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YEDİTEPE UNIVERSITY
GRADUATE INSTITUTE OF SOCIAL SCIENCES

THE IMPACT OF SHARED KNOWLEDGE ON SERVICE QUALITY

(An Application of the Structural Equation Modeling - SEM)

By

Abdulkadir KIRMIZI

Submitted to the Graduate Institute of Social Sciences in partial fulfillment of the requirements for the degree of Doctor of Philosophy (Management and Organization)

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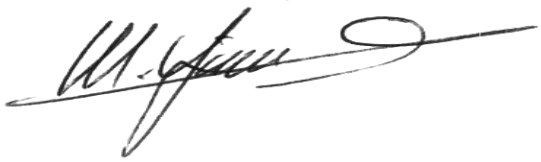
Doç. Dr. Mehmet Y. YAHYAGİL	
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LIST OF SYMBOLS

Symbol	Explanation
β	The regression coefficient
ρ_x	The reliability of the predictor variable
R^2	Overall coefficient of determination
χ^2	Chi-square statistic
n	Required sample size
N	Population size
B	Tolerated error of estimation
z	The abscissa of the normal curve that cuts off an area at the tails
m	The margin of error
p	The estimated value for the proportion of a sample that will respond to a survey question

LIST OF ABBREVIATIONS

Abbreviation	Explanation
IT	Information Technology
IS	Information Systems
SEM	Structural Equation Modeling
GFI	Goodness of Fit Index
TLI	Tucker Lewis Index
NFI	Normed Fit Index
CFI	Comparative Fit Index
MLE	Maximum Likelihood Estimation
RMSR	Root Mean Square Residual
ICT	Information and Communication Technology
QFD	Quality Function Deployment
PC	Personal Computer
ATM	Automated Teller Machines
PDA	Personal Digital Assistant
iDTV	Interactive Digital Television
POS	Point of Sale Device
EFA	Exploratory Factor Analysis
CFA	Confirmatory Factor Analysis
BPR	Business Process Reengineering
MIS	Management Information Systems
ERP	Enterprise Resource Planning
WLS	Weighted Least Squares
GLS	Generalized Least Squares
ADF	Asymptotically Distribution Free

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THE IMPACT OF SHARED KNOWLEDGE ON SERVICE QUALITY
(An Application of Structural Equation Modeling – SEM)

Prepared By : Abdulkadir KIRMIZI

ABSTRACT

This doctoral thesis builds and tests a theoretical model that reveals the relationship between mutual influence, mutual trust, shared knowledge and service quality using structural equation modeling (SEM). This is achieved through a research on the Internet banking service.

After a detailed analysis of the previous empirical studies, we developed our shared knowledge and service quality model. The model is based on two different approaches in two different areas. On one hand, there is a shared knowledge model which has been developed and tested by different scholars. On the other hand, service quality and its antecedents has been an attractive area for the researchers. This study is linking both area and filling the gap between the two.

In the shared knowledge model, mutual trust and mutual influence are the contributors to the shared knowledge. We used an instrument to evaluate these three elements which is already developed by the previous researchers. Using key informant methodology, two department heads has been surveyed in each Bank. 32 surveys have been collected from 16 banks in Turkey.

On the service quality side, we used an instrument which is developed based on the very well known instrument SERVQUAL. The instrument is a combination of E-S-QUAL and E-RecS-QUAL and called ESQ. Surveys based on this instrument are applied to the 142 Internet banking customers.

The model has been developed and tested using SEM methodology. SEM offers a means of developing and evaluating ideas about complex (multivariate) relationships. It is much easier to analyze the relationships in the complex models using SEM. AMOS 7.0 statistical program has been used to work on the model and to test it.

Finally, our conclusions are presented together with a reference to the limitations of the study, implications to the managers and recommendations for the future research. Based on the literature study and the results of our research, there are three main findings of our study. The proved significant contributions are: a) mutual influence to mutual trust, b) mutual trust to shared knowledge, and lastly, c) shared knowledge to service quality. Companies would be able to increase their service qualities in different areas by focusing on and putting efforts to increase the mutual influence, mutual trust and in turn, shared knowledge in their company.

Keywords: Shared knowledge, service quality, mutual trust, mutual influence, Internet banking

PAYLAŞILAN BİLGİNİN SERVİS KALİTESİ ÜZERİNE ETKİSİ (Bir Yapısal Eşitlik Modelleme –YEM Uygulaması)

Hazırlayan : Abdulkadir KIRMIZI

ÖZET

Bu tez; karşılıklı etkileşim, karşılıklı güven, paylaşılan bilgi ve servis kalitesi kavramları arasındaki ilişkiyi ortaya koyan teorik bir modelin oluşturulması ve Yapısal Eşitlik Modelleme (YEM) yöntemi ile analiz edilmesini içermektedir. Araştırma, Internet bankacılığı servisi özelinde gerçekleştirilmiştir.

Daha önce yapılmış ampirik çalışmalarla ilgili literatür çok detaylı bir şekilde analiz edildikten sonra, bu tezin konusu olan paylaşılan bilgi ve servis kalitesi modeli ortaya konmuştur. Bu model iki ayrı alandaki iki ayrı yaklaşım üzerine kuruludur. Bir yandan, bazı bilim adamları paylaşılan bilgi modelini geliştirip bu modelin uygulamalarını ortaya koyarken, diğer yandan servis kalitesi ve nedenleri modellemesi çok sayıda bilim adamının ilgilendiği bir alan olmuştur. Bu araştırma, her iki alan arasında bağlantı kurarak bu konudaki boşluğun doldurulmasını amaçlamaktadır.

Paylaşılan bilgi modelinde, karşılıklı güven ve karşılıklı etkileşim paylaşılan bilgiye katkıda bulunur. Araştırmanın bu bölümü için daha önceden bazı bilim adamları tarafından geliştirilmiş ölçümleme yöntemi kullanılarak bu üç kavram araştırılmıştır. Anahtar bilgi kaynağı metodu kullanılarak her bankada iki bölüm yöneticisine anket uygulanmıştır. Toplam 16 bankadan 32 adet anket toplanmıştır.

Servis kalitesi ölçümlemesinde ise SERVQUAL'dan türetilmiş bir ölçümleme yöntemi kullanılmıştır. Ölçümleme yöntemi E-S-QUAL ve E-RecS-QUAL'ın biraraya getirilmiş hali olan ESQ'dir. Bu yöntem sayesinde oluşturulan anket 142 kişiye uygulanmıştır.

Model YEM yöntemi kullanılarak analiz edilmiştir. YEM karmaşık ilişkileri analiz etmek için çeşitli araçlar sunmakta ve bu karmaşık ilişkilerin kolaylıkla analiz edilmesine imkan sağlamaktadır. Oluşturulan model AMOS 7.0 adlı istatistik programı kullanılarak incelenmiştir.

Son bölümde, araştırmanın sınırları ile birlikte erişilen sonuçlara, yöneticiler için anlamına ve araştırmacılar için tavsiyelere yer verilmiştir. Literatür taraması ve araştırmanın ışığında üç sonuca ulaşılmıştır. a) karşılıklı etkileşim karşılıklı güveni tetiklemekte, b) karşılıklı güven paylaşılan bilgiyi tetiklemekte c) paylaşılan bilgi ise servis kalitesini etkilemektedir. Firmalar, organizasyonlarının ilgili bölümleri arasındaki karşılıklı etkileşime, karşılıklı güvene ve paylaşılan bilgiye odaklanıp bunları arttırdıkları takdirde, müşterilerine değişik konularda sundukları servisin kalitesini de yükseltmiş olurlar.

Anahtar Kelimeler: Paylaşılan bilgi, servis kalitesi, karşılıklı güven, karşılıklı etkileşim, Internet bankacılığı

1. INTRODUCTION

1.1. Statement of the Problem

In the last two decades of the 20th century, a group of distinguished scholars (Drucker, 1988; Sveiby, 1992; Nonaka and Takeuchi, 1995; Grant and Baden-Fuller, 1995; Grant, 1997; Ichijo et al., 1998) have proposed that evolution is based on the management of knowledge; in other words, success of an organization depends on how the knowledge is created, acquired, shared and applied in the organizations to be creative and innovative. Knowledge Management (KM) is regarded as the new paradigm of the 21st century.

On the other hand, another group of distinguished scholars (McFarlan et al., 1983; Davenport and Short, 1990; Henderson and Venkatraman, 1993; Venkatraman, 1994; Applegate et al., 1999; McNurlin and Sprague, 2004) are emphasizing the prospect that the emerging Information Technology (IT) may become the driving force behind the required business transformation. Management of organizations should seek for the opportunities facilitated by IT in order to be able to keep up with the customer expectations with low costs and high quality.

The sharing of knowledge is a different process than managerial communication (Schrage, 1990; Sherif and Sherif, 1953). Shared knowledge goes beyond the basic informational level and it does so by first building a common language among the groups involved (Keen, 1988; Swanson, 1974). This common language, expressed in words or symbols that are understood by different groups, facilitates knowledge transfer. It enables the groups and their managers to develop an appreciation and understanding of each other's environment rather than simply exchanging information and translating technical and procedural terms.

Nelson and Cooprider (1996) defined "Shared Knowledge" as an understanding and appreciation among groups and their managers, for the technologies and processes that affect their mutual performance. Appreciation and understanding are the two core elements of shared knowledge. Appreciation among diverse groups must be characterized by sensitivity to the point of reference and interpretation of the other group, in order to

overcome the barriers caused by the different environments and languages used. For example, the appreciation that exists between a business development and an information systems (IS) group is different than the appreciation between human resources and accounting. This is due to the different environments and languages used by different business groups.

Delivering quality IT service in organizations is filled with considerable uncertainty stemming from the nature of the technology as well as the human issues surrounding design, implementation and operation (Robey et al., 1989). The effective management of these issues requires high levels of collaboration between providers of IT services and user groups in organizations. Several researchers have indicated that collaborative action is enhanced by the creation of strong partnerships between these groups (Henderson, 1990; Lasher et al., 1991). Central to the creation of partnerships is congruence in the perception of requirements and constraints of one group by the other and the existence of channels of communication and influence between the groups. The existence of both of these enhances mutually satisfactory adaptation through patterns of influence and negotiation, enabling IS groups to deliver products and services that users' appraise (Subramani and Henderson, 1996).

A deeper level of knowledge must be shared in order to achieve mutual understanding and this is often characterized as organizational knowledge. Badaracco (1991, p. 81) describes organizational knowledge as embedded knowledge, which is defined as: "knowledge which resides primarily in specialized relationships among individuals and groups and in the particular norms, attitudes, information flows, and ways of making decisions that shape their dealings with each other". A lack of this organizational and cross-functional knowledge may result in losses of business unit performance.

A major issue facing managers of IS groups is the increasing pressure to demonstrate the business value of the firm's investment in IT (Nelson and Cooprider, 1996). To take full advantage of the opportunities facilitated by IT, senior managers must integrate the management of information technology into the various business departments and functions of the firm (Henderson and Venkatraman, 1993; McFarlan, et al., 1983). Improving the relationship between IS and line managers has frequently been suggested as a way to meet this challenge (Boynton, et al., 1992; Elam, 1988; Rockart and Short, 1991).

The IS group's ability to effectively work with diverse functional groups can be a major factor in both IS and organizational performance (Henderson, 1990; Keen, 1988; Rockart and Short, 1991).

The recent development of information technology has led to major changes in the way services are delivered to the customers. Nowadays, customers are using more and more self-service options, which are more convenient and fast. In addition, the advent and use of the Internet has changed considerably the daily activities of most people, such as shopping and banking. The popularity of banking services delivered over the Internet (online banking services) is increasing in recent years (TUIK, 2005).

Online services, including online banking services, are becoming an attractive alternative to visiting service outlets or phoning call centers for increasing number of customers (HR-Focus 2000; Tracking 2001). Some of the reasons for customers to prefer online services (as online banking services) are convenience (Meuter, Ostrom, Roundtree and Bitner, 2000; Szymanski and Hise, 2000), feeling more in control of the service process (Bateson, 2000; Dabholkar, 1996) and avoiding human contact and saving time (Dabholkar, 1996; Meuter et Al., 2000). As far as online services are concerned, it is easier for customers to evaluate and compare the benefits of competing services (Santos, 2003). In addition, the switching costs are very low. That is why retaining the customer in the Internet space is of vital importance (Reichheld and Schefter, 2000). In order for service providers to retain their e-customers, they should have better understanding of how customers perceive and evaluate the quality of the electronically offered services. Businesses that have been experienced and successful in offering e-services are starting to apprehend that besides website presence and low price, the important success or failure factors also include the electronic service quality (Yang, 2001; Zeithaml, 2002). Although the literature on service quality is abundant (Parasuraman et al., 1991; Cronin and Taylor, 1992; Zeithaml et al., 1996; Carman, 1990), very little research has been conducted on the evaluation of the quality of services delivered over the Internet (Cox and Dale, 2001).

As far as banks in particular are concerned, during the second half of 1990s, the way of operating in the banking industry has undergone a fundamental change because of the advent of the Internet (Gunasekaran and Love, 1999). Taking into consideration the huge investments banks make in Internet infrastructure, customer satisfaction and retention are

turning into the crucial factors for success in online banking meaning that the generation of positive customer value on the Internet requires the establishment of long-term customer relationships (Bauer et al., 2005). In today's oversupplied world, where customers have very high demands, the financial services organizations are trying to become more customer-focused (Gonzales, Quesada, Picado and Eckelman, 2004). In order for the E-banking to be profitable, banks should focus not only on acquiring new customers but also on the retention of existing customers (Reichheld and Schefter, 2000).

According to Mols (2000) the introduction of E-banking services may change crucially the way banks build and maintain their customer relationships. The increased use of the Internet in the future will heighten the expectations and perceptions of customers, thus making e-service quality an increasingly important issue. Thus, understanding service quality issues within the new delivery channel becomes crucial.

As far as retail banks are concerned, the introduction of e-commerce has brought a dramatic change in the way relationships with customers are built and maintained. In banking, which has traditionally been a high contact service, the lack of direct human interaction in online channels entails the use of each service element as an opportunity to reinforce or establish quality perceptions for customers (Broderick and Vachirapornpuk, 2002).

Additionally, service quality is a key determinant in differentiating service offers and building competitive advantages, since the costs of comparing alternatives are relatively low in online environments (Grönroos et al, 2000; Santos, 2003). In view of these developments, service quality is a crucial issue in e-banking. Despite these findings as well as the fact that quality evidently determines the decision whether to use and remain loyal to an online service provider (Reibstein, 2002; Shankar et al., 2003), few academic efforts have been devoted to the identification of the criteria used by customers to assess a web portal's quality (Gounaris and Dimitriadis, 2003).

In addition, delivering high quality services is a way companies manage to improve their customer relationships. Delivering high quality services is a prerequisite for achieving customer satisfaction and only through customer satisfaction can the company gain loyal customers (Grönroos, 2000). Because of the highly undifferentiated products and services

that financial organizations, and specifically banks, offer, service quality becomes the main tool for competing in this marketplace (Stafford, 1996; Kim et al., 1998). In general, because of the higher profits and higher customer retention to which they lead, high-quality services are believed to provide banks with competitive edge in the marketplace (Bennett and Higgins, 1988).

From the information covered above, it becomes obvious that high service quality is essential for surviving in the highly competitive banking environment (Wang et al., 2003). This leads to the fact that a good understanding of the attributes that customers use to judge service quality is necessary in order for the company to be able to monitor and enhance its service performance and improve its overall service quality.

A great deal of research has been conducted on key service quality dimensions and customer requirements in the traditional banking environment, where personal interaction between the customers and the bank employees takes place (Cowling and Newman, 1995; Johnston, 1995; Bahia and Nantel, 2000; Oppewal and Vriens, 2000). However, the service quality attributes and customer requirements involved in Internet banking, where the interaction between the customers and the bank is impersonal, have not been studied enough, which can be implied by the fact that there has not been available a precise measurement instrument for online services quality (Cox and Dale, 2001). Thus, it is important for Internet banking providers to learn more about their customers' perceptions of the online banking services quality and the attributes that the customers find essential for a quality financial service delivery on the Internet. Customers have some expectations and criteria when they judge whether the provided E-banking service is satisfactory or not. This is what banks, which provide E-banking services, should try to find out so that they can improve their online services and gain competitive advantage in the banking industry.

In addition, as the service delivery process on the Internet differs significantly from that in the traditional brick-and-mortar banks' environment mainly because of the lack of direct contact between the employees and the customers in the Internet space, the attributes for defining a high quality service delivery are expected to differ in the two contexts.

Service quality is crucially important in the online banking business. Banks that achieve providing high quality services to their customers will be a step ahead of their competitors.

1.2. Objectives of the Study

It is now well established that firms need to make significant changes to organizational processes to derive advantages from the deployment of Information Technologies (IT). The strength of the interface between Information Systems providers (the IS group) and their users in organizations is a critical determinant of the firm's ability to visualize, design and deploy appropriate IT solutions and make the necessary organizational design changes to utilize the investments in IT (Davenport and Short, 1990). The creation of partnerships between IS groups and their users has often been highlighted as important to ensure effective IT implementation (Lasher et al., 1991).

Information systems groups are constantly involved in technology transfer processes to line organizations (Cooper and Zmud, 1990; Williams and Gibson, 1990). A primary responsibility of IS groups is to deliver information technology based on requirements of the line organization. The need to operate from a common knowledge base begins in the requirements phase of systems development (Ewers and Vessey, 1981), but continues through maintenance, support, and eventual deactivation or replacement of the technology (Henderson and Treacy, 1986; Jordan and Macheskey, 1990). A shared knowledge of both this process and the information technology in question supports and enhances the transfer of IT from IS to its customer base which are the business lines.

The objective of this Doctoral thesis is to investigate:

Shared knowledge between business units and information services (IS) units as one of the key contributor to the quality of the services provided by both parties,

Mutual trust and mutual influence as the key elements of shared knowledge in an organization, and

Online service quality as one of the key elements for banking industry competitiveness.

