectivism than a firm in an individualistic culture. It creates trust of individuals to the firm so they do not hide their expertise or knowledge.

2.3.2.6 Climate of fairness. The sixth element is the importance of a climate of fairness within the organization. Fairness must be based on trust and a sharing of useful information. Moreover, as a means to instill fairness into the organization, top management must respect their employees and show concern towards them. Interestingly, these aspects of fairness strongly resemble the characteristics of collectivistic cultures. Collectivistic societies have a tendency to share resources with group members. In addition, relationships are viewed as respectful. Unlike Canadian individualistic organizations, Japanese collectivistic organizations emphasize the widespread sharing of information (Zhao, 1993) which, in turn, leads to fairness. Trust leads fairness and sharing of knowledge among individuals. A firm in a collectivistic culture will be more likely to instill a climate of fairness than a firm in an individualistic culture.

2.3.2.7 Compensation system based on equality. The seventh element highlights the importance of having a compensation system based on equality. Compensation systems are based on an equity principle, as opposed to an equality principle. When a compensation system is based on an equity principle, large pay differentials exist. On the other hand, when compensation is based on an equality principle, small pay differentials are apparent. Compensation systems in Japan are based on the equality principle.

A compensation system based on equality principles generates job satisfaction and collectivism in firm and resulting in promise to knowledge sharing.

2.3.2.8 Employee ownership. The final element, employee ownership, high lights the notion that employees should have an ownership stake in their firms. Total involvement increases when employees have a stake in their firms. In collectivistic cultures, such as Japan or Mexico, it is not essential for employees to own company stock to feel that they have a stake in the company. In collectivistic cultures, employees naturally develop feelings of involvement and belongingness for their organization. But in Canada or the United States, individualistic cultures, employees often need to own company stock to feel as though they have an ownership stake. Unlike collectivistic cultures, employees in individualistic cultures do not naturally have feelings of ownership, an essential element in the TQM process. Employee ownership programs for employees to feel as though they have a stake in their company and open their mind to share their knowledge to others and contribute knowledge to the company. It is more usual in an individualistic culture.

2.3.3 Critical factors of TQM implementation

Implementing TQM needs to be a totally integrated, continuous and open system based on the commitment from top management and employees, as well as the communication with customers. An exhaustive list of critical factors consolidated from literature review on TQM implementation is depicted in Table 1. For facilitating discussions, they are divided into four categories of factors or elements, namely, organizing (OG), systems and techniques (ST), measurement and feedback (MF), and culture and people (CP). Both OG and CP categories represent the soft factors, while ST and MF are the hard factors of TQM implementation. Each category of factors has several sub-factors as elaborated later.

2.3.3.1 Organizing. This factor involves aligning a TQM program with an organization's strategic planning (SP) and providing associated plans and means that are necessary to introduce and promote continuous improvement. Organizing (OG) requires top management leadership and commitment, promotes the participation of employees, and provides company-wide education and training. Being its sub-factor, strategic planning functions as a vehicle to integrate quality requirements with business activities of an organization so that total quality is reflected in its corporate vision, mission and strategy statements (Crosby, 1979, Deming, 1986; Juran, 1986). The plan should match the organization's strategic directions, and optimize the use of resource and ensure the availability of trained employees for TQM implementation. This helps identify

customers' and other stakeholders' requirement, estimate the organization's current position against its competitors in the organization's current position against its competitors in the market, and then design and deploy a strategic plan into specific activities within the organization. Leadership associated with clear vision and directions can factor knowledge sharing and generate commitment (NIST, 200). Deming (1986) urges managers to institute leadership to usher the quality transformation process. Palermo and Watson (1993) argue that leaders should exhibit role model behavior, establish clear objectives and create a supportive environment. Education and training is another sub-factor that provides employees with the knowledge and skills to meet their overall work and personal objective. If carried out consistently and reinforced in the work place by being real time updating, education and training can from a solid base for continuous improvement (James, 1996). Furthermore, Grosby (1979) stresses top management commitment as the essential element for safeguarding TQM implementation. In order to communicate quality strategy across the organization, top management should create an organizational environment that focuses on continuous improvement. Their commitment promotes the creation of clear and visible quality values, along with a management system to guide all activities of the company towards quality excellence (Rao et al., 1997).

2.3.3.2 Systems and techniques. TQM embraces a wide range of systems, approaches, techniques and tools. Systems and techniques are also critical factors that have their own role in quality management. Dale and Lascelles (1990) argue that, because of the variety of starting points and motivations for continuous improvement, it is impossible to identify a unique implementation plan detailed clarifying the order in which particular tools and techniques should be used. Bunney and Dale (1997) add that they should be selectively used according to the different stages of quality management in an organization. Process analysis and improvement is another sub-factor that helps organizations evaluate the achievements of predicted results and monitor continuous improvement efforts moving to the right direction. Organizations should develop their quality philosophy, policy, procedures and objectives, and acquire information from employees, customers, suppliers and competitors (Ishikawa, 1985; Deming, 1986; Juran, 1986; McManus, 1994). If a quality system already exists, periodical assessments of its organizational performance are then vital to continuously improve the system (Ho, 1995; Karapetrovic and Willborn, 1998). Furthermore, having effective supplier chain management can contribute to the

quality performance in many ways (Deming, 1986; Giunipero and Brewer, 1993). Regular supplier evaluations help organizations to share information and improve mutual understanding. Long-term partnerships with suppliers also help the parties involved to solve quality problems and invest in quality improvement efforts.

2.3.3.3 Measurement and feedback. Measurement and feedback provides a link between strategy and action (Sinclair and Zairi, 1995). Rao et al. (1997) argue that communication of quality-related information and obtaining feedback from customers, suppliers, employees, competitors and other stakeholders form the basis for developing appropriate actions for continuous improvement. Internal performance measurement is often regarded as a means to assess internal quality issues and identify their strengths and areas for improvement (Bank, 1992; van Schalkwyk, 1998). Conducting self-assessments and benchmarking exercises are the common approaches used to measure internal performance. However, more organizations have put emphasis on external performance measurement in which the assessment of quality performance is carried out or data is given by persons of institutions outside and organization (Rao et al., 1997). For instance, certification bodies can assess an organization's quality performance and provide useful advice on improvements. Nevertheless, improper external performance may also bring along the pitfalls leading to incorrect decisions, wasted resources, and poor reputation of the organization (Adamson, 1995). Despite having different emphasis of performance measurement, proper communication can help the organization assure the employees, customers and other stakeholders are being informed of corporate objectives and how to attain the priorities (Bank, 1992; Longenecker for organizations to have recognition and rewards tied with the performance achievements and within the employees'ability (Crosby, 1989; Harrington, 1998). They can be formal or informal, and provide momentum for maintaining enthusiasm for implementing quality initiatives.

2.3.3.4 Culture and people. Culture and people is also a critical factor. TQM itself is a culture that advocates a total commitment to customer satisfaction through continuous improvement and innovation in all aspects of the business (Bowen and Lawler, 1992; Logothetis, 1992; Williams, 1994). The behaviors and thoughts of people reflect the shared culture in the organization. First off all, the existing organizational culture will affect TQM implementation unconsciously and in a taken-for-granted fashion. It is thus necessary to understand what the

existing culture is and how it affects the TQM program. Dale and Boaden (1993) advocate that culture change should be recognized as an ongoing process rather than a prerequisite to the introduction of TQM. Camison (1998) also advocates that the actions for changing organizational culture towards total quality can be arranged into technological aspects and intangible aspects. The technological aspect involves quality tools and techniques, while the intangible aspect is concerned with behavior rules, management style, organizational and communication structures. The change should be planned and carried out in a consistent and incremental manner. Top management must be prepared to resolve conflicts and resistance to change (Dale, 1999; Pun, 2001). Moreover, with effective employee involvement, organization releases the full potential of its people, to a certain extent, determines whether it could improve its performance continuously and achieve business success. Deming (1986) stresses the human aspects in his 14-points for quality improvement. Other quality experts (Crosby, 1979; Juran, 1986; Steeples, 1992) also underline the roles of human resource development to maximize people's ability.

2.3.4 Dimensions of Culture

The research by Hoftede from the results of his 40-country study of 88,000 employees and managers of a single U.S. multinational (IBM), Geert Hofstede (1980) constructed four distinct dimensions of culture as an underlying framework to identify and explain differences in cultural patterns observed across countries. Hofstede's power distance, uncertainty avoidance, individualism and masculinity dimensions define a specific set of values which describe some aspect of culture and human activities.

2.3.5 Individualism

Individualism pertains to societies in which social ties and commitments are loose. Everyone is expected to look after him or her and the immediate family. *Collectivism*, at the opposite pole from individualism, pertains to societies in which people from birth onwards are integrated into strong, cohesive in groups which throughout a lifetime continue to protect them in exchange for unquestioning loyalty (Hofstede, 1991).

In individualistic cultures, social identity is based on individual contribution. Basic social values emphasize personal initiative and achievement. Autonomy, variety, pleasure, and personal financial security take precedent over group loyalty. As a result, in highly

individualistic countries, there is greater employment mobility since individuals are expected to look after their own interests (Hofstede, 1980).

In collectivistic cultures, people are born into extended families or clans which protect them in exchange for loyalty. Social identity is based on group membership. Thus individual initiative is not highly valued and deviance in opinion or behavior is typically punished. In collectivistic cultures, group decisions are considered to be superior to individual decisions. (Hofstede, 1980).

Internal locus of control, people abilities to achieve and give little credence to external forces such as destiny, luck, or powerful others. In highly individualistic countries (e.g., United States, United Kingdom, Australia), individual freedom of action and independence are highly valued. Therefore, entrepreneurs who exhibit high levels of self-confidence, self-reliance, and bravado are admired and encouraged. Since individualistic cultures are more supportive of individual action and more tolerant of independent action than are collectivistic cultures, we would expect that an internal locus of control orientation would be less prevalent in collectivistic cultures than in individualistic cultures. A review of cross-cultural studies of locus of control suggests a considerable amount of empirical support for expecting differences in the prevalence of internals across cultures.

2.3.6 Uncertainty Avoidance

Hofstede defines *uncertainty avoidance* as ". . . the extent to which the members of a culture feel threatened by uncertain or unknown situations" (Hofstede, 1980). According to Hofstede, strategies for coping with uncertainty are rooted in culture and reinforced through basic institutions such as family, school, and state (Hofstede, 1980). In low uncertainty avoidance cultures, members are expected to cope with uncertainty as best they can. In high uncertainty avoidance cultures, structures are established which minimize the level of uncertainty faced by individual members.

In low uncertainty avoidance cultures, the inherent uncertainty of life is more easily accepted and each day is taken as it comes. It is believed that conflict and competition can be controlled within the rules of "fair play" and used constructively. Social deviants are not perceived as threatening, hence there is a greater tolerance for creative or novel behavior. In low

uncertainty avoidance cultures, there is more willingness to take risks, and achievement is often recognized in terms of pioneering effort (Hofstede, 1980).

In high uncertainty avoidance cultures on the other hand, it is believed that conflict and competition unleashes destructive aggression and should be avoided. Deviant persons and ideas are considered dangerous; hence a lack of tolerance for anyone or anything that is perceived as "different." In high uncertainty avoidance cultures, younger people, tend to alternative attitudes and behavior, are regarded with suspicion. There is more concern with security in life, and achievement is defined in terms of security.

Hofstede also found that in high uncertainty avoidance societies, there is a greater fear of failure, a lower willingness to take risks, lower levels of ambition, and lower tolerance for ambiguity (Hofstede, 1980).

Creativity and innovativeness have also been linked to a high tolerance for ambiguity, another common characteristic (Schein, 1982). Since low uncertainty avoidance cultures are more accepting of non-traditional behaviors, it follows that innovation in these contexts enjoy greater freedom and legitimacy than their counterparts in high uncertainty avoidance cultures where the "deviance" would be viewed with suspicion. U.S. entrepreneurs had somewhat higher preferences for innovation than their counterparts in Finland, a country with a relatively high uncertainty avoidance culture compared to the United States (Hofstede, 1980).

The elements of organizational culture can be categorized as follow (Bryman, 1989; and Brown, 1992):

(1) Observed behavioral regularities when people interact: The language they use, the customs and traditions that evolve, and the rituals they employ in a wide variety of situations.

(2) Group norms: The implicit standards and values that evolve in working group.

(3) Espoused value: The articulated, publicly announced principle and values that the group claims to be trying to achieve.

(4) Formal philosophy: The broad policies and ideological principles that guide a group's actions toward stockholders, employees, customers, and other stakeholders.

(5) Rules of the game: The implicit rules for getting along in the organization.

(6) Climate: The feeling that is conveyed in a group by the physical layout and the way in which members of the organization interact with each other, customers, or outsiders.

(7) Embedded skills: The special competencies group members display in accomplishing certain tasks, the ability to make certain thins that gets passed on from generation to generation without necessarily being articulated in writhing.

(8) Habit of thinking, mental models, and linguistic paradigms: The shared cognitive frames that guide the perceptions, thought, and language used by the members of a group and are taught to new members in the early socialization process.

(9) Shared meanings: The emergent understandings that are create by group members as they interact with each other.

(10) Integrating symbols: the ideas, feelings, and images groups develop to characterize themselves, that may or may not be appreciated consciously but that become embodied in buildings, office layout, and other material artifacts of the group.

The contribution from this research, therefore, will be to understand differences between transfer of tacit and explicit knowledge and suitable organizational culture elements to support the transfer process and the realization of knowledge in the firm. The essential organization factor(s) will be identified that allow knowledge transfer.

2.4 Knowledge performance Measurement

2.4.1 KM Performance Evaluation Methodology

2.4.1.1 Qualitative Analysis. A qualitative research approach was refined using the outcomes of a pilot study and reviews by researchers of organization learning. Besides, expert interviews, critical success factors method (CSFs), and questionnaires are used to implement qualitative methods for exploring specific human problem. From the organizational perspective, attention to an organization's internal controls has increased significantly. Although management is ultimately responsible for ensuring that internal controls are adequate, managers often lack the knowledge of internal control concepts. A questionnaire in an experiment examining an expert system, which could facilitate the transfer of internal control knowledge to management (Changchit, 2001). The results indicated that expert systems are viable support for transferring

internal control knowledge to managers, whose work experience is outside of accounting and control systems. Longbottom and Chourides reported at various stages of approaching and deploying KM programs from their research in interviewed organizations. (Longbottom, 2002). The research also investigated issues concerning the CSFs and measurements of KM, establishing practical and key factors likely to enhance successful implementation. It accessed a range of critical factors and identified appropriate measures over five organizational perspectives: strategy; human resource management; information technology; quality; and marketing.

2.4.1.2 Quantitative Analysis. The aim of quantitative analysis is to present the extent of the impact on both decision making and task performance, using historical data that is easily available, relevant, accurate and timely. This evaluation can avoid the drawbacks of qualitative analysis, especially in the subjective judgment of empirical results. Therefore, a quantitative research approach is designed to represent a tangible, visible and comparable 'ratio'. In other words, quantitative analysis can be used to measure the explicit knowledge of an organization or an individual, with both financial and no financial indicators.

2.4.1.3 Financial Indicator Analysis. Traditional quantitative methods focus on well-known financial measures, such as analysis of financial statement, the payback period, the return on investment (ROI), the net present value (NPV). These methods are best-suited to measure the value of daily transaction processing systems. An ROI index to evaluate KM projects and performance in customer value added (CVA) (Laitamaki, 1997). From the managerial perspective, deployment of a knowledge-based system, which was designed to automate tasks previously performed manually, train new staff members, and capture knowledge, to enable a university organization to improve services. Performance evaluation used NPV to diagnose the project outcome. Finally, the system could be viewed as an estimation tool, giving a competitive advantage to the organization. Tangible assets are capitalized and reported on firms' balance sheets. In contrast, intangibles are expensed, i.e. written off on the income statement, along with regular expenses such as salary, rents and interest. As a result, the book value of assets does not reflect the stock of intangibles, resulting from cumulative investments; market value does.

2.4.1.4 Non-Financial Indicator Analysis. In fact, non-financial measures method is different from traditional financial statement analysis. It uses non-financial indicators, such as the frequencies of each employ logins knowledge bases and each employ brings up

proposals, the number of topic numbers of discuss board, and the number of communities of practice (CoP) in company. These indicators are all related to behavior factors and system usage situation. CoP have begun to play an increasingly important role in modern, knowledge intensive organizations. The indicators for KM in a CoP showed the results of successful measurement and offer useful guidelines for KM procedures (Smits, 2004). To successfully manage knowledge, it must be measured. Holt et al. used four metrics to access organizational knowledge, including individual, context, content and process knowledge measures (Holt, 2004). These approaches enable us to relate knowledge to business performance more explicitly, and provide valuable insight into how knowledge may be strategically managed.

2.4.1.5 Internal Performance Analysis. Internal performance measurement methods focus on process efficiency and goal achievement efficiency. These methods evaluate KM performance through the gap between target and current value. The well-known methods are including ROI, NPV, balanced scorecard (BSC), performance-based evaluation, activity-based evaluation, and other models.

Underlying Kaplan and Norton's concept of BSC was that all aspects of measurement have their drawbacks; however, if companies offset some of the drawbacks of one measure, with the advantages of another, the net effect can lead to decisions resulting in both short term profitability and long term success (Kaplan, 1996). As a result, they suggested that financial measures be supplemented with additional ones, reflecting customer satisfaction, internal business processes and the ability to learn and grow. Many scholars have discussed the use of a Balanced Scorecard approach in determining a business-orientated relationship, between strategic KM usage and IT strategy and implementation (Martinsons, 1999). Valuable knowledge resides within individual employees and is critical to an organization's ability to solve problems and create new knowledge. In a sense, KM can be viewed as an activity, which acts as a constituent of a community, performing one's task by using tools or technology.

2.4.1.6 External Performance Analysis. External performance measurement methods always compare itself with benchmark companies, primary competitions, or whole industry average. With benchmarking or best practices methodologies, firms can understand its KM performance to compare competitions. Benchmarking is also seen as a tool for identifying, understanding and adopting best practices, in order to increase the operational performance of

intellectual capital (IC). From an organizational learning perspective, benchmarking is concerned with enhancing organizational performance, by establishing standards against which processes, products and performance can be compared and consequently improved. The "Best Practice" approach is an essential component of KM. It provides an opportunity to retain and use knowledge, even when an expert has left the organization. Asoh et al. investigated how governments could deliver more innovative services to a demanding public.

2.4.1.7 Project-orientated Analysis. Recent studies of KM and organizational learning in project environments have emphasized instead the difficulties of learning from projects—not only within individual projects, but also across and between projects (DeFillippi, 01). Processes of the capture, transfer and learning of knowledge, in project settings, rely very heavily upon social patterns, practices and processes, in ways which emphasize the value and importance of adopting a community-based approach to managing knowledge (Bresnena, 2003). The development of knowledge management theory, within project environments. Nevertheless, project organizations require particularly systematic and effective knowledge management, if they are to avoid knowledge fragmentation and loss of organizational learning. Knowledge management and knowledge competences in project organizations are particularly from a programmers, perspective. Finally, they made a contribution by presenting the Learning Programme Model. In order to systematically manage the knowledge created within a project, the project, itself, must be systematically managed by the model.

2.4.1.8 Organizational-orientated Analysis. The organization-oriented analysis is focus on whole organization, multidimension, and multi-layers in the firm. It can analyze KM performance evaluation from intellectual capital, BSC, technology, and process perspectives. The primary objective is estimated the level of KM performance in the whole organization. Most organizations have only a vague understanding of how much they have invested in intellectual capital (IC) let alone what they may receive from those investments. Standard financial accounting systems do not allow for the easy estimation of intellectual capital investments. Among the most widely used approaches for IC management and reporting. These models are designed to measure human, innovation, process and customer capital, and represent a major step toward providing precisely the information that firms and their stakeholders need to foresee the future. Thus, these

IC models can help visualize the knowledge-production process of research organizations. This reviewed previous KM measurement literature.

Table 2.2 Reviewed previous KM measurement.

Category	Sub-Categories	Researchers
Qualitative Analysis	Questionnaire	Changchit, 2001
Critical Success Factors	Expert interview	Chourides, 2003
Quantitative Analysis	Financial Indicator Analysis	
	Return On Investment	Laitamaki, 1997
	Net Present Value	Hall, 2000
Non- Financial Indicator	Analysis Communities of Practice	[Smits, 04]
	Individual, Context, Content	Holt, 2004
	and Process Knowledge Assessment	
Internal Performance Analysis		
	Balanced Scorecard	Kaplan, 1996
	Activity-based Evaluation	Hasan, 2001
External Performance Analysis		
	Benchmarking	Pemberton, 2001
	Best Practices	Asoh, 2002
Project-orientated Analysis		
	Social Patterns	Bresnena, 2003
	KM Project Management Model	Kasvi, 2003
Organizational-orientated Analysis	Intellectual Capital	Edvinsson, 1997

2.4.2 Evaluating knowledge resources

Business performance measurement (BPM) has become topical; businesses are beginning to realize the importance of effective measurement of business activities in order to maximize profits. Sustainable business success in the demanding world marketplace, a company must use relevant performance measure (Dixon, 1989). Financial measures generate excessive information that easily leads to information and data overload. Also those measures rarely integrate with one another or aligned to business processes, and they are often poorly defined.

Researchers believe, evidence suggests that there are seven main reasons for the sudden interest in performance measurement today:

(1) The changing nature of work

(2) Increasing competition;

(3) Specific improvement initiatives

(4) National and international awards;

(5) Changing organizational roles;

(6) Changing external demands; and

(7) The power of information technology

The Performance Measurement is tool to assess the performance of the various operations in the company. The good performance measurement should be constructed from Mission, Goals, and Objectives

Performance Measure should be a means of objectively assessing programs, products, activities, or services. Therefore, performance measurement should have the following characteristics.

(1) related to your mission and goals

(2) indication the methods to measure objectives

(3) indication the time objectives will be measured

(4) indication the responsible person who will do the measurement

(5) There are two ways of Measuring Performance (Lynn, 1991)

2.4.2.1 Direct measures of performance is the measurement of direct resource used to perform the operations.

1) Time

2) Error rates

3) Compliance

4) Cost

5) Number of outputs per input

6) Standardized tests

2.4.2.2 Indirect measures of performance is used when direct resources are not obvious or hard to measure directly. The measurement can be done by

1) Perceived time

2) Perceived efficiency

3) Perceived quality

2.4.3 Categories of Performance Measures

2.4.3.1 Input measures (e.g., staff time, materials, equipment, resources) are useful in showing resources or effort used to provide services; however does not show effectiveness.

You may be a spending a lot of effort doing the wrong things.

2.4.3.2 Output measures (e.g., number of products produced or services provided) are useful in defining program or service; however, does not reveal quality or efficiency.

You may be producing or providing a lot of the wrong things inefficiently or with poor quality Categories of Performance Measures.

2.4.3.3 Outcome measures (e.g., score on standardized test, distance from proposed targets) are useful in showing the impact or benefit of the program or service.

2.4.3.4 Efficiency measures (e.g., cost per unit of output, outputs per unit of input, outputs per unit time) are useful in showing productivity and cost effectiveness.

2.4.3.5 Quality measures (e.g., reliability, accuracy, courtesy, competence, responsiveness) are useful in measuring the effectiveness in meeting customer expectations.

Lack of quality can be measured (Vance, 1998)

2.4.4 Evaluating knowledge resources

Organizations can evaluate knowledge resources in two ways. First, they should identify what knowledge is necessary to achieve the more important strategic themes. Second, they can use logic to determine whether their knowledge resources meet the criteria for being a sustainable source of competitive advantage.

2.4.5 Linking knowledge resources to strategic themes

Our case firm's most important strategic theme is to Create Customer Value. In order to achieve this, it must pursue a customer intimacy strategy. This requires alignment between the firm's internal activities and the firm's value proposition that may be done through Customer Management Processes. This alignment between the firm's knowledge-based strategy –

Creating Customer Value – and its activities identifies what it needs to know to achieve the strategy. In this case, it needs knowledge about solution development, customer service requirements, relationship management processes, and advisory service strategies. The firm needs deep knowledge about its customers, their markets, and how to use this knowledge to create value for them. The firm's next most important strategic theme is to Build the Franchise. While its growth objectives will result from creating customer value, this will be incremental growth. In order to achieve more quantum growth, it must identify and capture new market opportunities through large-scale investment decisions. In terms of alignment between the knowledge-based strategy and activities, it needs knowledge about environment, Environment and government indicators to enable market opportunities to be assessed and investment decisions made with confidence. In also needs product development, speed to market and – in some cases – joint venture/partnership knowledge in order to capture market opportunities.

2.4.6 Balance Scorecard: The relationship between knowledge resources and strategy

The first step in understanding the contribution of knowledge is to tie it to the organization's strategy. Our case firm is pursuing a differentiation strategy by trying to create customer value through offering superior technical support, in the design, construct and after sales stages. The firm wants to eliminate its customers' management headache of dealing with multiple contractors through becoming a 'one-stop-shop' for its customers. Its strategic themes are: customer service excellence, corporate governance, information & knowledge management, market leadership, manufacturing excellence, people & community, and zero harm. Its key knowledge-based strategy, in Kaplan and Norton's terms, is to Create Customer Value.

Research and literature have shown that the balanced scorecard model may be a useful performance measurement system to the knowledge management within business (Kaplan and Norton, 1996). A balanced scorecard is also believed to be extremely useful in rescuing troubled organizations. Interaction between business and Information is one of mistrust and anger; a pervasive lack of communication between information and business side. As a remedy, a suitable balanced scorecard can be used to re-establish connection with the business side and restore the confidence of management and stakeholders in the knowledge management function.

The main attributions, which is the degree to which knowledge management and other processes make business results successful. Two constitute the issue of attribution:

(1) To what extent the knowledge will support business results

(2) To what extent do business processes and practices help knowledge management's ability to deliver results?

The attributes require business organizations to have some methodology to track knowledge management performance to business results. In order to gain good performance measurement, methodology must be able to:

(1) Map business processes to the systems, network elements, and applications required to support them, and

(2) Create metrics to measure the performance against the requirements of business processes.