The dissertation objectives are based on the following arguments:

- Mutual knowledge bases between functional groups provide a potential bridge to organizational productivity (Krauss and Fussel, 1990). This is particularly true in the case of information systems groups and the line groups they support,
- Shared knowledge is understanding and appreciation among groups and their managers, for the technologies and processes that affect their mutual performance (Nelson and Cooprider, 1996).

- Since the costs of comparing alternatives are relatively low in online environments, service quality is a key determinant in differentiating service offers and building competitive advantages (Grönroos et al, 2000; Santos, 2003).

- The interdependence among functional groups becomes especially critical in complex environments (Pfeffer and Salancik, 1978; Schrage, 1990; Thompson, 1967; Weick, 1982).

2. LITERATURE REVIEW

2.1. Service Quality

2.1.1. Definition and characteristics of services

Many scholars have offered various definitions of service. For example, Ramaswamy (1996, p. 3) described service as "the business transactions that take place between a donor (service provider) and a receiver (customer) in order to produce an outcome that satisfies the customer". Zeithaml and Bitner (1996, p. 5) defined service as "deeds, processes, and performances". Grönroos (1990) pointed out that a service is an activity or series of activities of more or less intangible nature that normally, but not necessarily, take place in interactions between the customer and service employees and/or systems of the service provider, which are provided as solutions to customer problems.

Some researchers view service from the perspective of a system-thinking paradigm. A production system where various inputs are processed, transformed and value added to produce some outputs which have utility to the service seekers, not merely in an economic sense but also in terms of supporting the life of the human system in general (Lakhe and Mohanty, 1995).

Based on these definitions, Ko (2000) developed four dimensions of quality: 1) program quality, 2) interaction quality, 3) outcome quality, and 4) physical environment quality.

Although there have been many efforts to understand the concept of service, there is no consensus among researchers on the characteristics of service (Chang et al, 2002). According to Ko (2000), the conceptualization can be divided into two groups.

First, some researchers view the concept from the perspective of service itself - they pay attention to the discrepancy between the marketing strategies of service and goods. This approach differentiates service (intangible) from goods (tangible), which suggests that different marketing strategies should be developed for each of these concepts. Parasuraman et al. (1985), and Zeithaml and Bitner (1996) identified four features of service that distinguish it from goods. Service is intangible, heterogeneous, perishable and is

simultaneously exists in production and consumption. This approach distinguishes service from goods, by pointing out the unique features of service. It advances the understanding of the concept. However, it has drawn many critiques. On the one hand, the four characteristics mentioned above are not universal in all service sectors. Wright (1995) criticized this first approach for four reasons. First, a service industry depends more on tangible equipment to satisfy customers' demand while some customers do not care about whether goods are tangible or not. Second, some service businesses are well standardized such as franchise industries. In addition, in some cases, customers value the equality and fairness from the service provided. Third, many services are not simultaneously produced and consumed. Fourth, highly technological or equipment-based services could be standardized. On the other hand, this approach focuses on service and ignores the role of customers (Wyckham et al., 1975).

The second approach is based on the ideas of some researchers who view service from the perspective of service customers - they focus on the utility and total value that the service provides for the consumer. This approach points out that service combines tangible and intangible aspects to satisfy customers during the business transaction (Grönroos, 1990; Ramaswamy, 1996). This approach implies that because consumers evaluate service quality in terms of their experiences, customers' subjective perceptions have great impact upon service success or failure (Shostack, 1977).

Services are a diverse group of economic activities which are not directly associated with the manufacture of goods, mining or agriculture. They typically involve the provision of human value added in the form of labor, advice, managerial skill, entertainment, training, intermediation and the like. They differ from other types of economic activities in a number of ways. Many, for example, cannot be inventoried and must be consumed at the point of production. This would include trips to the doctor, enjoying a meal at a restaurant, flying from Tokyo to Paris, or attending a concert. This is in marked contrast with manufactured products, whose tangible character allows them to be stored, distributed widely and consumed without direct interaction with the entity that produced the good (OECD, 2000).

Technological advances are, however, narrowing the differences between services and other economic activities. While it has not reached the point where someone can enjoy the

ambience of a good restaurant without physically going to one, information and communication technology (ICT) now enables people to participate in a growing number of service-related activities in real, or deferred, time, without having to be physically present. Copies of movies and most other performances can be recorded and mass-produced for future consumption, like manufactured products. Software is developed and boxed like any other manufactured product, and is considered, for all intents and purposes, a good. In these instances services have, in a sense, taken on the characteristics of commodities – one provider is mass-producing a common product for many people. Service providers are thus increasingly able to benefit from economies of scale. The benefits have not, however, been restricted to large enterprises as small firms can achieve similar gains through increased networking (OECD, 2000).

The relationship between service providers and consumers is also changing in other ways that may have significant implications for economies. Technology now allows providers to produce a single product, which is not mass-produced, but which is capable of being mass-consumed, either on a standardized or customized basis. Such as the case with online Internet access to dictionaries, encyclopedias, newspapers, museum collections, etc. It will also apparently be the case with key, basic operating software in the near future, as both Microsoft and Sun Microsystems have announced their intention to supplement distribution of "boxed" software with online versions (Taylor, 1999).

Services have many characteristics that distinguish them from physical goods. As stated by Grönroos (2000), in most cases of producing a service, the core value is produced in buyer-seller interactions and most importantly in service contexts customers participate in the production process. This characteristic of services that customers participate in the production process is of utmost importance when the issue of service quality is discussed. The reason is that because of the participation of customers in the production of the service, the quality of the service is directly perceived by the customer in the time of production. That is why service quality can be defined as the quality as it is perceived by customers (Grönroos, 2000) and therefore the measurement of service quality has been a real challenge for service providers.

2.1.2. Traditional services quality

The importance of the service sector in recent years is reflected in the increased part of services of the national economies. There is a dramatic shift toward services in the world economy and the number and diversity of service providers increases constantly. In this competitive environment, the service companies have to be faster, leaner, work more efficiently and provide better service quality in order to stay competitive (Kenova and Jonasson, 2006).

The most common definition of service quality is the traditional notion that views quality as the customer's perception of service excellence. That is to say, quality is defined by the customer's impression of the service provided (Berry et al., 1988; Parasuraman et al., 1985). The assumption behind this definition is that customers form the perception of service quality according to the service performance they experience and based on past experiences of service performance. It is therefore the customer's perception that categorizes service quality.

During the past two decades many researchers investigated service quality. During this time, the importance of service quality for the differentiation of the service and for gaining competitive advantage has been recognized (Zeithaml et al., 1996; Ennew et al., 1993). Early scholarly writings on service quality suggested that service quality stems from a comparison of what customers feel a company should offer (their expectations) with the company's actual service performance (Zeithaml et al., 2000). One of the first researchers to suggest that the concept of service quality was strongly related to trust and perceptions was Gummesson (1979). Later, Grönroos (2000) introduced the notion of "Total Perceived Service Quality" which defines how a customer perceives the difference between the expected service and the experienced service.

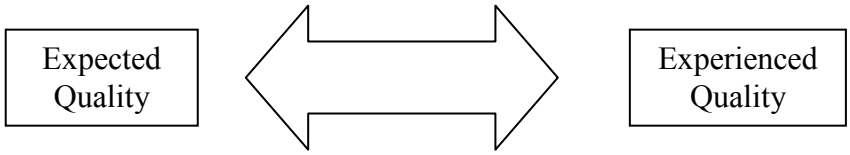

Figure 2.1 Total perceived quality (Grönroos, 2000).

According to these early findings, service quality was accepted as a measure of how well the customer expectations were met by the delivered service. Parasuraman, Zeithaml and Berry (1988, p. 15) defined service quality as "the overall evaluation of a service firm that results from comparing that firm's performance with the customer's general expectations of how firms in that industry should perform".

Many researchers have tried to define the dimensions of service quality. There are two main methods used to define the dimensions of service quality (Santos, 2003). According to the first method, service quality is defined in terms of functional quality ("how" the service is delivered = process) and technical quality ("what" service is delivered = outcome) (Grönroos, 2000). The second method tries to define service quality with the help of specific characteristics of a given service. For example, Parasuraman et al. (1988) describe service quality in five to ten dimensions (responsiveness, reliability, assurance, tangibles and empathy). These five dimensions for defining service quality constitute the SERVQUAL instrument developed by Parasuraman, Zeithaml and Berry(1988). This instrument has been developed to measure service quality based on the difference of customers' expectations and perceptions for a given service (the so called disconfirmation method). It has been very popular and widely used in the field of Service Marketing and Management.

The idea of measuring service quality by comparing customers' expectations and perceptions of a given service has been criticized in recent years. Opponents of this approach argue that measuring only customers' perceptions is more reliable. Some of the opponents are Cronin and Taylor, who developed the SERVPERF instrument in 1992. This instrument is similar to the SERVQUAL instrument, but it measures service quality only on the basis of customers' perceptions of a given service. Other opponents to the disconfirmation method are Dabholkar et al. (2000) who have found that measuring only the perception of customers can better evaluate their intention and evaluation. Furthermore, Dabholkar et al. (2000) state that in this way, detailed service quality studies can be performed with the use of more efficient, simpler and cross-sectional designs. All the above findings have led to defining service quality as an overall evaluation of service performance.

Looking at both ways of defining service quality, based on expectation and perceptions, it becomes obvious that service quality is a multi-dimensional concept, which means different things to different people (Brady and Cronin, 2001).

2.1.3. Service quality models

Based on the traditional definition of service quality, Parasuraman et al. (1985) developed the "Gap Model" of perceived service quality. This model describes five gaps: (a) the gap between management perceptions of consumer's expectations and expected service, (b) the gap between management perceptions of consumer's expectations and the translation of perceptions into service quality specification, (c) the gap between translation of perceptions of service quality specification and service delivery, (d) the gap between service delivery and external communications to consumers, and (e) the gap between the customer's expected level of service and the actual service performance. As mentioned above, this disconfirmation paradigm conceptualizes the perception of service quality as a difference between the expected level of service and the actual service performance. They revealed the following 10 second-order dimensions that are used by consumers in assessing service quality in a broad variety of service sectors: (a) tangibles, (b) reliability, (c) responsiveness, (d) competence, (e) courtesy, (f) credibility, (g) security, (h) access, (i) communication, (j) understanding (Parasuraman et al., 1985).

SERVQUAL is an instrument for measuring how customers perceive the quality of a service (Grönroos, 2000). In the mid-1980s, Berry and his colleagues Parasuraman and Zeithaml began to investigate what determines service quality and how it is evaluated by customers (Grönroos, 2000). As a result of their study, they developed the SERVQUAL instrument for measuring service quality, which initially included 10 service quality dimensions, which were later reduced to the following five: tangibles, reliability, responsiveness, assurance and empathy. The following Table 2.1 Ten Dimensions of perceived service quality (Grönroos, 2000) describes the initial 10 elements of the SERVQUAL instrument.

Table 2.1 Ten Dimensions of perceived service quality (Grönroos, 2000)

Service Quality Dimension	Definition
Reliability	Involves consistency of performance and dependability
Responsiveness	Willingness or readiness of employees to provide service (timeliness of service, giving prompt service)
Competence	Possession of the required skills and knowledge to perform the service
Access	Approachability and ease of contact
Courtesy	Politeness, respect, consideration and friendliness of contact personnel
Communication	Keeping customers informed in language they can understand and listening to them
Credibility	Trustworthiness, believability, honesty, and having the customers' best interests at heart
Security	Freedom from danger, risk and doubt
Understanding/Knowing the customer	Making the effort to understand the customer's needs
Tangibles	Physical evidence of the service

Table 2.2 Five Dimensions of perceived service quality (Grönroos, 2000)presents the final five service quality dimensions which came as a result of the reduction of the initial ten dimensions.

Table 2.2 Five Dimensions of perceived service quality (Grönroos, 2000)

Service Quality Dimension	Definition
Tangibles	The appeal of facilities, equipment, material and employees which the service firm uses to deliver its services to the customer
Reliability	Consistency of performance and dependability
Responsiveness	Willingness or readiness of employees to provide service
Assurance	The knowledge and courtesy of employees and their ability to convey trust and confidence
Empathy	The providing of caring, individualized attention to customers

The instrument is based on the idea of the disconfirmation model; in other words, on the comparison of customers' expectations with their experiences from the service. Usually, the five dimensions of the instrument are described through the use of 22 attributes and

respondents are asked to state (on a seven-point scale from "Strongly disagree" to "Strongly agree") what they expected from the service and how they perceived the service (Grönroos, 2000).

Furthermore, the reasoning of the SERVQUAL instrument is based on the "Zone of Tolerance" concept, suggested by Berry and his colleagues. This concept assumes that customers do not have expectations for a service attribute on one given level, but rather can accept a range in the real experience and still regard the service as satisfactory. The borders of the customer's "Zone of tolerance" are formed by a Desired Level, the level on which the customers believe the service should be, and an Adequate Level, the minimum level of service that customers are willing to accept. Customers consider the service performance which falls within the borders of this "Zone of Tolerance" to be good (Grönroos, 2000). This instrument has been widely used by researchers, but still, there are some controversies in its applicability across different service industries. In some studies the five dimensions of the instrument (determinants) have been found to be unstable across different types of services. Therefore, the SERVQUAL tool should be applied very carefully and the set of determinants and attributes used should be adapted to the specific situation (Grönroos, 2000).

In their seminal study, SERVQUAL measures service quality as a gap between expectation and perception in an appliance repair and maintenance firm, several retail banks, a long-distance telephone provider, a securities broker, and credit card companies (Parasuraman et al., 1988). This study provided a comprehensive conceptualization of service quality with an instrument to measure perceived service quality for the first time in service quality studies. It became very popular among service quality researchers.

However, several researchers challenged the usefulness of the SERVQUAL scale as a measure of service quality by pointing out its shortcomings (e.g., Babakus and Boller, 1992; Brown et al., 1993; Carmen, 1990; Cronin and Taylor, 1992; Dabholkar et al., 1996). For example, Carmen (1990) selected four service settings that were quite different from those used in the original test. He found that in some situations, SERVQUAL needs to be customized by adding items or changing the wording of items, though it was originally designed to be a generic instrument for measuring service quality at any sector. In addition, he also suggested that the five dimensions in SERVQUAL are not sufficient to

meet service quality measurement needs, and that the measurement of expectation in SERVQUAL is problematic.

Finn and Lamb (1991) found that the SERVQUAL measurement model is not appropriate in a retail setting. They argued that retailers and consumer researchers should not treat SERVQUAL as an “off the shelf” measure of perceived quality. Much refinement is needed for specific companies and industries. According to Brown et al. (1993) using the difference in scores causes a number of problems in such areas as reliability, discriminate validity, spurious correlations, and variance restriction. Finally, Cronin and Taylor (1992) argued that the disconfirmation paradigm that SERVQUAL applied was inappropriate for measuring perceived service quality. They pointed out that the disconfirmation paradigm measures customer satisfaction instead of service quality. In their study, Cronin and Taylor (1992) used the performance scale (SERVPERF) only, and found that SERVPERF outperformed SERVQUAL.

SERVQUAL's shortcomings result from the weakness of the traditional definition that it applies. It is noted that there are several problems in the traditional definition of service quality (Ko, 2000). First, customers' needs are not always easy to identify. If their need is not correctly identified, conformance to a specification is not proper. Schneider and Bowen (1995) pointed out that customers bring a complex and multidimensional set of expectations to the service encounter. Customers come with expectations for more than a smile and handshake. Their expectations include conformance to at least ten service quality attributes (i.e., Parasuraman, et al.'s 10 dimensions-reliability, responsiveness, competence, access, courtesy, communication, credibility, security, understanding, and tangible). Second, the traditional definitions failed to provide a way to measure customers' expectation, which determines the level of service quality. Customer's expectations may fluctuate greatly over time (Reeves and Bednar, 1994). Therefore, it is not parsimonious to define quality in terms of customer's expectations. Empirically it is not valid to use the difference in scores between expectation and perceived service quality to measure service quality.

Oliver (1997) also pointed out the traditional model's shortcomings by distinguishing quality from satisfaction. First, while quality perceptions could come from external mediation instead of experience of service, satisfaction has to be experienced by

consumers in person. In addition, quality judgments standards are based on ideals or perceptions of excellence, while satisfaction judgments include predictive expectations, needs, product category norms, and even expectations of service quality. Moreover, while quality judgment is mainly cognitive, satisfaction is an affective experience (Bitner and Hubbert, 1994; Oliver, 1994). Service quality is influenced by very few variables such as external cues like price, reputation, and various communication sources, while satisfaction is more vulnerable to cognitive and affective processes such as equity, attribution, and emotion. Quality is primarily long-term while satisfaction is primarily short-term.

Ko (2000) summarized analyses by researchers' discussions of service quality definitions and pointed out that service quality should be clarified as follows. First, from the above analyses, it could be noted that the disconfirmation paradigm, which compared the perceived service quality and expectation, is not appropriate in defining service quality (Ko, 2000). Second, because service quality may not require the customer's experience and consumption, the disconfirmation paradigm does not clarify service quality (Ko, 2000). Third, service loyalty is easier to measure if the judgment occurs primarily at the attribute-based cognitive level. Fourth, a customer's perception of quality has been the main focus of the service quality research. Fifth, the overall impression of consumers determines service quality. Sixth, service is not uniform - in different service sectors consumers' perception of service quality may be different. Seventh, service quality is multidimensional or multifaceted. Eighth, service quality should be clearly differentiated from customer satisfaction.

Several researchers approached service quality from perspectives quite different from Parasuraman et al. (1988). On the one hand, some scholars provide multi-dimensional models of service quality. At first, Grönroos (1984) used a two-dimensional model to study service quality. The first dimension is Technical Quality that refers to the outcome of the service performance. The second dimension is Functional Quality that refers to the subjective perception of how the service is delivered. It is the reflection of the consumer's perception of the interactions between consumers and service providers. According to his model, these two dimensions of service performance are compared to the customer's expectations and eventually the customer has his/her own service quality perception. Later, McDougall and Levesque (1994) added a third dimension - physical environment to

Grönroos' (1984) model and proposed the Three Factor Model of Service Quality. It consists of service outcome, service process (Grönroos, 1984), and physical environment. They tested the model by a confirmatory factor analysis using the dimensions of the SERVQUAL scale, which provided empirical support for the model. These three components in the above models, together with Rust and Oliver's (1994) service product, represent one important aspect of services. All of them contribute to consumers' perception of service quality (Ko, 2000).