The most important factors that can either expand knowledge management are also need to examined. The top managers need to communicate their performance and value throughout the company. One way to build a well is to use the balanced scorecard methodology that is proving valuable at many organizations. A good knowledge management balanced scorecard will embed knowledge sharing initiatives and indicators within corporate strategic goals which will comprise the four BSC components (Kaplan and Norton, 1992);

(1) financial issues,

(2) internal business processes,

(3) customer-related performance, and

(4) learning and growth .

This research work identified knowledge management concerns of different stakeholders. The objectives of the knowledge management balanced scorecard are stated as follows:

(1) Align knowledge management activities and activities with business goals and needs

(2) Align employees' efforts towards knowledge transferring objectives

(3) Establish measures for evaluating the effectiveness of the organization

(4) Stimulate and sustain improved knowledge transferring performance

(5) Achieve balanced results across stakeholders groups.

The Knowledge management balanced scorecard framework which goes to the heart of the relationship between knowledge management and business. It derives from the perception that the knowledge management should migrate from a mere commodity support to a strategic partner to the business. Its four perspectives are given as follows:

(1) Customer orientation: how should Knowledge management appear to business unit executives to be considered effective in delivering its services?

(2) Operational excellence: at which services and processes must Knowledge management excel to satisfy the stakeholders and customers?

(3) Future orientation: how will Knowledge management develop the ability to effectively and to continuously learn and improve its performance ?

(4) Corporate contribution: how should Knowledge management appear to the company executive and its corporate functions to be considered a significant contributor

2.4.7 Reviewed decision-making techniques use for prioritization factor

Multi-attribute decision-making (MADM) techniques have the advantage that they can assess a variety of options according to a variety of criteria that have different units, This is a very important advantage over traditional decision aiding methods where all criteria need to be converted to the same unit. Another significant advantage of most MADA techniques is that they the capacity to analyze both quantitative and qualitative evaluation criteria together.

TOPSIS, outranking, and AHP are three of the most frequently used MADM techniques. TOPSIS views a with *m* point in the n-dimensional space. It was developed by Hwang and Yoon (1981). The method is based on the concept that the chosen alternative should have the shortest distance from the positive-ideal solution. TOPSIS defines an index called similarity (or relative closeness) to the positive-ideal solution and the remoteness from the negative-ideal solution. Then the method chooses an alternative with the maximum similarity to the positive-ideal solution (Yoon & Hwang, 1995).

The outranking decision aid methods compare all couples of actions. Instead of building complex utility functions. They determine which actions are being preferred to the others by systematically comparing them on each criterion. The comparisons between the actions lead to numerical results that show the concordance and/or the discordance between the actions, and then allow to select or to sort the actions that can be compared. In the literature, there are five

different fuzzy outranking approaches: Roy's approach (1977), Takeda's approach (1982), Siskos, Lochard, and Lombard (1984), Brans, Mareshal, and Vincke (1984), and Martal, D'avignoon, and Couillard (1986), and Martel, D'avignon, and Couillard (1986), The most well known outranking methods are ELECTRE, ORESTE, and PROMETHEE.

AHP is the most popular method used in the literature, This method, developed by Saaty (1980), divides a complicated system under study into a hierarchical system of elements, Pair-wise comparisons are made of the elements of each hierarchy by means of a nominal scale. Then, comparisons are quantified to establish a comparison matrix, after which the eigenvector of the matrix is derived, signifying the comparative weights among various elements of a certain hierarchy. Finally, the eigenvalue is used to assess the strength of the consistency ratio of the comparative matrix and determine whether to accept the information.

The fuzzy versions of all these techniques were developed to deal with situations, which are ambiguous or not well defined. In this paper, fuzzy AHP will be preferred in the prioritization of HC indicators since this method is the only one using a hierarchical structure among goal, attributes, sub-attributes, and alternatives. Usage of pair-wise comparisons is another asset of this method that lets the generation of more precise information about the preferences of decision makers. By using pair-wise comparisons, judges are not required to explicitly define a measurement scale for each attribute (Spires, 1991).

2.4.8 Background of ANP

AHP and ANP are multicriteria decision-making tools, which are argued to prossess qualitative (decision model development) and quantitative (decision model analysis) components. AHP models a hierarchical decision problem framework, which consists of multiple levels specifying unidirectional relationships. ANP models a network structure the relaxes the hierarchical and unidirectional assumptions in AHP to allow interdependent relationships in the decision making framework. Although the two decision tools possess the same qualitative and quantitative procedures to structure and analyze a decision problem, ANP needs further quantitative steps to solve a network decision problem. For details of the ANP method, refer to T.L. Saaty (1996). Those who want to skip the complicated mathematical algorithm and look for using any commercially available ANP software, consult the website of Expert Choice. In this study, only a brief description of the method is provided, which is based on Cheng and Li (2004)

who suggested that ANP is composed of four qualitative (1 to 4) and five quantitative (5 to 9) steps:

2.4.8.1 To state the decision problem – The topmost level is to state the decision problem. This starts the decomposition of further levels down the structure until final level that is usually the scenarios or alternatives to be selected.

2.4.8.2 To make sure that the decision problem is to be solved by ANP- As already stated, ANP is used to structure a decision problem into a network form. For solving strictly hierarchical model, AHP is sufficient.

2.4.8.3 To structure the unstructured decision problem – The topmost decision problem level is abstract in nature. It must be decomposed into a set of manageable and measurable levels until the level of criteria for assessing the scenarios or alternatives.

2.4.8.4 To determine who the raters are- Those who are responsible for making the decision are the raters for completing a questionnaire.

2.4.8.5 To design a questionnaire for eliciting data from raters – It is suggested to use the pairwise comparison, which can elicit more information to assign weights to the rated elements. It is common to use the 9-point priority scale to estimate the relative importance between paired elements (T.L. Saaty, 1980). The example in this paper shows samples of the scale.

2.4.8.6 To calculate the eigenvector of each of the developed matrices – Each decomposed level with respect to a higher level forms a matrix. It is necessary to calculate the eigenvector for the elements of this matrix. For the algorithm, refer to T.L. Saaty (1980) or Cheng and Li (2001).

2.4.8.7 To measure the consistency ratio (CR) of each of the matrices to find out the inconsistency of rating – One of the best reasons to use pairwise comparison and matrix is to measure the CR to ascertain that raters are consistent in rating. If the CR value cannot pass the acceptable level, it is certain that the raters rated arbitrarily or mistakenly. Rerating is then needed. For the algorithm to calculate CR, refer to T.L. Saaty (1980) or Cheng and Li (2001; 2003).

2.4.8.8 To form the supermatrix by the eigenvectors of the individual matrices (also known as submatrices) (T.L. Saaty, 1996) – The eigenvectors of each of the developed matrices should gather together to form a supermatrix.

2.4.8.9 To compute the final limit matrix – In order to compute the final limit matrix, the supermatrix, which has been ensured of column stochastic, has to raise to high power until weights have been converged and remain stable (Sarkis, 1999).

2.5 The analytic hierarchy process (AHP)

The strategic organizational decision problems industries experience in management have multiple criteria with respect to qualitative domains. These organizational decisions are technically complex and require frequent group decision-making meetings. Interest in decision-making continues to grow and AHP is a multi-criteria decision-making technique well suited to derive collective judgments in this context in that it facilitates the quantitative comparison of alternatives. As opposed to other performance evaluation techniques, it can account for not only quantitative but also for qualitative impacts. Other reasons to discard alternative multidimensional evaluation techniques in this context is the irrelevance of the probability of occurrence of impacts. AHP was developed for analyzing a variety of decisions concerning complex technological, economical and socio-political problems. It has been applied successfully in decisions about, for example, product/process/project selection, and resource allocation performance measurement.

The first step in the AHP is to structure a complex decision into a hierarchy of factors. The basic structure of AHP consists of three hierarchical levels: objectives, criteria, and alternatives. By breaking the problem into these subunits, the decision-maker can focus on smaller sets of decisions. One of the most extended elaborated structures consists of a forward and backward part. The forward planning process is the resultant scenario or state of a system determined by the existing state and the actors who pursue their objectives, policies, and individual outcomes. The desired outcome is brought about by applying policies to influence actors to remove obstacles in the way of this outcome. This is the backward planning process.

Pair wise comparisons of the different factors, based on a nine-point ordinal scale, indicate the relative importance of or the relative preferences for the factors. In order to derive

valid results, all factors must fall within the same order of magnitude (Saaty, 1994). A major strength of the AHP is that it allows for -and explicitly deals with- inconsistencies. It provides a measure of the ratio of inconsistency (CR) that indicates the degree to which each pair wise comparison is consistent with the remainder of the comparisons. Saaty indicates a maximum value for this measure. Weighting factors and priorities for these factors are estimated according to a mathematical approach proposed by Saaty. Alternative procedures have been developed with respect to the measurement scale. When a group decision support tool is to improve judgments and intuition by providing a surveyable and comprehensible support, the conventional AHP, provided by the software package "Expert Choice", is a suitable approach. This user-friendly approach enhances effectiveness due to explicit logical foundations, efficiency by dividing the decision problem in subunits and reliability by providing a consistency index. Comprehensible graphics regarding weighting factors and preferences improve the general overview during the decision process. Furthermore, this approach leaves ample room for consensus building.

The basic version of AHP has been developed to support decision-making by an individual decision-maker. Additional software allows a decision group to use this approach. Each decision-maker inserts his pair wise comparisons and this software computes collective judgments. By adding feedback links between the decision- makers, the decision-makers are induced to give collective judgments based on a compromise or even consensus.

CHAPTER 3

RESERARCH METHODOLOGY

3.1 Research Question

What is the role of Total Quality Management (TQM) culture on the transfer knowledge within Research and Development function in New Food Product development?

3.2 Objectives

3.2.1 To understand the Total Quality Management culture and their influences contributing to effective knowledge transfer within Research and Development function in food industry.

3.2.2 Identify proper knowledge transfer model that facilitate knowledge management and determine the ideal organizational culture as knowledge transfer supporter in New Product development.

3.3 Scope

To investigate Total Quality Management culture link to knowledge transfer and the proper form of knowledge transfer in Research and Development for New Product Development process.

3.4 Expected Contributions

The result of this research will reveal how organization culture in outline of Total Quality Management culture can be used effectively to influence knowledge transfer within Research and Development department. Results will assist managers to identify types of knowledge transfer form in their firms and the organization culture elements that can be used to facilitate effective knowledge transfer. Through this mechanisms will be identified that will be

able to improve culture to promote workers to share their expertise's in the Research and Development function to best obtain existing knowledge in the firm in an efficient way. The relationship between organizational culture and tacit and explicit knowledge transfer will be discovered.

3.4.1 The identification of Total Quality Management culture influencing the successful knowledge management.

3.4.2 The realization of the impact of successful knowledge transfer to main success applicable dimensions according to BSC.

3.4.3 Determination of the difference between tacit and explicit knowledge transfer and suitable culture form for each type of knowledge transfer.

3.4.4 The identification of elements of organizational culture that will assist good tacit and explicit knowledge transfer from existing Research and Development.

3.4.5 To develop the knowledge transfer form that best suits for knowledge management in Research and Development function in food industry.

3.5 Methodology

3.5.1 The first part of the research

The first part is the study of culture and knowledge transfer in organizations. This kind of research is appropriate by the method of the case-study approach as suggested by Yin (1994), interviews were completed with three Organizations with incorporate research and development function as a main function for product and development. The companies under study should have exceptional number of new product releases. The companies are in Thailand with different type of ownership structures. The first is a large and leading food cooperation, The second is subsidiary of a multi-national food firm. The third case is a Thai-owned food producer. Although all three companies are research- based product development for commercial and their work in each product is the project-based organizations, operate and are considered leaders in respective fields, the food industry category illustrate a broad range of knowledge management techniques. The fact that each organization operates under completely different circumstances allows for a useful contrast in how knowledge transfer is conducted.

Semi-structured interviews were conducted with senior and middle-level managers from each company. Questions specifically addressed knowledge management policies, practices and tools, as well as culture and management structures, if any, that were designed to foster these types of investments. The industrial contexts leading to the development of knowledge management techniques were also investigated, as well as the major innovation drivers within the industry, and significant cultural influences within the firm

3.5.1.1 Preliminary study of the various companies in different industrial sectors.

3.5.1.2 Initial study the selected company. Interview workers involving in Research and Development function.

1) Interview Research and Development manager in selected companies to examine the organizational culture on tacit and explicit knowledge transfer

2) Interview workers who directly involve in knowledge transfer in Research and Development function.

3.5.1.3 Develop the interview protocol.

3.5.1.4 Validate protocol with expert in the field who are university professors in related field and senior R&D managers.

3.5.1.5 Testing protocol with ten engineers whose works relate to product development.

3.5.1.6 Revise the interview protocol.

3.5.1.7 Study by using protocol in three to five selected food companies. Using interview protocol to managers and Research and development workers to study organizational culture of the company and knowledge transfer factors.

3.5.2 The Second part of research

The second part is to select the knowledge transfer form from the information gathered from the first phase. The AHP is used to design the knowledge transfer form.

This study has been initiated to support management decisions in its contentious strategic decision for an organizational based on food industry disciplines to select knowledge transfer form. AHP has been used to formulate and analyze this decision. Its support is aimed at

the formation of consistent logical foundations. Moreover, its support is aimed at arranging priority of each factor with regard to alternatives.

A pilot study will be conducted to assess the appropriateness of AHP in this multidisciplinary context including organizational culture and knowledge transfer. AHP is considered appropriate when it evokes consistent collective judgments based on an acceptable compromise or consensus. In this context, attention is paid to the additional value of using a questionnaire and interview of stake holders in Research and Development department. The AHP has been used to formulate a simple decision structure for analyzing the strategic decision for a knowledge transfer model. The result is based on the consistencies and degrees of consensus formation of groups of worker in Research and Development function. Subsequently, an extended AHP structure can be managed with a forward or backward structure. In the forward AHP structure, explicit attention is paid to the desired but realistic objective in industry for the knowledge transfer success. The alternative is based on objective of Research and Development can be derived based on department's interest in knowledge management and their sources of demand, resources, constraints and research problems. The backward structure is based on our hypothesis that a sound decision for an organizational culture structure of a Research and Development unit can be based on the comparison of different criteria related to knowledge transfer form, application value of results, organizational culture. These criteria assess the research and development activities.

3.5.3 Sample

The sample three to five companies for a case study will be examine in different levels. The case will be people who are responsible and knowledgeable about the Research and Development functions in a sample company. The knowledge of knowledge workers especially, in Research and Development knowledge because it is essential knowledge as capability for New product Development process and represent technical knowledge.

The group of sample contains:

(1) R&D workers whose works have direct involvement in knowledge transfer.

(2) Managers who are in charge of R&D function.

The company is selected from companies that have structured R&D function and originally research and develop their own products. The case will be people who are

responsible and knowledgeable about the Research and Development function in a sample company. The knowledge of knowledge workers especially, in R&D knowledge because it is essential knowledge as capability for NPD process and represent technical knowledge.

3.5.4 Study

This research will be case study (Yin, 1984). The study emphasizes organizational culture and knowledge transfer in the modern firm, therefore the qualitative study by case study will be best suit. The case study can result in better corollary in organizational culture study by focusing on samples of a sample organization (Bryman, 1989). Besides, the cases can involve mixture of different study methods.

Study the organization culture especially, in R&D function and find the Linkage to the success of knowledge transfer

3.5.5 Factors Under Study

3.5.5.1 The organizational culture

1) Human relations
   (1) Openness to change
   (2) Human orientation
   (3) Sharing knowledge potential (Goh, 2002)
   (4) team commitment
2) Task-oriented organization
   (1) Mission and value
   (2) Problem seeking solving (Goh, 2002)
   (3) Quality
   (4) Excellency
3) Organizational structure
   (1) power distance
   (2) Control
   (3) Decision making
   (4) organization design (e.g. Bureaucratic)
4) Management style
   (1) Leadership

(2) Trust

(3) collaboration

(4) Reward system

5) Environment

(1) Competition (Goh, 2002)

(2) Technology

3.5.5.2 The knowledge transfer

1) Knowledge context

(1) Knowledge embeddedness

(2) Knowledge articulability

2) Recipient context

(1) Project priority

(2) Learning culture

3) Interaction context.

(1) Organizational distance

(2) Physical distance

(3) Knowledge similarity

(4) value distance

4) Transfer activity context.

Interview R&D manager with semi-structured interview question in the case study to explore the organizational culture and overview the way knowledge has been transferred in the company.

3.5.5.3 Questionnaire

Develop questionnaire to study areas in a sample company. The questionnaire is composed of two level investigation; organization structures and workers. Organizational culture and knowledge transfer factor from the literatures and from the information gathered from manager interviewing.

3.5.6 Validation of the model from research

The model from the study is validate by accessing the model of right and proper form of knowledge transfer generated by AHP from the information of the study in the selected

food industries. The model is validated in the research and development department in a selected food company and the result is measured by Balance Scorecard for the performance success resulting from the knowledge transfer model.

CHAPTER 4

RESULT

4.1 The research steps

4.1.1 studying in the five food industries.

4.1.2 Using AHP to generate the model.

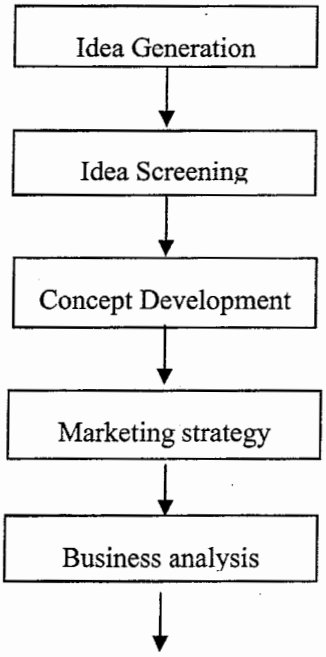
4.1.3 Verifying the model in the selected industries (two companies: one is the best and closet to the model and another is worst and the most different to the model)

4.1.4 Identifying the model by qualitative and quantitative study

4.1.5 summary and conclusion.

4.2 Food Product Development Process

The new product development process is characterized by eight major steps



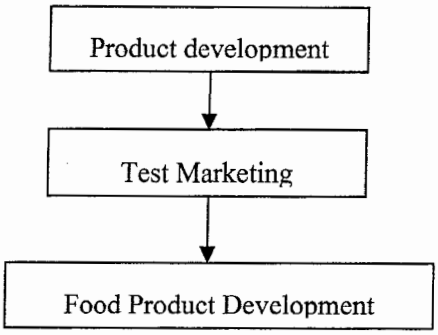


Figure 4.1 Schematic of Food Product Development Process

Define idea generation as "a systematic search for new product ideas"; they take the view that management should take a strategic approach. This would involve the use of clearly defined objectives such as market share or the cash flow that would be realistically expected for the development of a specified product. Idea generating would normally include well tried methods such as brainstorming sessions amongst personnel and information gathering from various sources such as customers, competitors and trade journals.

The generation of a large number of ideas will invariable result in some ideas that are unsuitable for developing further. Ideas are screened using a simple rating process taking account of possible product attributes.

Their third stage, concept developing and testing, involves taking a promising idea to a more concrete level. This stage involves developing a concept and defining parameters for a product. Once this is achieved some sort of testing of the concept will be carved out; this would purchase the product. Any feedback gained would be assessed. The marketing strategy development stage allows for a detailed strategy to be developed and addresses such points as the "target market, the planned product positioning, the sale and market share".

The fourth stage revolves around undertaking some form of business analysis. Factors such as a review of the sales, costs, and profit projections, in order to ascertain whether the company's objectives are met, are undertaken. Product development involves the production of a physical product.

The next stage, test marketing, is deemed suitable for products that have passed through the previous stages. This is believed essential when introducing a new product that requires a large investment or when management is unclear about the product and does not wish to

make a major financial mistake. It is acknowledged that some companies do little or no market testing, particularly if they are introducing products that have minor modifications or are copies of already successful competitors' products.

Commercialisation is seen as the stage in which the new product is launched and a commitment to manufacture and consign capital investment/storage facilities/marketing costs/sales promotion cost is taken.

The research aimed to achieve an in-depth comprehension of the research question, and given the contribution of knowledge to organization performance. It was considered appropriate to choose a case study approach that "seeks to describe, decode, translate and otherwise come to terms with the meaning not the frequency" of the phenomenon under study (Maanen, 1979). The case study research method is appropriate when the investigation must consider both the phenomenon of knowledge transfer and the context which is the contribution to performance in which the phenomenon is occurring (Yin, 1993). There was one investigator; and the output is a model suggesting how to manage knowledge resources in an organizational context.

This exploratory study addressed a phenomenon that has not yet been thoroughly researched. A case study approach was employed and interviews were conducted. The researchers believe that the case study approach was most appropriate because of the nature of the research questions. The five case studies that were the subjects of this study are of knowledge transfer and assimilation exercises involved in product development. These cases illustrate successful knowledge transfer where the product development process was also a success. This research strategy used interviews and artifacts records. These descriptions were developed with a view to understanding the various knowledge forms. Consequently, these forms were brought to bear on solving problems, understanding the history of the product development exercises, and identifying representational forms that were used to capture the knowledge as well as the modes of communication. This exploratory research was conducted through the lens of the research questions.

Additionally, the research was conducted within an industry, new product development and deployment can mean leadership or failure to the firms competing for market share. This knowledge-intensive organization employed knowledge workers who are difficult to

replace within a function or department. As a result, this knowledge intensive organization relies on the competency of its human resources.

4.3 Part1 The model formulation

4.3.1 Sample characteristics

The characteristics of the respondents are described in terms of gender, age, education, time in the organization, and time with an account on the system.

The respondents were generally well educated. Those who responded also have spent a considerable amount of time with the organization, with over 50% of the employees working for over 5 years. They are also experienced in utilizing the system.

Table 4.1 Sample Characteristics

Characteristics	%
Gender	
Male	68
Female	32
Age	
23-30	2
31-40	16
41-50	40
51-60	32
Over 60	10
Education	
High school/GED	2
Some college	14
College degree	23
Some graduate school	15
Master's degree	45
PhD/JD/MD, etc.	1

Table 4.1 Sample Characteristics (continue)

Characteristics	%
Years in organization	
1	15
2-4	25
5-8	15
9-10	10
Over 10	35
Access to the system	
Less than 6 months	7
Six months to a year	9
Between 1 and 2 years	30
Between 2 and 5 years	44
Over 5 years	10

N = 169

4.3.2 Reliability and validity of scales

Because multiple items were utilized to measure each construct, these items were combined under their respective constructs in order to analyze all constructs in a single model. Each of these constructs was tested for reliability and validity using Cronbachs' α (minimum 0.7) and factor analysis (minimum loading 0.40). The Reliabilities analysis was shown in the appendix point.

The criteria of sample selection

The research participants were knowledge workers from various communities or functional groups that represented the concept, design, development, and deployment phases of the innovation process. These knowledge workers had similar backgrounds that were illustrated through their present and past roles within the research and development community. The average experience of these experts was 12 years, with education ranging from a high school education to the bachelor degree level. The range in diversity of experience and education of the interviewees allowed the researchers to explore the unique perspectives of each community. The basis of the

qualitative analysis centers on the complex and experiential data developed from the semi-structured interviews. Each interview was analyzed through an iterative process in which each line was examined to identify words and phrases, which were then developed into dimensions, categories, and subcategories.

AHP formulation of the model

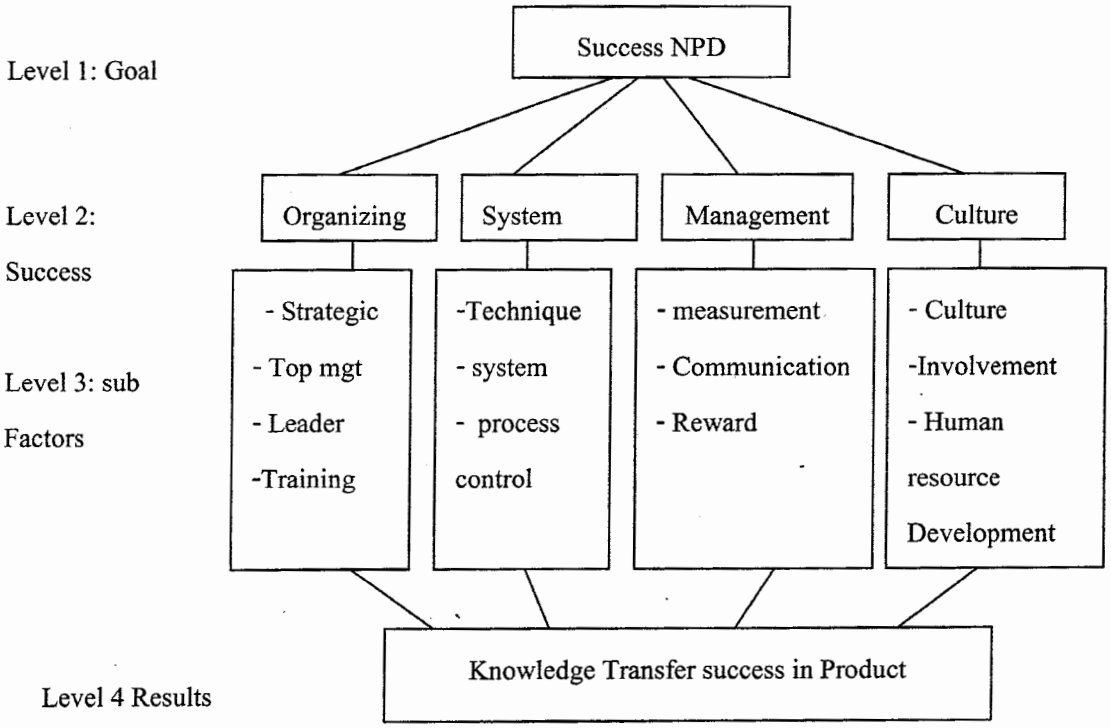


Figure 4.2 AHP formulation of the model

4.3.3 Finding from five cases of industry

4.3.1.1 AHP formulation of the model The data was collected from the five industries and the results were processed by AHP to generate the model. The AHP devised by Saaty (1994, 1996) is a powerful technique in solving fuzzy and complex decision problems. The process can be used to make trade-off and determine priorities among factors and sub – factors that is critical to manage the organization. In order to investigate the managerial views on the critical factors that will affect the implementation of KM.

The study has concluded of three phases, including:

1) structuring the problem and building the AHP model;

2) collecting data from interviews; and

3) determining the normalized priority weights of individual factors and sub-factors.

Phase 1: Structuring a hierarchy model

The model has four levels.

Level 1 states the goal of the problem.

Level 2 consists of the critical factors, and

Level 3 lists the sub-factors of individual critical factors.

Level 4 is the desired results .

Phase 2: Measuring and collecting data

R&D managers of enterprises were invited to attend a personal interview. Since these managers were familiar with the management practices in their organizations, they served as the evaluators to determine the relative weights against a given list of critical factors and sub-factors affecting the Knowledge transfer. A five-point scale was employed to assign relative scores to pair-wise comparisons amongst the factors and sub-factors. The evaluators would assign a score to each comparison using the scale. This process continued till all levels of the hierarchy, and eventually a series of judgment matrices for the critical factors and sub-factors was obtained.

Table 4.2 critical factors and sub-factors

	1	2	3	4
Factors	organizing	Systems	Management	Culture
Sub- factors	- Strategic - Top mgt - Leader -Training	- technique - system - process control	- measurement -communication - Reward	- Culture - Involvement - Human resource Development

Phase 3: Determining the normalized weights

In order to determine the relative importance of the factors and sub-factors, those judgment matrices were translated into the largest value problems, and then computed the normalized and unique priority vectors of weights with the aid of the Expert Choice software (DSS, 1995). The resulting priority weights determined the relative importance of individual factors and sub-factors, and in turn identified the points on which organizations should put their efforts throughout.

Table 4.3 Saaty's nine-point scale (Saaty, 1994)

Intensity of importance	Definition	Explanations
1	Equal importance	Two activities contribute equally to the objective
3	Weak importance of one over other	Experience and judgment slightly favor one activity over another
5	Essential or strong important	Experience and judgment strongly favor one activity over another
7	Demonstrated importance	An activity is favored very strongly over another; its dominance demonstrated in practice
9	Absolute importance	The evidence favoring one activity over another is of the highest possible order of affirmation
2, 4, 6, 8	Intermediate values between the two adjacent	When compromise is needed judgments
Reciprocals of above nonzero	If activity i has one of the above nonzero numbers assigned to it when compared with activity j then j has the reciprocal value when compared with i	A reasonable assumption

would assign a score to each comparison using the scale. This process continued till all levels of the hierarchy, and eventually a series of judgment matrices for the critical factors and sub-factors were obtained.

4.3.1.2 AHP result analysis To clarify importance of the critical factors and sub-factors, the judgments collected from evaluators generated the normalized weights for the factors and sub-factors.

Table 4.4 Ranking of weighted factors and sub-factor

	Food industries	
	Ranking of factors and Sub-factors	Weight
Level 2	1 OG	.544
	2 ST	.175
	3 MT	.148
	4 CT	.134
Level 3	1	.268
	2	.132
	3	.807
	4	.733
	5	.647
	6	.607
	7	.537
	8	.507
	9	.131
	10	.373
	11	.337

Table 4.5 The statistical results from the study

	CASE A		CASE B		CASE C		CASE D		CASE E	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Articulability	4.40	0.5	3.80	0.4	4.00	0.4	3.58	1.1	3.28	0.9
Emboddedness	4.20	0.8	4.50	0.5	4.13	0.4	4.23	0.5	4.08	0.4
Physical distance	2.40	0.5	2.00	0.2	2.25	0.4	1.88	0.1	2.08	0.8
Norm distance	4.80	0.4	4.85	0.2	4.40	0.5	4.78	0.2	4.40	0.5
Knowledge distance	4.60	0.5	4.53	0.4	4.45	0.5	4.50	0.5	4.55	0.4
Learning culture	3.60	0.5	3.00	1.1	3.48	0.8	2.50	1.6	2.47	1.0
Project Priority	3.20	0.8	2.75	0.8	3.49	0.8	2.25	0.8	3.20	0.6
Org distance	2.30	1.3	2.00	0.8	1.98	0.1	1.83	0.9	1.78	0.8
Transfer activity	4.40	0.9	4.63	0.4	4.58	0.4	4.03	0.3	4.18	0.8

Table 4.6 Outstanding successful Case Study Data and Results

Case Study	Case A	Case B	Case D
Data Sources	Interview = 19 Artifacts = 35	Interview = 23 Artifacts = 30	Interview = 19 Artifacts = 45
Focus	Integrated design, development and deployment Innovation to increased knowledge transfer. There was a single innovation definition phase and three prototype tests that employed the initiative changes.	Focused on view of projects in terms of risk and resource management.	Offered daily food menu service . Involved developing scaleable platforms. The products were prototype tests and a final product deployed .

Table 4.6 Outstanding successful Case Study Data and Results (continue)

Case Study	Case A	Case B	Case D
Result	There was zero deviation from planned and actual deployment dates All goals were exceeded.	One test was deployed 14 days prior to the planned Deployment date and two were delivered on time. 30 days were gained in the development process that could then be used in the testing to ensure a reduction in errors. All goals were exceeded.	The product was delivered 12 days after the planned date. However, all other goals were met.
Context	There were 18 development and test teams: business units and one external vendor were involved with the development of Product.	There was design, development and deployment teams supported by 1 test team. The development involved features that make up a portion of software development. There were customers from the USA, Germany and Japan, and domestic.	The customer was one large local food industry. The number of organizations and communities locally.

4.3.1.3 Sensitivity analysis

Sensitivity analysis allowed us to verity the results of the decision. A sensitivity analysis can be formed to see how sensitive the alternatives are to change with the importance of the criteria. The Expert Choice implementation of AHP provides four graphical sensitivity analysis modes: dynamic, gradient, performance and two-dimensional analysis. Also, performance sensitivity analysis is employed in this study: It proves how well each alternative performs on each criterion by increasing or decreasing the importance of the criteria. In addition to

this, each sub-criterion performs on each main criterion by increasing or decreasing the importance of the main criteria. It should be noted that if a criterion is not sensitive, it would be better to eliminate it from the AHP model

Because if subjective evaluation criteria weights variations, a sensitivity analysis is required in order to examine the way criteria weight changes affect the overall score and ranking of the 5 types of power plants. Cases are examined. In the first alternative case, the two main criteria are considered of equal importance; have a 50% weight. The second alternative case assumes 25% weight and 75% weight.

The overall score and ranking of the 5 types of power plants under the three difference sets of criteria weights are presented in this study. When priority is given to each aspects, that is the criterion has a 75% weight against 25% weight the higher rank raise their score even more other rank last, as they have the worst performance with regard to all aspects.

Although the ranking solution showed a possible scenario where, for example, "damages aspects" are clearly the most important criteria, the AHP solution can change in accordance with shifts in analyst logic. To explore the response of model solutions to potential shifts in the priority of strategies, a series of sensitivity analyses of criteria weights can be performed by changing the priority (relative importance) of weights. Each criterion can be characterized by an important degree of sensitivity, i.e. the ranking of all strategies changes dramatically over the entire weigh range. The problem is to check whether a few changes in the judgment evaluation can lead to significant modifications in the priority final ranking. For this reason, sensitivity analysis is used to investigate the sensitivity of the alternatives to changes in the priorities of the criteria at the level immediately below the goal. The analysis proposed emphasizes the priorities of the four "first-level" criteria in the AHP model reported in Fig. 1 and shows how changing the priority of one criterion affects the priorities of the others. It is clear that as the priority of one of the criteria.

The sensitivity analysis proposed here is only relevant to the priorities of the four "first-level" criteria. Second, because we have changed each attribute weight one at a time, only the "main effects" have been considered. In other words, "interaction effects" of the changes made to two or more weights have been ignored. There simplifications have been adopted for the following reasons:

1) the final solution is mainly sensible to changes in the priorities at the highest level of the hierarchy;

2) the introduction of the interaction effects makes the sensitivity analysis too complex for actual applications. Nevertheless, one should note that the main effects are generally the most important aspects in a sensitivity analysis.

In the case of increasing importance of a criterion to the maximum value of 1.0, we assigned the alternative that gained the highest rank to score 5 and the lowest rank to score 1. The value of our best model is 25, Model 2 is 2, and that our best. In summary, we can conclude Model is the best among the alternatives.

Table 4.7 Successful Case Study Results

Knowledge Transfer
Results Summary. The results derived from the data indicate that the organizational context can become a supporter to the transfer process of knowledge. One aspect of the organizational structure was the practices and processes through which knowledge flowed from one person or group to another. Throughout all the successful case studies, there was a evidences on new practices were created valid and usable knowledge. Another aspect of the context that was important to the interviewees was the trustworthiness and credibility of the sender and the receiver. Because the food technology was not, there were reliable and available experts from which to assimilate knowledge. As a result, knowledge was created within the collaborative and interactive accommodation processes of experimentation.
Insight 1. The success of knowledge transfer depends on an active learning context in which there are few gaps between actual and formal patterns of use and communication can flow along new as well as established practices within the organization.
Insight 2. One barrier to the success of transfer is the causal ambiguity of knowledge within the nature of the context.
Insight 3. The success of knowledge transfer is contingent on an strenuous and trusting relationship between knowledge workers.

Table 4.7 Successful Case Study Results (continue)

Knowledge Transfer		
Insight 4. One barrier to knowledge transfer demand the receiver's perception that the value and accuracy of the knowledge is unconfirmed.		
Insight 5. The success of transfer is dependent on the creation of knowledge through interaction within and between knowledge workers.		
Results Summary. The successful knowledge transfers were explained in the interviews as relating to the sender, the recipient, and the attributes of knowledge. For example, if knowledge is difficult to assimilate, especially if the receiver lacks the capacity to apply this knowledge in their work.		
Insight 6. The success of the transfer of knowledge is directly related to the sender, recipient, and knowledge attribute.		
Sender Related factor	Recipient Related factor	Knowledge factor
1) Reliance on internal over external knowledge 2) credibility 3) trust 4) reliance on trial-and-error learning 5) human interaction	1) Reliance on internal over external knowledge 2) motivation 3) trust 4) Absorptive capacity 5) Lack of reliance on trial-and-error learning 6) understanding 7) Search proactive activity for knowledge to be use	1) Confirmed knowledge 2) Simple knowledge
Knowledge Attributes		
Results Summary. The knowledge categories do not fall easily within the delineation of implicit and explicit. An inspection of the interview and lessons-learned data revealed that the categories themselves are not a barrier to successful transfer. However, the attributes can deter transfer because of the complexity, ambiguity, and untested content.		

Table 4.7 Successful Case Study Results (continue)

Informal Knowledge
Summary Results. An examination of the interviews and lessons the creation of informal knowledge occurred through the same process as in the successful case studies. Additionally, evidence indicated that the process of knowledge creation and was successful because the parties were sharing the informal knowledge behaviors.
Insight 8. Informal knowledge is not successfully shared if the knowledge workers are not able to face their different interpretive schemes.
Insight 9. The transfer of informal forms is dependent on the networking and interconnections between knowledge workers and communities. This involves a dynamic and social process that occurs through sense making within the innovation process.
Insight 10. Informal knowledge creation include a variety of forms that depend on the experiential learning of individual knowledge workers
Factors that Influenced the transfer of Knowledge
Results Summary. Inspection of the data revealed that the movement of knowledge depends on a fertile organizational context. This context involves clarity of goals and strategic direction that is provided by leadership through processes that provide structure and a basis of understanding.
Insight 13. In order for knowledge to be transferred throughout the leadership must communicate clear and compatible goals and strategies.
Insight 14. The ambiguity and scarcity of resources (such as expertise and equipment) can prohibit the experimentation and collaborative decision-making needed. Insight 15. There is a close connection between organizational capabilities and communication in the successful transfer and assimilation of knowledge forms and boundary objects.
Transfer Activities
Results Summary. The communication do not lead to the success of knowledge transfer. However, the application the knowledge travel through these communication channels such as complexity, volume, and ambiguity can be a determinant. The following evidence found in case studies.

Table 4.7 Successful Case Study Results (continue)

Transfer Activities
1) One successful formal meeting was conducted to announce and transfer a change in strategy, which was then supplemented by content on document. The following additional meeting about the strategy was set. This informal communication mode was successful, as the change transfer between people.
1) Weekly formal status meetings were considered a good forum in which to exchange information on issues and a means of association. 2) The database tools were compatible across business units so that knowledge contained within these repositories could be transferred with ease (in form of manual and product information).
Insight 16. The success of knowledge transfer is dependent on the clarity of the content and design of the communication mode. The volume and complexity of the knowledge must be transferred to the recipients in a manner that is usable for knowledge needed to complete innovation tasks and events.
Insight 17. Formal and informal communication will occur within groups but still need supplemental intervention and reinforcement.
Insight 18. All communication repositories should be compatible so that knowledge can move easily to ensure successful transfer.
Insight 19. Formal meetings held on a regular basis to make certain there is a forum to share ideas and issues as well as promote group identity. These meetings can be face-to-face in order to transfer information. The content of these meetings should be supplemented with codified data that is easily accessible to all knowledge workers to further ensure success in transfer.

Note: Case C: the results are from correspondents of 15 and Case E Contains of 13 responses.

4.3.4 The model from Cases

The Company A was operated under a Large Thai food cooperation. It was established on 17 January 1978 with a registered capital of five million Baht to sell livestock feed in Thailand's Southern Provinces. In 1987, the company started an integration process by expanding into livestock farming business. In addition the company was listed on the Stock

Exchange of Thailand in the same year. And in 1988, the company started aquaculture business lines, including shrimp feeds, shrimp farming, and shrimp processing, for export market vision of becoming the "Kitchen of the World", placing significant importance on research and development to improve production efficiency at every step of operations as well as develop products to meet the satisfaction of customers and consumers1998, the company acquired animal feeds and meat processing companies from the company Group. The overhaul was completed in 1999, making it a fully integrated in both livestock and aquaculture businesses. This overhaul set a solid base for company to fulfill the vision to become "Kitchen of the World". Soon after the company invested in many countries e.g. Turkey, USA, EU, Malaysia, Vietnam, India, Denmark, and China to build facilities and/or establish distribution channels.

In 2005, the Company's total sales amounted to THB 113,374 million with sales from operations in Thailand contributing 87% of total sales, meanwhile 13% of total sales was from overseas operations.

The philosophy is based on serving the customer's needs and become the leading of food business. The company's research and development stand behind the success of the Company's being the industry leader. The R&D teams comprise high caliber professionals who are highly revered in Thailand's agriculture industry. Aside from developments for the sustainability of the overall industry, they emphasize product development to satisfy consumer requirements. Manufacturing food products to meet the differing regulations and standards of each customer throughout the world, together with the Company's ability to develop products and improve its animal breeding process to meet international standards, have resulted in customers being confident that the Company's products are of high quality, tasty and safe for consumption.

The company also takes pride in being committed to a program of total quality improvement.

4.3.4.1 Team Structure The company A has transferred teamwork, careful selection procedures, extensive and intensive communication and employee relations systems. The associated practices of job rotation, internal training and small group activities can also be observed. The structure shifted from a hierarchical authority relations to a team structure. Its structure saw authority relations with the introduction of team leader positions. Team leaders played an important role in mediating relations between workers and

management. The relations also constituted an attempt to break management level difference in the company. The product development processes are in the hands of relatively self-contained teams. They believed that the team structure was a cost-saving measure. This pointed to the high trust between workers and management. Among the factors that seemed to contribute to high trust was management's ability to deliver its promises and motivation.

4.3.4.2 Human Resource Practices The Company is in the process of developing a formal corporate governance policy, which, posted approved by the Board of Directors, will then be disseminated to directors, management and employees at all levels as guidelines for conduct, leading to good corporate governance. Furthermore, the Company is in the process of developing a Code of Conduct for employees to provide guidance in conducting business in various areas, stressing honesty, fairness and righteousness, adherence to rules and regulations, transparency and responsibility to society, communities, environment and stakeholders. It is a known practice for Total Quality Management (TQM) to build organizational cultures, involving high levels of worker commitment, and flexibility. Some of the HR practices, such as promotion and pay systems, the company appeared to have adjusted the system to include consideration of merit in the management and team member categories.

The company has characterized by careful selection procedures which emphasize attitude and potential rather than experience and acquired skill". Employees were selected locally on the basis of their ability, attendance and willingness to work efficiently. The organization required high level of vigilance and care on the part of the operator. As the skill levels in the area were considered as much. Consequently, even though the company emphasized the selection of qualified people, it could not always "recruit the most suitable people for the long-term good of the company.

4.3.4.3 Training is essential in creating a well-disciplined and creative team that takes a lead in solving problems and initiating improvements. The company decided to try and understand the training needs, competence skills of people and the gap in their knowledge to achieve business aims. Job training was typically provided internally. It included personal development plans and consultation with staff, which was comprised of regular meetings with staff representatives to discuss training and development. The most effective means of learning is

believed by the company through practical experience; "the best knowledge comes from hands-on experience learning though imitation and apprenticeship.

4.3.4.4 Organizational Culture In spite of management's openness in communication, visibility in management, the degree to which workforce had accepted continuous improvement activities was high. The good control mechanism was also evident in the quality audits. Local managers seemed not to be too concerned as long as the targets were met. Operators must follow manufacturing standards and et procedures every day, every time. In this way, it is possible to maintain quality standards consistently. Quality Assurance is used in all operations and reduces most operation problem. The company also had no problem in implementation of the system such as implementing the 5Ss, which needed to be managed properly to realize quality, cost and delivery. The attitude of the workers seemed to show the following attitudes.

1) Work for the advancement. 'I will produce much performance to advance in job position'.

2) There are often company rules, the workers are followed and the enforcement of them is strict. For instance, underlying reasons for the existence of rules seem to be clear to the operators.

3) Improvement in working practices and productivity is not my business but should be left to the experts. These attitudes, which also include questioning of authority, contrasted with the adherence to company rules and ownership of processes for continuous improvement. Training efforts were concentrated at the managerial level. The biggest thing, which we haven't been successful in, is the Kaizen, small-group activity work. The managers and engineers can actually carry on these activities but unless the people on the shop floor agree into them and understand them and want to be part of them, it's not sustainable. And if the people don't participate into it and understand why they are doing it, it's wasted. Because we haven't cascaded the information down, and haven't got the skills bottom up to top,

The involvement of staff in shop floor activities. This created trust towards and perception of fairness of management. There were only a handful of team coaches who could enhance worker commitment and earn their respect and trust by

(1) Being fair and consistent,

(2) Instilling a sense of self-belief and pride by constantly encouraging team involvement and new ideas. "Regular team meetings where successes are celebrated are vital".

(3) Providing immediate feedback.

(4) Providing positive reinforcement wherever possible.

4.3.5 Overall

Older workers tended to work according to their own rules and enjoyed the freedom created by the weak control mechanism in the factory. Attention was given to the training of operators to promote organizational learning. The second lesson is that factors, such as trust, openness in communication and visibility in management are influential in minimizing worker resistance and in increasing job satisfaction. The third lesson is that although the transfer of quality control techniques can be perceived as contributing to improved results in customer delivery, cost reduction and stock control, long-term sustainability of these results is difficult to achieve in the absence of the social dimension conducive to continuous improvement culture in the company.

The success of the knowledge transfer requires emphasis on training, open communication, trust, hands-on and visible management and individual appraisals of co-operation, teamwork, strict discipline and attention to detail. Absence of or selective attention given to these elements can inhibit the firm's full understanding of the transferred practices. In the given case study. The case study presented in this paper highlights the

4.3.6 Summary of the model

The model indicates applicable knowledge and the general placement of the context, knowledge system, knowledge outcomes, and effectiveness variables. The model's objective, that the organization's knowledge management capabilities lead to higher levels of organizational effectiveness, is substantiated. In the hold-out sample, the derived model explains 32% of the variance of overall performance, 35% of change in performance, and 49% of commitment. The organizational context features and knowledge work behaviors together account for 56% of clarity, 38% of improvement, and 40% of effective knowledge generation and use. The organizational context features account for from 34 to 43% of the knowledge work behaviors.

Our choice of contextual features and knowledge work behaviors was guided by the theoretical perspective that new knowledge and new uses for knowledge are socially constructed through product development process, and that success in NPD depends on a wide set of pertinent knowledge frameworks. this perspective.

4.3.7 Organizational contextual elements

Direction and performance information has a pervasive impact on knowledge work behaviors, relating significantly to knowledge behaviors: focusing on system performance, using systematic processes, and trying new approaches. It also relates directly to clarity of organizational strategy and plan.

IT quality contributes to three knowledge work behaviors, using systematic processes, knowledge linking, and to trying new approaches. It also relates directly, although to one knowledge outcome, effective knowledge generation and use, and, commitment to company.

The human resource practices and development emphasis has a pervasive impact in the NPD organization. It has significant paths to all four knowledge work behaviors and to two knowledge outcomes: organizational clarity and effective knowledge generation and use. It is also positively related to commitment to company.

Reward for organizational performance relates to knowledge linking and weakly to trying new approaches, while pay for individual contribution relates weakly positively to using systematic processes and trying new approaches and negatively to knowledge linking.

Both pay variables relate positively to commitment to company and pay for organizational performance relates negatively to willingness to turnover.

4.3.8 Sources and Recipients

The source and recipient R&D units. This study found that two relationship-related variables are significantly associated with transfer success, including norm distance and knowledge distance. Norm distance refers to the extent to which the parties share similar understandings and ideas about the knowledge transfer project. The idea is that it is easier to transfer knowledge between people who can readily interact in a well-coordinate. Regarding NPD activities, this study supports the finding that a concurrent transfer, between base projects and new projects improves the efficiency of NPD efforts. The implication is that NPD managers ought to constantly coordinate knowledge transfers between source and recipient, in order to reduce norm

distance between the two units. Moreover, since NPD efforts are by definition exploratory, the concurrent can also help in the ongoing assessment of the knowledge's embeddedness.

The second significant relational variable, knowledge distance, refers to the degree of overlap of the knowledge bases of the source and the recipient. A relationship between knowledge distance and transfer success was not found. A possible explanation is that recipient firms would screen source partners to find situations where they have much knowledge to learn. Thus, the focus would be on whether the source has enough knowledge, not on whether the source might have too much knowledge available. A negative relationship between knowledge distance and transfer success. Lacking an appropriate overlap of knowledge, it is obvious that any teacher-student relationship between the parties will be made more difficult. NPD activities in which learning and knowledge transfer are critical, such as in cross-functional teams or cross-organizational efforts. transfer activities supplements the findings that learning in complex NPD projects is enhanced by highly interactive and iterative communications by cross-functional teams and as well as by interactions encourage active inquiry and participative decision making In addition, consistent with the notion that NPD is a dynamic and interactive problem-solving process, the results with respect to articulability suggest that R&D managers might be directed to undertake a sort of pre-transfer, knowledge-preparation process involving both the source and recipient to make certain that any tacit knowledge is made to be more accessible by conversion to a more articulble form, and more internalizable to the intended recipient. Such a process would entail the use of multiple presentations, discussions, and dialogues about the knowledge across multiple teams within both the source and the recipient organizations. It would also involve providing opportunities for the teams to put the knowledge into action, either through role-playing or case-related activities, to allow for the type of tacit–explicit conversions and reflective learning by doing. Transfer processes that could be used to support the development of shared understandings could also help reduce any knowledge gaps between the parties. Thus, while the objective of the embeddedness analysis would be to develop an understanding of the knowledge elements needing to be transferred, the objective of the knowledge-preparation process would be to involve both the source and recipient in the articulation of knowledge, so as to reduce the relational distances that may exist between the parties. However, simultaneous with both or either of these processes, R&D managers could also assess potential sources' and recipients' knowledge

bases. Such a knowledge-gap analysis would allow the managers to assess the relative overlap of the parties' knowledge bases. A manager could use this information to select among the alternative sources or recipients. Nonetheless, to the extent that organizational does matter, it seems clear that relationship building between less organizationally internalized parties could improve transfer success. In turn, this would make decision making with respect to the appropriate organizational governance mode through which to execute the knowledge transfer project considerably less complex. In other words, assuming that a reasonable knowledge preparation process can be implemented regardless of whether the knowledge transfer is to occur through an acquisition, intra-organizationally, or through an alliance,

4.3.9 Knowledge behaviors

The articulability and embeddedness constructed questionnaire measured in this study suggest the importance of knowledge context. Relational variables tested in this study support the idea that contextual dimensions need to be aligned to facilitate knowledge transfer. In addition, the variable knowledge distance confirms notion of the receptivity of the recipient based on its knowledge gap with the source. Moreover, the study also examined the influence of the degree of transfer activities undertaken on transfer success. It found evidence that the degree of interaction between new product development (NPD) partners affects knowledge transfer outcomes.

Importantly, rather than only examining each of these variables separately, the analysis also supported assessment of the relative contributions of each variable to transfer success. The findings suggest that R&D managers should pay attention to the form of the knowledge, any potential relationship distances between the parties, and the degree of interactions undertaken between the parties. In particular the form of the knowledge to be transferred, in terms of its articulability and its embeddedness, could play a critical role in its ultimate transferability. Relationship between articulability and transfer success, articulability proved to be negatively related to transfer success. In other words, knowledge that can be readily codified in recipes, manuals, etc. is less likely to be internalized within the recipient than less articulated knowledge. A positive association between articulability and transfer success used measures of knowledge transfer success focused on the number of transfers that occurred and/or how difficult the transfer processes were.

Knowledge internalization which is ownership of, commitment to, and satisfaction with the knowledge.

Tell us that organizational learning requires, among other things, the reconstruction and adaptation of the transferred knowledge at the receiving end. This is also because knowledge codified by a source may be incompatible with a recipient's cultural beliefs ways of conducting business. As a result, such knowledge could lack legitimacy in the recipient's context, and the recipient may be less motivated to take ownership of, and become committed to this knowledge.

Codified knowledge is easier to transfer, as long as appropriate decontextualization processes occur with respect to the knowledge, its transfer is likely to be more successful than one including less articulated knowledge. R&D managers should develop a knowledge evaluation scheme or internal knowledge scanning process through which they can assess the degree of embeddedness of certain knowledge within the organization, and then use this information to guide their development of both pre-transfer knowledge preparation processes and overall knowledge transfer plans.