On the other hand, Dabholkar et al. (1996) proposed a hierarchical model of service quality. This model suggests that service quality is a multi-level and multi-dimensional construct, including (a) consumers' overall perception of service quality, (b) a dimension level which consists of physical aspects, reliability, personal interaction, problem solving, and policy, and (c) a sub-dimension level which recognizes the multifaceted nature of the service quality dimensions. They found that quality of service is directly influenced by the perceptions of performance levels. In addition, customers' personal characteristics are important in assessing value, but not quality.

At last, Brady (1997) combined these two lines. He developed a hierarchical and multidimensional model of perceived service quality by combining Dabholkar and associates' (1996) hierarchical model and McDougall and Levesque's (1994) Three Factor Model (Brady, 1997). There are three dimensions in the model: interaction quality, outcome quality, and physical environment quality. Each of these dimensions consists of three corresponding sub-dimensions: (a) Interaction Quality- Attitude, Behavior, and Expertise, (b) Outcome Quality-Waiting Time, Tangibles and Valence, (c) Physical Environment Quality- Ambient Conditions, Design, and Social Factors. This hierarchical and multidimensional approach is believed to better explain the complexity of human perceptions than the conceptualizations currently offered in the literature (Dabholkar et al., 1996; Brady, 1997). The empirical test of this model shows that the model is psychometrically sound.

In short, perception of service quality is a controversial subject with no consensus having been reached on how to conceptualize or operationalize the construct. SERVQUAL, which applies the traditional disconfirmatory model, was the first effort to operationalize service quality. Although it made great contribution to the field of service quality, it is insufficient

because of its inherent weakness. More recent models such as Brady's (1997) hierarchical multidimensional model synthesize prior approaches and represent the complexity of the construct of service quality perception.

2.1.4. Studies on traditional banking services quality

Researchers have used the SERVQUAL scale to measure the quality of various services, including bank services (Cowling and Newman, 1995). According to the study conducted by Cowling and Newman in 1995 concerning the SERVQUAL scale, one bank found out that the highest disparity between the expectations and perceptions of customers was found to exist for reliability, responsiveness, and empathy, and the lowest for tangibles. Also, concerning the banking industry, by using the critical incident technique, Johnston (1995) examined the service quality perceptions of the customers. He found out 18 service quality attributes: access, aesthetics, attentiveness/helpfulness, availability, care, cleanliness/tidiness, comfort, commitment, communication, competence, courtesy, flexibility, friendliness, functionality, integrity, reliability, responsiveness and security.

Furthermore, an alternative measure of service quality in retail banking that comprises 31 items with six underlying key dimensions was proposed by Bahia and Nantel (2000). These six dimensions are: effectiveness and assurance, access, price, tangibles, service portfolio and reliability.

In addition, by using conjoint experiments to measure the service quality of retail banks, Oppewal and Vriens (2000) proposed the use of 28 attributes including four service quality dimensions to evaluate service quality. These four dimensions are: accessibility, competence, accuracy and friendliness, and tangibles. Of those four dimensions, the most important in determining banking preference turned out to be the accuracy and friendliness, followed by competence, tangibles and accessibility.

2.1.5. Definition and characteristics of e-services

E-services are services delivered over the Internet. The fact that the services are delivered over the Internet pose some challenges to the service providers. First of all, the direct contact between service employees and customers is missing and secondly the service

delivery setting is completely changed. In the case of e-services, websites become the "moment of truth" between customers and the company (Iwaarden et al., 2003). As a result the websites (user-interface) determine to high extent how the service is delivered to the customers. Customers evaluate both what the company offers and how it offers it. Because of the lack of face-to-face interaction with service representatives, the user interface (site design) is what customers of e-services interact with, and as such it can be expected to influence their evaluation of the overall service quality. That is why it is advisable that companies consider very well the design and function of their websites as well, because customers might get frustrated and eventually be discouraged of visiting the website if it cannot be accessed easily or the work with it is very slow. Additionally, the information content of the website is considered to be important for online evaluations (Grönroos, 2000).

2.1.6. E-services quality

As a consequence of the increasing importance of modern information and communication technologies for the delivery of financial services the analysis of e-banking quality issues becomes an area of growing interest to researchers and managers (Hughes, 2003; Jayawardhena, 2004).

E-service quality is defined as overall customer assessment and judgment of e-service delivery in the virtual marketplace (Santos, 2003). Businesses that have been experienced and successful in offering e-services are starting to apprehend that besides website presence and low price, the important success or failure factors also include the electronic service quality (Yang, 2001; Zeithaml, 2002). One of the reasons for the increased importance of e-services quality is that over the Internet, it is much easier for customers to compare different service offerings than through traditional channels (Santos, 2003). Thus, customers of online services expect equal or higher levels of service quality than the customers of traditional services (Santos, 2003).

The importance of delivering high quality e-services has been recognized by many companies, but still there is the problem of how the quality of online services is defined, what are it's determinants are and how it can be actually measured. There exist many models and methods for measuring the quality of traditional services (Cowling and

Newman, 1995; Johnston, 1995; Bahia and Nantel, 2000; Oppewal and Vriens, 2000), but there is not that much research done on the quality of services delivered over the Internet (Cox and Dale, 2001). Recently, there have been two approaches to studying e-services that can be distinguished. The first approach suggests the study of e-service quality on the basis of already existing service quality theory (Grönroos, 2000; Zeithaml et al., 2000). The other approach suggests the study of e-service quality through empirical research and the development of new categories of e-services (Szymanski and Hise, 2000).

Parasuraman and Grewal (2000, p. 171) propose that research is needed on whether "the definitions and relative importance of the five service quality dimensions change when customers interact with technology rather than with service personnel". Because the SERVQUAL tool dimensions and attributes were developed for traditional services where direct contact between the employees and the customers occur, many researchers believe that the items of the instrument and their content would need to be refined before they can be meaningfully applied in the online service context. According to Zeithaml et al. (2000), additional dimensions may also be needed in order for the full construct of e-service quality to be captured.

Yang (2001) proposed in his research the use of seven online service quality dimensions which align with those of the SERVQUAL scale. These dimensions include reliability, responsiveness, access, ease of use, attentiveness, credibility and security. Besides the application of already existing models on the e-service quality measurement, some researchers have recently proposed new quality dimensions, specific for the online services.

For example, in a recent study on the quality of online services of 23 travel agencies, Kaynama and Black (2000) have used seven quality dimensions derived from SERVQUAL: responsiveness, content and purpose (derived from reliability), accessibility, navigation, design and presentation (all derived from tangibles), background (assurance), and personalization and customization (derived from empathy).

Furthermore, Ziethaml et al. (2000) conducted research on focus groups consisting of people with experience in online shopping. As a result of the study, they defined eleven e-quality dimensions (the so-called E-SQ instrument): reliability, responsiveness, access, and

flexibility, ease of navigation, efficiency, assurance/trust, security/privacy, price knowledge, site aesthetics and customization/personalization. Later in 2002, Zeithaml revised the E-SQ model and decreased the online service quality dimensions to seven. These dimensions are as follows: efficiency, fulfillment, system availability, privacy, responsiveness, compensation and contact (Parasuraman et al., 2005).

Based on the SERVQUAL scale, Barnes and Vidgen (2002) have developed the eQual (Previously called WebQual) WebQual is a method for assessing the quality of Web sites. The method has been developed iteratively through application in various domains, including Internet bookstores and Internet auction sites.

eQual is based on quality function deployment (QFD), which is a structured and disciplined process that provides a means to identify and carry the voice of the customer through each stage of product and or service development and implementation (Slabey, 1990). Applications of QFD start with capturing the 'voice of the customer' - the articulation of quality requirements using words that are meaningful to the customer. These qualities are then fed back to customers and form the basis of an evaluation of the quality of a product or service. eQual differs from studies that emphasize site characteristics or features (Kim and Eom, 2002), which are used as part of later processes in QFD. In the context of eQual, Web site users are asked to rate target sites against each of a range of qualities and to rate each of the qualities for importance. Although the qualities in eQual are designed to be subjective, there is a significant amount of data analysis using quantitative techniques, for example, to conduct tests of the reliability of the eQual instrument (Barnes and Vidgen, 2002).

Madu and Madu (2002) proposed 15 dimensions of online service quality: performance, features, structure, aesthetics, reliability, storage capacity, serviceability, security and system integrity, trust, responsiveness, product differentiation and customization, Web store policies, reputation, assurance and empathy.

2.1.7. Online systems quality

Discussing online services, we cannot measure their quality simply by researching the online service quality dimensions. The reason is that online services are quite different

from the traditional services, where an interpersonal service encounter takes place. In an interpersonal service encounter, where customers have direct contact with service personnel, the way service personnel behaves, talks, smiles etc. will influence to a high extent the satisfaction of the customers with the service delivered. In the virtual space customers communicate with the company through an information system. By using the Internet as a service delivery channel, companies should be aware of the fact that some aspects of the human interaction of traditional service settings cannot be replaced by technology (Cox and Dale, 2001). Such aspects, according to Cox and Dale (2001) are for example courtesy, friendliness, helpfulness, care, commitment, flexibility and cleanliness. The absence of these aspects of human interaction through which quality can be delivered to customers will have to be compensated by other quality factors, for example different features of the company's website, through which the online services are delivered. That is why a literature review on the online systems quality is necessary for the purpose of this study.

There is much research done on the quality of online information systems and websites in particular. Doll and Torkzadeh (1988) suggested five quality dimensions that influence customer satisfaction with the Website of a given company. These dimensions are: content, accuracy, format, ease of use and timeliness. In recent years, many studies have been conducted on the success features of websites. According to a study done by D'Angelo and Little(1998), when designing a website the following factors should be considered: navigational characteristics, visual characteristics, and practical consideration including images, background, color, sound, video, media and content. Other researchers, Liu and Arnett (2000) propose that major determinants of a website success are the following factors: system use, system design quality, information quality and playfulness.

Studying websites' quality, Cox and Dale (2001) have found out and proved four quality factors of a website: ease of use (the design of the Web site), customer confidence (how the website generates customer trust), online resources (capabilities of the website to offer products/services) and relationship services (how the website bonds with the customer and inspires loyalty) (Yang et al., 2004). According to Abels et al. (1999), user criteria for a good website design include use, content, structure, linkage, search and appearance. Later,

using the finding from Abels et al. (1999), Santos (2003) has discovered five dimensions of online systems quality: ease of use, appearance, linkage, structure and layout, and content.

The features that a website should possess in order to be successful and contribute to the service quality depend to a high extent on the type of service provided. For example, the features of a website for purchasing music and books are expected to differ from those of a bank's website. As far as Internet banking websites are concerned, Jayawardhena and Foley (2000) proposed website features critical to enhance customer satisfaction: the speed to download, content, design, interactivity, navigation and security. Furthermore, Waite and Harrison (2002) have found seven dimensions that influence customer satisfaction with banks' websites: transaction technicalities, decision making convenience, interactive interrogation, specialty information, search efficiency, physical back-up and technology thrill.

2.1.8. E-Banking services

Banks are considered to be one of the main business cases, which use information system technologies and information to perform their business. As the existing financial organizations and the banks, they corresponded in a face-to-face manner or regular mail with their customers and clients. Internet banking or online banking became one of the main channels as the information technology evolved. Online banking (or Internet banking) is a term used for performing transactions, payments etc. over the Internet through a bank, credit union or building society's secure website. This allows customers to do their banking outside of bank hours and from anywhere where Internet access is available. In most cases a web browser is utilized and any normal Internet connection is suitable. No special software or hardware is usually needed (Wikipedia, 2006).

A straightforward definition for e-banking is that it offers customers all the traditional banking facilities and services any bank provides with the added value of managing it online or virtually (Bankrate, 2007).

"Internet Banking" can be defined as "systems that enable bank customers to access accounts and general information on bank products and services through a personal computer (PC) or other intelligent device " or "any banking activity held on Internet (from promotion to sale)" (Mathias and Sahut, 1999, p. 6).

Internet banking is among the multiple remote distribution channels banks have been deploying for more than 20 years, to complement the branch and call centers and to interact with their customers, as illustrated in Figure 2.2 below. Phone banking, electronic payment debit, credit and electronic purse cards to pay at retail outlets or Points of Sale (POS), cash withdrawal machines and bank kiosk machines making use of Automated Teller Machines (ATM), PC banking, Internet banking, mobile banking, Personal Digital Assistant (PDA) banking and interactive Digital TV (iDTV) banking are examples of the multitude of channels and technologies used. Of the different delivery channel applications, Internet banking, a content based secure application based on the open information Internet infrastructure, has the most similarities with other IS services' infrastructure (Centeno, 2003).

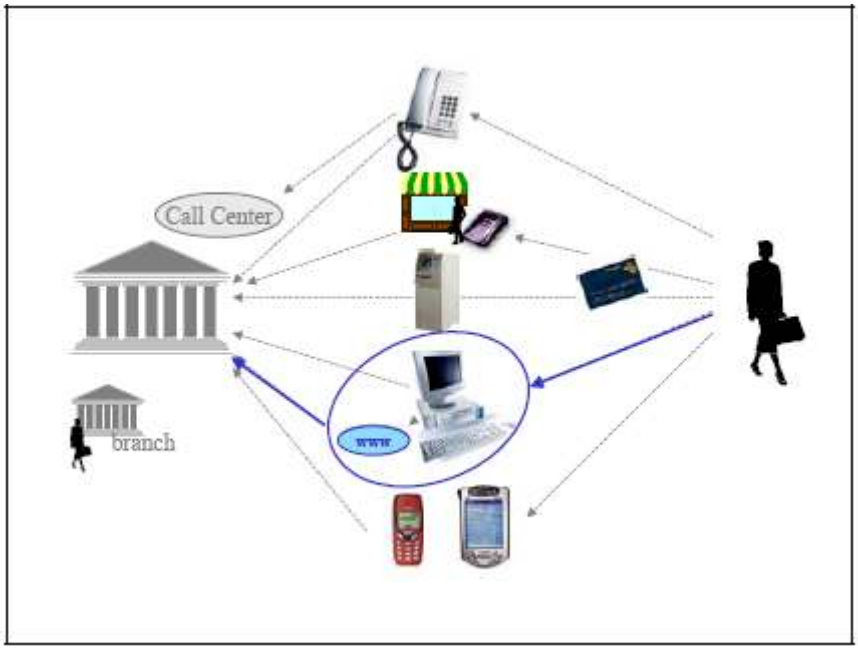

Figure 2.2 Banking Distribution Channels (Centeno, 2003).

Traditionally, the banks made use of bank-owned infrastructures (although built on top of wired public telecommunication lines) to deliver ATM, POS and phone banking services. PC banking then required customers to have a PC, PC skills and a dial-up modem to access a bank server through the phone line. Internet banking, however, now requires customers to make use of nonproprietary Internet infrastructure and access, with lower penetration levels than phone lines and lower levels of security. Internet banking also requires a

minimum level of user Internet skills. This move to an open environment such as the Internet represents a qualitative step with significant implications for all the actors, including banks, industry and users, and raises new policy issues (Centeno, 2003).

Banks offer Internet banking mainly to increase cost-effectiveness, increase customer reach, and retain market share. Branch-based transactions are much more expensive than alternative delivery channels Table 2.3 Cost of Banking Transaction by Channel (Estimates by US Department of Commerce, 1998) (BIS, 2001). (BIS, 2001). As can be seen from the following table, the cost of one transaction in a branch is more or less equal to cost of 100 transactions in Internet banking.

Table 2.3 Cost of Banking Transaction by Channel (Estimates by US Department of Commerce, 1998) (BIS, 2001).

	Transaction Cost (US Dollar)
Physical Branch	1.07 $
Phone	0.52 $
ATM	0.27 $
Internet	0.01 $

E-Banking services are banking services delivered over the Internet. The services provided by banks over the Internet which once included only checking of accounts, have recently evolved to include a full range of banking services. Nowadays, nearly all services accessible at the branch or by phone can be accessed on the Internet as well. The development of technology allows banks to offer not only “branch-based” services over the Internet, but also new added-value services which are available only online such as electronic commerce, real-time brokerage, financial information menus, e-mail alerts and third party services (tax payment, portals or management of electricity bills) (Centeno, 2003). Figure 2.3 below shows a possible classification of Internet banking services.