Another key aspect of a transfer that needs to be understood is the relationship between. Only trying new approaches predicts all three knowledge outcomes. It also relates positively to commitment to company and negatively to willingness to turnover. Focusing on system performance relates to methods and processes improvements and weakly to organizational clarity. Using systematic processes predicts methods and processes improvements and has an especially strong link to organizational objective clarity. It also has a direct path to overall performance. Knowledge linking relates only to effective knowledge generation and use.

4.3.10 Knowledge outcomes

All three knowledge outcomes relate to change in performance. Organizational clarity and effective knowledge generation and use also predict overall performance. Among the knowledge outcomes, organizational clarity explains methods and processes improvements which, in turn, explains effective knowledge generation and use. Organizational clarity and methods and processes improvements predict commitment to company. Among the effectiveness variables, commitment to company, as expected, has a significant negative path to willingness to turnover, and a positive but weak path to change in performance.

4.3.11 Discussion of results

The contextual organizational elements has influences on the knowledge work behaviors and knowledge outcomes. Direction and performance information has the strongest effect to the knowledge system. It relates directly to three of the knowledge work behaviors to using systematic processes and focusing on system performance, to the fourth, knowledge linking. It has several effects to methods and processes improvements, and a particularly strong direct relationship and another indirect effect to organizational clarity. On the other hand, it has only indirect effect to effective knowledge generation and use. Thus, the presence of direction and performance. information seems primarily to broaden what people attend to in their work and how they go about solving problems and learning, but these business related frameworks only indirectly drive the linking of knowledge across the organization, its effective generation and use, and improvements in methods and processes. This pattern of findings is consistent with. It operates primarily by enabling the using of systematic processes and the linking of knowledge.

Given the emphasis in the literature on the creation of cross-functional teams for NPD. the competitive importance of human capital (knowledge resources in the form of skilled and knowledgeable employees) in the knowledge enterprise development emphasis has the most paths through the model of any of the contextual organizational elements. Developing employees, through formal developmental experiences, mentoring, and job experiences, expands their capacity for individual by exposing them to new formal knowledge and to tacit knowledge gained from experience.

In contrast, the compensation system variables have fewer and generally weaker effects through the knowledge system. Both organizationally and individually based pay weakly predict trying out new approaches. But they apparently provide opposite incentives for knowledge linking, with individually based pay negatively relating and pay based on organizational performance positively relating to this behavior. Direct HR practices influences on knowledge work behaviors and knowledge outcomes exchange and interaction among employees by making it possible for employees to experience some of the new value that is created through successful knowledge management in the organization.

Learning and innovation are competencies that can be built into organizational processes. The very strong link of using systematic processes to organizational clarity suggests

that these processes also help employees work for organization, how it operates, and what it is trying to accomplish. Focusing on system performance leads both to methods and processes improvements and to knowledge linking, which, in turn, leads to effective knowledge generation and use. This again, is consistent with the notion that knowledge creation depends on the breadth of knowledge attended to. The procedural knowledge that systematically guides how problems are approached are prime enablers both of the capacity to absorb various knowledge frameworks, and of its Knowledge work behaviors and knowledge outcomes. Application in new approaches. Trying new approaches is the only knowledge work behavior with significant paths to all knowledge outcomes, confirming the centrality of learning through experience and experimentation to knowledge outcomes in NPD settings.

4.3.12 Direct determinants of employee outcomes.

Communications, as these activities, whether conducted face-to-face or virtually, will allow the parties to enhance their understanding of the knowledge, reduce relationship distances, and provide the mechanisms through which the source's knowledge can be de- and then re-contextualized within the recipient.

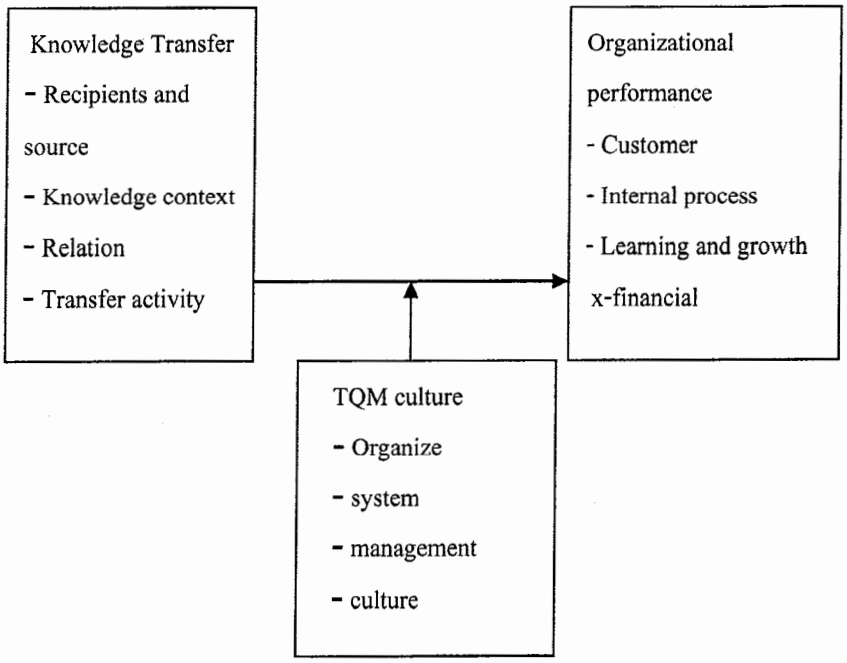


Figure 4.3 Relationship of Factor Group

4.4 Part 2 The Verification of the model

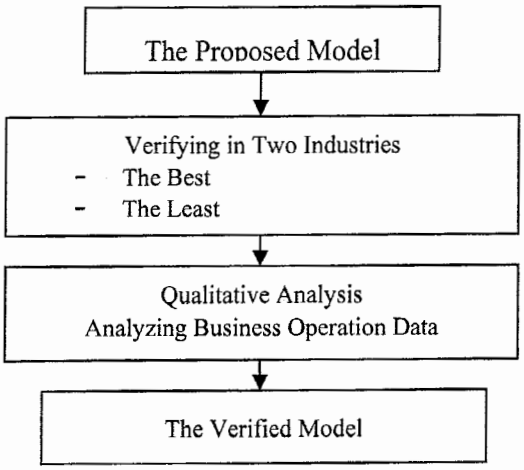


Figure 4.4 The Model Verification process

4.4.1 New Product Development

4.4.1.1 The company profile

- Gross Profit 2006 1,585,110
- ROI 9.46
- Manufacturing

Sukumvit (Bekery) , Bangna (cookie), Ladkrabang Froozen Food, Chiengmai

- No. Employees 4000
- NO. Employees in
- R&D in the case 23

The factory: Ekachai district, Samutsakorn province

- Frozen Food
- Quick meal
- Seafood
- Frozen food
- Raw materials for more than 200 restaurants

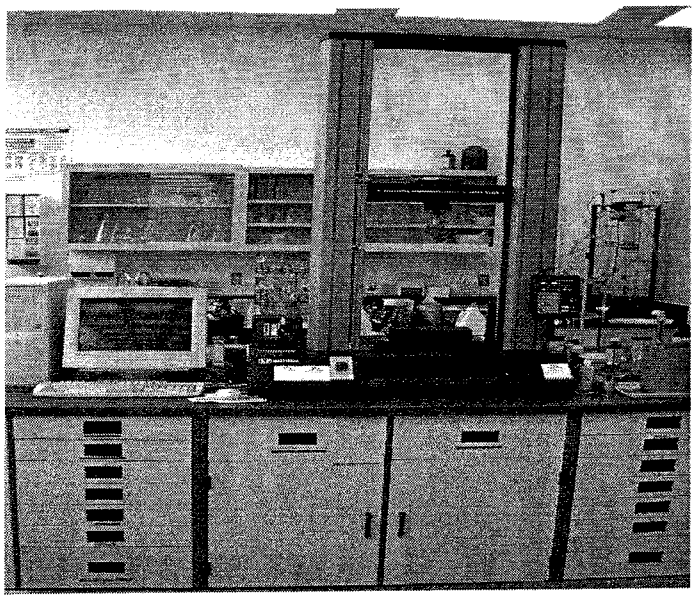


Figure 4.5 R & D room

1) Product Development
2) Process of new product development in the verification case
3) Management of R&D department in the company

4.4.1.2 Top management involvement In this company the top manager management holds the following obligations, especially in relation to product development activities: Goal setting; Communication; Problem solving; Creating and managing changes; Motivation; Control; Responsibility.

4.4.1.3 Involvement of the marketing department. Although product development in the food industry is often dominated by food science and nutritional aspects, the marketing department is the department with the expertise concerning customer demands and the department responsible for communicating these demands during the development of new products. Thus the participation of the marketing department in the development stage ought to have a positive impact on the success rate.

4.4.1.4 Involvement of the production department. The production department has the expertise in how to transform new ideas into mass-production. The production department is also responsible for actual production scale of the new product

4.4.1.5 Information from customers. The qualitative interviews seemed to indicate that companies often had conversations with their direct customers, and that several

occasions involve new product proposals with the customers. It therefore seems evident that the use of conversations with customers increases the success rate.

4.4.1.6 Information from employees. Employees are viewed as internal suppliers and customers, and that they should be encouraged to come up with new proposals and ideas, because many of the employees have daily contact with external suppliers and customers. This verification by case study covered the food companies. The main instrument used for the study was the questionnaire administered and backed up by personal interviews where it was considered necessary. The questionnaire was made up of classification and subject-matter questions that elicited information on all study variables which included, among others: R&D activities in the organizations; number, age, qualifications and experience of professionals in the R&D department; process of new product development; resource allocation to product development; existence of key individuals or groups of individuals; strategies and organization for new product development; and influence of technology on product innovation. In all cases the respondents were the R&D managers or technical persons mandated to do so by each company. The data were analyzed by using percentages.

4.4.1.7 Investment in R&D. A formal organizational arrangement in the form of a functional R&D department that attracted organizational resource commitment. The existence of such an arrangement in most of the food companies is considered very important for successful new product development efforts, a view shared by reports from similar studies (Cooper, 1980). Two had no functional R&D department undertaking new product development but indicated, however, that new product development was the responsibility of the production department.

4.4.1.8 Organization of R&D. An analysis of the staffing situation in the companies that have R&D departments revealed that most of the key professionals engaged were either scientists or technologists, who together account for 86.96% of the total R&D staff. This is not surprising, as most research work centres on the science and technology of foods. In situations where engineering tasks are involved, the services of engineers attached to production departments were engaged. In all cases, the R&D departments were headed by a highly qualified, educated and experienced food scientist

Distribution of R&D staff among key professionals in the food companies

Key Number (%) Mean number professionals

Engineers 4 (8.60) 0.5

Scientists 25 (54.35) 3.1

Technologists 15 (32.61) 1.9

Others 2 (4.35) 0.3

Highest qualifications and experiences of heads of R&D departments (%)

Qualification O.N.D. 0 (0.00)

H.N.D. 0 (0.00)

B.Sc. 5 (62.50)

M.Sc. 3 (37.50)

Ph.D. 0 (0.00)

Experience (years) 0–5 – –

6–10 1 (12.5)

11–15 3 (37.5)

16–20 1 (12.5)

.21 3 (37.5)

or technologist with at least a master's degree in a scientific discipline (Table 3). About 87.5% of the R&D heads have a minimum of 11 years of relevant work experience. The existence and adequate staffing of the R&D department is particularly important as problems associated with new product development would need to be given appropriate and continuous attention. As expected, the degree of success achieved depends largely on the technological competence and skills of R&D staff, their creativity, motivation, commitment and track records, placing a great demand on the managerial skills of the R&D manager.

The pattern of supervision of R&D heads also revealed that all the heads had access to top management , a situation that offers unique opportunities to push new product development proposals through, secures top management support and organizational resource commitment. This has a positive effect on the volume and performance of new product introduction. Companies whose heads of R&D departments reported directly to their Chief Executive Officers, on the average, introduced more products that were also more highly rated in performance than others. Cooper and Kleinschmidt (1987) and Rotherwell (1976) have reported

similar results from separate studies, where it was stressed that the presence of a person (R&D head) who is more senior and has greater authority is a strong factor for successful new product development activities.

Management of NPD process

The seven-phase model used for assessing the

involvement of the food companies in pre-commercializ-

Pattern of supervision of R&D heads Number (%)

Reporting directly to Chief Executive 5 (62.5)

Reporting to Technical/Production Director 3 (37.5)

Reporting to 'others' 0 (0.00)

Distribution of product performance according to pattern of supervision Weighted mean Product performance rating Total number of products rating.

NPD process. activities revealed that some companies were not active in some phases of the process. The development of marketing strategy and product development are the two phases in which most of the food companies (90%) are active, while participation is fewest (50%) in initial screening and business analysis.

Sources of NPD ideas in the food industry Source Percentage of companies

R&D department 87.5

Production department 75.0

Marketing department 75.0

Customers 50.0

Competitors 25.0

Nature of product innovations the companies provided information on the nature of innovative activities involved in developing 31 new products. The analysis shows that most of the innovations (58.06%) are incremental, involving minor modifications to existing products. In a number of cases these were imitations of foreign products having local raw material inputs.

4.4.2 Verification Methodology

A survey was sent to R&D scientists in selected food industry firm. Scientists were contacted in firms with multiple R&D projects. the addition of items to more completely measure reputation, was selected as it is suited for assessing factors that affect the sharing decision. Form of the knowledge. Complexity and tacitness of the knowledge sought by the recipient is controlled for by asking respondents to consider only non-codified knowledge; that is, "personal, practical scientific know-how.

4.4.2.1 Dependent variable respondents were asked about recent incidents of deciding to share technological knowledge with a fellow R&D scientist and others were asked about recent incidents of deciding not to share technological knowledge. "The questionnaire inquired about each employee's last information transfer decision – not a typical decision. The former approach is likely to result in a representative sample of transfer decisions while the latter probably would lead to a biased sample.

4.4.2.2 Independent variables Reputation is separated into two dimensions. The first dimension has three components associated with past behavior. These are (1) nature of interaction, (2) duration of interaction, and (3) frequency of interaction. The second contains three components associated with expected result of action.

4.2.2.3 Contextual Variables Organization structure, socialization mechanisms, boundary-spanning individuals or gatekeepers, communications technology, and task structure all play a role in stimulating R&D communication. Stock, Greis, and Dibner [33] indicate that type of R&D task, technological expertise, interaction structure, and organizational and cultural characteristics influence technical communication. structures and systems affect the R&D process (idea generation, selection, control and implementation projects, transfer and utilization of new technology)." Geographic Distance. Based on the trend to decentralize R&D and the global dispersion of R&D activity across locations, geography must be considered. Geographic considerations must be analyzed in conjunction with social characteristics; e.g., Burt [7, p. 31] measures interaction "frequency and physical proximity." Technological Distance. Science-related attributes of the source's knowledge base and the recipient's knowledge base are expected to affect the communication of scientific know-how. Significance of knowledge sharing. By definition, information asymmetries between source and recipient are paramount for knowledge

sharing. R&D task. Based on differences in R&D work, Thompson [35, p. 384] indicates that "communication patterns therefore should be quite different for basic and applied research." Status/power. Whether the sharing of technological knowledge is horizontal or vertical (and the direction is up or down) is noted. Hierarchy may matter and the authority or status of the source and recipient is recorded. Systems. Aside from the endogenous influences to the sharing of technological knowledge there exist exogenous influences to the transaction. "The kinds of knowledge, skills, and learning that the members of an organization will acquire will reflect the payoff – the incentives – imbedded in the institutional constraints.

4.4.2.4 Collection of study Quantitative data analysis relies upon 23 usable surveys while 23 responses to open-ended questions augment statistical findings (Table 1). This dissertation research supports the proposition that reputation plays a vital role in the flow of scientific know-how in a multidivisional, multinational organization. Past behavior clearly has bearing on the communication of technological knowledge from one scientist to another scientist. Interestingly, the influence was not always in the hypothesized direction. Findings corroborate and clarify theory regarding the role of social factors in the exchange of intangible resources. One scientist's expectations for a second scientist's future conduct determine whether or not the first scientist will share technological knowledge with the second. With regard to the individual and group levels, both have a substantive role; reputation signals emanate from the scientist and the R&D group to which he or she belongs. An important finding with ramifications for theory, practice, and further research was the revelation that it is not frequency of interaction in to, but the level of knowledge flow to the source relative to the knowledge flow from the source that plays a crucial role in the decision to transmit technological knowledge. The source scientist considers the balance of past transactions and whether the sum of these prior interactions (obligation or indebtedness) is positive, negative, or zero. Other findings relate to the impact of the contextual variables on knowledge sharing . scientists working on applied research more often answered questions outside the realm of applied research. Why would an applied research scientist deny assistance to other applied research scientists in his or her firm yet provide assistance to non-applied research scientists? Such counter-intuitive findings are examined in more depth. Geographic factors are also a determinant in the decision to share knowledge with an R&D.

4.4.3 Result from Verification (Quantitative results)

The questionnaire survey is developed to expose the theory and model of the measurement model in this research . This survey was sent to companies under selection which is food manufacturing company in Bangkok. A total of 23 useable questionnaires were returned by respondents. of 87 percent of the experience and educations. Analysis of the respondents' profiles indicated that the respondents come from a wide range of industries. it is sufficient within this paper to show the overall approach of the respondent's organization to NPD and knowledge management result measurement. The survey was structured according to the six dimensions of the performance measurement framework: reuse, invention, exploitation, stakeholder contribution, NPD performance and enabling context. For each of the six dimensions, five to seven questions asked respondents to rate how they perceive their performance within these dimensions. the questions had a 0-5 scale and some questions were binary. The binary responses were rated with 0 for "no" and 5 for "yes". Generally, NPD performance. The response is rated on a 0 to 5 scale. The final question asks respondents to rate, on a scale of 0 to 5, their capability to measure performance within each of the six dimensions. the six dimensions, the respondents achieved the highest average score for how they perceived their performance for the NPD performance dimension (57 per cent). The stakeholder contribution dimension achieved the second highest value (53 per cent). Next were the dimensions of invention and enabling context, both scored at 50 per cent, and the biggest deficiencies were seen to be in reuse and exploitation performance (46 % and 50 %respectively). Respondents saw the re-use dimension as the most important (46 %) for measuring overall NPD performance, followed by the invention and exploitation (43 %). NPD output performance was rated fourth of the six dimensions Although there is an increasing awareness of how soft factors, such as culture, human resource management and infrastructures impact performance, the enabling context dimension was still considered the least important of the six areas. In terms of how respondents perceived their capability to measure performance against each of the six dimensions, not surprisingly the highest scoring dimension was for NPD performance. This is a predominantly financially-oriented dimension, which is probably the best understood and most commonly addressed perspective within the broader context of NPD.

The measurement dimension

1) Stake holder contribution: Customer: Result 53 %

times spend with customers
of meeting with customers
# of NPD projects involving customers
Senior Management: # of involvement
Production: # production staff involvement
# of Production requirement communication
Marketing: marketing staff involvement
Marketing information feed back from customers

2) Operating context: Result 50 %

# of Awards per innovation
# of team complaints
Employee satisfactory
# of training
IT budget
# of new idea within R&D

3) Reuse of Assets: Result 46 %

# of historical data reuse in future projects
% of Patents.
# of review after projects
time to present require assets
Time until assets are stored

4) Invention of Assets: Result 50 %

# of totally new invention
Modification
new technology/ new market
new technology/ Existing market

Existing technology/ new market
Existing technology/ Existing market
Market share gained by new product

5) NPD performance : Result 57 %

Complaints by customers
# of customers buy new product
positive answer by customer in satisfaction survey
#products meet customer requirement
new products deliver with no defect.

Price compare to competition

6) Commercialization: Result 43 %

new product serve new need
Volume of sale
# of sales form new product in the past 12 months
# of invention

4.4.4 Result from Verification (Qualitative results)

4.4.4.1 Analyzing Gap to indicate the Priority of improvement areas. The results are accessed and compare between actual and goal to identify the gaps. Also, the gap will point to the important areas for improvement requirement By using the simple approach the gaps between importance and agreement were analyzed and the biggest gaps were regarded as most interesting to analyze. It is assumed that the biggest gaps are signals from the respondents about where to improve first. Therefore the first step in the simple approach is to rank the statements according to the size of the gaps. The statements with the biggest gaps first the enabler statements and then the result statements. A quick overview tells us that according to the ranking in the enabler factors should be prioritized for improvements in the following order:

1) Leadership,
2) team work ,
3) People,

4) Operation, and

5) Strategy.

The result is very clear which are improvement of soft factor of product development (Leadership, People and teamwork), before you try to improve the "hard or logical aspects" (=Processes, Strategy). The suggested ranking is also supported by the biggest gap under innovation results which is "employees' motivation and commitment have increased during the last 4 years" . That: Improve first the "soft aspects of innovation" (=Leadership, People, and Teamwork) before trying to improve the "hard or logical aspects" (=Processes, Strategy). To discuss the validity and hence the sustainability of this finding we will compare and discuss the findings by using another approach which is often used for the same purpose – identifying improvement areas. In Dahlgaard et al (2006) the simple approach presented in this article for prioritizing improvement areas was compared to an advanced statistical approach where structural equation modeling and PLS (Partial Least Squares method) was used. As shown in sections 5 and 6 the simple approach uses respondents' assessments of importance and agreement (= performance) of each statement area while the advanced statistical approach only uses the respondents' assessments of the performance dimension. The importance is estimated by using estimated correlations between enabler and results performance data. When comparing the two alternative approaches for identifying and prioritizing what to improve first we found both equalities and differences.

The two approaches identified both leadership (especially innovativeness i.e. building an innovative culture) and people to have a high priority for improvements. But regarding teamwork & resources, and processes, the two approaches showed different signals. The simple approach identified teamwork & resources to have the second highest priority for improvements while the advanced statistical approach showed a low priority for this area.

From table 2 it is seen that the 4th, 5th and 8th highest gaps were related to teamwork and resources and the gaps were relatively high – between 0.80 and 0.89. The gap measurements were related to the following statements: The resources necessary to accomplish the roles set up for the company's innovation program are clearly mapped out (Gap = 0.89). The company allocates consequently and visibly resources for the innovation (Gap = 0.88). The employees participate in external innovation activities, creativity discussions, creativity teams etc.

(Gap = 0.80). The voices of the employees (= the gaps between importance and performance assessments) say clearly that these three areas should have a high priority when setting up a strategic plan for improvements. The "statistical voices" (the advanced statistical approach) told us another story.

However, we recommend listening to the voice of the employees. We see no reason why the above three areas should be ignored. It seems that the comparison between the two approaches indicates a weakness in the advanced statistical approach – a weakness which seems to be caused by this approach's neglecting to include the employees'

Perceived importance. Another difference was related to processes. The advanced approach estimated the highest impact score (correlations) from processes to innovation results and it was therefore concluded, that processes should have the highest.

Priority in the strategic plan for improvements. But the simple approach, which used the voices of the employees on the importance dimension, identified processes only to have the 4th priority – behind leadership, teamwork & resources and people. The three highest gaps under processes, when using the simple approach, were the following: Bench Marking data from "best practices" within innovation are used to set objectives for future improvements (Gap = 0.67). Faulty omission of key activities in the new product development process seldom happens (Gap = 0.65). Design errors, production errors, communication errors, marketing errors, etc. are continuously reduced or eliminated throughout the new product development process (Gap = 0.61). Because these gaps were relatively low compared to other gaps in table 2 we conclude that the above areas should not have a high priority for improvements. The advanced statistical approach tells another story. This means that the priorities for improvements can be expected to be different depending on the approach used and, as shown with this

example, we should never accept uncritically the so called "advanced" recommendations. When estimating the statistical correlations between the latent variables shown in figure 1 we found some strange results which also tell us that we should be careful when using statistical correlations for prioritizations.

We did not find a significant direct effect of strategies and plans on the innovation process (significance level = 0.05). This result is surprising, since many studies stress

the importance of having strategies and plans for innovation processes. In our case this result could be due to the specific company we are investigating. This company is very

experienced in formulating and deploying strategies, and the respondents may therefore have put less emphasis on this area when assessing the statements related to this area. Also, customer orientation did not show a significant direct effect on the innovation process (significance level = 0.05). This came as a big surprise, since several authors have found clear evidence of such an impact. One explanation for this can be that the company is producing pumps, and the end users have not been directly involved in the decision making process when investing in new products. Such decisions have been made in co-operation with for example plumbers who sell and install the products to the many end (actual expected goal, performance), and gap

4.4.4.2 Leadership

The organization is characterized by an innovative culture (time to think freely and follow up on own ideas, learn of experiences, risk willingness etc.), entrepreneurship.

(4.51, 3.30) 1.21

Leadership Important information is shared quickly and accurately to the right persons - up, down and sideways in the organization.

(4.47, 3.45) 1.02

Leadership Creating, acquiring and transferring of new knowledge and skills are a part of the company culture.

(4.49, 3.52) 0.97

Teamwork/ Resources

The resources necessary to accomplish the roles set up for the company' s innovation programme are clearly mapped out

(4.22, 3.33) 0.89

Teamwork/ Resources

The company allocates consequently and visibly resources for the

innovation

(4.16, 3.28) 0.88

People The reward system related to innovation is known by everybody and reviewed and improved collectively

(3.88, 3.03) 0.85

Leadership The organization is always scanning the horizon and is proactively anticipating change

(4.32, 3.48) 0.84

Teamwork/ Resources

The employees participate in external innovation activities, creativity discussions, creativity teams etc.

(3.98, 3.18) 0.80

People All people try to improve and develop them-selves in order to cope with future challenges within the innovation area

(4.38, 3.66) 0.72

People Core team members use 80% or more of their time on the innovation project

(4.21, 3.52) 0.69

Processes Bench Marking data from " best practices" within innovation are used to set objectives for future improvements

(3.97, 3.30) 0.67

Processes Faulty omission of key activities in the new product development process seldom happens

(4.33, 3.68) 0.65

People The innovation team consists of committed employees from different departments which participate equally in the project

(4.11, 3.48) 0.63

Processes Design errors, production errors, communication errors, marketing errors, etc. are continuously reduced or eliminated throughout the new product development process

(4.39, 3.78) 0.61

People Team members are empowered to make decisions about their innovation project and to participate in the planning and decision making for innovation
(4.24, 3.67) 0.57

People in the organization possess a willingness to accept and adopt 'external' ideas
(4.10, 3.54) 0.56

Strategy Visions, goals, and strategies for innovations are communicated clearly to everybody
(4.26, 3.81) 0.45

Strategy A Policy Deployment Process for innovation is established (develop 3-5 year plans, annual objectives, departmental plans, implementation, reviews, etc)
(4.16, 3.74) 0.42

Strategy Success criteria for the innovation programme have been formulated (guidelines, minimum standards, result benchmarks etc.)
(3.88, 3.49) 0.39

People Employees' motivation and commitment have increased during the last 4 years
(4.46; 3.70) 0.76

Products/ Sales
The percentage of sales provided by innovations that are less than four years old has increased
(4.16, 3.50) 0.66

Products/ Sales
The number of innovations that provide the company with a sustainable competitive advantage has increased the last three years
(4.36, 3.71) 0.65

Products/ ROI
Return on investment (ROI) of the company' s innovation programs has increased during the last four years
(4.11, 3.60) 0.51

The comparison of result. The most successful case and the least successful cases. Research has shown that 5 industries showed

TQM difference level of success therefore the TQM element well are study guideline to present the difference level of study success.

(1) Information

That information is used for improvement purposes, a process approach, as opposed to a results approach must be adopted. information to identify problems, solve them, and make improvements, on the other have, The least successful case show opposite nature, Often, performance and quality information is used to improve performance, but it is utilized to control employee, quality control tools are often implement to all employees. Due to their adoption of a results approach which is short-term oriented, most the successful organization does not interactively use information for improvement purposes. Consequently, quality problems are rarely found during the process, and corrective actions cannot be used for improvement purposes.

(2) Responsibility

The most successful industries saw responsibility knowledge manager, is also essential in the successful implementation a TQM to Employee should have the authority to control their own work activities. In managers give authority to their subordinates, Managers fear that they will lose their jobs in the process when they will lose their formal authority, group membership are viewed as long-term and permanent. Thus, many of the actions of collectivists in the workplace center on the long term aspects of their workgroup memberships. Since job security is often not a concern, collectivistic managers are comfortable with the notion of empowering employees. In other words, they give employees the authority to make quality decisions. Sing quality tools are available to all first line employees and foremen, employees are given the authority to improve their performance and quality during the process.

(3) Rewarded

The third element is in the successful can rewarded for results. When implementing a TQM, individuals, teams and all members of the organization must be rewarded for results. In the most appropriced case employees will often receive a large bonus when their organization performs well because organizations recognize their employees' achievement at the

organization level. Organizations in collectivistic cultures are more sensitive to their employees' need for reinforcement than individualistic cultures, organizations in collectivistic cultures reward their employees for results.

The organization especially in R&D work result create and maintain a reward system that is based on the team. Teams provide a structural basis for cooperation, which is a necessity in a TQM. Highly individualistic cultures, organizations design reward systems using mostly or solely individual rewards. Group-based rewards are used because the jobs are often designed as team structures and accomplishments are team-based. Employees will prefer group-based rewards rather than individual-based rewards because individual rewards may lead to comparisons between employees which may lead to competition.

CHAPTER 5

SUMMARY AND CONCLUSION

5.1 Discussion of the research findings for TQM management

The research finding that according to the ranking in the enabler factors should be prioritized for improvements in the following order:

(1) Leadership,

(2) team work,

(3) People,

(4) Operation, and

(5) Strategy.

The organizing was the most critical factor with a normalized local weight of 0.542 in the second hierarchy level. It was about three to four times greater than that of the culture and people. The measurement and feedback and the systems and techniques. The *two* soft factors were significantly affecting the decisions regarding TQM management concepts. Regarding the third hierarchy level, top management commitment was the most important in Organizing sub-factor. Its normalized local weight was about one, two and three times greater among that of leadership, education and training and strategic planning, respectively. The second critical factor was CP. Under its auspices in the level three, the normalized local weight of existing organizational culture was obviously less important than other sub-factors of employee involvement, human resource development and culture, recognition and rewards and internal performance measurement . By examining the global weight rankings in the third level, top management commitment, leadership and education and training were the three most influential sub-factors that would facilitate.

The findings of this study, conclusions is designated as

5.1.1 The food companies are not active enough in research their own innovate products as this reflects in low funding and inadequate staffing, resulting in poor new product performance than expectation.

5.1.2 The product is the core or the central strategy in new product development and firms can seek differential advantage through it. However, it is important that a very strong synergy exists between the product and the firm's technical and product capabilities and resource base.

5.1.3 The existence of an R&D department headed by a senior manager is a necessary but not a sufficient condition for successful management of the NPD process. The greater success can be achieved through the teamwork of professionals from the R&D, production, marketing, finance and other departments.

In particular, the insignificant relationship between TQM and innovation performance provides the important insight R&D management, not TQM, which function as the key resources for achieving a high level of product development performance.

Customer interaction, which is one of the key TQM elements, provides a solid foundation on which more radical innovations can be successfully implemented. R&D function must integrate its activities with company efforts to improve knowledge by adapting key principles about knowledge improvement to their own operations. In addition, R&D can also help reduce risk in product design, hence, reducing costs. Therefore, to a certain degree, improvement on product knowledge should result in the development and introduction of new products.

managing product innovation differs markedly from knowledge control that is focused on pursuing conformance to specification. This particularly applies in the case of more radical innovation, for example, when a company becomes an early entrant in a new market pursuing first-mover advantages, a characteristic of innovation that is incorporated in this study. This approach is in contrast to knowledge-oriented companies which would usually focus on the established market where customers' expectations can be clearly identified. of soft TQM are signi5cantly related to the measures of organizational performance. Five out of six soft TQM elements have a positive relationship with organizational performance. These are Workforce commitment, Shared vision, Customer focus, Use of teams, and Cooperative supplier relations.

Firms may need to consider possible organizational and cultural changes rather than merely being concerned purely with sources of funds. Until now, good knowledge and good service have been defined in terms of meeting company standards, but the application of total knowledge management to every peration involving R&D activities will require managements not

only to cede power and responsibility to employees but also to foster an across-the-board team approach involving all parties with the organization, and to make the customer an important part of the process. In addition, improved knowledge can also be achieved by giving more attention to the time cycle of R&D. This will lead to R&D becoming more competitive and encourage a greater awareness of customer requirements. The results may also have interesting implications for policy makers in that, although it can be argued that the more frequent monitoring of the R&D process is likely to lead to increased efficiency, it can in turn be reflective of managerial short-termism and the lack of technology strategies. Also, that present accounting treatment and financial reporting requirements compound shorttermism, and incline company management to further reduce R&D expenditures on long-term prestigious R&D, in order to minimize the impact on earnings and share prices. There is a wide range of knowledge strategies that could be applied by New Zealand companies in an attempt to improve the knowledge and competitiveness of R&D activities, but this survey, indicate that the two criteria in need of greatest change are competitive benchmarking important in its own right. It is industry's commitment to being innovative and technologically competitive that is important" . Suggestions such as reducing cycle time, becoming more aware of competition, adopting a team approach to process simplification, formalizing performance evaluation and investing more into innovation will not immediately create knowledge management of the R&D activities. Neither will they be achieved without major organizational and cultural change.

5.2 Research Limitation

The study demonstrates that there is a relationship between organizational culture and managers' individual outcomes; commitment and knowledge management efficacy, and some weak relations between culture and performance. Furthermore, the significant relationships between managers individual outcomes and performance also suggest that culture may have important indirect effects on performance.

The study may speculate that some of the uncertainty factor facing the manager may be related to efficient operation of the knowledge i.e., to staffing, production, procurement, etc., while another part of the uncertainly originates in the variance of customers' needs and wants. In

our study, the focused on the manager's perceptions of cultural values and personal outcomes. The immediate task facing the manager is a smooth operation.

The research concluded to the objective as planed at the beginning , The limitation of the research are constraints of the completion of the result, the implementation of the model was limited by time of the education therefore, the performance result of the knowledge management cannot be seen fully such as the financial aspect as the result needed longer period of time to show, Second limitation is the business secret the research aimed and focused to the food industry which the competition is very critical production process involved secret in food manufacturing so the information is not fully released to the researcher casily. The Third limitation is the objective of the research. The research concentrated in the knowledge management in Research and Development which did not pay much attention to the industry as whole in order to highlight at the knowledge transfer the further research needs to be emphasis on the knowledge management.

The whole company. In addition the research should examined on the link of knowledge management to this research studied the relationship of knowledge as management and other concepts of management the link should also be to often management concept such as strategic management, Balance scorecard, Strategic Human Resource Management, CRM, in order to gain better view of the knowledge management implement.

5.3 Conclusion on knowledge transferring

The articulability and embeddedness constructs measured in this study suggest the importance of knowledge context . In addition, knowledge distance confirms the receptivity of the recipient based on its knowledge gap with the source. Moreover, the study also examined the influence of the degree of transfer activities undertaken on transfer success. It found that the interaction between new product development (NPD) influence knowledge transfer outcomes. R&D managers should pay attention,to the form and embeddedness of the knowledge, any potential relationship distances between the parties, and the degree of interactions undertaken between the parties.

In particular, the form of the knowledge to be transferred, in terms of its articulability and its embeddedness, could play a critical role in its ultimate transferability. Articulability

proved to be *negatively* related to transfer success. In otherwords, knowledge that can be readily codified in manuals, diagrams is *less* likely to be internalized within the recipient than less articulated knowledge.

Organizational learning requires, among other things, the reconstruction and adaptation of the transferred knowledge at the receiving. This is also because knowledge codified by a source may be incompatible with a recipient's cultural beliefs and characteristic. and the recipient may be less motivated to take ownership of, and become committed to this knowledge. R&D managers should develop a knowledge evaluation scheme or internal knowledge scanning process through which they can assess the degree of embeddedness of certain knowledge within the organization, and then use this information to guide their development of both pre-transfer knowledge preparation processes and overall knowledge transfer plans.

Another key aspect of a transfer that needs to be understood is the relationship between the source and recipient R&D units. This study found that two relationship-related variables are significantly associated with transfer success, including norm distance and knowledge distance. Norm distance refers to the extent to which the parties share similar understandings and ideas about the knowledge transfer project. NPD managers ought to constantly coordinate knowledge transfers between source and recipient, in order to reduce norm distance between the two units. NPD activities in which learning and knowledge transfer are critical, such as in cross-functional teams or cross-organizational efforts should be strengthen , consistent with the notion that NPD is a dynamic and interactive problem-solving process. Such a process would entail the use of multiple presentations, discussions, and dialogues about the knowledge across multiple teams within both the source and the recipient organizations Thus, while the objective of the embeddedness analysis would be to develop an understanding of the knowledge elements needing to be transferred, the objective of the knowledge-preparation process would be to involve both the source and recipient in the articulation of knowledge, so as to reduce the relational distances that may exist between the parties. However, simultaneous with both or either of these processes, R&D managerscould also assess potential sources' and recipients' knowledge bases One interesting finding in this study is that the separation of research on knowledge transfer by governance mode may have less importance in reality than in convention or in research ease, as organizational distance was not found to be a statistically significant factor in this study.

Nonetheless, to the extent that organizational mode does matter, it seems clear that relationship building between less organizationally internalized parties could improve transfer success. In turn, this would make decision making with respect to the appropriate organizational governance mode through which to execute the knowledge transfer project considerably less complex. In other words, assuming that a reasonable knowledge preparation process can be implemented regardless of whether the knowledge transfer is to occur through an acquisition, intra-organizationally, or through an alliance, the choice of governance mode can be made for rationales other than the need to facilitate knowledge transfer.

Another interesting finding was that the physical distance variable was also not statistically significant.

5.31 Recommendation

5.3.1.1 A multidisciplinary team of specialists from R&D, production, marketing, finance and other departments, headed by the R&D head, should be maintained by each food company to handle their new product development efforts because of the diversity of skills required for its success.

5.3.1.2 Adequate attention must be given to all phases of the new product development process because each phase has some contribution to new product success.

5.3.1.3 R&D managers, who are presumed to be part of top management, should take advantage of such a position to ensure that new product decisions are integrated into strategic planning at the corporate level, in view of the critical role these decisions play in

5.3.1.4 Determining corporate growth and position in the competitive market place.

5.3.1.5 Since technical and production capability support is an important factor for new product success in the food industry, adequate attention should be paid to

5.3.1.6 Development in ingredients technologies, processing technology, packaging systems and materials. Efforts should be made to develop capabilities in these areas to enable companies to explore opportunities created by new or imaginative combinations of existing technologies.

5.3.1.7 The overall impact

5.3.2 Industrial Implication

Top management involvement

Management may assume lots of forms, but it is evident that modern management holds at least the following obligations. Especially in relation to product development activities : Goal setting; Communication; Problem solving; Creating and managing changes; Creating effectiveness; Motivation; Control; Responsibility, Considering these obligations its should be clear that in product development at the developing stage management involvement is a key variable in explaining the success of the new product.

Involvement of the marketing department

Although product development in the food industry is often dominated by biological and nutritional aspects, the marketing department is the department with the expertise concerning customer demands and the department responsible for communicating there demands during the development of new products. Thus the participation of the marketing department in the development stage ought to have a positive impact on the success rate.

Involvement of the production department

The arguments concerning the production department's participation in the development stage are rather similar to the arguments in the previous section. The production department has the expertise in how to transform new idea into mass-production. We therefore assume that the participation of the production department in the development stage has a positive impact on the success rate.

Information from customers and about customers

Direct conversation with customers

The qualitative interviews seemed to indicate that companies often had conversations with their direct customers, and that several companies discussed new product proposals with the customers. It therefore seems evident that the use of conversations with customers increases the success rate.

Information from employees

Modern TQM theories strongly emphasize that employers should be viewed as internal suppliers and customers, and that they should be encouraged to come up with new proposals and ideas, because many of the employees have daily contract with external suppliers and customers. Without going into further discussions of the TQM concept, the following hypothesis seems adequate: The extent to which information from employees is applied has a positive impact on the success rate.

People-Oriented Influences. Factors that satisfy personal and professional needs seem to have the strongest effect on the innovative performance of an organization. The most significant drivers are derived from the work itself, including personal interest, pride and satisfaction with the work, professional work challenge, accomplishments and recognition. Other important influences include effective communications among team members and support units

across organizational lines; good team spirit, mutual trust, respect, low interpersonal conflict, personal pride and ownership, plus opportunities for career development, advancement and, to some degree, job security. All of these factors help in building unified project team that can exploit the organizational strengths and competencies effectively, and produce integrated results that support the organization's mission objective. All of these factors seem to lend support to work environment conducive to innovation that can be transformed into overall business performance.

Organizational Process and Support. These influences include the organizational structure and technology transfer process that relies by-and-large on modern project management techniques. While the research did not favor specific project structures and processes over others, it specifically pointed at effective project planning and support systems, clear communication or organizational goals and project objectives, and overall managerial leadership as important conditions for effective R&D team performance and innovative results. An effective project management system also includes effective cross-functional support, joint reviews and performance appraisals, and the availability of the necessary resources, skills and facilities. Other crucial components that effect the work/business process are team structure, managerial power, command and control and its sharing among the team members and organizational units, autonomy and freedom, and most importantly technical direction and leadership.

Long-Range Strategy. This set includes many of the variables that are primarily within the control domain of senior managers, such as organizational stability, availability of sufficient resources, management involvement and support, personal rewards, and the stability of organizational goals, objectives and priorities. Since all of these influences are images of personal perception, it is important for management to create the desired message through proper communications. For example, a company merger might be perceived as an opportunity of threat, as a stabilizer or destabilizer, depending on how it is communicated. The relationship of managers, to their staff and to the people in their organizations, the mutual trust, respect and credibility, all are critical factors toward building an effective partnership between the R&D personnel and its sponsor organization.

Work and Task Related Influences come from the nature of the work and its context. As shown in the correlation analysis of Table 2, it is interesting to see that only variables associated with the personal aspects of work, such as interest, ability to solve problems, job skills and experience, are statistically significant in driving innovative performance. Many other work-related variables from the structural side, such as project size, work complexity and work process, has no statistically significant influence on innovative performance. The significance of this finding is in two areas. First, managers must be able to attract and hold people with the right skill sets, appropriate for the work to be performed. They must also invest in maintaining and upgrading job skill, and support systems. Secondly, managers have more flexibility with a higher impact toward innovation on the motivational than on the structural side of work. That is , while the total task structure and the development process is fixed and more difficult to change, the way managers distribute, assign and present the work is more flexible. Promoting a climate of high interest, involvement and support might be easier to achieve than reengineering the work process, yet having a higher impact on innovative performance.

It has also been suggested that, to success was learning organization, a company needs to be skilled at:

(1) Systematic problem solving;

(2) Experimentation with new approaches;

(3) Learning from its own experiences and past history;

(4) Learning from experiences and best practice of others;

(5) Transferring knowledge throughout the organization and with in the business unit.

Systematic problem solving

Deutscher has introduced data collection mechanisms on which decision making and problem solving can be based. These include: quality history sheets;

(1) The installation of automatic load monitors to track quality variations; and

(2) A customer feedback study to determine which products are in demand and why.

Experimentation with new approaches

In an attempt to make improvements in quality, customer orientation and production processes, the introduction of TQM needs improved communication.

Learning from their own experiences and past history

The main benefits of teamwork and two-way communication are:

(1) Clarity of purpose;

(2) Clear accountability; and

(3) Effective measurement of past performance.

Learning from the experiences and best practice of others

Remset's branch, regional and administrative managers, together with sales representatives, meet regularly with major customers to product use and the after-sales service experience of customers.

Transferring knowledge throughout the organization

The effective transfer of knowledge throughout organizational achieved by:

(1) The organizational climate which emphasizes teamwork;

(2) Two-way communication and shared vision;

(3) Regular team briefings;

(4) Monthly management meetings;

(5) Use of cross-functional teams;

(6) Product demonstrations; new product launches; and a TQM induction program.

There are a clear indication of each organization continuously acquiring new knowledge about customers, suppliers, processes and employees. Learning is obviously an output of a successfully implemented TQM program and a TQM initiative can only be regarded as successful when a new working environment has been created in which people are able to learn, share knowledge and contribute.

The recommendation for top managers

(1) Investigate the behavioral, conceptual or operational features of each best common element and the foundation of each management system in order to better know how to incorporate them in their daily management.

(2) Investigate and support a variety of methods maintaining high ethical standard in workplace. They also should use their power well and serve as models of appropriate ethical behavior for the entire firm.

(3) Blend business and quality planning into a single strategic plan. Moreover, they should involve more employees, main customers and suppliers in their strategic planning development. They inputs produce a plan that more accurately reflects the customers' needs and company's capabilities, by having goals and objectives that everyone can support

(4) Clearly define their business areas. Successful managers are able to offer lucid explanations of the directions in which their companies are headed.

(5) Change the traditional roles of strategic planners (analyst, adviser, etc). Today most successful planners are involved as facilitators of groups, shepherds of the planning process, and organizational strategy coordinators, responsible for ensuring the strategic thinking of all workers within the organization.

(6) Continuously find ways to update and improve their daily leadership skills and employees' morale and satisfaction.

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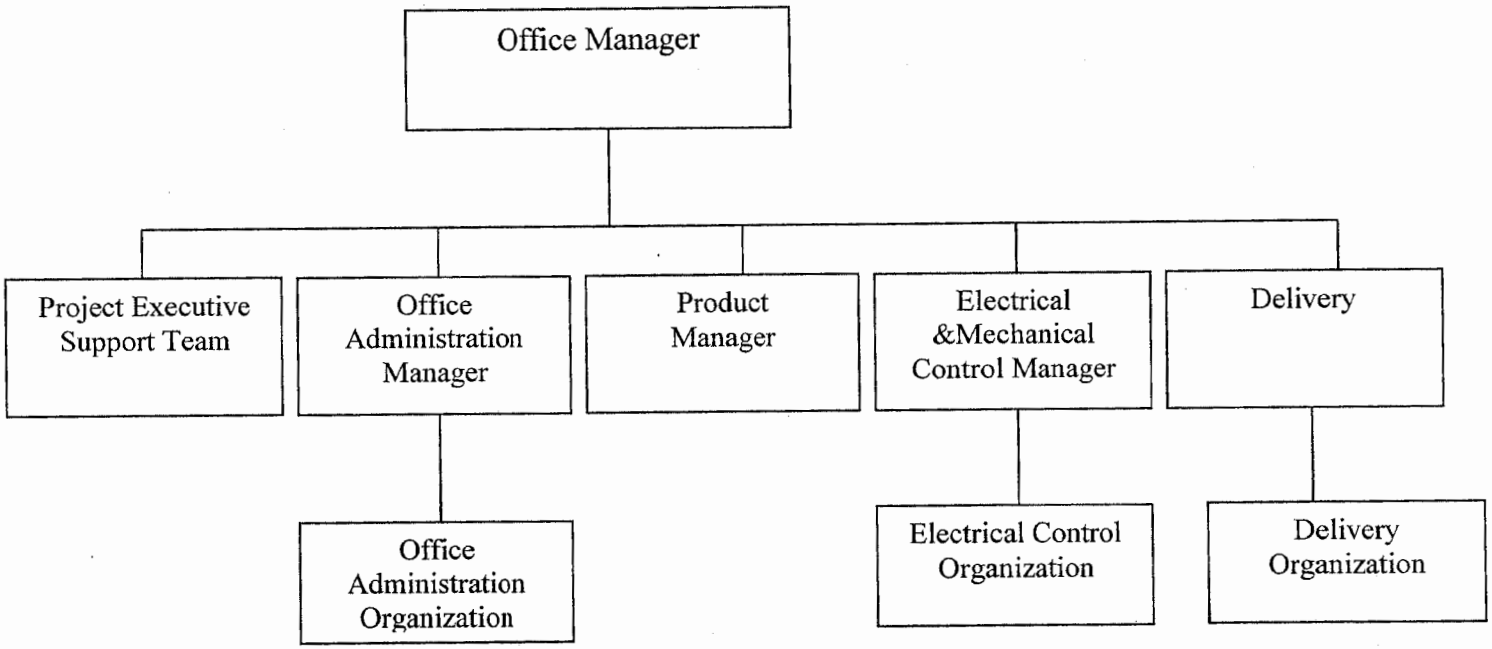
APPENDIX A