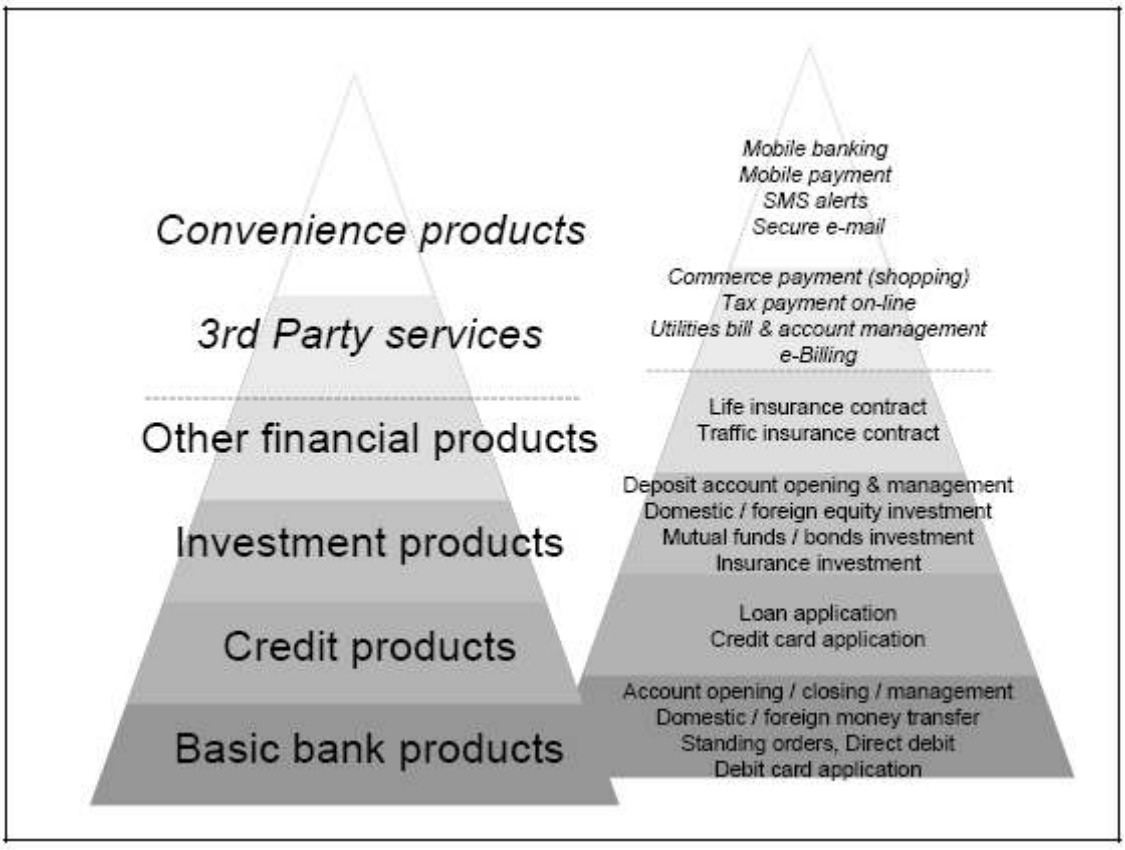

Figure 2.3 Classification of Internet Banking Services (Centeno, 2003).

The number of people using online banking services in Turkey is steadily increasing as can be seen in Table 2.1. Number of active customers (customers who made at least a transaction within the last three month) is increased by 30 % within one year between March 2006 and March 2007.

Table 2.4 Number of Internet Banking Users in Turkey (Türkiye Bankalar Birliği - Turkish Banking Association, 2007)

Period	Individuals		Companies		Total	
	Number of Customers	Number of Active Customers	Number of Customers	Number of Active Customers	Number of Customers	Number of Active Customers
March 2006	14.741.561	2.350.461	654.390	332.759	15.395.951	**2.683.220**
June 2006	15.368.206	2.478.523	752.797	355.700	16.121.003	**2.834.223**
September 2006	15.676.090	2.686.697	839.246	395.350	16.515.336	**3.082.047**
March 2007	17.385.363	3.059.573	852.838	404.350	18.238.201	**3.463.923**

The increased use of online banking services has many advantages for both customers and banks. For customers, E-banking services allow them to have better overview of their banking business and help them to manage their banking transactions more conveniently and fast. Additionally, customers who use Internet banking prove to be involved in more banking transactions, which is beneficial for the banks themselves.

As a whole, customers' motivation to use E-banking services comes from a number of factors: freedom of time and space, speed, convenience, 24 hours a day availability and price incentives (Mattila, Karjaluoto and Pento, 2002). Despite all the advantages the Internet offers to both banks and their customers in terms of increased productivity and reduced costs, it also hides a lot of disadvantages and challenges for the service providers. On the Internet, the comparison between different service offerings is much easier and switching costs are lower, which makes it easier for customers to change service providers (Santos, 2003). This, on its behalf, posts a challenge for the banks to not only acquire new customers, but retain their existing ones as well. To retain its customers, banks should try to make them satisfied with their services and offerings and this can be achieved through delivering high quality services. Delivering high quality online services requires understanding of the online service quality dimensions considered crucial and trying to improve the quality of the services provided over the Internet, so that a competitive advantage is gained.

The increased importance of information and communication technology for the delivery of financial services has led to the growing interest of researchers and managers in E-banking quality issues (Jayawardhena, 2004). Different studies consider particular service quality dimensions of simple banking websites.

Jun and Cai (2001), by using the critical incidents method in online banking, distinguish three central quality categories, namely the customer service quality, online systems quality and banking service products quality. Other researchers, Broderick and Vachrapompuk (2002) tracked the usage pattern of members of an Internet banking community. They found out that what influenced the service evaluation most were cues in the service setting, key events in the service encounters and the level and nature of customer participation. Unfortunately, they were not able to deduct from their research a precise and testable measurement of E-banking service quality.

Jayawardhena (2004) transformed the original SERVQUAL scale to the Internet context and developed a battery of 21 items to assess service quality in e-banking. By means of an exploratory (EFA) and confirmatory factor analysis (CFA), these 21 items were condensed to five quality dimensions: access, web site interface, trust, attention and credibility. Although 59 per cent of the variance in overall service quality can be explained by the model, affective customer reactions to the service process are not considered. This has to be seen critical as several authors emphasize the importance of hedonic aspects of the electronic service consumption represented by the extent of fun and enjoyment provided by the portal (Dabholkar, 1996; van Riel et al., 2001).

2.1.9. E-SQ (E-S-QUAL and E-RecS-QUAL) instrument for measuring online services quality

E-SQ Instrument is an instrument similar to the SERVQUAL scale, developed specifically for measuring online services (e-services) quality. The model has been developed in 2000 and tested and revised in 2002 by Parasuraman et al. who made an exploratory study on quality perceptions of customers as far as online shopping is concerned. The development of this instrument went through three stages. During the first stage the researchers conducted qualitative study on six focus groups with six to seven participants in each group (Zeithaml et al., 2000). They claimed that "the responses of focus-group participants to e-service quality (e-SQ) dimensions were remarkably consistent across the groups, experience levels, and e-service businesses discussed. The focus groups revealed that consumers use basically similar dimensions in evaluating e-SQ regardless of the type of product or service being evaluated on the Internet" (Zeithaml et al., 2000, p. 15).

The dimensions for measuring e-service quality at that stage were eleven: reliability, responsiveness, access, flexibility, ease of navigation, efficiency, assurance/trust, security/privacy, price knowledge, site aesthetics and customization /personalization. Table 2.5 Dimensions of perceived e-SQ (Zeithaml et al., 2000)below contains description of each of the above-mentioned dimensions of e-service quality.

Table 2.5 Dimensions of perceived e-SQ (Zeithaml et al., 2000)

E-Service Quality Dimension	**Description**
Reliability	Involves the correct technical functioning of the site and the accuracy of service promises (delivering when promised) and product information
Responsiveness	Quick response and the ability to get help if there is a problem or question
Access	The ability to get on the site quickly and to reach the company when needed
Flexibility	Choice of ways to pay, ship, buy, search for and return items
Ease of Navigation	The site contains functions that help customers find what they need without difficulty, possesses a good search engine, and allows the customer to maneuver easily and quickly back and forth through the pages
Efficiency	The site is simple to use, structured properly, requires minimum of information to be input by the customer
Assurance/Trust	The confidence the customer feels in dealing with the site and is due to the reputation of the site and the products or services it sells as well as clear and truthful information presented
Security/Privacy	The degree to which the customer believes the site is safe from intrusion and personal information is protected
Price Knowledge	The extent to which the customer can determine shipping price, total price and comparative prices during the shopping process
Site Aesthetics	The appearance of the site
Customization/Personalization	How much and how easily the site can be tailored to individual customers' preferences, histories and ways of shopping

The above described model resembles to the SERVQUAL instrument (Parasuraman et al., 1991), but it also includes few new dimensions specific for the online space.

First of all, the quality dimensions of reliability, responsiveness, access, assurance and customization/personalization are also the key quality dimensions of the SERVQUAL instrument for traditional service settings. These five dimensions have the same perceptual attributes as those in traditional service quality evaluations, besides the access and

reliability dimensions. These two dimensions have some attributes which deal with online-specific issues as well (Zeithaml et al., 2000)

Secondly, several of the quality dimensions of perceived e-SQ are new and most of them are related to technology: ease of navigation, flexibility, efficiency, site aesthetics and price knowledge (Zeithaml et al., 2000). Such dimensions as ease of navigation, efficiency and site aesthetics have been proved to be important for evaluating online systems quality (website quality in particular) by many researchers (Doll and Torkzadeh, 1988; Abels et al., 1999; Jayawardhena and Foley, 2000; Liu and Arnett, 2000; Santos, 2003). One of the new dimensions that do not involve technology is price knowledge, which is probably specific for the case of online shopping, investigated in this study (Zeithaml et al., 2000).

Later, the attributes pertaining to the above-mentioned 11 dimensions of e-service quality found out in the research by Zeithaml et al. in 2000 were used as the e-service quality (E-SQ) domain from which the researchers drew items for the E-SQ instrument. As a second stage in the development of the E-SQ instrument, Zeithaml et al. developed a preliminary scale consisting of 121 items which was incorporated into two versions of a questionnaire. These questionnaires were evaluated with the help of focus groups. As a result, a final revised questionnaire consisting of 113 items was constructed. Then the researchers hired a marketing research firm to distribute the questionnaire to a random sample of Internet users who had sufficient online shopping experience. After the collection of the survey data, the data was subject to scale-reduction and refinement analyses. As a result of this procedure, the initial 11 dimensions were reduced to total of 7 dimensions (Parasuraman et al., 2005).

During the research, Parasuraman et al. (2005) observed that there was missing data on some items. After an analysis of these items, they concluded that they were all related to service recovery. That is why they separated those items to develop a separate e-service recovery scale (E-RecS-QUAL). The rest of the items formed an e-core service quality scale (E-S-QUAL). The E-S-QUAL scale consists of 4 dimensions with 22 attributes and the E-RecS-QUAL consists of 3 dimensions with 11 attributes. After the development of these scales, they were empirically tested by using questionnaires distributed to sample of users of the most visited at that time web sites in the USA – amazon.com and walmart.com (Parasuraman et al., 2005).

The E-S-QUAL and E-Recs-QUAL' dimensions and their descriptions are presented in Table 2.6 and Table 2.7 E-RecS-QUAL dimensions and their description (Parasuraman et al., 2005) below.

Table 2.6 E-S-QUAL dimensions and their description (Parasuraman et al., 2005)

Dimension	**Description**
Efficiency	The ease and speed of accessing and using the website
Fulfillment	The extent to which the site's promises about order delivery and item availability are fulfilled
System Availability	The correct technical functioning of the site
Privacy	The degree to which the site is safe and protects customer information

Table 2.7 E-RecS-QUAL dimensions and their description (Parasuraman et al., 2005)

Dimension	**Description**
Responsiveness	Effective handling of problems and returns through the site
Compensation	The degree to which the site compensates the customers for problems
Contact	The availability of assistance through telephone or online representatives

A combination of E-S-QUAL and E-RecS-QUAL has been formed and the dimensions of it can be seen in Figure 2.4.

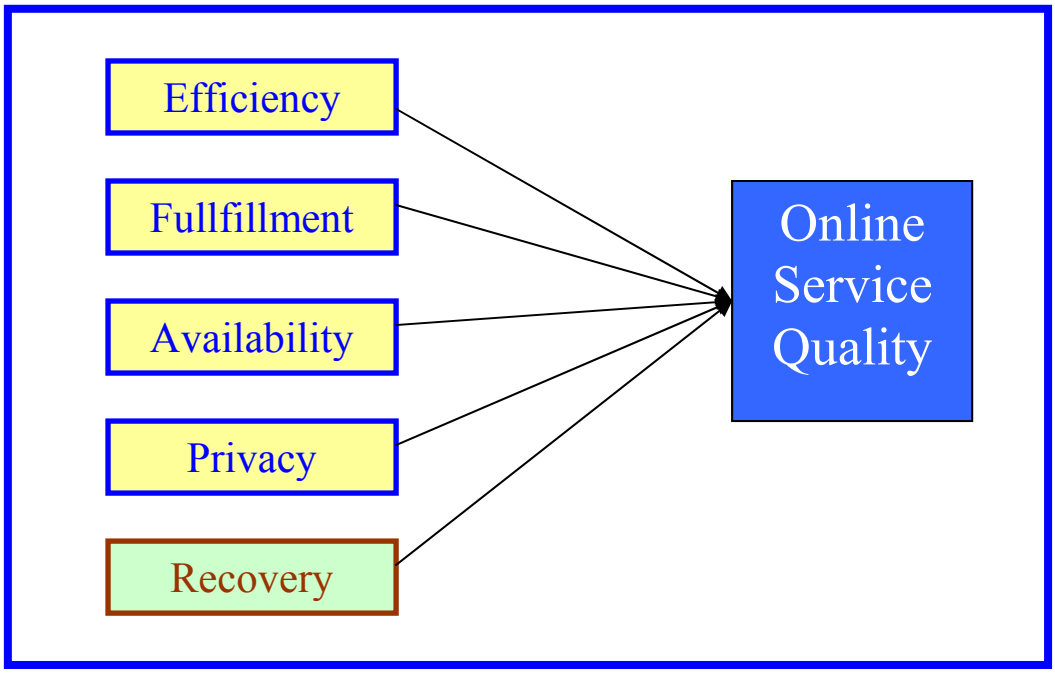

Figure 2.4 Online service quality dimensions (Parasuraman et al., 2005)

2.2. Knowledge Management

2.2.1. Knowledge and Knowledge Management

Winter (1988, p. 189) describes business firms as “organizations that know how to do things”. For Winter (1988), a company truly is a collection of people organized to produce something; goods, services or a combination of the two. Their ability to produce depends on what they currently know and on the knowledge that has become embedded in the routines and machinery of production. The material assets of a firm are of limited value unless people know what to do with them. So, when “knowing how to do things” definition is accepted for a firm, then knowledge becomes very important for the company.

2.2.2. Data, information and knowledge

Davenport and Prusak (2000, p. 1) clarify that “Knowledge is neither data nor information, though it is related to both …” and further down they say that “… data, information, and knowledge are not interchangeable concepts”. They point out that confusion among the three has resulted in many organizations investing large amounts of money in the technology of knowledge management without achieving any useful results. They consider that understanding the difference among the three concepts is crucial: "Organizational success and failure can often depend on knowing which of them you need, which you have, and what you can and can't do with each. Understanding what these three things are, and how you get from one to another is essential to doing knowledge work successfully". Definitions of these concepts have been summarized in their book titled Working Knowledge.

Data is hard, factual information often in numerical form - it can tell you when, and how often something happens, how much it costs and so on but it does not say why it happened. Organizations love accumulating vast quantities of data - the sheer bulk of which serves to confuse and obscure any value.

Information for Davenport and Prusak comes in the form of a message - and it is the receiver rather than the sender of the message who determines that it is information - through some communication channel whether voice, e-mail, letter, etc. It is different from

data in that it has meaning or shape. In fact, data can be transformed into information with the addition of meaning. The two authors list a number of ways for doing it.

- Contextualized - the purpose of the data is known;
- Categorized - the unit of analysis or key component is known;
- Calculated - perhaps through a statistical or mathematical analysis;
- Corrected - through the removal of errors;
- Condensed - by being summarized or tabulated.

Knowledge transcends both data and information in a number of ways. It is a mixture of experiences, values of information and know-how, which serves as a frame for the creation of new experiences and information. It is fluid although at the same time has a formal structure and can be considered both as a process and a stock. It derives from information - in a similar way information derives from data- via a transformation, which takes place in and within persons. The two authors list a number of transformation procedures.

- Comparison – with other situations we have known;
- Consequences – for our decisions and actions;
- Connections – how does it relate to others;
- Conversation – what do others think about it.

In a similar way, Zack (1999a) distinguishes knowledge from data and information:

Data represent observations or facts out of context that are, therefore, not directly meaningful. Information results from placing data within some meaningful context, often in the form of a message. Knowledge is that which we come to believe and value on the basis of the meaningfully organized accumulation of information (messages) through experience, communication, or inference.

He also states that knowledge may vary from :

- General which is broad, publicly available and independent of particular events, to
- Specific, which in contrast is context-specific (Both context and contextual categories must be described/defined by the firm).

Nonaka and Takeuchi (1995) and Von Krogh et al. (2000) define knowledge as a justified true belief: When somebody creates knowledge, he or she makes sense out of a new situation by holding justified beliefs and committing to them. The emphasis in this definition is on the conscious act of creating meaning.

Building on Polanyi (1958) and Wittgenstein (1995), Sveiby (1994,1997) defines knowledge as a capacity to act (which may or may not be conscious). The emphasis of the definition is on the action element: A capacity-to-act can only be shown in action. Each individual has to re-create his or her own capacity to act and reality through experience – a view which is akin to constructivism (von Glaserfelt, 1988).

Knowledge defined as a "capacity-to act" is dynamic, personal and distinctly different from data (discrete, unstructured symbols) and information (a medium for explicit communication). Since the dynamic properties of knowledge are in focus, the notion *Individual Competence* can be used as a fair synonym (Sveiby, 2001).

Cohen (1998) in his report of the U.C. Berkeley Forum on "Knowledge and the Firm" quotes a number of definitions that have been given by different participants during the forum. Each definition is somewhat different than the other. One of them defines knowledge as "justified" or "warranted" beliefs relative to a "framework". The framework (or shared context) is created by the shared practice of a community drawn together by work. According to this definition, the community of practice is the main source of knowledge creation, and like Nonaka, knowledge creation is a dynamic group process of seeking meaning and testing beliefs. Another participant, defines knowledge as "information given meaning" in a very similar way that Davenport and Prusak (2000) state. Another one, defines knowledge as "information in context".

There is no anonymous definition of knowledge. In order to do that, researchers will first have to search for a common vocabulary to express a common understanding of the basic knowledge concepts. Cohen (1998, p. 35) reports that "there is a trap in assuming we will suddenly hit on the one right definition of 'knowledge'. It is neither possible nor desirable to validate a single set of terms and meanings and banish the rest. (…) Language is both the common ground on which we meet and the medium through which we express the diversity of our ideas".