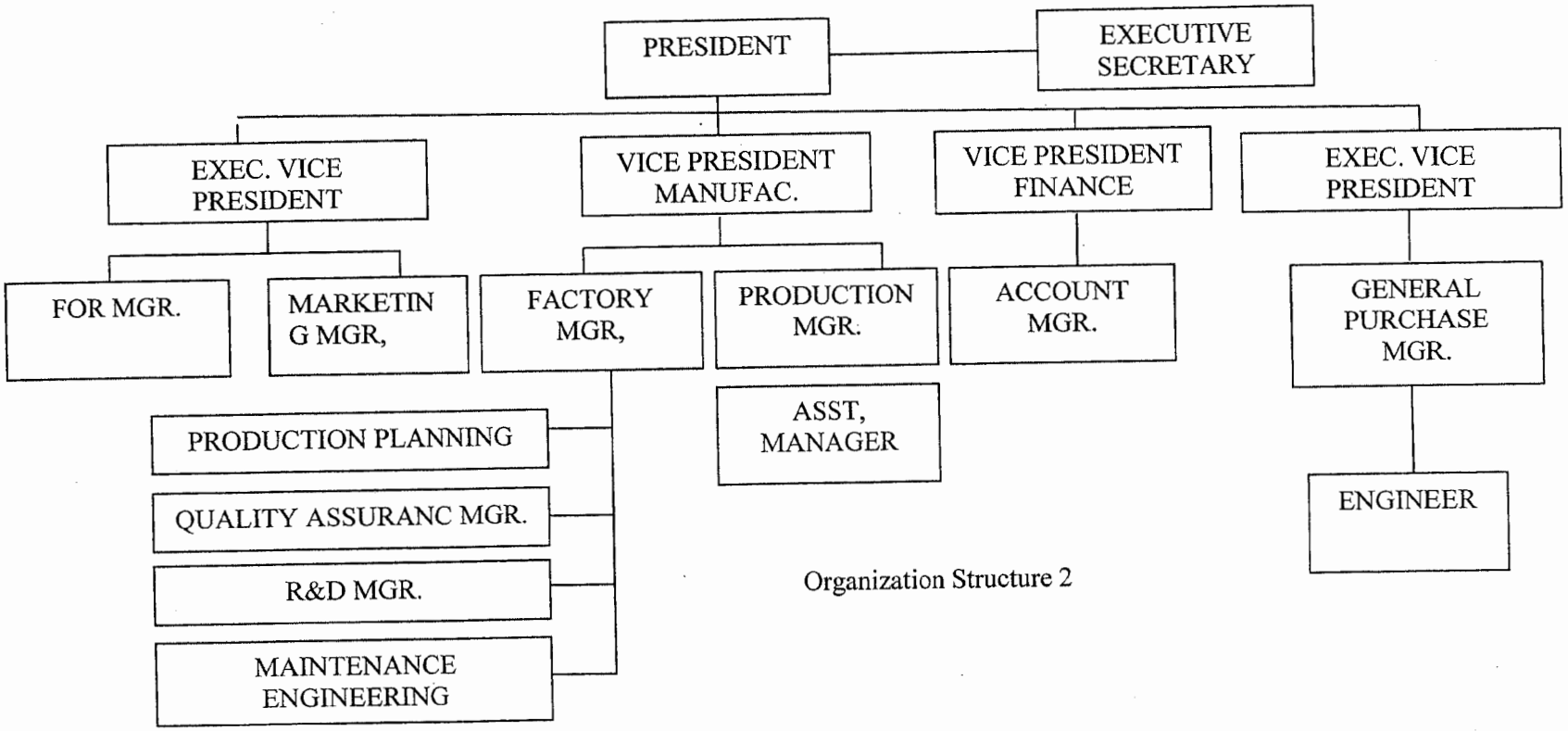
ORGANIZATION CHART

Regional Director of Production



Organization Structure 1

ORGANIZATION CHART



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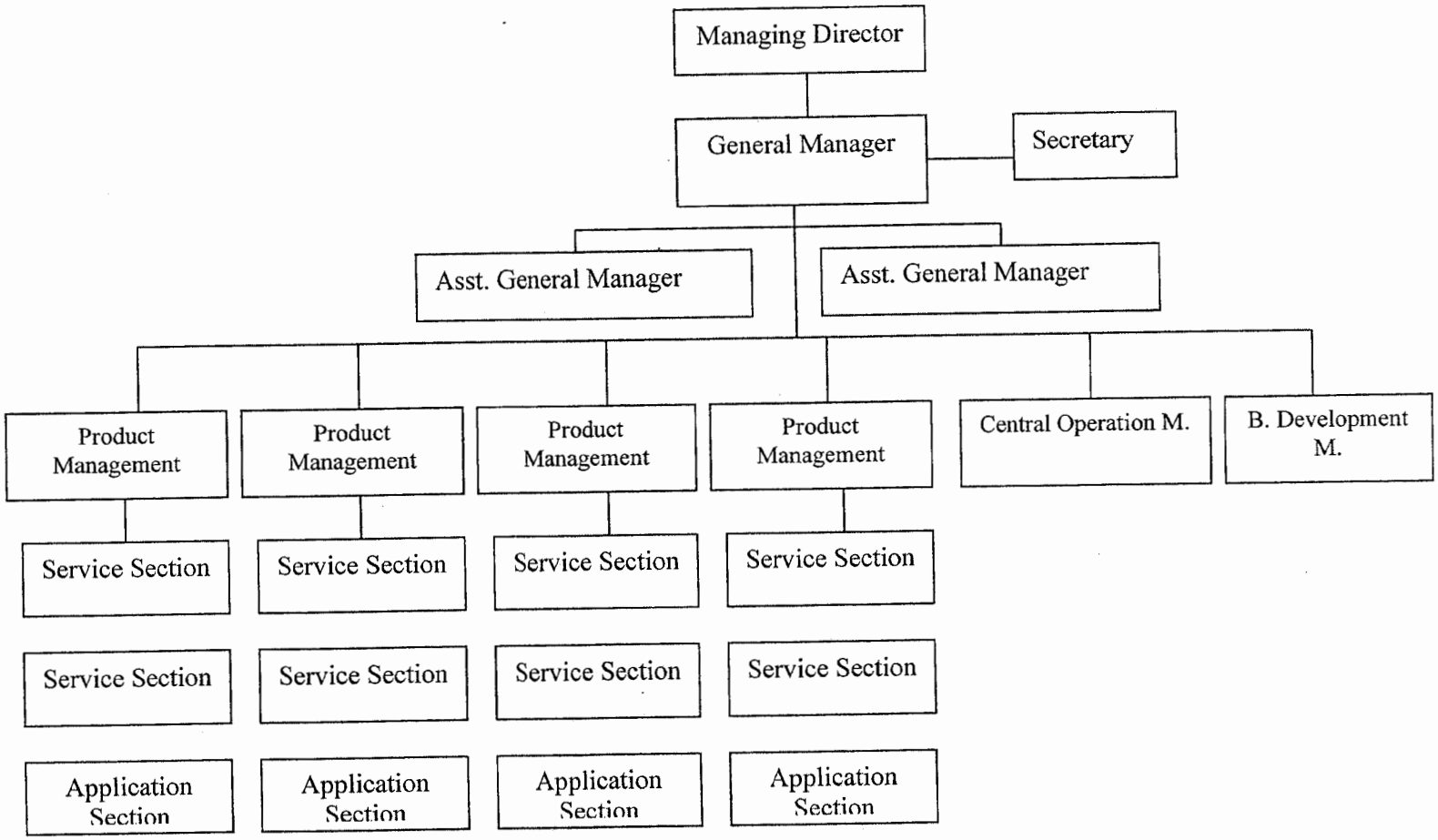

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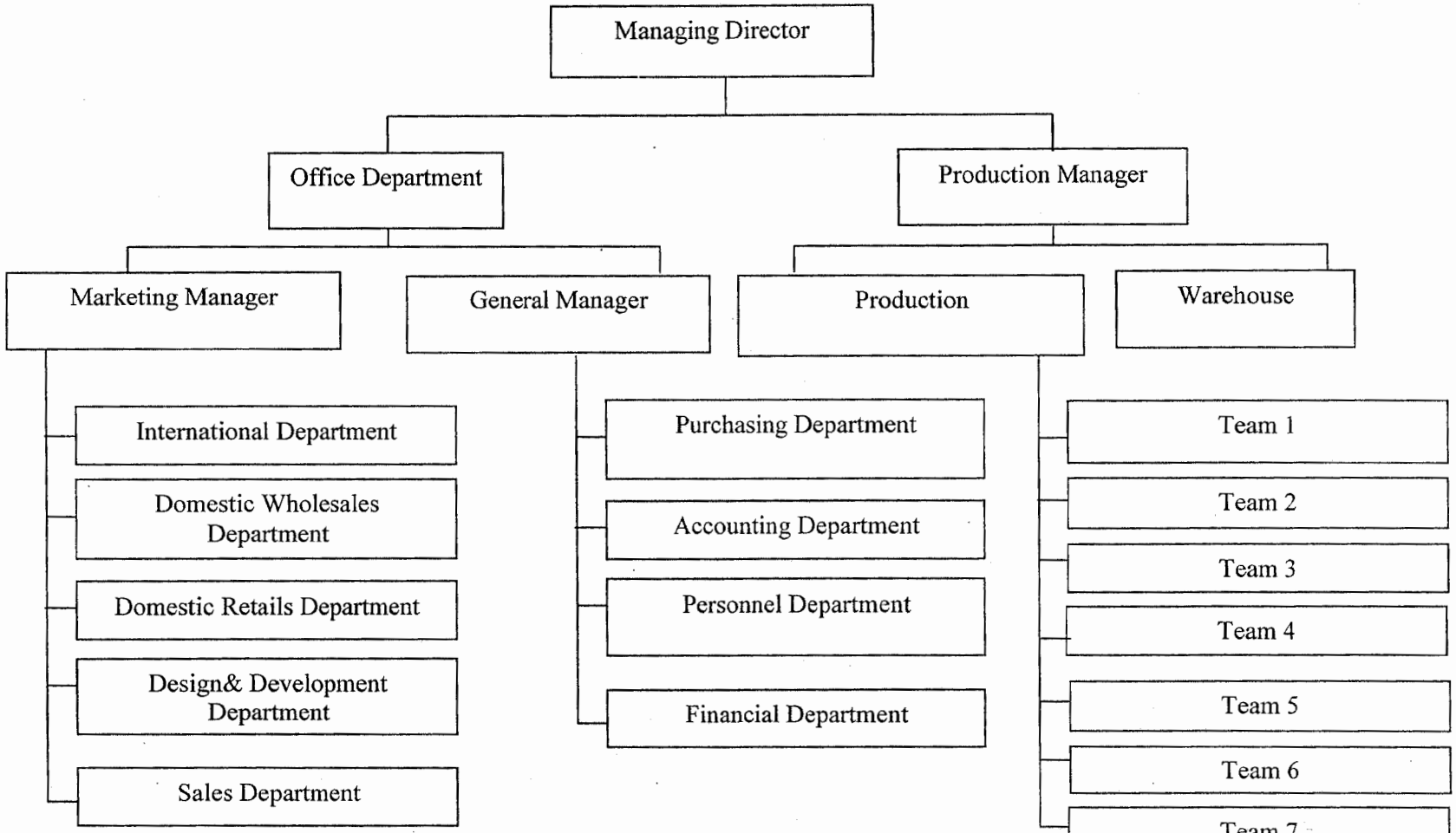

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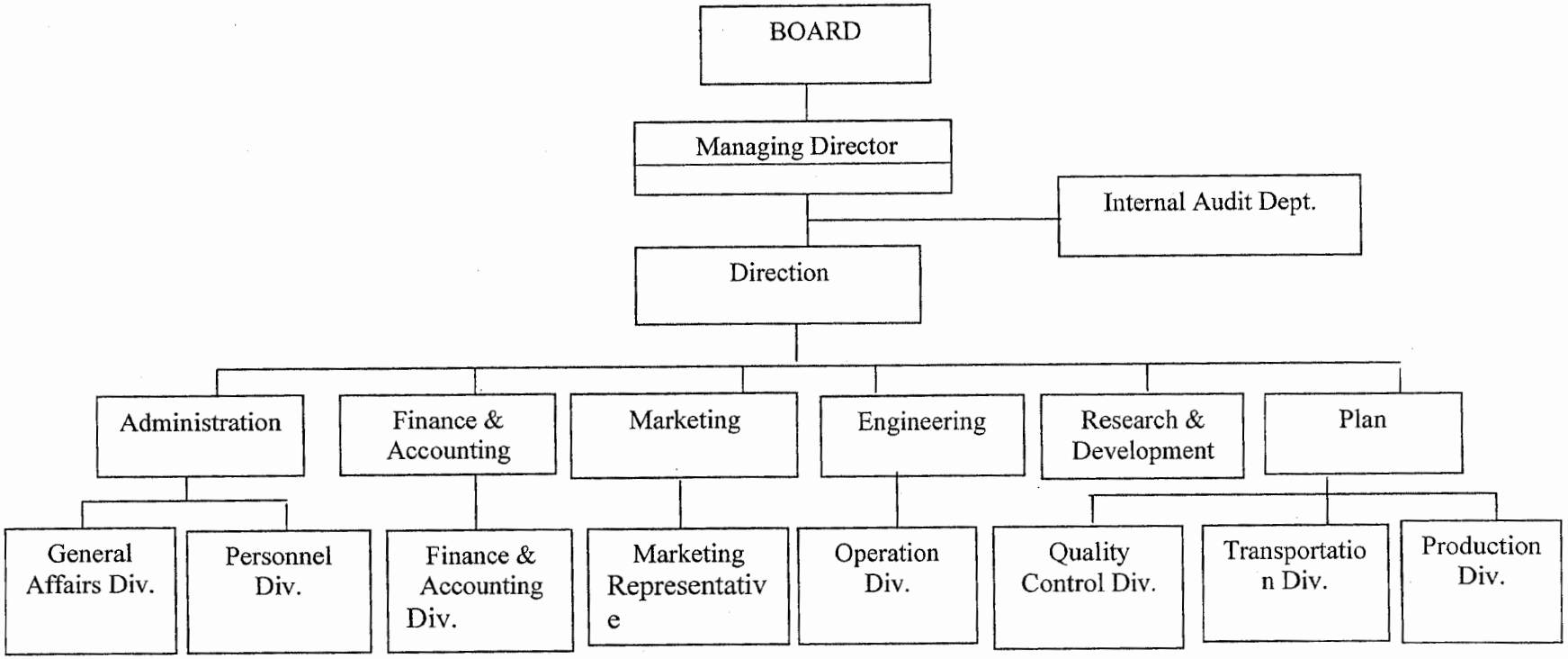

Organization Structure 5

APPENDIX B

STATISTIC ANALYZE

Frequencies

Statistics

		Articulability	Embodedness	Physic distance	Norm distance	Knowledge distance	Learning culture	Project Priority	Org distance	Transfer distance
N	Valid	15	15	15	15	15	15	15	15	15
	Missing	0	0	0	0	0	0	0	0	0

Frequency Table

Articulability

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	greater	9	60.0	60.0	60.0
	most	6	40.0	40.0	100.0
	Total	15	100.0	100.0	

Emboddedness

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	lower	1	6.7	6.7	6.7
	average	1	6.7	6.7	13.3
	greater	7	46.7	46.7	60.0
	most	6	40.0	40.0	100.0
	Total	15	100.0	100.0	

Physic distance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	lower	9	60.0	60.0	60.0
	average	6	40.0	40.0	100.0
	Total	15	100.0	100.0	

Norm distance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	greater	3	20.0	20.0	20.0
	most	12	80.0	80.0	100.0
	Total	15	100.0	100.0	

Knowledge distance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	greater	6	40.0	40.0	40.0
	most	9	60.0	60.0	100.0
	Total	15	100.0	100.0	

Learning culture

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	average	6	40.0	40.0	40.0
	greater	9	60.0	60.0	100.0
	Total	15	100.0	100.0	

Project Priority

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	lower	3	20.0	20.0	20.0
	average	6	40.0	40.0	60.0
	greater	6	40.0	40.0	100.0
	Total	15	100.0	100.0	

Org distance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	least	3	20.0	20.0	20.0
	lower	8	53.3	53.3	73.3
	average	1	6.7	6.7	80.0
	greater	1	6.7	6.7	86.7
	most	2	13.3	13.3	100.0
	Total	15	100.0	100.0	

Transfer distance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	average	3	20.0	20.0	20.0
	greater	3	20.0	20.0	40.0
	most	9	60.0	60.0	100.0
	Total	15	100.0	100.0	

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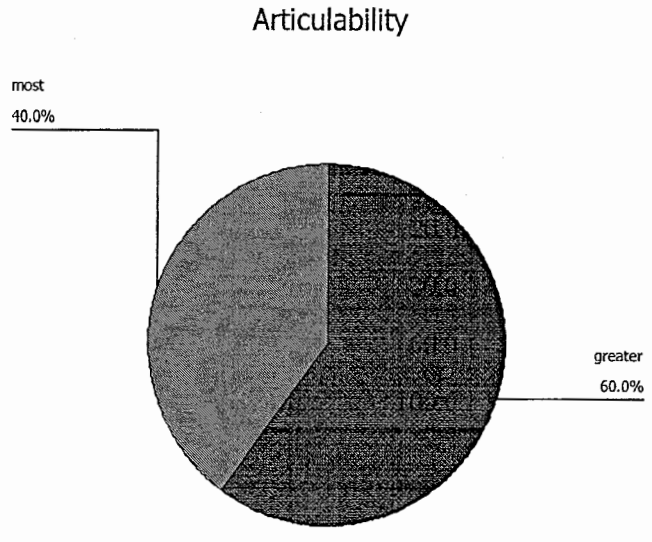
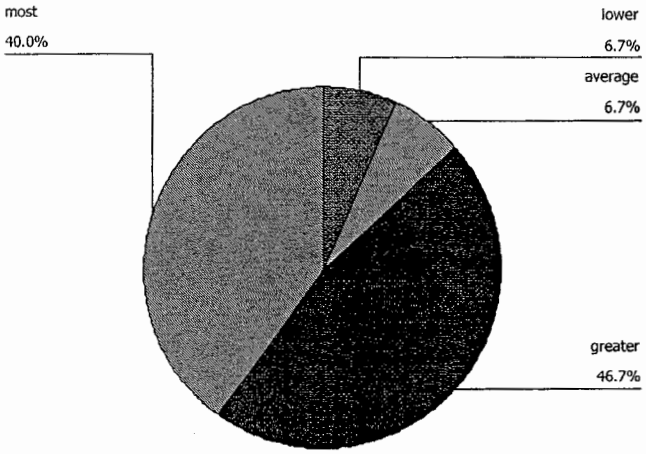
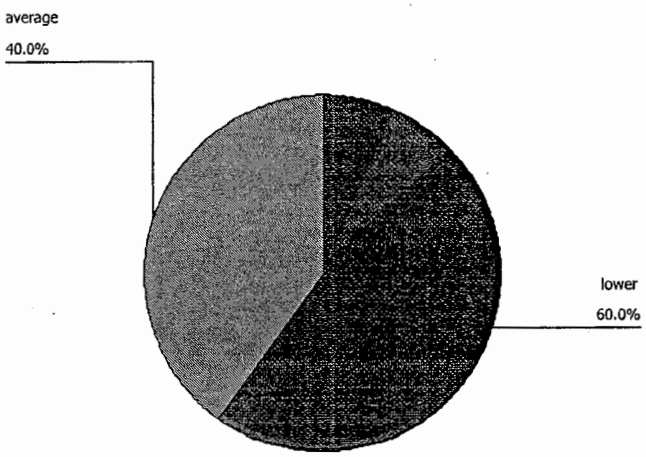


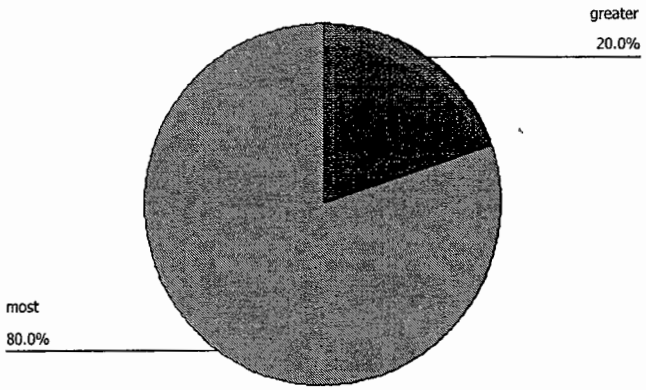
Emboddedness



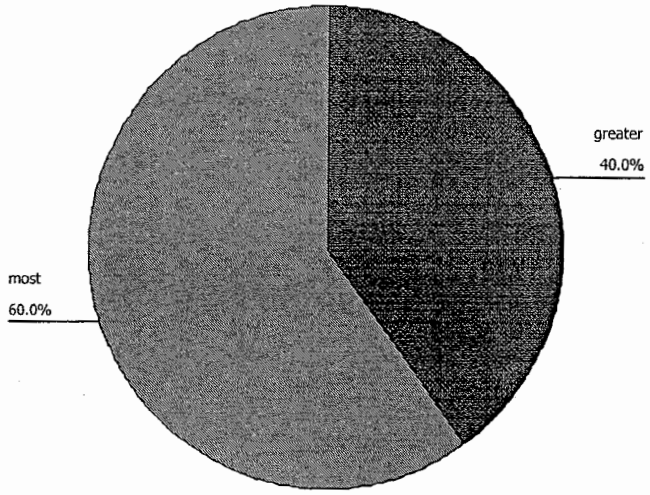
Physic distance



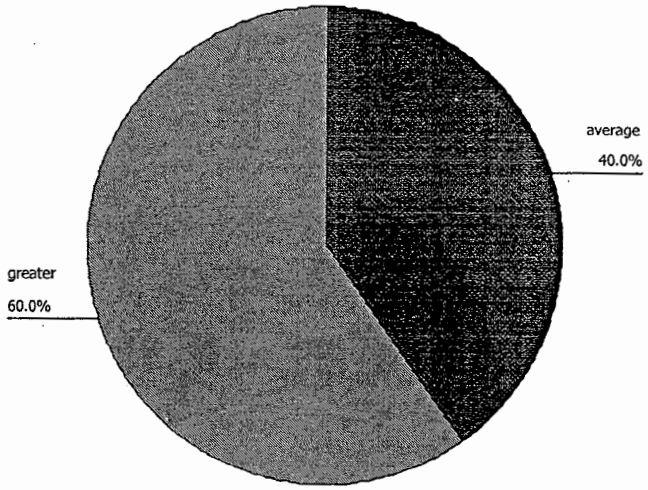
Norm distance



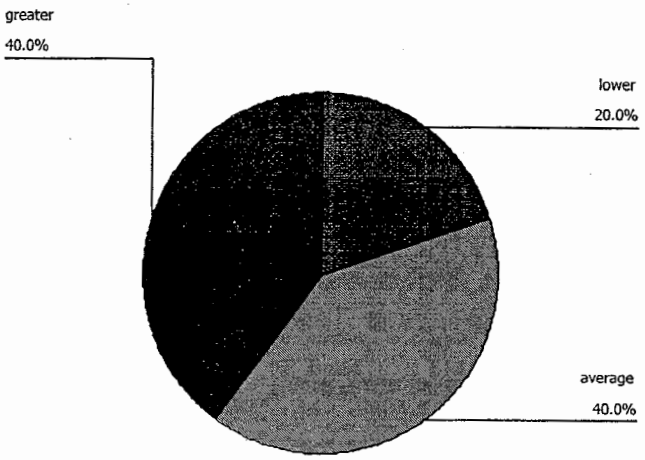
Knowledge distance



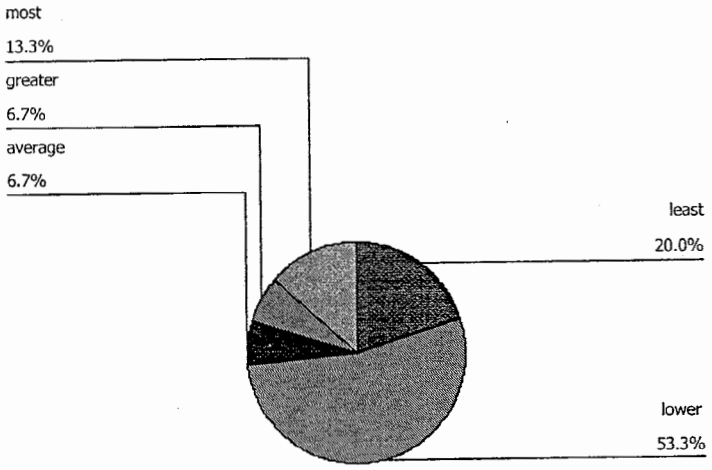
Learning culture



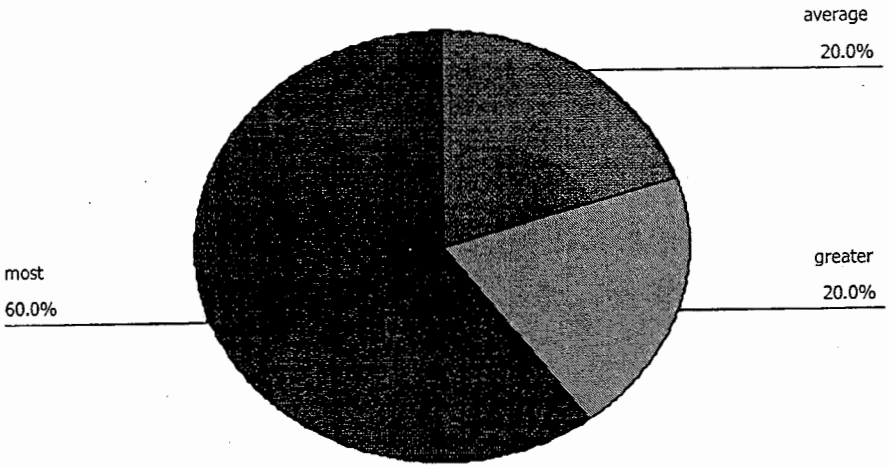
Project Priority



Org distance



Transfer distance



Frequencies

Notes

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Statistics

		Articulability	Embodedness	Physic distance	Norm distance	Knowledge distance	Learning culture	Project Priority	Org distance	Transfer distance
N	Valid	23	23	23	23	23	23	23	23	23
	Missing	0	0	0	0	0	0	0	0	0
Mean		3.78	4.52	2.22	4.87	4.52	3.00	2.78	2.00	4.61
Std. Deviation		.795	.511	.422	.344	.511	1.044	.850	.739	.499

Frequency Table

Articulability

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Average	10	43.5	43.5	43.5
	Greater	8	34.8	34.8	78.3
	Most	5	21.7	21.7	100.0
	Total	23	100.0	100.0	

Emboddedness

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Greater	11	47.8	47.8	47.8
	Most	12	52.2	52.2	100.0
	Total	23	100.0	100.0	

Physic distance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Lower	18	78.3	78.3	78.3
	Average	5	21.7	21.7	100.0
	Total	23	100.0	100.0	

Norm distance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Greater	3	13.0	13.0	13.0
	Most	20	87.0	87.0	100.0
	Total	23	100.0	100.0	

Knowledge distance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Greater	11	47.8	47.8	47.8
	Most	12	52.2	52.2	100.0
	Total	23	100.0	100.0	

Learning culture

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Least	2	8.7	8.7	8.7
	Lower	4	17.4	17.4	26.1
	Average	11	47.8	47.8	73.9
	Greater	4	17.4	17.4	91.3
	Most	2	8.7	8.7	100.0
	Total	23	100.0	100.0	

Project Priority

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Lower	11	47.8	47.8	47.8
	Average	6	26.1	26.1	73.9
	Greater	6	26.1	26.1	100.0
	Total	23	100.0	100.0	

Org distance

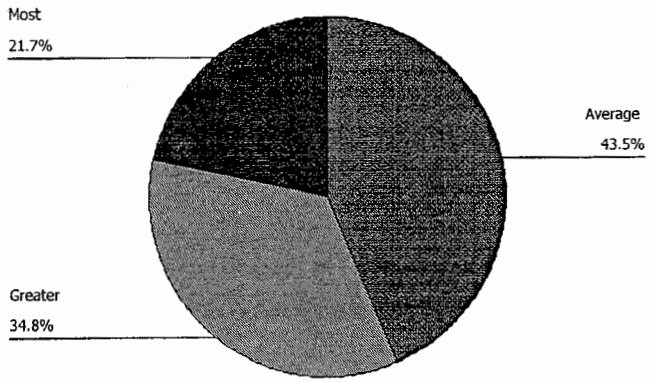
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Least	6	26.1	26.1	26.1
	Lower	11	47.8	47.8	73.9
	Average	6	26.1	26.1	100.0
	Total	23	100.0	100.0	

Transfer distance

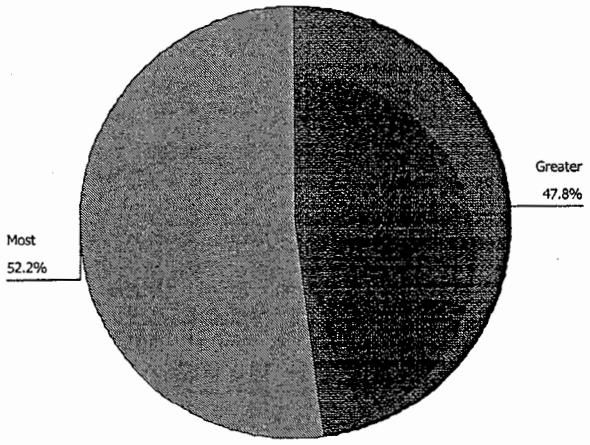
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Greater	9	39.1	39.1	39.1
	Most	14	60.9	60.9	100.0
	Total	23	100.0	100.0	