The difficulty for defining knowledge originates on the very intangible meaning of the term: knowledge, wisdom, intelligence are concepts constantly revised and redefined as part of cognitive psychology and philosophy of science. It might be due to this lack of coincidence that we have such a variety and diffusion to the interpretation of Knowledge Management.

1.1.1.1. The nature and creation of knowledge

One can find various classifications for knowledge in literature. It is first Polanyi (1958) who makes the critical distinction between tacit and explicit knowledge, by noting that people can know more than they can tell. The most extensive, is the one proposed by Nonaka and Takeuchi (1995), which as they admit, derives from the above mentioned work of Polanyi. According to this classification:

Tacit knowledge is subjective and experience-based knowledge that cannot be expressed in words, sentences, numbers or formulas, often because it is context specific. This also includes cognitive skills such as beliefs, images, intuition and mental models as well as technical skills such as craft and know-how. Tacit knowledge is highly personal and hard to formalize, making it difficult to communicate with others.

Explicit knowledge is objective and rational knowledge that can be expressed in words, sentences, numbers or formulas (context free), and shared in the form of data, specifications, manuals etc. It includes theoretical approaches, problem solving, manuals and databases. It can be readily transmitted between individuals formally and systematically.

This distinction of the types of knowledge uncovers the existence of a more tangible knowledge, the explicit knowledge, consequently more adaptable in appearance and with a clearer relationship or link with the term "information". Polanyi (1966) made the confusing assumption that all knowledge has tacit dimensions, but today most scientists and researchers agree that knowledge exists on a spectrum. At one extreme of the spectrum it is almost completely tacit, that is, semiconscious and unconscious knowledge held in peoples' heads and bodies. At the other end of the spectrum, knowledge is almost completely explicit, or codified, structured, and accessible to people other than the individuals originating it. Of course, most knowledge exists in between the two extremes of the spectrum.

According to Nonaka and Konno (1998), explicit is the form of knowledge that has been emphasized in the western world, while many Japanese view knowledge as being primarily tacit. Cohen (1998) identifies some more differences between the Western (primarily U.S.) and the Eastern (primarily Japanese) ways of perceiving knowledge issues. Westerns are focused on knowledge re-use, knowledge projects, and knowledge markets; Easterns, on the other side, are interested in knowledge creation, knowledge cultures, and knowledge communities. Westerners aim to managing and measuring knowledge and look for short-term results; Easterners are nurturing knowledge and aim for long-term advantages.

Zack (1994) also states that Knowledge may be of several types, all of which can be made explicit:

- Declarative knowledge, which is about describing something
- Procedural knowledge, which is about how something occurs or is performed, and
- Causal knowledge, which is about why something occurs.

From a more realistic perspective Zack (1999b) classifies the knowledge a firm possesses, according to whether it is core, advanced or innovative:

Core knowledge is that minimum scope and level of knowledge required for the company to survive. Companies owning this level of knowledge can not assure long-term competitive viability, but it does represent a basic industry knowledge barrier to entry.

Advanced knowledge is what enables a firm to be competitively viable. Competing organizations may generally have the same level, scope or quality of knowledge but only when the specific knowledge content varies it enables knowledge differentiation.

Innovative knowledge is that knowledge that enables a firm to lead its industry and to significantly differentiate itself from its competitors. According to Zack, it is innovative knowledge that often enables a firm to change the rules of the game.

Nonaka and Takeuchi (1995) use the distinction between tacit and explicit knowledge in order to explain how an interaction between these two categories of knowledge forms what they call the knowledge creation spiral. Here is how they define the four different modes of knowledge creation:

- Socialization: from tacit knowledge to tacit knowledge. It is the process to acquire tacit knowledge through sharing experiences by means of oral expositions, documents, manuals and traditions, which adds new knowledge to the collective base, owned by the organization.
- Externalization: from tacit knowledge to explicit knowledge. This is the process of converting tacit knowledge in explicit concepts which presumes that knowledge which is on its own difficult to communicate, becomes tangible by means of metaphors, thus integrating in the culture of the company. It is the essential activity in the creation of knowledge. (i.e. This occurs when someone documents his or her knowledge in an area.)

- Combination: from explicit knowledge to explicit knowledge. It is the process of creating explicit knowledge by reuniting explicit knowledge drawn from a certain number of sources, through the exchange of telephone conversations, meetings, mail etc., and which can be categorized, tackled, classified with basic forms of data to produce explicit knowledge. (i.e. Reading a research article demonstrates explicit to explicit knowledge transfer.)

- Internalization: from explicit knowledge to tacit knowledge. It is a process by which explicit knowledge is incorporated into tacit knowledge. It analyzes the acquired experiences of the new items of knowledge put to practice and is

incorporated in the bases of tacit knowledge of the members of the organization in the form of shared mental models or work practices. (i.e. As people consume [read] explicit knowledge, it morphs and merges into their tacit realm of understanding.)

In a more simplified way they say that explicit knowledge is shared through a combination process and becomes tacit through internalization; tacit knowledge is shared through a socialization process and becomes explicit through externalization.

1.1.1.2. Knowledge and intellectual capital

Intellectual capital, as a term, was first introduced in 1960s and the conceptualization process did not start until the early 1990s (Jones and Jordan, 1998). John Kenneth Galbraith was the first who propose the intellectual capital concept. He believed that intellectual capital refers to actions that call for the use of mind power, and is not just simple knowledge and IQ (Masoulas, 1998). With the coming of knowledge-based economy, the subject of intellectual capital has been widely discussed and applied (Edvinsson and Malone, 1997; Masoulas, 1998; Roos and Roos, 1997; Stewart, 1994). There are several frames of different references concerning intellectual capital. Edvinsson and Sullivan (1996, p. 358) defined intellectual capital as "knowledge that can be converted into value". This very broad definition suggests that the management of the knowledge is the process that will create the intellectual capital and a higher value for the organization (Bassi, 1997). Bell (1997) and Stewart (1998) consider the knowledge as a value for the organization. Moreover, the definition of the intellectual capital is also used to explain the value of intangible assets. Expertise, know-how, information technology, and learning ability are part of the intellectual capital of the organization (Bontis, 1996)

Intellectual capital is created by the interaction and interplay of its three parts: human, structural and relational capital (Stewart, 1998).

Human Capital

Human capital is the collective capability of the firm to extract and deduce the best possible solutions from the knowledge of its employees (Bontis, 1996). It is a source of innovation and strategic renewal. In the beginning of 20th century, when Taylor approach was widely recognized, the full potential of human capital was not realized. In the 21st century, however, it is difficult to remain competitive without utilizing the human capital effectively (Bergendahl and Mattsson, 1999).

The issue of organizations today is how to acquire human capital to the extent that is needed to enable the desired growth rate. Human capital grows in two ways. First, when an organization uses more of what people know, and secondly, when more people know more knowledge. To use more of what people know, companies must create opportunities for turning private knowledge to public and tacit knowledge to explicit (Stewart, 1998).

Valuable knowledge, hard to replace, is the key to gain competitive advantage (Bassi, 1997). This knowledge is forged in communities of practice. But these communities and the human capital they create is not always contributing to the shareholder value. The challenge for the managers is how human capital can be turned in proprietary advantage. Nowadays, most valuable knowledge workers are also the ones best able to leave their employers, taking their talent and network with them (Stewart, 1995). Gaining access to the power of a firm's human capital often means knowing what piece of information or knowledge is relevant, which employee has it, and the speed with which the knowledge can be shared (Edvinsson and Sullivan, 1996).

Some scholars listed measurement indicators of human capital as average seniority of employees, number of employee, added value/professional employees, added value/number of employees, average age of employees, number of managers, time in training and education degree of employees (Dzinkowski, 2000; Edvinsson and Malone, 1997; Stewart, 1998; Bontis, 1996).

Structural Capital

Structural capital is the infrastructure that firms develop to commercialize their human capital. It provides the environment to create and leverage knowledge (Edvinsson and Sullivan, 1996). Roos and Roos (1997) states that the structural capital comes from relationship and organizational value, reflecting the external and internal focus of the company, plus renewal and development value, which is the potential for the future. Structural capital, through routines and structures, supports the individuals within the organization and thereby organizational performance (Bontis, 1996).

Some of what comes into the category of structural capital is entitled to legal rights of ownership, technologies, inventions, data, publications, and processes that can be patented, copyrighted or shielded by trade-secret laws. Further, among the elements of structural capital are also strategy and culture, structures and systems, organizational routines and procedures, assets that are often far more extensive and valuable than codified ones. It is the job management to build corporate assets (Stewart, 1995).

Systematic management of intellectual capital creates growth in shareholder value (Bergendahl and Mattsson, 1999). This is accomplished, among other things, through the continuous recycling and creative utilization of shared knowledge and experience. This, in turn, requires the structuring and storing of competencies with the help of technology, process descriptions, manuals, and networks, to ensure that the competence will remain within the company when the employees leave the company. Once stored, these become a part of the company's structural capital i.e. by structuring intellectual assets together with information systems enables the creation of organizational knowledge from an individual knowledge and know-how base. The structural capital creates a condition for rapid sharing of knowledge and sustained, collective knowledge growth. In addition, through structured, easily accessible and intelligent work processes, human capital will also be more productive (Bontis, 1996).

Organizational capital as part of the structured capital is the systems and competencies to handle and retain the innovation ability and value creating processes within the organization. The innovation creating capital consists of the organizational structure for research and development, as well as of patents and trademarks (Edvinsson, 1998).

Relational Capital

The last part of intellectual capital is relational capital, which refers to the networks and relationships of the organization and in particular their satisfaction with, and loyalty to the company (Bergendahl and Mattsson, 1999). Edvinsson and Malone (1997) pointed out the relational capital was intercourse and partnership between organizations and other organizations or customers. Even though it is not the most tangible part of the intellectual capital, it is the one which most easily can be perceived as creating value for the company (Bontis, 1996; Stewart, 1998). Besides the customers partnership emphasized by most organizations, the relational capital also contains connect of organizations and stakeholders such as suppliers, regulators, subcontractors, market channels and shareholders and so on (Lynn, 1998; Bontis, 1996).

It is the interaction with their participants that the company can turn intellectual capital into monetary returns. Shared knowledge, especially in regards to customers and suppliers is the ultimate form of relational capital (Stewart, 1998). Customer capital is essentially made up of the potential of the companies' customers (affect company value), the type of relation that the company has with its customers (direct contact), the customer base (risk distribution), and competitors and the competitive environment (risk and opportunity) (Edvinsson, 1998).

Dzinkowski (2000), Bontis (1998), Edvinsson and Malone (1997), and Stewart (1998) defined measurement indexes of relational capital are number of supplier/customer alliances and their value, market share, satisfied customer index, and distribution channel productivity and quality and so forth.

Based on the review of this section, intellectual capital could be regarded as a combination of human capital, structural capital and relational capital. If intellectual capital could help organization transform knowledge into corporate value, in turn, it has an impact on the quality of the services produced. If intellectual capital is a valuable resource of competitive advantages of organizations, it will contribute to the financial performance of products of the organizations.

1.1.1.3. Knowledge transfer

The ability to transfer knowledge from one unit to another has been found to contribute to the organizational performance of firms in both manufacturing (Epple et al., 1996; Galbraith, 1990) and service sectors (Baum and Ingram, 1998; Darr et al., 1995). Although the benefits of knowledge transfer have been widely accepted, the effectiveness of knowledge transfer varies considerably among organizations (Argote, 1999; Szulanski, 1996).

Knowledge transfer in the fields of organizational development and organizational learning, is the practical problem of getting a packet of knowledge from one part of the organization to another part of the organization (Wikipedia, 2007). It is considered to be more than a communication problem. If it were merely that, then a memorandum, an e-mail or a meeting would accomplish the knowledge transfer. Knowledge transfer is more complex, because (1) knowledge resides in organizational members, tools, tasks, and their sub-networks (Argote and Ingram 2000) and (2) much knowledge in organizations is tacit or hard to articulate (Nonaka and Takeuchi, 1995).

Argote and Ingram (1999, 151) define knowledge transfer as "the process through which one unit (e.g., group, department, or division) is affected by the experience of another". They further point out the transfer of organizational knowledge (i.e., routine or best practices) can be observed through changes in the knowledge or performance of recipient units. The transfer of organizational knowledge, such as best practices, can be quite difficult to achieve.

Disterer (2001) describes knowledge transfer as knowledge sharing within an enterprise between individuals and groups. This gets special attention because value of knowledge increases with use (Quinn et al., 1996). Not the individual knowledge or expertise of their members but the collective knowledge of their teams is a core asset of many firms. This synergetic behavior of knowledge is the economic driver for knowledge transfer. The vision of knowledge management may be a working environment, where employees are working like (Disterer, 2001):

- filling best practices in knowledge databases,

- filling forms and screens with their experiences and information,
- teaching, tutoring, mentoring colleagues, discussing and dialoging openly with colleagues,
- writing reports, and preparing written analysis papers, providing personal notes and papers to colleagues,
- giving openly hints and remarks, providing helpful suggestions and actively offering answers to colleagues
- carefully documenting insights, writing procedures and handbooks when working on improvement processes
- using existing knowledge databases for their tasks.

In this broad vision, people recognize that working together openly without holding back or protecting vital pieces of knowledge will result in more productivity and innovation than any one could reach individually. These approaches and processes should be supported by information systems to assure efficient and effective usage of resources. Information technology industry offers a lot of tools and techniques to support knowledge management, but despite all of these offerings, many firms experienced that other issues are more critical than technical ones. Ruggles (1998, p. 88) states that "if the people issues do not arise, the effort underway is probably not knowledge management. If technology solves the problem, yours was not a knowledge problem". Whiting (1999, p. 5) points out to the similar issue : "When you start talking about knowledge, it's really about people, relationships, communities, and a new way of working".

Sveiby (2001) proposes a framework that distinguishes nine basic knowledge transfer/conversions which have the potential to create value for an organization. Activities that form the backbone of a knowledge strategy are to be aimed at improving the capacity-to-act of people both inside and outside the organization.

1. Knowledge transfers/conversions between individuals
2. Knowledge transfers/conversions from individuals to external structure

3. Knowledge transfers/conversions from external structure to individuals
4. Knowledge transfers/conversions from individual competence into internal structure
5. Knowledge transfers/conversions from internal structure to individual competence
6. Knowledge transfers/conversions within the external structure
7. Knowledge transfers/conversions from external to internal structure
8. Knowledge transfers/conversions from internal to external structure
9. Knowledge transfers/conversions within internal structure

Knowledge transfers/conversions between individual professionals:

Knowledge transfers/conversions between individuals are concerned with how to best enable the communication between employees within the organization and determine what types of environments are most helpful for creativity. The strategic questions are: How can we improve the transfer of competence between people in our organization? And: How can we improve the collaborative climate? The most important issues are probably concerning trust in the organization (Huener et al., 1998). How willing are people to share their ideas and what they know? Answers to such questions lead towards activities focused on trust building, enabling team activities, induction programs, job rotation, master/apprentice schemes, etc.

Oticon, the Danish hearing-aid manufacturer established in 1905, has re-designed whole work areas to create an atmosphere of openness, flexibility, creativity and sharing. The company emphasizes “live” interaction. Stand-up coffee bars encourage impromptu meetings, and dialogue rooms with a table and chairs help employees relax while solving problems or sharing knowledge. Oticon even locked up elevators so there would be more “accidental” meetings in the stairwell. The company believes that paperwork hampers the exchange of information because it is slower and more formal than oral communication. The company therefore designated a “paper room,” the only room where paper is ”safe.” Even electronic mail is discouraged in favor of face-to-face communication. These tactics have contributed towards live dialog becoming an integral part of Oticon’s business so much that other forms of communication are almost non-existent (LaBarre, 1994).

In some companies, personnel rotation programs are common. For instance every executive including the CEO at Southwest Airlines spends at least one day every quarter as a baggage handler, ticket agent, or flight attendant. This "shop-floor" experience keeps the knowledge of the operation fresh in the minds of all employed. It also improves communication across all levels (Fambare, 1989).

Knowledge transfers/conversions from individuals to external structure

Knowledge transfers/conversions from individuals to the external structure are concerned with how the organization's employees transfer their knowledge to the outside world. The strategic question is: How can the organization's employees improve the competence of customers, suppliers and other stakeholders? Answers to such questions lead towards activities focused on empowering the employees to help the customers learn about the products, getting rid of red tape, doing job rotation with customers, holding product seminars, providing customer education, etc.

Consultants at McKinsey, the US based consulting firm, are encouraged to spend time on publishing their research and methods in order to build the reputation of the firm. Baxter International markets healthcare products and has extended its offering to include service to hospitals. Baxter employees now mix drugs in intravenous solutions and act as brokers for other vendors (Harari, 1994).

Knowledge transfers/conversions from external structure to individuals

Employees learn a lot from customer, supplier and community feedback such as ideas, new experiences, feedback and new technical knowledge. Knowledge transfers/conversions from the external structure to individuals are concerned with how the organization's employees can learn from the external structure. Organizations tend to have procedures in place that capture such knowledge, but they are scattered, not measured and hence do not systematically influence strategy formulation. The strategic question is: How can the organization's customers, suppliers and other stakeholders improve the competence of the employees? Answers to such questions lead towards activities focused on creating and maintaining good personal relationships between the organization's own people and the people outside the organization.

Adding an intangible dimension to traditional $-based sales and revenue reporting enables an organization to follow up such intangible revenues (Sveiby, 1998). Employees at Betz Laboratories in Trevose, Pennsylvania, frequently participates in its customers' quality management teams in order to gain a better understanding of, and even anticipate customer needs. This knowledge is used to develop products that will boost customer sales. Betz measures value added from this knowledge by tracking its customers' return on investment, and its own employees receive awards for outstanding efforts to increase these returns (Garvin, 1993).

Knowledge transfers/conversions from individual competence to internal structure

Huge investments are currently being made in order to convert individual competence (often tacitly held) into data repositories. Indeed, the marketers of database software have been so successful that many managers believe that buying a database is equal to "Knowledge Management". Actually, it is only one of nine possible strategic activities. To focus one's investments on databases and document handling etc. will realize only a fraction of the value of a more strategic approach based on a knowledge-based theory of the firm, which comprises all nine knowledge transfers/conversions.

The strategic question is: How can we improve the conversion of individually held competence to systems, tools and templates? Answers to this question lead towards activities focused tools, templates, process and systems so that competence can be shared more easily and efficiently.

The key to create value from database or intranet system is not the sophistication of the technology but on the climate in the firm and the level of involvement from all agents in the system. The US chemicals manufacturer Buckman Labs is well-known for nurturing a collaborative climate despite the fact that its 1,300 associates are spread all over the world. The company has been using electronic means for capturing experiences and information since 1987. Its new products to sales ratio went from ~25% to >35% when it began involving the customers in their intranet in 1994 (Buckman, 2001).

Knowledge transfers/conversions from internal structure to individual competence

Competence "captured in a system" is information and that needs to be made available to other individuals in such a way that they improve their capacity to act; otherwise the investment is a waste. IT systems can by definition only produce information. The key to value creation is whether the information generates competence. The strategic question is: How can we improve individuals' competence by using systems, tools and templates?

Answers to such questions lead towards activities focused on improving the human-computer interface of systems, action-based learning processes, simulations and interactive e-learning environments.

The Copeland Corporation, a manufacturer of compressors, changed its entire manufacturing approach based on the results of a single demonstration effort, in which a multifunctional team designed a demonstration factory to manufacture a new product line. Experimentation, whether an ongoing program or a demonstration project, helps individuals move from superficial knowledge to a more basic understanding of its processes—from knowing about something to learning how and why. The corporation was able to transform from a high cost operation with marginal quality to a 25 percent market share in two years (Garvin, 1993).

Knowledge transfers/conversions within the external structure

What do the customers tell each other about the services/products of a supplier? How are the products used? The conversations among the constituencies can have an enormous impact on strategy of a company. Strategy formulation from a knowledge perspective adds a richer range of possible activities to traditional customer satisfaction surveys and public relation activities. The company can support the competence growth of customers and influence how competence is transferred between the stakeholders in the external structure. The strategic question is: How can we enable conversations among the customers, suppliers and other stakeholders to improve their competence?

Answers to such questions lead towards activities focused on partnering and alliances, improving the image of the organization and the brand equity of its products and services; improving the quality of the offering; conducting product seminars and alumni programs.

Knowledge transfers/conversions from external to internal structure

Knowledge transfers/conversions from external to internal structure are concerned with what knowledge the organization can gain from the external world and how such new knowledge can be converted into action. The strategic question is: How can competence from the customers, suppliers and other stakeholders improve the organization's systems, tools, processes and products?

Answers to such questions lead towards activities focused on empowering call centers to interpret customer complaints, creating alliances to generate ideas for new products, research and design alliances, etc.

Knowledge transfers/conversions from internal to external structure

The strategic question is: How can the organization's systems, tools, processes and products improve the competence of the customers, suppliers and other stakeholders? Answers to such questions lead towards activities focused on making the organization's systems, tools and processes effective in servicing the customer, extranets, product tracking, help desks, e-business, etc.

Knowledge transfers/conversions within internal structure

The internal structure is the supporting backbone of the organization. The strategic question is: How the organization's systems, tools, processes and products can be effectively integrated? Answers to such questions lead towards activities focused on streamlining databases, building integrated IT systems, improving the office layout, etc.

This is also a field dominated by enterprise systems and other company-wide IT solutions.

People issues are meant to be critical for the success of knowledge management and knowledge transfer initiatives. The impediments for knowledge transfer caused by soft

factors into individual and social barriers are categorized into individual and social. The two categories of individual and social barriers should by no means indicate that the issues are independent. Indeed, these cultural issues are highly dependent. These are usually observed on different organizational levels, the individual and the group level. They have in common, that they hinder organization members to contribute to the knowledge sharing processes.

There are some barriers that complicate knowledge transfer. There are many factors, including the followings (Wikipedia, 2007):

- the inability to recognize and articulate "compiled" or highly intuitive competencies - tacit knowledge idea (Nonaka and Takeuchi, 1995),
- geography or distance (Galbraith, 1990),
- lack of a shared/superordinate social identity (Kane et al., 2005),
- language,
- areas of expertise,
- internal conflicts,
- generational differences,
- union-management relations,
- incentives,
- the use of visual representations to transfer knowledge,
- problems with sharing beliefs,
- assumptions, heuristics and cultural norms,
- previous exposure or experience with something.
- misconceptions

- faulty information
- organizational culture non-conducive to knowledge sharing (the "Knowledge is power" culture)
- motivational issues
- lack of trust

Individual barriers to knowledge transfer

There are individual barriers that make knowledge transfer more difficult to achieve in the organizations. Individual barriers are classified as loss of power, revelation, uncertainty and motivation by Disterer (2001).

Loss of Power: Knowledge can be used to take action and to enforce spheres of influence, to pass knowledge to colleagues might grant some of these potentials. Those who do not own this knowledge are deprived of the capacity to act or to influence respectively. From a business perspective, this applies to knowledge about customers, competitors, suppliers, procedures, recipes, methods, formulas etc. In this sense someone who passes on knowledge to a colleague looses the exclusiveness of his or her influence, which might have suggested some job security and respect. "Knowledge is power" is the well-known line to describe situations, where experts with rare knowledge have the highest reputation and monopolies of knowledge causes knowledge hoarding instead of knowledge transfer (Reimus, 1996).

This is a common phenomenon in many companies. Especially in situations where job security is low, knowledge as a power becomes vital for the individual and knowledge might be seen as a kind of insurance against loosing the job (Davenport et al., 1998). In special industries like professional service firms, (consultants, marketing and advertisement experts, lawyers, accountants and tax advisors) the employees are competing directly with each other through their special knowledge and talents. It might be part of the individual culture of the high performing employees that they voluntarily enter into the competition for scarce seats on the career path because they like to compete and to excel

each other on principle (Quinn et al., 1996). The drawback of the competition is that knowledge workers would be very cautious to share openly their knowledge with colleagues, because they possibly give up an individual lead. In these companies, competition and corresponding incentives and rewards urge to build a unique expertise in a certain area and to prove that expertise for clients, not to share it with colleagues.

Revelation : Passing on knowledge to colleagues or putting working results into a knowledge database may be considered as revelation, because it proclaims that this knowledge has a certain value and rareness. If this assessment is not shared by other users of the database, embarrassment may happen. There are some colleagues who point out and suggest their necessary improvements just to emphasize their own expertise. Similar to this is the well-known "not-invented-here" syndrome which describes the attitude not to use foreign knowledge because it could be interpreted as inability to provide an own solution.

Uncertainty: Especially younger and less experienced people may feel some uncertainty, because they can not judge if their working results represent valuable knowledge for others. Especially they cannot estimate if their knowledge is too general or too well known or that some results are too specific for a special situation and therefore useless for colleagues in other situations. The positioning on the scale of ‘general’ to ‘specific’ is not trivial at all and, thus, generates uncertainty.

Motivation: Transferring knowledge may be seen as additional work, because of the time for documentation, communication etc. Some employees do not expect reciprocal benefits from transferring their knowledge because they do not believe these benefits or they do not experience it. There is a need that the employees have some self-motivated creativity and some sense of "care-why" (Quinn et al., 1996) in order to foster knowledge sharing. Part of the problem is that typically the benefits of the contribution to a knowledge database are gotten by a different stakeholder at a later point in time. So, the benefits usually won't be earned by the provider but by his/her colleagues (Nissen et al., 2000). Therefore precondition of the participation in knowledge transfer is the assumption of equilibrium, a balanced give and take between colleagues who are sharing knowledge. The insight that knowledge sharing can only be beneficial if everybody provides his knowledge unselfishly may have charm theoretically. But in day to day practice the benefit is to uncertain, therefore the individual's commitment into transferring and sharing knowledge might fail.

Social Barriers to Knowledge Transfer

Beside individual barriers, there are also some social barriers in the organization. Disterer (2001) classified social barriers as language, conflict avoidance, bureaucracy and hierarchy and incoherent paradigms.

Language : In some companies a certain lack of a legitimate language (Von Krogh, 1998) is perceptible, which is known and acceptable for all involved people and can carry personal knowledge. This covers the need for a common language to communicate knowledge and special language features like analogies and metaphors to externalize tacit knowledge hidden in individual mental models, viewpoints, working models, schemata, paradigms and beliefs (Nelson and Cooprider, 1996; Nonaka, 1994).

Conflict Avoidance: Attitudes of conflict avoidance and some conservative habits may prevent the transfer of knowledge, if this knowledge contains some new thoughts or innovative ideas. If most leading members of an organization are not comfortable with change and not willing to take risks, new ideas may be covered very easily, different views and perspectives would be hidden, knowledge not culturally legitimated may be suppressed. This is the reason why Fahey and Prusak (1998) call it one of the eleven deadliest sins of Knowledge Management not to establish, challenge and align a shared context for the members of an organization. This shared context requires engagement in open, honest, supportive, and critical dialogue to develop different and/or new views.

Bureaucracy and Hierarchy: More bureaucratic and administrative organizations show formal procedures, which prevent the transfer of knowledge and new ideas. Strong hierarchical enterprises prevent even cross-functional communication, all the more cross-functional cooperation or knowledge sharing.

Incoherent Paradigms: A lack of coherence between the personal intents of the individuals and the paradigms of the organization (which cover strategic intent, vision, mission, strategies, values etc.) can cause difficulties to articulate and justify personal beliefs which do not fit with the ruling paradigms of the organization (Von Krogh, 1998).

In these situations, explicating knowledge may be difficult because articulating particular knowledge or ideas may not be culturally legitimated through the paradigms of the company.

Even in many companies the ruling paradigms, the vision of the future, the mission of the companies, the main strategic issues are not known by all employees because they are not well enough communicated. In this case the uncertainty about unknown paradigms hinders the articulation of ideas and knowledge.

Countermeasures to barriers

There are empirical results showing that cultural aspects like individual and social barriers are critical for knowledge management initiatives. The benchmarking study of the American Productivity and Quality Center (1996), list culture, rewards, and support among the most important issues within knowledge management.

A survey by Ernst & Young (Ruggles, 1998) list "culture" as the biggest impediment to knowledge transfer: 54% of the respondents marked it as an impediment. Next issue on the ranking was top management failure to signal importance (32%), which is an indicator that paradigms of the companies are not well enough communicated or understood within the companies. The biggest difficulty in managing knowledge is changing people's behavior, which is basically their behavior of transferring and sharing knowledge with their colleagues.

These studies and surveys show on a high level that cultural issues made by individual and social barriers are among the leading problems of knowledge management. Unfortunately till now there are no studies differentiating and ranking the single barriers. Also there is no measurement of the impact of possible countermeasures which can be taken by management.

Traditionally, organizations have rewarded their professionals and employees based on their individual performance and know-how. In many organizations, a major cultural shift would be required to change their employees' attitudes and behavior so that they willingly and consistently share their knowledge and insights (Alavi and Leidner, 1999; Davenport et al., 1998; Ruggles, 1998; Whiting, 1999). Experts agree that for the success of

knowledge management initiatives cultural issues are more important than technical ones (Alavi and Leidner, 1999; King, 1998; Ruggles, 1998).

Interestingly there are strong references to a negative correlation between actual management techniques of Business Process Reengineering (BPR) - which often result in downsizing - and knowledge management: "Given the downsizing in many U.S. corporations during the past decade, it is not uncommon to find negative cultural aspects with respect to knowledge" (Davenport et al., 1998, p. 43). Main reasons are:

- BPR projects result in organizational designs that disrupt the flow of information and knowledge because traditional working routines are broken (APQC, 1996; Russell, 1996).
- As an outcome of many BPR projects employees have to leave the company. In the context of knowledge management, it means the company looses a significant amount of tacit knowledge together with these employees (APQC, 1996; Eisenberg, 1998; Huang, 1998; Mahe and Rieu, 1998; Nissen et al., 2000).

- BPR projects and their results boot the competition among the employees and therefore deteriorate the climate for openly sharing knowledge (Von Krogh, 1998).

- One of the main objectives of BPR is the reduction of redundancies, but knowledge management initiatives require a significant amount of redundancy within the organization to afford time for communication and reflection (Nonaka, 1994; Nonaka, 1991; Wiig, 1997).

Therefore it will be important in future research to analyze in more detail the dependencies between management techniques that aim to increase efficiency and knowledge management that aim to foster knowledge transfer and sharing.

Concern and Trust : A precondition for knowledge sharing within organizations is a attitude of concern and trust among the organization members. Krogh (1998) defines it as serious attention, a feeling of concern and interest within an organization. His concept includes phenomena like trust among the people, interest for different viewpoints and

experiences, access to help, tolerance in judgment, courage to voice opinions, to allow experiments and to take risks.

Necessarily, organizations have to strive for a culture of accepting mistakes and not to penalize errors, a climate of constructive conflicts giving organization members the chance of "falling forward". Organizational development processes should develop a common set of ethical standards and values for an organization and should achieve a consensus of accepted working practices and habits. These standards and values should be stated explicitly and communicated through the company.

Leadership: Knowledge sharing is also based on consistent, reliable, plausible behavior of management. Management must positively communicate that they are thoroughly convinced that knowledge needs to be "nurtured, supported, enhanced, and cared for" (Nonaka and Kanno, 1998) and that they even financially support knowledge management initiatives (Whiting, 1999).

Management must afford time for communication and reflection. There must be organizational slack that provides permission and time to allow employees to network (Von Krogh, 1998; Wiig, 1997).

Mutual trust is necessary among all organization members to openly share knowledge. Trust results in common expectations of reliability, consistency, and plausibility. Trust reduces the fear that others will act opportunistically. Likewise management must act as examples for knowledge sharing, they have to walk-the-talk and give up knowledge hoarding first. Members of a profession or a community accept standards of behavior and working habits from their peers (Quinn et al., 1996), therefore management must act as peers to give an example in knowledge sharing.

Rewards and Incentives: Special rewards and incentive methods can act as extrinsic motivators, so that employees are willing to share and transfer knowledge.

Some companies make positive experiences with the provision of personal recognition and reputation when people have contributed to knowledge databases or actively participated in knowledge sharing. For example, simple rewards are used by Texas Instruments, where they created an annual award named “Not Invented Here, But I did it Anyway Award”

(Davenport et al., 1998) to reward usage of other employees' knowledge. Buckman Labs reward the top 150 “knowledge sharers” (judged by knowledge managers) with a new laptop and an incentive trip to a resort (Davenport et al., 1998). AMS honors contributors to the knowledge center with a bronze plaque at the headquarter and publishes regularly a top 10 list of most frequently used contributions (King, 1998).

Incentives schemes may also foster knowledge sharing, although especially empirical studies on financial incentives showed quite different results. Nevertheless many companies incorporated issues of knowledge sharing into their compensation plans and promotion policies. So the big consulting and accounting firms commonly base personal evaluations in part on how many contributions are made to knowledge databases, how many new employees people have been tutored and how many training courses have been designed (Quinn et al., 1996; Whiting, 1999).

Clear responsibilities may be defined for tutoring and mentoring within an organization. Ongoing programs which systematically develop organization members (continuing education) can foster common habits and attitudes and can support communication among organization members. On a smaller scale, at the end of bigger projects and transactions, time and effort for explicitly debriefing should be provided to learn systematically by experiences. These lessons learned could be systematically analyzed and stored for access through other employees.

Communities of Practice: An attractive approach to foster knowledge transfer and knowledge sharing is to develop communities of practice within companies. These groups of professionals care about certain topics by enhancing the ability of its members to think together, to stay in touch with each other and to share ideas with each other. These informal networks, sometimes also called knowledge fairs or clubs, competence centers or creativity centers, are groups of professionals, informally bound to one another through a common class of interests and problems and a common pursuit of solutions.

People who are exposed to common class of interest and problems often develop a common language to communicate and develop a sense of mutual obligation to help each other (Manville and Foote, 1996; McDermott, 1999). These phenomena can be used to

overcome some of the individual and social barriers to knowledge transfer within the community of practice.

To support the building of communities of practice, time should be given to organize and attend meetings, to create bulletins, to sample a skills directory. Communities should have the necessary tools and techniques to form, evolve and develop. At least they need a forum, either physically or electronically, to spark collaborative thinking and working not just make merely static presentations of information and ideas.

In order to get acquainted with each other, community members should start to discuss operational topics and problems on a regular base. Moreover they build up and refine a common language and common understanding of approaches and solutions. During and after this initial phase the communities should decide themselves what kind of knowledge they want to share and how to share it.

In general, communities of practice are networks within an organization, where people with common interests and problems can meet. Through their common language and work habits they develop over time more trust and openness to transfer and share knowledge openly.

Codification vs. Personalization: In special industries, where knowledge of professional experts is a core asset, careful management of this asset has special importance, e.g. in management consulting and law firms. On the one hand, management is responsible for the independency of the company from individual professionals. On the other hand, the business of these firms is partly a "people business", where the very personal and individual link between clients and consultants or lawyers is critical. This special situation requires special approaches to manage knowledge. Hansen et al. (1999) observed that management consulting firms employs two very different knowledge management strategies which address cultural issues. The firms pursue one of these two strategies predominantly and use the second one to support the first.

One strategy ("codification strategy") centers on information technology: the knowledge is carefully codified and stored in knowledge databases and can be accessed and used by anyone. With the other strategy ("personalization strategy") knowledge is tied to the person

who developed it and is shared mainly through direct person-to-person contact (Hansen et al., 1999).

With a codification strategy knowledge is extracted from the person who developed it, is made independent from the person and stored in form of interview guides, work schedules, benchmark data etc. and then searched and retrieved and used by many employees. Personalization strategies focus on dialogue between individuals; knowledge is transferred mainly in personal meetings and one-on-one conversations.