Pie Chart

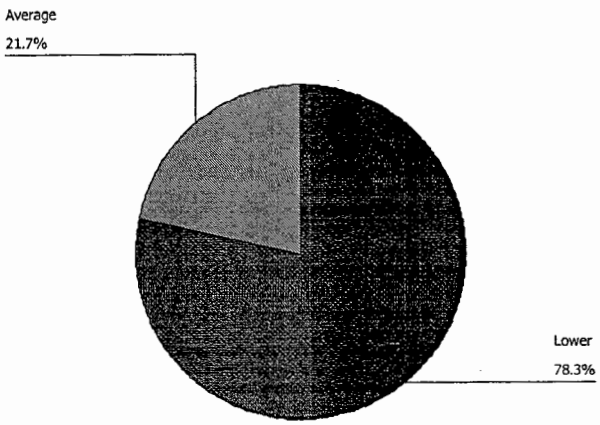
Articulability



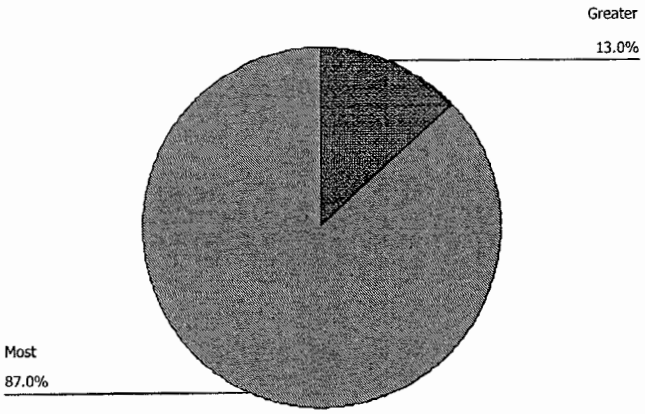
Emboddedness



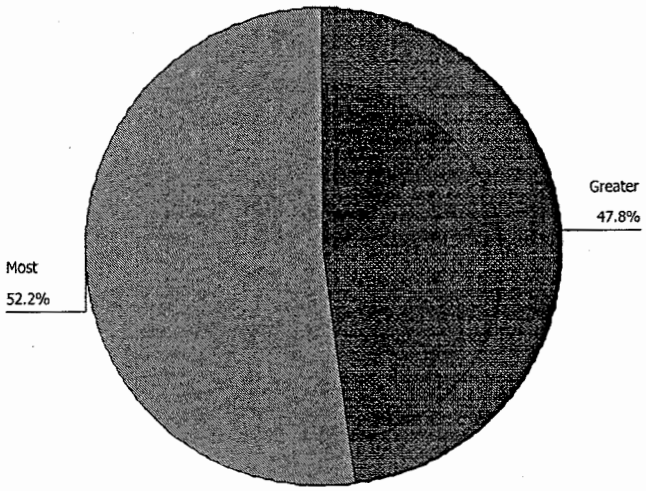
Physic distance



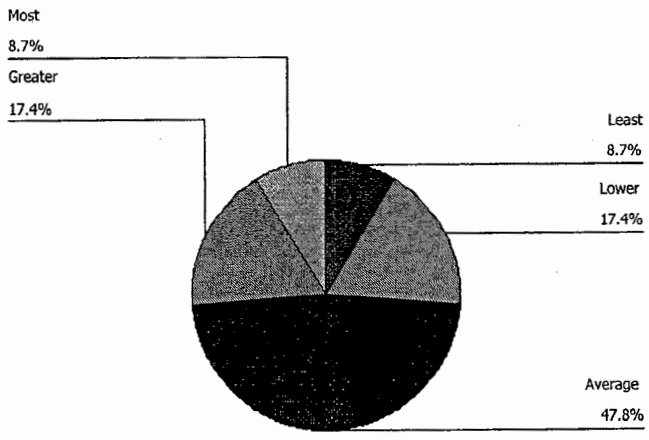
Norm distance



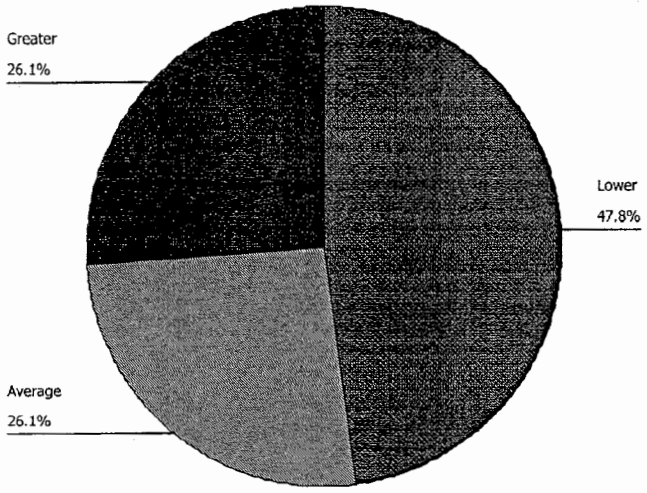
Knowledge distance



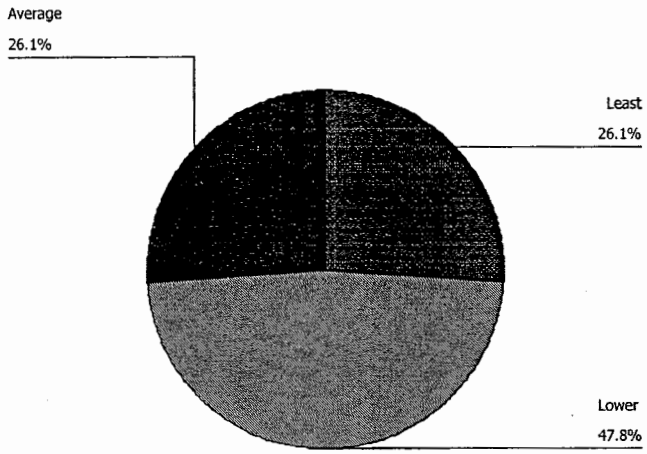
Learning culture



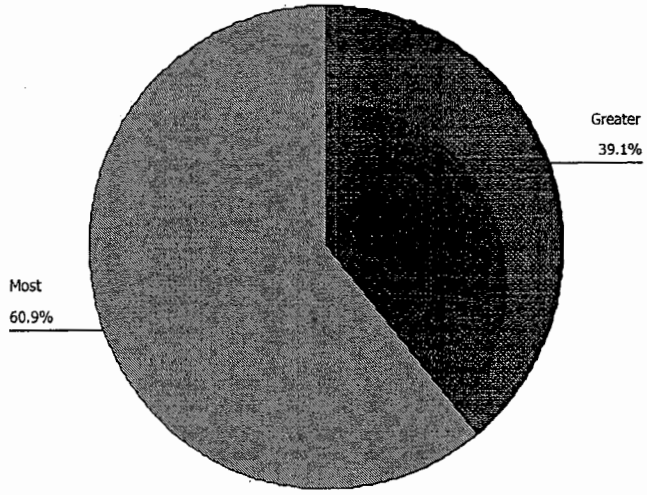
Project Priority



Org distance



Transfer distance



Frequencies (Case 2)

Statistics

		Articulability	Embodedness	Physic distance	Norm distance	Knowledge distance	Learning culture	Project Priority	Org distance	Transfer distance
N	Valid	23	23	23	23	23	23	23	23	23
	Missing	0	0	0	0	0	0	0	0	0
Mean		3.78	4.52	2.22	4.87	4.52	3.00	2.78	2.00	4.61
Std. Deviation		.795	.511	.422	.344	.511	1.044	.850	.739	.499

Frequency Table

Articulability

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Average	10	43.5	43.5	43.5
	Greater	8	34.8	34.8	78.3
	Most	5	21.7	21.7	100.0
	Total	23	100.0	100.0	

Emboddedness

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Greater	11	47.8	47.8	47.8
	Most	12	52.2	52.2	100.0
	Total	23	100.0	100.0	

Physic distance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Lower	18	78.3	78.3	78.3
	Average	5	21.7	21.7	100.0
	Total	23	100.0	100.0	

Norm distance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Greater	3	13.0	13.0	13.0
	Most	20	87.0	87.0	100.0
	Total	23	100.0	100.0	

Knowledge distance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Greater	11	47.8	47.8	47.8
	Most	12	52.2	52.2	100.0
	Total	23	100.0	100.0	

Learning culture

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Least	2	8.7	8.7	8.7
	Lower	4	17.4	17.4	26.1
	Average	11	47.8	47.8	73.9
	Greater	4	17.4	17.4	91.3
	Most	2	8.7	8.7	100.0
	Total	23	100.0	100.0	

Project Priority

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Lower	11	47.8	47.8	47.8
	Average	6	26.1	26.1	73.9
	Greater	6	26.1	26.1	100.0
	Total	23	100.0	100.0	

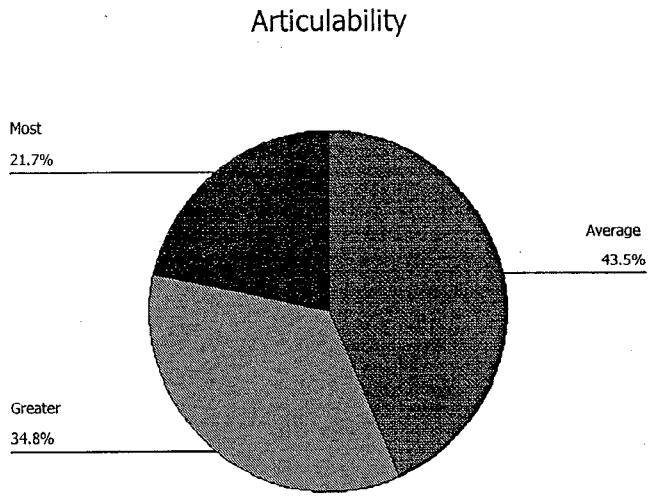
Org distance

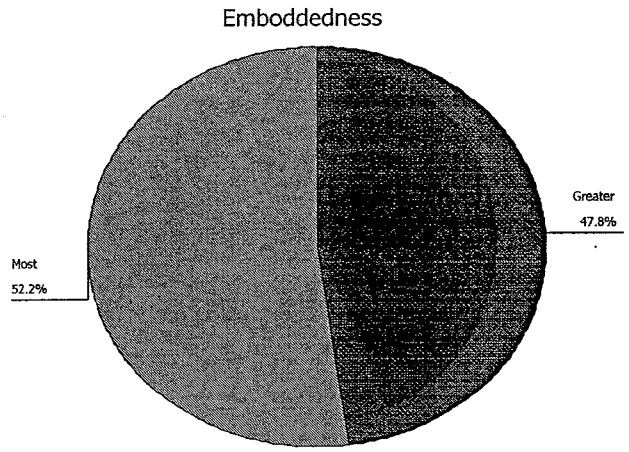
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Least	6	26.1	26.1	26.1
	Lower	11	47.8	47.8	73.9
	Average	6	26.1	26.1	100.0
	Total	23	100.0	100.0	

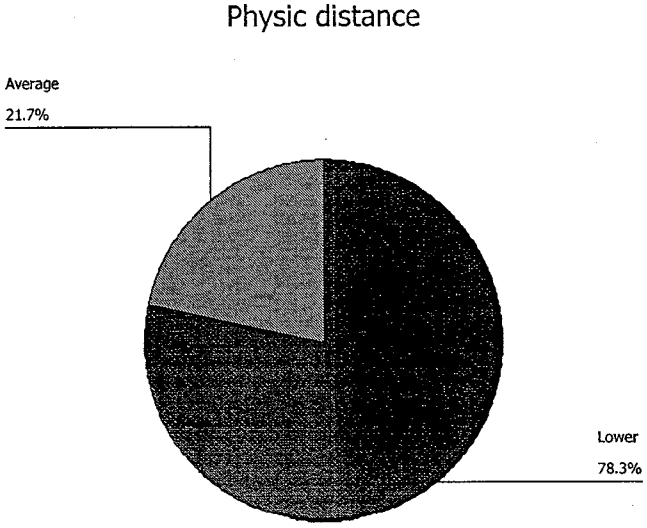
Transfer distance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Greater	9	39.1	39.1	39.1
	Most	14	60.9	60.9	100.0
	Total	23	100.0	100.0	

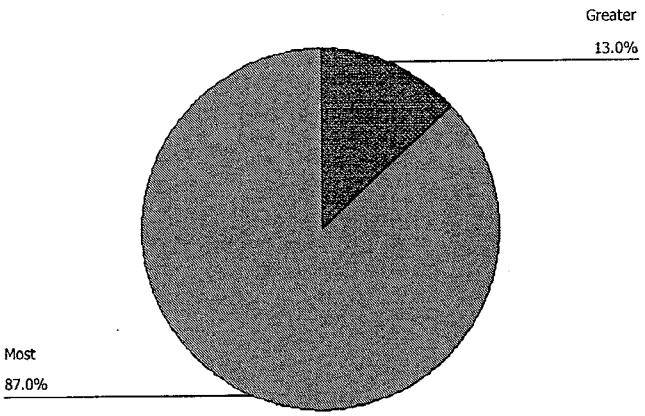
Pie Chart


Articulability
Most
21.7%
Average
43.5%
Greater
34.8%

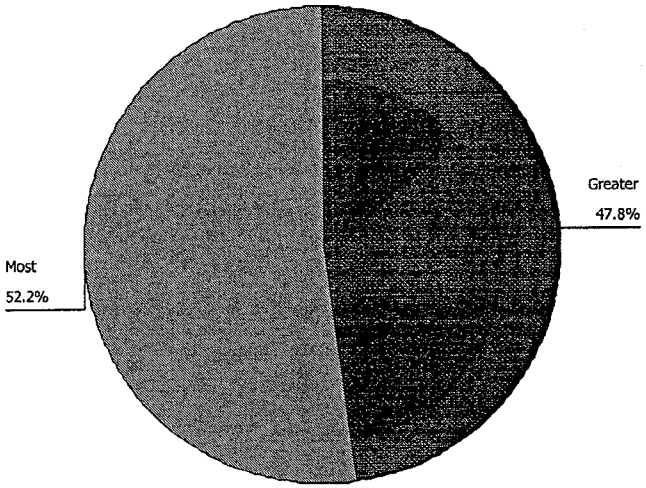

Emboddedness
Greater
47.8%
Most
52.2%


Physic distance
Average
21.7%
Lower
78.3%

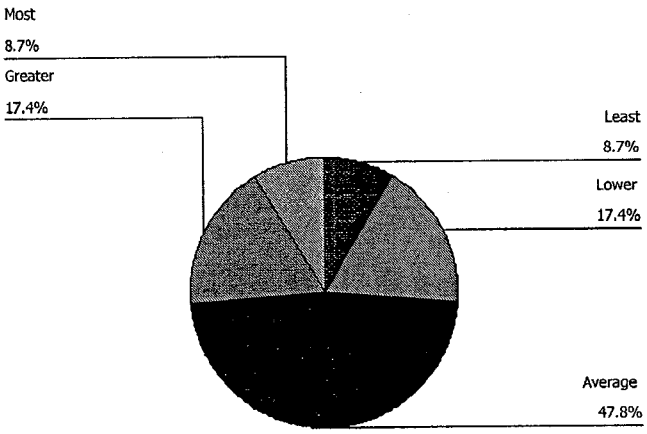
Norm distance



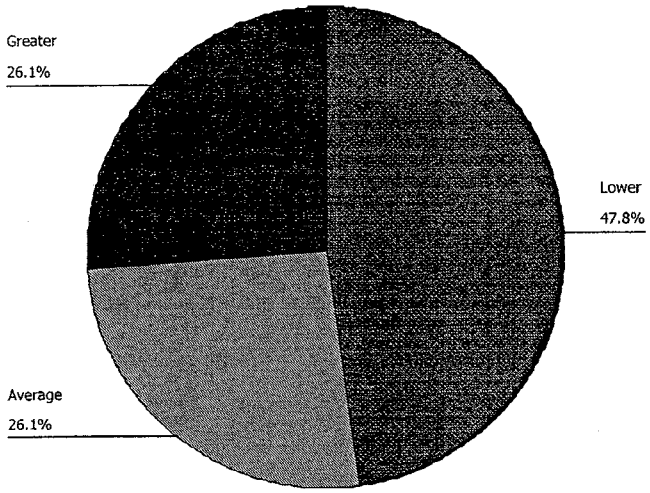
Knowledge distance



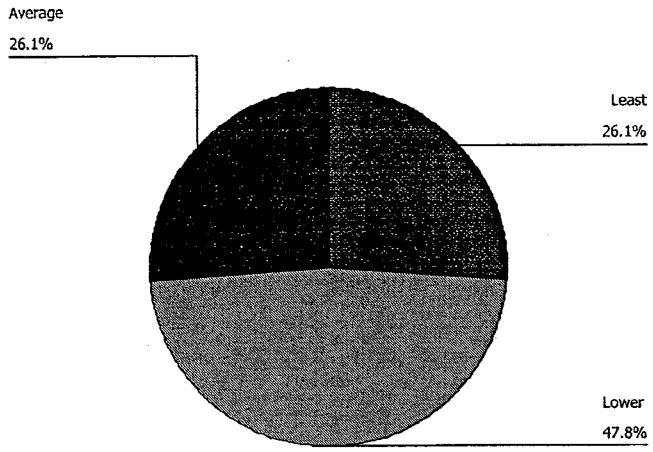
Learning culture



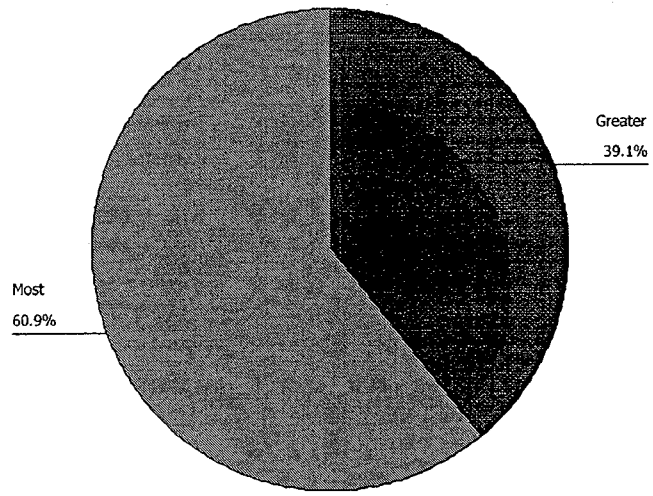
Project Priority



Org distance



Transfer distance



Frequencies (Case 3)

Notes

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Statistics

		Articulability	Embodedness	Physic distance	Norm distance	Knowledge distance	Learning culture	Project Priority	Org distance	Transfer distance
N	Valid	23	23	23	23	23	23	23	23	23
	Missing	0	0	0	0	0	0	0	0	0
Mean		3.78	4.52	2.22	4.87	4.52	3.00	2.78	2.00	4.61
Std. Deviation		.795	.511	.422	.344	.511	1.044	.850	.739	.499

Frequency Table

Articulability

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Average	10	43.5	43.5	43.5
	Greater	8	34.8	34.8	78.3
	Most	5	21.7	21.7	100.0
	Total	23	100.0	100.0	

Emboddedness

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Greater	11	47.8	47.8	47.8
	Most	12	52.2	52.2	100.0
	Total	23	100.0	100.0	

Physic distance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Lower	18	78.3	78.3	78.3
	Average	5	21.7	21.7	100.0
	Total	23	100.0	100.0	

Norm distance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Greater	3	13.0	13.0	13.0
	Most	20	87.0	87.0	100.0
	Total	23	100.0	100.0	

Knowledge distance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Greater	11	47.8	47.8	47.8
	Most	12	52.2	52.2	100.0
	Total	23	100.0	100.0	

Learning culture

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Least	2	8.7	8.7	8.7
	Lower	4	17.4	17.4	26.1
	Average	11	47.8	47.8	73.9
	Greater	4	17.4	17.4	91.3
	Most	2	8.7	8.7	100.0
	Total	23	100.0	100.0	

Project Priority

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Lower	11	47.8	47.8	47.8
	Average	6	26.1	26.1	73.9
	Greater	6	26.1	26.1	100.0
	Total	23	100.0	100.0	

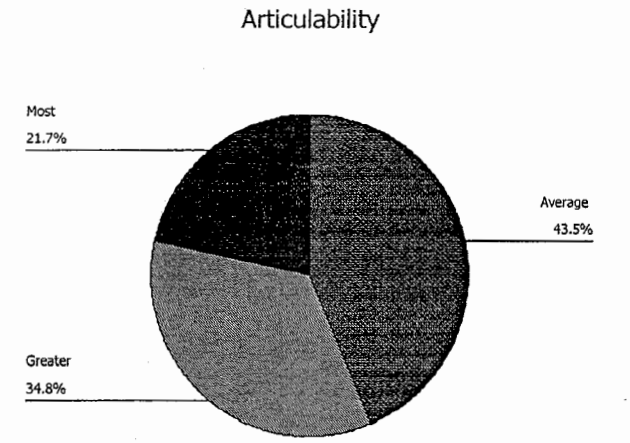
Org distance

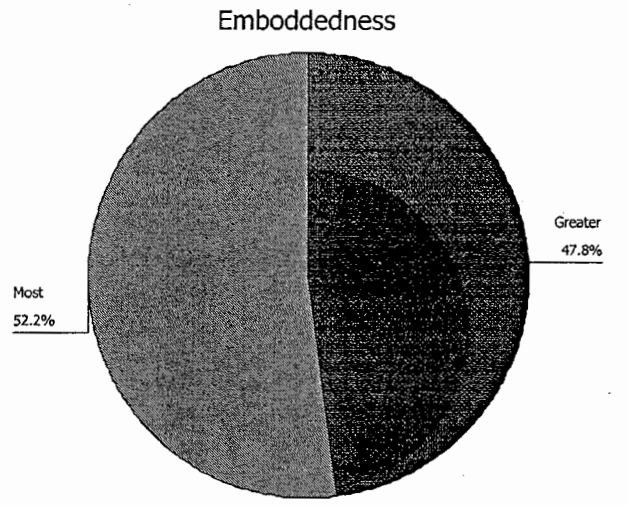
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Least	6	26.1	26.1	26.1
	Lower	11	47.8	47.8	73.9
	Average	6	26.1	26.1	100.0
	Total	23	100.0	100.0	

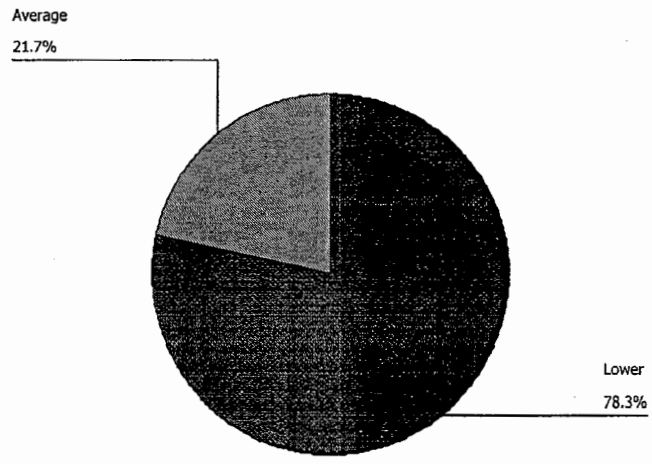
Transfer distance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Greater	9	39.1	39.1	39.1
	Most	14	60.9	60.9	100.0
	Total	23	100.0	100.0	

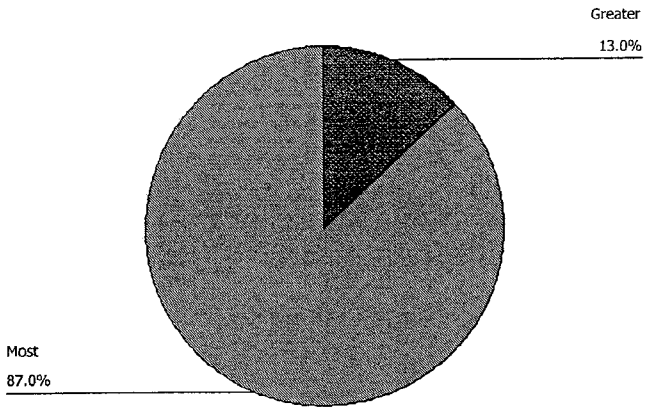
Pie Chart


Articulability
Most
21.7%
Average
43.5%
Greater
34.8%

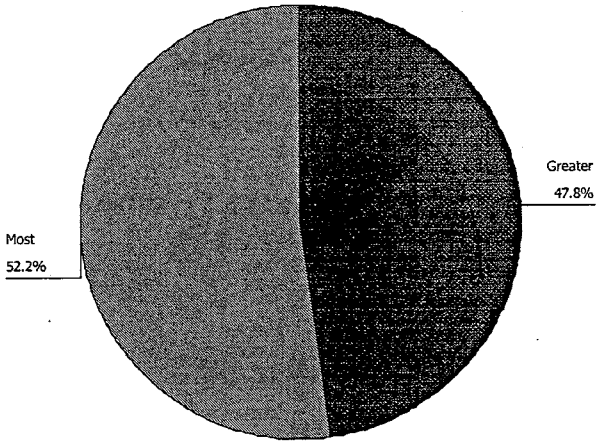

Emboddedness
Greater
47.8%
Most
52.2%


Physic distance
Average
21.7%
Lower
78.3%

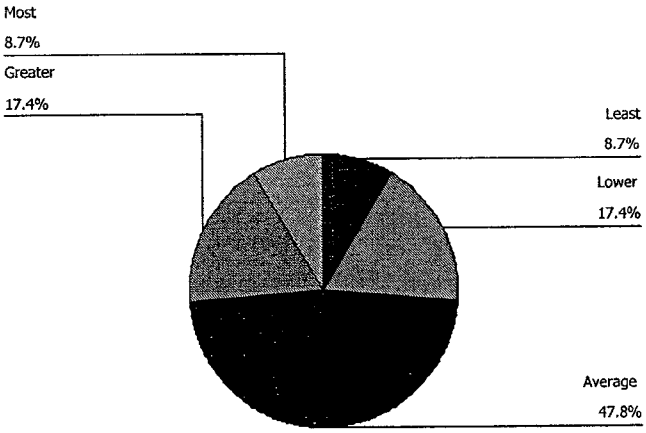
Norm distance



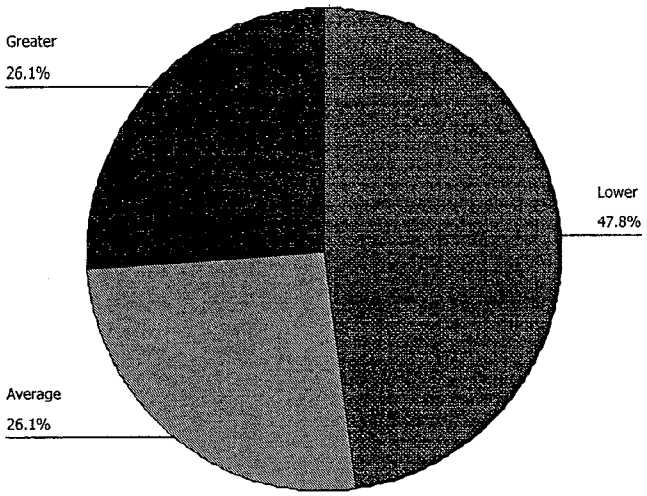
Knowledge distance



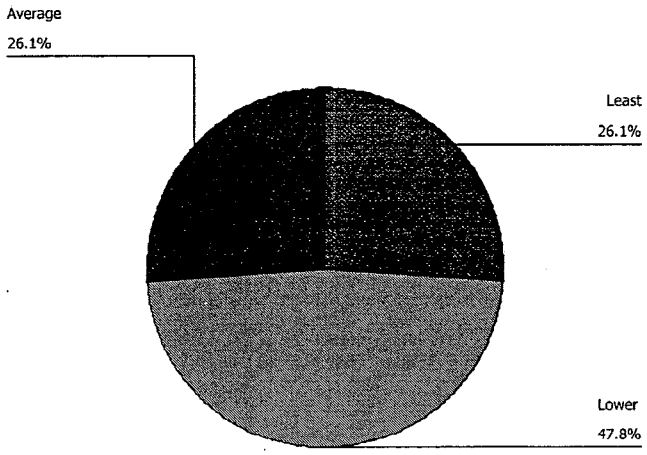
Learning culture



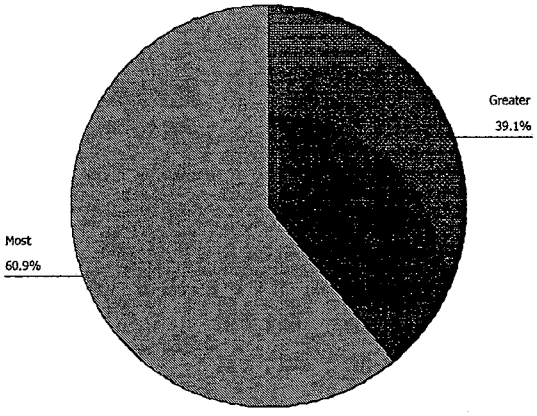
Project Priority



Org distance



Transfer distance



APPENDIX C

QUESTIONNAIRE

แบบประเมิน "วัฒนธรรมการจัดการองค์ความรู้ในองค์การ"

แบบประเมินวัฒนธรรมการจัดการความรู้นี้มีจุดมุ่งหมายเพื่อช่วยให้องค์การทำการประเมินตนเองในการทราบและ สามารถประเมินเพื่อปรับปรุงวัฒนธรรมองค์การด้วยแนวทางการจัดการคุณภาพทั่วทั้งองค์การ (TQM) เพื่อสนับสนุนการจัดการความรู้ เครื่องมือนี้แบ่งเป็น 6 ส่วน

กรุณาส่งแบบสอบถามคืน กฤษดา พิศลยบุตร
หมายเลขโทรศัพท์ 02-3108570 โทรสาร 02-310-8579
email: bkrisda@msn.com
คณะวิศวกรรมศาสตร์ มหาวิทยาลัยรามคำแหง อาคารลายสือไท
ถนนรามคำแหง หัวหมาก บางกะปิ กทม 10240

ส่วนที่ 1
ข้อมูลทั่วไป

กรุณาตอบคำถามต่อไปนี้ตามที่ท่านทราบ หากคำถามใดที่ไม่ทราบข้อมูลท่านสามารถเว้นว่างไว้ได้

เพศ ( ) หญิง ( )ชาย
ตำแหน่งงาน ( )ผู้จัดการ ( )นักวิทยาศาสตร์/วิศวกร ( ) พนักงานปฏิบติงาน
ประสบการณ์ทำงาน) ปี(( )น้อยกว่า 5 ปี ( )5 – 10 ปี ( )10 – 15 ปี ( )15 ปี ขึ้นไป
ระดับการศึกษา ( ) ต่ำกว่าปริญญาตรี ( ) ปริญญาตรีหรือเทียบเท่า ( ) สูงกว่าปริญญาตรี
ความเชี่ยวชาญหรือความถนัดในงานที่ปฏิบัติ.....
การฝึกอบรมที่ได้รับในช่วงเวลาสามปีที่ผ่านมา.....
.....
จำนวนผลิตภัณฑ์ที่พัฒนาในรอบปี

( ) น้อยกว่า 5 ( ) 5 – 10 ( ) 10 – 15 ( ) 15 -20 ( )มากกว่า 20

จำนวนที่ประสบความสำเร็จ

( )น้อยกว่า 5 ( ) 5 – 10 ( ) 10 – 15 ( ) 15 -20 ( )มากกว่า 20

ระยะเวลาพัฒนาต่อผลิตภัณฑ์

( )น้อยกว่า 3 เดือน ( ) 3 – 6 เดือน ( ) 6 เดือน – 1 ปี ( ) มากกว่า 1 ปี

จำนวนบุคลากรที่ใช้ในทีมพัฒนาผลิตภัณฑ์ (คน)

( )1 ( ) 2 – 5 ( ) 5 – 10 ( ) 10 - 15 ( )มากกว่า 15

ระยะเวลาเฉลี่ยที่ผลิตภัณฑ์จะวางแผนในท้องตลาด.....

ร้อยละของงบประมาณในงานพัฒนาผลิตภัณฑ์เทียบกับงบประมาณทั้งหมด.....

ร้อยละของรายได้จากผลิตภัณฑ์ที่ได้พัฒนาเทียบกับรายได้รวม.....

ส่วนที่ 2
วัฒธรรมการจัดการองค์ความรู้

คำแนะนำ : ประเมินว่าองค์การของท่านมีการดำเนินการเกี่ยวกับการจัดการความรู้อย่างไร
1= ไม่มีเลย 2 = มีน้อยมาก 3 = มีระดับปานกลาง 4 = มีในระดับที่ดี5 = มีในระดับที่ดีมาก

I. กระบวนการจัดการความรู้

P1 .แผนกงานของท่านมีการวิเคราะห์อย่างเป็นระบบเพื่อหาจุดบกพร่องในเรื่องความรู้และใช้กระบวนการที่เป็นขั้นตอนชัดเจนในการแก้ไขจุดบกพร่อง

O1 O2 O3 O4 O5

P2. แผนกงานของท่านมีวิธีการในการแสวงหา จัดเก็บ และใช้ความรู้ เกี่ยวกับ วัตถุดิบ กระบวนการสินค้า อย่างเป็นระบบ

O1 O2 O3 O4 O5

P3. พนักงานทุกคนของแผนกงานมีส่วนร่วมในการแสวงหาความคิดใหม่ๆ ทั้งในและนอกระบบการทำงานปกติ โดยเฉพาะในการพัฒนาผลิตภัณฑ์

O1 O2 O3 O4 O5

P4. แผนกงานมีกระบวนการถ่ายทอดวิธีปฏิบัติที่ดี) Best Practices (จากการดำเนินการหรือการแก้ปัญหาที่ประสบความสำเร็จ ที่เป็นระบบ ซึ่งรวมถึงการมีการจัดทำข้อมูลที่ได้เป็นเอกสารและบทเรียนที่ได้รับ

O1 O2 O3 O4 O5

P5. องค์การเห็นคุณค่าของ ความรู้โดยนัยและทักษะที่ฝังในตัวพนักงานแต่ละคนและสนับสนุนให้มีการถ่ายทอดความรู้และทักษะนั้นๆ ทั่วทั้งองค์การ

O1 O2 O3 O4 O5

รวมคะแนน) ข้อ P1 ถึง P5 (:.....

II. ผู้แลกเปลี่ยนความรู้

L1. การจัดการความรู้เป็นกลยุทธ์ที่สำคัญขององค์การ

O1 O2 O3 O4 O5

L2. องค์การเข้าใจถึงศักยภาพของสินทรัพย์ทางความรู้ (Knowledge assets (ในการทำรายได้ให้องค์การ และมีการพัฒนากลยุทธ์ต่างๆ เพื่อทำการตลาดและขายสินทรัพย์ทางความรู้เหล่านั้น

O1 O2 O3 O4 O5

L3. องค์การใช้การเรียนรู้เพื่อเสริม Core competencies ที่มีอยู่ ให้เข้มแข็งและเพื่อสร้าง Core competencies ใหม่ๆ

O1 O2 O3 O4 O5

L4. การว่าจ้าง ประเมินผลให้ผลตอบแทนพนักงาน จะพิจารณาถึงการที่พนักงานมีส่วนร่วมในการสร้างองค์ความรู้และแลกเปลี่ยนองค์ความรู้

O1 O2 O3 O4 O5

L5. พนักงานเข้าใจและร่วมมือในการเปลี่ยนแปลงปรับปรุงต่างๆที่เกิดขึ้นในองค์การได้ง่ายการ

O1 O2 O3 O4 O5

รวมคะแนน) ข้อ L1 ถึง L5 (:.....

III. การแลกเปลี่ยนระหว่างผู้มีส่วนในการจัดการความรู้

C1. องค์การส่งเสริมและให้การสนับสนุนการแลกเปลี่ยนเรียนรู้

O1 O2 O3 O4 O5

C2. ทั่วทั้งองค์การมีบรรยากาศของการเปิดเผยและไว้วางใจซึ่งกันและกัน

O1 O2 O3 O4 O5

C3. องค์การตระหนักว่าวัตถุประสงค์หลักของการดำเนินการเรื่องการจัดการความรู้ คือ การสร้างคุณค่าให้ลูกค้า

O1 O2 O3 O4 O5

C4. กระบวนการเรียนรู้เป็นผลที่เกิดจาก “การปรับปรุงของระบบการทำงาน” และ “ความอยาก” ในการสร้างนวัตกรรม

O1 O2 O3 O4 O5

C5. การเรียนรู้ถือเป็นความรับผิดชอบของพนักงานทุกคน

O1 O2 O3 O4 O5

C6. การติดต่อสื่อสารของพนักงานระหว่างกันมีหลายช่องทาง สะดวก ง่าย

O1 O2 O3 O4 O5

C7. การแลกเปลี่ยนการเรียนรู้ของพนักงานทุกคนมีความเหมือนกันในด้ายความสนใจ พื้นฐานความรู้ ประสบการณ์ของทั้งสองฝ่าย

O1 O2 O3 O4 O5

รวมคะแนน) ข้อ C1 ถึง C7 (:.....

IV. กิจกรรมในการจัดการความรู้

T1. เทคโนโลยีที่ใช้ช่วยให้ทุกคนในองค์การเชื่อมโยงและสื่อสารกันได้อย่างทั่วถึงและเชื่อมโยงกับหน่วยงานนอกที่เกี่ยวข้องได้ด้วย

O1 O2 O3 O4 O5

T2. เทคโนโลยีที่ใช้ก่อให้เกิดคลังความรู้ขององค์การ ที่ทุกคนในองค์การสามารถเข้าถึงได้

O1 O2 O3 O4 O5

T3. เทคโนโลยีที่ใช้ทำให้องค์การตอบสนองลูกค้าดีขึ้น

O1 O2 O3 O4 O5

T4. องค์การสนับสนุนเรื่องการพัฒนาเทคโนโลยีสารสนเทศที่มีคนเป็นศูนย์กลาง) Human Centered Information Technology(

O1 O2 O3 O4 O5

T5. องค์การพร้อมและสนับสนุนเต็มที่ที่จะนำเทคโนโลยีที่ช่วยให้เกิดการประสานงานที่ดีขึ้นมาให้พนักงานใช้

O1 O2 O3 O4 O5

T6. ระบบสารสนเทศขององค์การเป็นแบบ “ให้ข้อมูลได้ทันทีที่เกิดขึ้นจริง (Real-time)” “มีการบูรณาการกัน” และ “ชาญฉลาด”

O1 O2 O3 O4 O5

รวมคะแนน) ข้อ T1 ถึง T5(:.....

V. การวัดผลการจัดการความรู้

M1. องค์การคิดค้นวิธีการต่างๆ ที่เชื่อมโยงความรู้กับผลการดำเนินการด้านการเงิน

O1 O2 O3 O4 O5

M2. องค์การมีการกำหนดตัวชี้วัดสำหรับการจัดการความรู้ไว้โดยเฉพาะ

O1 O2 O3 O4 O5

M3. มีความสมดุลระหว่างตัวชี้วัดที่ตีค่าออกมาเป็นตัวเงินได้ง่าย) เช่น ต้นทุนที่ลดได้ ,การเพิ่มผลผลิต ฯลฯ (และตัวชี้วัดที่ตีค่าเป็นตัวเงินได้ยาก) เช่น ความถึงพอใจของลูกค้า การตอบสนองลูกค้าได้เร็วขึ้น ,การพัฒนาของบุคลากร ฯลฯ(

O1 O2 O3 O4 O5

M4. องค์การจัดสรรทรัพยากรให้กับกิจกรรมต่างๆ ที่ทำให้ฐานความรู้ขององค์การเพิ่มพูนขึ้นอย่างเห็นได้ชัด

O1 O2 O3 O4 O5

รวมคะแนน) ข้อ M1 ถึง M4) :.....

VI. Total Quality Management Culture

Q1. ทุกคนในองค์การเห็นความสำคัญ ให้ความสำคัญและเป็นส่วนในการก่อให้เกิดคุณภาพต่อลูกค้า

O1 O2 O3 O4 O5

Q2. พนักงานมีโอกาสและอิสระในการตัดสินใจและมีการมอบอำนาจหนาที่ ความรับผิดชอบ

O1 O2 O3 O4 O5

Q3. การให้รางวัลพิจารณาจากผลงานของทีม ไม่ใช่ส่วนตัว

O1 O2 O3 O4 O5

Q4. องค์การสนับสนุนเรื่องการประสานงานกันระหว่างบุคคล แผนก สายงาน

O1 O2 O3 O4 O5

Q5. องค์การมีระบบการพิจารณาความดีความชอบที่ยุติธรรมและมีความมั่นคงในอาชีพ

O1 O2 O3 O4 O5

Q6. ทุกคนในองค์การตระหนักและมีความต้องการจะพัฒนางานและผลิตภัณฑ์ให้ดียิ่งขึ้นโดยต่อเนื่อง

O1 O2 O3 O4 O5

รวมคะแนน) ข้อ Q1 ถึง Q5(:.....

----------ขอขอบคุณที่ท่านได้สละวลาให้ข้อมูลที่มีประโยชน์อย่างยิ่งต่องานวิจัยครั้งนี้----------

แบบประเมิน "ผลสำเร็จการการจัดการองค์ความรู้ในองค์การ"

การประเมินเชิงคุณภาพ

แบบประเมินวัฒนธรรมการจัดการความรู้นี้มีจุดมุ่งหมายเพื่อช่วยให้องค์การทำการประเมินผลสำเร็จในการวิจัยและพัฒนาเพื่อการพัฒนาผลิตภัณฑ์ใหม่

กรุณาส่งแบบสอบถามคืน กฤษดา พิศลยบุตร
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คณะวิศวกรรมศาสตร์ มหาวิทยาลัยรามคำแหง อาคารลายสือไท
ถนนรามคำแหง หัวหมาก บางกะปิ กทม 10240

ส่วนที่ 1
ข้อมูลทั่วไป

กรุณาตอบคำถามต่อไปนี้ตามที่ท่านทราบ หากคำถามใดที่ไม่ทราบข้อมูลท่านสามารถเว้นว่างไว้ได้

เพศ ( ) หญิง ( )ชาย

ตำแหน่งงาน ( )ผู้จัดการ ( ) นักวิทยาศาสตร์/วิศวกร ( ) พนักงานปฏิบัติงาน

ประสบการณ์ทำงาน) ปี( )น้อยกว่า 5 ปี ( ) 5 – 10 ปี ( ) 10 – 15 ปี ( ) 15 ปี ขึ้นไป

ระดับการศึกษา ( ) ต่ำกว่าปริญญาตรี ( ) ปริญญาตรีหรือเทียบเท่า ( ) สูงกว่าปริญญาตรี

ส่วนที่ 2
ความสำเร็จขององค์การในการวิจัยและพัฒนาผลิตภัณฑ์
การประเมินเชิงคุณภาพ

คำแนะนำ : ประเมินว่าองค์การของท่านมีการดำเนินการอย่างไร

1= ไม่มีเลย 2 = มีน้อยมาก 3 = มีระดับปานกลาง 4 = มีในระดับที่ดี5 = มีในระดับที่ดีมาก

1. ความเปลี่ยนแปลงด้านการจัดการและภาวะผู้นำ

L1 .แผนกงานของท่านมีลักษณะของวัฒนธรรมนวัตกรรม) การคิดอย่างอิสระ การเรียนรู้จากประสบการณ์ การรับความเสี่ยง การทดลองแนวความคิดใหม่ (

O1 O2 O3 O4 O5

L2 .สารสนเทศในระดับการจัดการ มีการเผยแพร่ทั่วถึง และเที่ยงตรงทั้งระดับเดียวกับและ ระดับการบริหาร

O1 O2 O3 O4 O5

L3 .การสร้างภาวะผู้นำ การถ่ายทอดและกรได้มาซึ่งองค์ความรู้ใหม่และทักษะเป็นส่วนหนึ่งของวัฒนธรรมองค์การ

O1 O2 O3 O4 O5

L4 .ผู้นำมีการตรวจสอบสภาพการดำเนินการและเตรียมรับการเปลี่ยนแปลง

O1 O2 O3 O4 O5

2. ความเปลี่ยนแปลงด้านทีมงานและการจัดการทรัพยากร

H1 .ทรัพยากรบุคคลที่จำเป็นต่อการดำเนินการได้มีการเตรียมการอย่างบเหมาะสม

O1 O2 O3 O4 O5

H2 .ทรัพยากรบุคคลที่จำเป็นต่อนวัตกรรมได้มีการจัดสรรและมีความชัดเจน

O1 O2 O3 O4 O5

H3 .ระบบรางวัลที่สัมพันธ์กับการสร้างสรรค์นวัตกรรมได้มีการจัดการอย่างเหมาะสม ได้ตรวจสอบโดยผู้ปฏิบัติงานและได้รับความเห็นชอบ ยอมรับ

O1 O2 O3 O4 O5

H4 .ทรัพยากรบุคคลมีส่วนร่วมในกิจกรรมเกี่ยวข้องกับนวัตกรรม

O1 O2 O3 O4 O5

3. ความเปลี่ยนแปลงด้านตัวบุคคล

P1 .ทรัพยากรบุคคลที่จำเป็นต่อนวัตกรรมได้มีการพัฒนาตนเองเพื่อความพร้อมในด้านนวัตกรรม

O1 O2 O3 O4 O5

P2 .ทรัพยากรบุคคลที่จำเป็นต่อนวัตกรรมได้มีการจัดสรรและมีความชัดเจน

O1 O2 O3 O4 O5

P3 .ผู้ที่เป็นบุคคลสำคัญหลักของทีมงาน ใช้เวลามากกว่า ร้อยละ 80 ในกิจกรรมนวัตกรรม

O1 O2 O3 O4 O5

P4 .ผู้ร่วมงานในทีมงานนวัตกรรมมาจากหลายสายงาน ทำงานร่วมกันโดยยึดมั่นต่อเป้าหมายร่วม

O1 O2 O3 O4 O5

P5 .มีการกระจายอำนาจและให้มีส่วนร่วมในการตัดสินใจ กาวางแผน

O1 O2 O3 O4 O5

P6 .มีการยอมรับความคิดใหม่จากภายนอก ในการทำงาน

O1 O2 O3 O4 O5

4. ความเปลี่ยนแปลงด้านกระบวนการดำเนินงาน

O1 .มีการใช้ " best practices" ด้านนวัตกรรม เพื่อตั้งเป้าหมายการทำงาน

O1 O2 O3 O4 O5

O2 .ไม่พบว่ามีการละเลยกิจกรรมสำคัญในการอกแบบและพัฒนาผลิตภัณฑ์ใหม่เลย

O1 O2 O3 O4 O5

O3 .ความผิดพลาดในด้านการตลาด การผลิต การออกแบบ ลดลงอย่างต่อเนื่องในกระบวนการพัฒนาผลิตภัณฑ์

O1 O2 O3 O4 O5

5. ความเปลี่ยนแปลงด้านยุทธศาสตร์

S1 .วิสัยทัศน์ พันธกิจ ป้าหมาย จุดประสงค์เป็นที่ทราบทั่วถึงทั้งองค์การ ชัดเจน

O1 O2 O3 O4 O5

S2 .นโยบายด้านนวัตกรรมได้มีการรองรับสนับสนุนด้วยแผนของแผนกระยะกลาง แผนการปฏิบัติงาน

O1 O2 O3 O4 O5

S3 .มีการตั้งมาตรฐาน วัดความสำเร็จ ด้านนวัตกรรม

O1 O2 O3 O4 O5

S2 .นโยบายด้านนวัตกรรมได้มีการรองรับสนับสนุนด้วยแผนของแผนกระยะกลาง แผนการปฏิบัติงาน

O1 O2 O3 O4 O5

6 . ความเปลี่ยนแปลงด้านผลิตภัณฑ์

R1 .ยอดขายสินค้าที่เกิดจากด้านนวัตกรรมมียอดสูงขึ้นกว่า สามปีที่ผ่านมา

O1 O2 O3 O4 O5

S2 .จำนวนผลิตภัณฑ์ จากนวัตกรรม สูงกว่าคู่แข่ง เมื่อเทียบกับสามปีที่ผ่านมา

O1 O2 O3 O4 O

R3 .กำไรจากสินค้าที่มาจาก นวัตกรรม สูงขึ้นกว่าสามปีที่ผ่านมา

O1 O2 O3 O4 O5

ความสำเร็จขององค์การในการวิจัยและพัฒนาผลิตภัณฑ์
การประเมินเชิงปริมาณ

1. การเปลี่ยนแปลงด้านผู้มีผลประโยชน์เกี่ยวข้อง

- เวลาที่ใช้หารือกับลูกค้า
- จำนวนครั้งที่ พบลูกค้า
- จำนวนผลิตภัณฑ์ที่พัฒนาด้วยความร่วมมือของลูกค้า
- จำนวนผลิตภัณฑ์ที่ผู้บริหารระดับสูงเกี่ยวข้อง
- จำนวนผลิตภัณฑ์ที่พนักงานการผลิตเกี่ยวข้อง
- จำนวนจำนวนผลิตภัณฑ์ที่พนักงานการตลาดเกี่ยวข้อง
- จำนวนผลิตภัณฑ์ที่ต้องการข้อมูลจากการตลาด

2. การเปลี่ยนแปลงด้านการดำเนินงาน

- จำนวนรางวัลที่ได้รับต่อสินค้านวัตกรรม
- จำนวนครั้งที่พนักงานร้องเรียน
- ระดับความพึงพอใจพนักงาน
- จำนวนครั้งการฝึกอบรม พนักงาน
- ปริมาณงบประมาณทางสารสนเทศ
- จำนวนผลิตภัณฑ์ใหม่จากฝ่ายวิจัยและพัฒนา

3. การเปลี่ยนแปลงด้านการนำความรู้มาใช้ใหม่

- จำนวนครั้งที่ความรู้ ข้อมูลจากโครงการพัฒนาผลิตภัณฑ์เดิมได้นำมาใช้ใหม่
- จำนวนสิทธิบัตร
- จำนวนการเปลี่ยนแปลงในการพัฒนาผลิตภัณฑ์
- ระยะเวลาจนถึงความต้องการองค์ความรู้
- ระยะเวลาจนกว่าองค์ความรู้ใหม่ได้เก็บรักษา

4. การเปลี่ยนแปลงด้านการเสร้าง องค์ความรู้ใหม่

- จำนวน ผลิตภัณฑ์ที่ใหม่โดยสมบูรณ์แบบ
- จำนวนผลิตภัณฑ์ที่ปรับปรุงแก้ไขเพิ่มเติมจากเดิม

- จำนวนเทคโนโลยีใหม่ในตลาดใหม่
- จำนวนเทคโนโลยีใหม่ในตลาดเดิม
- จำนวนเทคโนโลยีเดิมในตลาดใหม่
- จำนวนเทคโนโลยีเดิมในตลาดเดิม
- ส่วนแบ่งการตลาดของนวัตกรรม

5. การเปลี่ยนแปลงด้านสมรรถภาพการดำเนินงานของสายงานวิจัยและพัฒนา

- จำนวนข้อร้องเรียนจากลูกค้า
- จำนวนลูกค้าที่ซื้อผลิตภัณฑ์ใหม่ที่เพิ่มขึ้น
- จำนวนความเห็นเชิงบอกต่อผลิตภัณฑ์
- จำนวนผลิตภัณฑ์ที่สนองความต้องการลูกค้า
- จำนวนผลิตภัณฑ์ที่ส่งมอบโดยไม่มีของเสีย

6. การเปลี่ยนแปลงด้านความสำเร็จทางการเงิน

- จำนวนผลิตภัณฑ์ใหม่ที่รองรับความต้องการใหม่ จากลูกค้า
- ปริมาณการขาย
- ปริมาณยอดขายผลิตภัณฑ์ใหม่
- จำนวนผลิตภัณฑ์ในรอบปีที่ผ่านมา

----------ขอขอบคุณที่ท่านได้สละเวลาให้ข้อมูลที่มีประโยชน์อย่างยิ่งต่องานวิจัยครั้งนี้----------

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