The individual barriers become significantly low with the personalization strategy, because the individual professionals keep the control through the whole knowledge management cycle. The individual is recognized as an expert and is cared for. In fact, knowledge management strategies focusing on personalization could be called communication strategies, because the main objective is to foster personal communication between people. Core IT systems with this strategy are yellow pages (directories of experts, who-knows-what systems, people finder database) which show people with whom they should talk regarding a given topic or problem. The main disadvantages with personalization strategies are a lack of standards and the strong dependencies from the communication skill and will of the professionals.

Organizational Design of Enterprises: Some organizational designs can foster intra-organizational collaboration. To produce involvement and commitment partnerships and other forms of ownership of the enterprise by their employees can be utilized (Hildebrand, 1994; Miles et al., 1998). Moreover, these organizational forms address the hesitation of professionals with very specialized knowledge to work within strong hierarchies and in working environments with strong regulations (Quinn et al., 1996).

Office Design and Construction: To lower disadvantages of bureaucracy and formal communication ways modern shop and office layout reduce the distance between workers and executives to foster ad hoc, informal and face-to-face communication. Nowadays, the office spaces of executives are more open and easily accessible for employees. Similar effects are caused by placing the offices of engineers in the middle of the production hall instead of placing them in a far distant research and development center (Disterer, 2001).

2.3. Information Technology (IT)

Information technology is a specific technology that processes data and information. IT (information technology) is a term that encompasses all forms of technology used to create, store, exchange, and use information in its various forms (business data, voice conversations, still images, motion pictures, multimedia presentations, and other forms, including those not yet conceived). It's a convenient term for including both telephony and computer technology in the same word. It is the technology that is driving what has often been called "the information revolution." (WhatIs, 2005).

Information technology (IT) has moved from the periphery to the center of everyday business and social life, playing a pivotal role in the transformation of all organizations (Scott-Morton, 1991).

Information technology is rather new.. At the turn of the 20th century, Frederick Taylor revolutionized the workplace with his ideas on organization of work, job breakdown and measurement. It was only during the second half of the previous century that the evolution of computing technologies in business gave real signs of organizational changes. Centralized computer mainframes of the 1960s allowed for massive calculations. As the amount of data was increasing, Management Information Systems (MIS) during the 1970s were put in use in order to convert the data into useful information reports. Soon after the first Information Systems (IS) groups appeared within the organizations. The revolution of the Personal Computer (PC) in the 1980s offered decentralized computing capabilities on the desk of managers, manufacturing automation on the production floor, and distributed information control (Papoutsakis, 2005).

In the mid 1990s, the Internet and related technologies once again gave people, individually and collectively, increasing power to access vast amounts of information in order to accomplish goals. It is worth noticing here that the focus of all these systems was data and information. Thus, it is evident that during the last two decades of the previous century, it was Information Technology (IT) that once again retransformed organizations to an extended degree (Papoutsakis, 2005).

In the modern organization, effective use of technology, particularly IT is considered among the key variables that are driving competitiveness. Companies compete on the value

that their products and services offer to customers, including their benefits based on the technical features, and the cost effectiveness that allows them to competitively price these offerings. The efficiency to which technology can be introduced, developed and managed is of major consideration in competitive environments and hence in determining which companies will be the winners and losers in every market.

Porter and Millar (1985, p. 149-150) have warned that "…information technology is more than just computers. Today, [1985], information technology must be conceived of broadly to encompass the information that businesses create and use as well as a wide spectrum of increasingly convergent and linked technologies that process the information. In addition to computers, data recognition equipment, communications technology, factory automation, and other hardware and services are involved." Despite the fact that they did not foresee, at the time, all 'other hardware and software involved' in today's IT-world, their visualization is remarkable.

Zuboff (1988) identifies another unique and revolutionary aspect of IT. She states that IT does not simply "automate" information-handling process; it also generates large quantities of information previously unavailable to the organization.

Davenport and Short (1990, p. 12) define Information Technology as "…the capabilities offered by computers, software applications, and telecommunications" and further explain that "Information Technology should be viewed as more than an automating or mechanizing force; it can fundamentally reshape the way business is done" and that "IT can make it possible for employees scattered around the world to work as a team" .

L.C. Thurow, in his Foreword to Scott Morton's (1991, p. v-vi) points to the very broad definition of IT, used in the Management in the 1990s Research Program of MIT, as: "…including computers of all types, both hardware and software; communication networks from those connecting two personal computers to the largest public and private networks; and the increasingly important integrations of computing and communication technologies, from a system that allows a personal computer to be connected to a mainframe in the office to globe-spanning networks of powerful mainframe computers." In addition, he emphasizes on the IT contribution to the financial world: "Information technologies … are the very means whereby the financial service industry creates markets

and distributes its products. Today's world capital markets could not exist without information technologies."

Venkatraman (1994, p. 83) states that "IT is not simply a utility like power or telephone but a fundamental source of business scope reconfiguration to redefine the rules of the game…"

Applegate et al. (1999, p. vii) identify Information Technology (IT) as: "…computing, communications, business solutions and services…" and emphasize on the implications of the information explosion, bringing up the example of the rapid expansion of the number of volumes in the Library of Congress. Indeed there was a doubling between 1933 and 1966, a second between 1967 and 1979, and yet another doubling by 1987. And further down they explain that "…IT refers to technologies of computers and telecommunications (including data, voice, graphics, and full motion video)."

Information technology has four different functions:

- Conversion, storage, processing and communications (Yates and Benjamin, 1991) or
- Input-output, storage, processing and transmission (Jonscher, 1988).

The following three key characteristics are proposed by Yates and Benjamin (1991):

- Compression of time and distance;
- Expansion and transformation of organizational knowledge;
- Flexibility and adaptability to the needs of virtually any organization.

This view of IT and its applications, both in its past and present forms, provides a useful perspective for thinking about future use of IT. The authors have identified a number of trends that are affecting the development of new IT applications.

Cohen (1998, p. 27), in his report, gives us the opinion of two executives from the industrial world, as they have been expressed during the U.C. Berkeley Forum. Gordon Petrash and his colleagues at Dow Chemical have seen during the implementation of a

knowledge management project that "…information technology is not an answer, but a tool that can be effectively used only by people who understand their common purpose".

Laurence Prusak, of IBM, in answer to a question about the future role of technology, said that "… cheap wide-band computing will help connect people in the future, but he cautioned against expecting too much from technology" (Cohen, 1998, p. 37). Prusak referred to telephone and the television, as two examples that have recently created "utopian fantasies" about what technology can do.

From all of the above definitions and comments it is clear that IT is not an end in itself. It is a means to the end of business competitiveness and performance.

There are several reasons that have made the mission of successfully managing IT a very critical issue for today's organizations (Papoutsakis, 2005) :

1. It has recently been considered a strategic asset used to form competitive strategies and modify organizational processes.

2. The applications in which organizations are employing IT have increased in complexity.

3. As the IT capabilities –along with its applications- become more complex, the task of developing strategies and systems to deliver the technology has also become difficult.

Hence, as one of the firm's key resources and key success factors, IT needs to be planned and exploited within the context of the organization in which it is deployed or being considered.

2.4. A Chronology of IS and Business Units Relationship

The nature of the relationship between information technology professionals and the rest of the organization is usually considered a key determinant of success in information systems. Opinions about the appropriate form and function of this relationship have evolved substantially over the last 30 years, leading us from participation (Swanson, 1974), through involvement (Ives and Olson, 1984) and line leadership (Rockart, 1988) to partnership (Henderson, 1990).

Studies of relationships between IS groups who provide IT products and services and their clients, often termed the 'Line' groups suggest that cooperative arrangements such as partnerships between IS and User groups significantly enhance outcomes on a variety of dimensions (Henderson, 1990; Lasher et al., 1991). The Partnership Model (Henderson, 1990) identifies a set of six key factors impacting the nature of the IS-User relationship. These are the nature of Mutual Benefits, the level of Commitment and Trust, the extent of Knowledge Sharing, the level of Distinctive Competencies and the Organizational Linkages between the two groups.

The flexibility and adaptability of mutually regulated mechanisms are advantageous in context such as that faced by IS providers and clients in organizations where participants can discover and fashion efficient ways of using and deploying information technologies during ongoing task execution. Such IS-User partnerships are critical components of organizational efforts to effectively exploit the potential of information technologies (Broadbent and Weill, 1993; Weill, 1992).

Prior research studies on partnerships in general, provide case based evidence or conceptual frameworks on issues such as vulnerability and risks from partnerships and articulate the nature of management processes in specific instances that led to outcomes observed (Johnston and Lawrence, 1988; Konsynski and McFarlan, 1990; Lasher et al., 1991). Examinations of IS-User partnerships are similarly focused on providing rich, contextual descriptions of the phenomenon, identifying common themes and proposing intuitive models to guide action and further research (Henderson, 1990; Lacity et al., 1995). A paper by Lee and Kim (1999) examined the association of partnerships and success in outsourcing.

In its simplest manifestation, the domain of the relationship between IS group and the rest of the organization comprises four components: the people working in the IS function (IS professionals), the information systems, the people in the rest of the organization (business people), and the business processes. In the early days of information systems, IS professionals were responsible for the information systems, and the people in the rest of the organization took care of the business processes and their outcomes. This arrangement was fine for limited transaction processing, but it did not work very well when systems became more tightly connected to business processes. The systems did not meet the needs

of the business, and the business did not change to accommodate new systems (Avital and Vandenbosch, 2002).

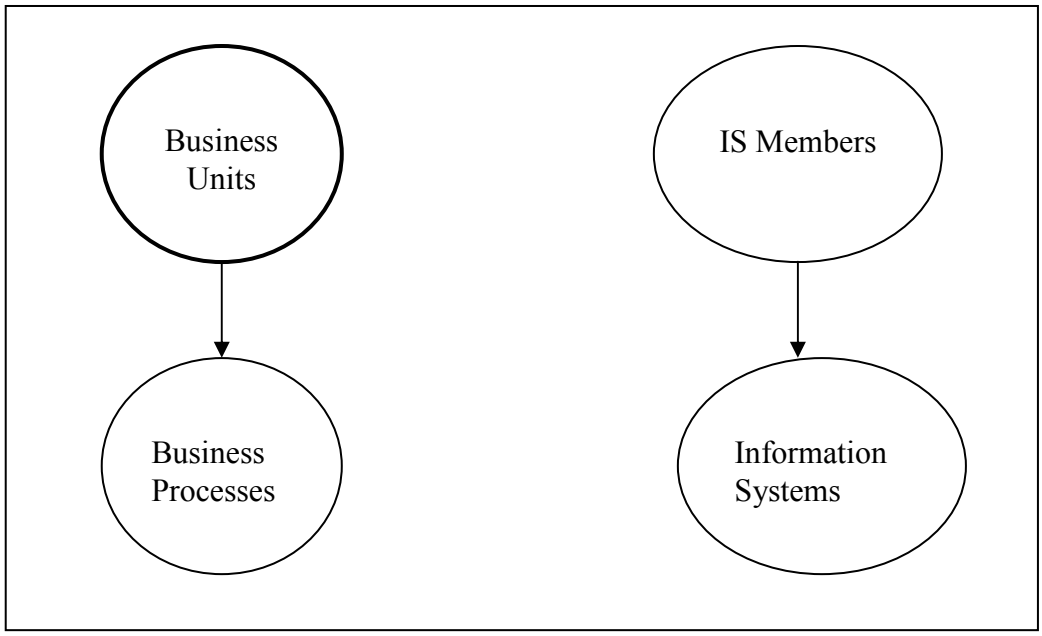

Figure 2.5 The information systems (IS) function is isolated from the business processes (Avital and Vandenbosch, 2002).

Swanson (1974), Ives and Olsen (1984) and Barki and Hartwick (1989), recognized the need for the participation and involvement of users in IS development. Rockart (1988) went even further by asking the line to take the leadership role. He argued that significant business understanding is required to design information systems that meet the strategic objectives of the organization. In addition, the implementation of most strategic systems requires a transformation of the organization, encompassing changes to people and processes. According to Rockart, line leadership enables both of these to take place. Closely related to line leadership is the notion that top management commitment is the key to successful implementation of information systems (Jarvenpaa and Ives, 1991). IS was perceived and treated in the organizational environment as a cost-center rather than a profit-center, as an expense rather than an asset.

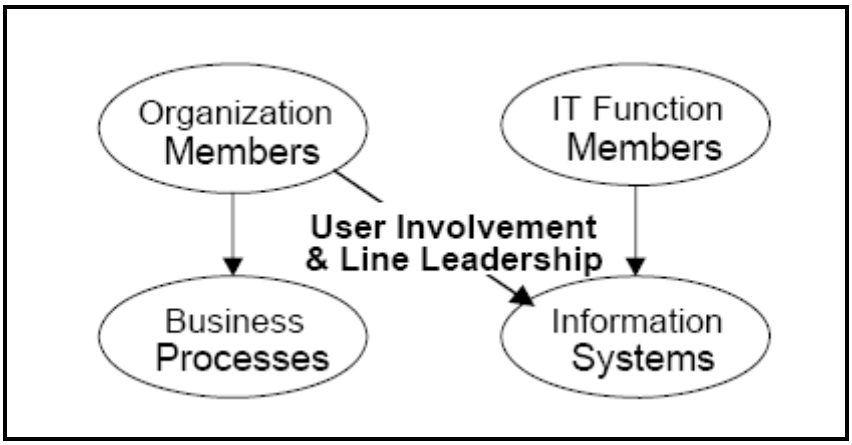

Figure 2.6 User involvement and line leadership are critical for IS success (Avital and Vandenbosch, 2002).

In response, and in an attempt to regain their status, IS departments re-engineered themselves as trusted advisors and started to manage their relationships with the rest of the organization using the "supplier-customer" metaphor. Abundant research supports this approach and points to the importance of relationship management. IS departments are encouraged to actively manage their interactions with internal clients, or users. Advice falls into two categories: ensuring that user expectations are clearly managed (Ginzberg, 1981) and building good relationships through trust and credibility (Bashien and Markus, 1997). Though we do not dispute that good relationships, trust, and credibility are very important in any social or organizational context, the advocators of relationship management often imply that the IS community should control rather than collaborate. In another stream, researchers stress the importance of the IS organization and the line working together to develop high value systems (Henderson, 1990; Reich and Benbasat, 1996; Chan et al., 1997). Rather than pointing to either the line or information technology as the source of both problems and success, they assert that when there is mutual understanding of and commitment to goals, incentives and approaches, the likelihood of success is much higher. Partnership requires mutual dependency. In the spirit of true partnership, both parties must be fully and equally responsible for the success or failure of the project or product. Perhaps most importantly, line managers must be actively involved in IS management and IS managers must be actively involved in business decisions (Henderson, 1990). As it has been defined in both the IS and the management literature, partnership is clearly a group or organization-level construct (Lasher et al., 1991). A partnership depends on trust, common goals, clearly established success criteria and executive leadership (Kanter, 1989).

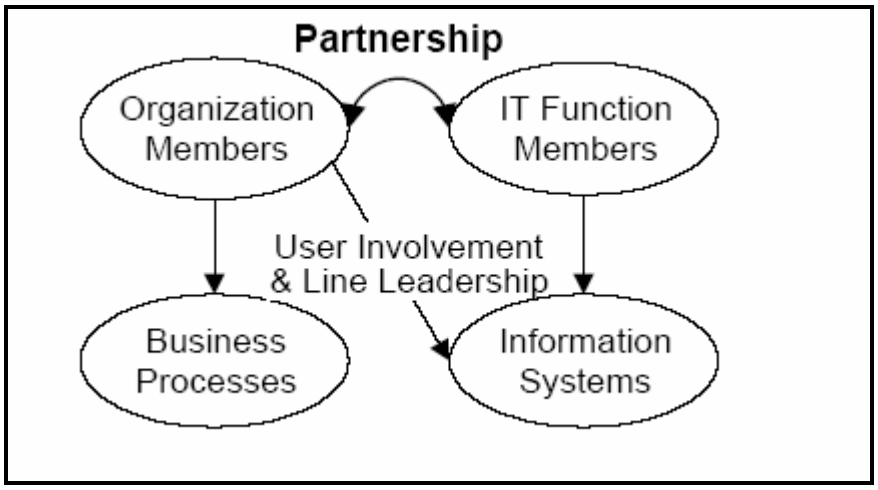

Figure 2.7 A partnership between the IS Function and the line increases success (Avital and Vandenbosch, 2002).

Since systems and technology have become more pervasive, it has become increasingly difficult to differentiate between the system and the business processes (Orlikowski, 1991). Enterprise resource planning (ERP) systems are one of the latest examples of this trend. The flexibility built into most software and the ease with which much of it can be altered, makes the division between programming and using arbitrary. For example, configuring an ERP system is not considered a programming task, and yet, a great deal of knowledge about the way the ERP works is necessary before one can configure it successfully. Configuring is not considered using the system either; nevertheless, without detailed knowledge of the business processes, configuring is not possible. Consequently, it is our contention that the division between process and system is becoming less and less relevant.

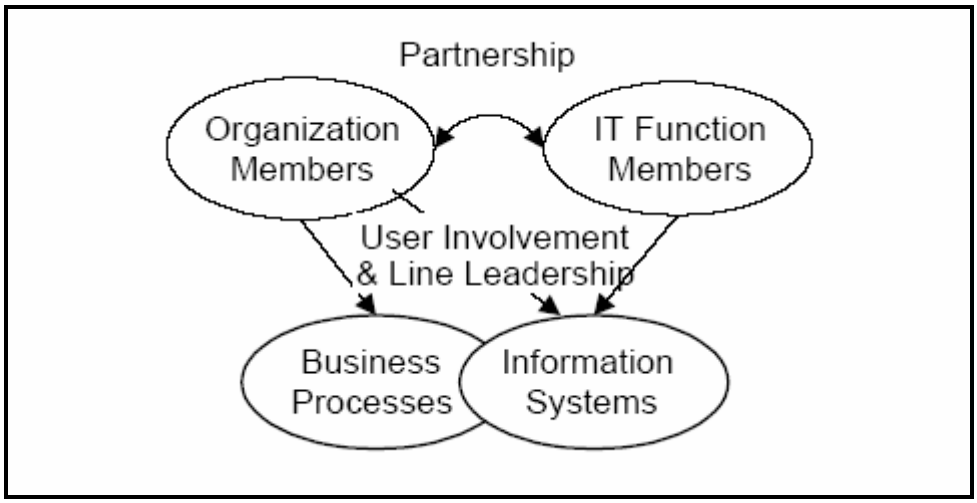

Figure 2.8 Information Systems and the Business Process Are Tightly Integrated (Avital and Vandenbosch, 2002)

Given the extensive focus in the literature on the path between individual users and information systems, it is surprising that the relationship between the IS professionals and business processes has been almost ignored. Nelson and Cooprider (1996) referred to the development of shared knowledge and understanding, and pointed at both IS competence in line managers and business competence in IS managers as a key to successful IS projects. Their advice on how to create understanding includes making the management of data a shared responsibility and ensuring that IS professionals interact directly with customers. Similarly, Reich and Benbasat (1996) found that the level of mutual understanding of and commitment to the business and IS agenda was strong at business units in which shared knowledge about the business and IS along with shared beliefs about the importance of IT were the norm.

3. RESEARCH DESIGN AND METHODOLOGY

3.1. The Model

The following model is proposed for the IS group performance by Nelson and Cooprider (1996). Our research model is based on the following model with some extensions.

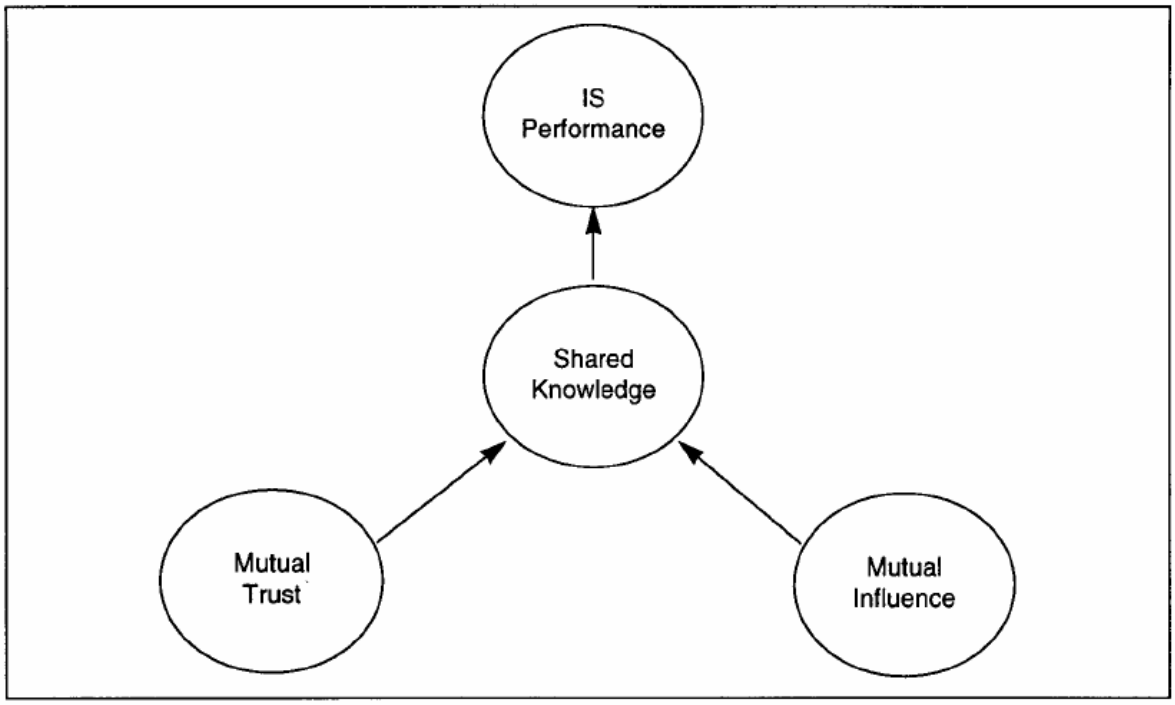

Figure 3.1 A Model of Shared Knowledge (Nelson and Cooprider, 1996)

In the Nelson and Cooprider's (1996) model the concepts in the figure above are defined as following:

3.1.1. Shared knowledge

Conventional wisdom is that managerial communication is important. Managers should "manage by walking around" (Peters and Waterman, 1982) and informal communication is the means by which organizations function (Sinetar, 1988). On the other hand, the sharing of knowledge is a different process than managerial communication (Schrage, 1990; Sherif and Sherif, 1953). Shared knowledge goes beyond the basic informational level (Keen, 1988; Swanson, 1974). There is a need for this deeper form of interaction: "One can brief a

reluctant manager endlessly without accomplishing anything, unless one comes to realize his hidden resistances and strives to bring them up to consciousness in some way" (Churchman and Schainblatt, 1965, p. B-82).

A first step in going beyond the informational briefing stage of the IS - line relationship is to build a common language. Shared knowledge must be expressed in words or symbols that are common to the social domain of both groups (Zeleny, 1989). Such a shared language can facilitate knowledge transfer as well as create a positive social influence process (Pondy, 1978). IS and line managers must develop an appreciation and understanding of the other's environment rather than merely sharing information and translating technical and procedural terms (Cooprider, 1990; Henderson, 1990; Swanson, 1974). That is, communication is only a means to and facilitator of shared knowledge (Bostrom, 1989). Nelson and Cooprider (1996) define shared knowledge as an understanding and appreciation among IS and line managers for the technologies and processes that affect their mutual performance.

Appreciation among groups is characterized by sensitivity to the frames of reference and interpretations of the other group. Dent (1991) gives the example of managers appreciating accounting. He points out that this appreciation, this shared knowledge, is unique between any two groups. For example, the appreciation that exists between an administrative and an accounting group is different than the appreciation between engineering and accounting. This is due to the different environments and languages used in administration and engineering. Krauss and Fussell (1990) term this unique shared knowledge a "miniculture" between groups.

Swanson (1974) characterizes appreciation somewhat differently, emphasizing user's involvement and appreciation of the MIS system itself rather than that of the other group. He acknowledges that this "system" appreciation does have an interpersonal element which is the mutual support and cooperation between managers and MIS staff. Swanson defines appreciation as a manifold of beliefs regarding the object(s) appreciated.

Effective shared knowledge can be viewed as a synergy between groups (Bostrom, 1989). This synergy is defined as mutual understanding and respect between groups. This representation of shared knowledge is consistent with Huber (1991), who differentiates

synergy from pure information as a new understanding between organizational subunits. Appreciation and understanding are the two core elements of shared knowledge.

Keen (1988, p. 52) maintains, "The relationship between IS and business managers has to be one of mutual understanding not of the details of each other's activities, knowledge, and skill bases, but of the other's needs, constraints, and contribution to an organizational venture partnership." Simply communicating facts is not sufficient. A deeper level of knowledge must be shared to achieve mutual understanding. This deeper level of knowledge is often characterized as organizational knowledge.

Badaracco (1991, p. 81) describes organizational knowledge as embedded knowledge, which is defined as "knowledge which resides primarily in specialized relationships among individuals and groups and in the particular norms, attitudes, information flows, and ways of making decisions that shape their dealings with each other." A lack of this organizational and cross-functional knowledge may result in losses of IS performance (Kaiser and Srinivasan, 1982). As boundary lines between organizational functions become vaporous (Davenport and Short, 1990; Rockart and Short, 1991), manager struggle to keep them informed about the technologies, processes, and people that fall outside their primary functional area yet contribute to their success. IS group impact nearly every functional group in the information-intensive organization. However, Lucas (1984) maintains that functional users of information systems have very little understanding of what is involved in the analysis and design of information systems. This lack of knowledge can lead to missed opportunities for line managers to contribute domain knowledge at critical points in the design process. However, Newman and Robey (1992) have found that through design process encounters and joint development episodes, the level of understanding between the IS and user groups can be improved, reinforcing the need for shared knowledge between these groups.

The day-to-day operations of the business can present barriers to IS and line managers taking advantage of opportunities to share knowledge. IS managers are frequently consumed with keeping pace with rapidly changing technologies and IT processes and can be far removed from the business functions that their systems support (Kaiser and Srinivasan, 1982; Newman and Robey, 1992). They often seek information about the technologies and methods of other functional operations only in response to the IS

requirements for a specific support or design request. The day-to-day problems and opportunities of these supported operations are often unfamiliar to them (Henderson, 1990). IS and line managers often speak different technical and procedural languages (Keen, 1988), and as a result they feel disaffected from one another (Tushman and Romanelli, 1983). The operational needs and constraints presented from one side can be perceived as unreasonable demands and a lack of cooperation from the other. The commonality of organizational goals is often lost due to a lack of understanding of each others' realities.

When faced with information that is not consistent with their own reality, humans experience internal conflict, which Festinger (1957) labels cognitive dissonance. The way line managers articulate their IS design or support needs may be foreign and inconsistent with the terminology and methods the IS group uses and understands (Keen, 1980, 1988). While line managers may try to conceptualize and describe the business requirements of an information system, their counterparts in IS may attempt to translate without sufficient domain knowledge to accurately interpret the message and, hence, the actual requirements (Boland, 1978; Bostrom, 1989; Guinan, 1988). The IS manager experiences an inconsistency between his or her own functional knowledge and the interpreted line requirements. This can lead to a feeling of distance from both the line manager and the final requirements for the information system (Festinger, 1957). This phenomenon is often a two-way street, with line personnel also lacking in knowledge and understanding of the language, technologies, and methods of the IS group (Lucas, 1984).

By understanding what motivates members of groups to seek knowledge and reduce inconsistency, it is possible to identify the mechanisms that facilitate the sharing of knowledge between functional groups. The external interactions of groups have patterns similar to the internal patterns of members of the group (Ancona, 1990). In this case, when individual members of the IS group find inconsistencies between their knowledge and that of their counterparts in the line group, the group itself displays these inconsistencies. As the knowledge base, expectations and realities of each group become more distant from that of the other; lack of cooperation and inter-group conflicts begin to appear (Sherif, 1962). What then occurs is the in-group/out-group phenomenon (Sherif et al., 1965), which can exhibit itself in terms of "us against them" group attitude (Bettenhausen, 1991). The

attainment of organizational goals and mutual productivity becomes an almost impossible task in the face of this organizational inter-group conflict. The absence of a shared reality between groups is a critical factor in these dysfunctional group dynamics. This absence of shared reality may lead to poor group performance, while the presence of such a shared perception may lead to better performance.

3.1.2. Trust

Trust has a major impact on relationships between organizational groups. Trust is defined as a set of expectations shared by all those in an exchange (Zucker, 1986). Trust is an expectation that alleviates the fear that one's exchange partner will act opportunistically (Bradach and Eccles, 1989). Additionally, trust is a set of expectations that tasks will be reliably accomplished (Sitkin and Roth, 1993). Groups work well together in an atmosphere of mutual trust based on mutual commitment and a stable long-term relationship (Anderson and Weitz, 1992). This type of committed, long-term relationship is the foundation for our conceptualization of trust. Mutual trust is defined as the expectation shared by the IS and line groups that they will meet their commitments to each other (Dasgupta, 1988).

The attainment of mutual trust leads to shared knowledge. Repeated inter-group exchange communications build trust, leading to increased communications and the eventual sharing of knowledge (Anderson and Narus, 1990). A study of the relationship between marketing research providers and users shows that trust is a facilitating factor of other relationship processes such as quality of interactions and involvement levels (Moorman et al., 1992). By alleviating the fear of the unexpected and facilitating interactions and involvement (Bradach and Eccles, 1989), trust encourages a climate conducive to the sharing of knowledge.

By repeatedly working together to obtain mutual goals, groups develop a mutual trust (Sherif and Sherif, 1953). By sharing expectations and reducing individual dissonance-inducing fears among group members, mutual trust brings groups closer together. Empirical evidence of this phenomenon is demonstrated in a series of controlled studies of camping groups in which competing teams develop trust relationships followed by a sharing of knowledge on solving a common problem (Sherif, 1966). Although it may also

seem reasonable that sharing knowledge might lead to trust, Sherif's work demonstrates that repeated episodes of joint effort and communication leads to trust, which then leads to the sharing of methods and ideas. Trust which developed through repeated communication is demonstrated to be different from and a determinant of shared knowledge.

The investment of trust between different organizational groups can be viewed as a leap of cognitive faith and understanding (Lewis and Weigert, 1985). The increases in mutual understanding brought on by mutual trust result in shared knowledge between groups. Trust also leads to appreciation through the common manifold belief in the performance of both of the groups involved (Swanson, 1974).

3.1.3. Influence

Organizational groups engaged in joint work are often dependent upon each other for the achievement of goals (Sherif, 1962). One of the consequences of this dependence is the creation of influence relationships (Anderson and Narus, 1990). Without this mutual influence, mutually interdependent tasks can become decoupled, and conflict between groups can result (House, 1991). The ability of a group to accomplish its goals can be limited by its ability to influence other groups in the organization (Kanter, 1983; Pfeffer and Salancik, 1978). One way influence is developed through the law of reciprocity (Cohen and Bradford, 1989). People expect payback for contributions to an exchange. The perception of reciprocal benefits leads to mutual influence and success in future group exchanges. So, we can define mutual influence as the ability of groups to affect the key policies and decisions of each other.

Social communication and social influence processes are interwoven with the processes of knowledge creation and dissonance reduction (Festinger, 1957). By seeking social support for ideas, individuals and groups seek to either influence others into accepting these ideas or be influenced by others' ideas and attitudes. This influence process is necessary for achieving mutual understanding between groups (Churchman and Schainblatt, 1965). Through this social influence mechanism, cognitive elements are exchanged between groups leading to shared knowledge (Nelson and Cooprider, 1996).

The frequency of information exchange between buyer-seller groups is positively related to the level of group influence (Boyle et al., 1992). The sharing of knowledge is not limited to

simple information exchange, but is related to the influence developed between groups as a result of more frequent and in-depth communication. By depending on each other for the joint accomplishment of goals, expectations, needs, and knowledge are shared across groups. One way influence is developed is through the law of reciprocity (Cohen and Bradford, 1989). People expect payback for contributions to an exchange. The perception of reciprocal benefits leads to mutual influence and success in future group exchanges.

Mutual influence has been conceptualized as the ability of groups to affect the key policies and decisions of each other. These influence processes result in increased levels of appreciation and understanding of each others' work environment and accomplishments through mutual policy making and decision making, leading again to shared knowledge. As in the case of mutual trust, it is conceivable that once shared knowledge is achieved, it may result in higher levels of mutual influence between groups.

Communication is an antecedent of mutual trust and influence. These constructs, although distinct in nature, are closely linked to each other. The establishment of a history of communications in the context of quality interactions impacts trust, while the frequency of these communications in the context of social mechanisms leads to influence. It is likely that some interaction between mutual trust and influence is a result of communication quality, and frequency. In the discussion of shared knowledge, we stated that communication is, only a means to and a facilitator of shared knowledge. That is, repeated and frequent communications contribute to service quality through the development of mutual trust and influence leading to shared knowledge. As IS and line groups move beyond simple communications to understanding and appreciating the expectations, realities, and methods of each other, the benefits of these dynamics are seen in the quality of the services that IS group provides. In this way, shared knowledge acts as a mediating variable between mutual trust and influence and the quality of services that IS provides together with their counterparties (Nelson and Cooprider, 1996).

A mutual appreciation of and attractiveness toward another group or individual is an integral component of shared cognition (Festinger, 1957; Sherif, 1966). A series of experiments on competing groups showed that contact between groups was not in itself sufficient to motivate the groups to achieve common goals (Sherif, 1966). Only through repeated cooperation between groups is trust developed, and this trust leads to an increased

seeking of information about the other group – resulting in shared knowledge being desired and built. This sharing of knowledge is needed for groups to achieve superordinate goals that are beneficial to both groups. These experiments reinforce the role of shared knowledge as a mediating variable in the relationship between trust and performance. Similarly, Churchman and Schainblatt (1965) maintain that (1) influence is necessary to achieve mutual understanding between groups, and (2) successful implementation of projects presuppose that the involved parties have attained some level of mutual understanding. Thus, influence leads to shared knowledge.

3.1.4. Service quality

The superiority of service quality provides significant performance related advantages such as customer loyalty, responsiveness to demand, market share growth and productivity (Berry et al., 1985; Capon et al., 1990; Berry and Parasuraman, 1991; Anderson et al., 1994; Rust et al., 1994; Barnes and Cumby, 1995; Lassar et al., 2000; Roberts et al., 2003). In addition, to successfully leverage service quality as a competitive edge, the antecedents of service quality should be determined correctly.

Wong and Tjosvold (1995) state that, in cooperation, people believe their goals are positively related so that as one moves toward goal attainment, others reach their goals. They understand one's goal attainment helps others reach their goals; as one succeeds, others succeed. People in cooperation encourage and value each others effectiveness because the success of one helps others pursue their goals. Cooperative task force members believe they are closer to reaching their goals when others develop useful ideas; their own goal attainment depends upon others acting effectively.

People in cooperation share information, take each others perspective, communicate and influence effectively, exchange resources, assist and support each other, discuss opposing ideas openly, use higher quality reasoning and manage conflicts constructively (Deutsch, 1949, 1973, 1980; Johnson and Johnson, 1989; Johnson, Johnson and Maruyama, 1983; Johnson et al., 1981; Lanzetta and Englis, 1989; Tjosvold, 1984, 1986a, 1986b). These studies also show that interaction patterns in cooperation result in task completion, problem solving, reduced stress, attraction, strengthened work relationship, and confidence in future collaboration (Etherington and Tjosvold, 1990).

Wong and Tjosvold (1995) in their research titled "goal interdependence and quality in services marketing" found that the warmth and coldness of the service provider enhanced and lowered the service quality of the bank in the cooperative and competitive contexts.

Researchers in product development also point out that knowledge sharing and shared team vision are critical for superior product development process in terms of cost, time, and quality which are critical competencies in the dynamic global competitive business environment (Rauniar, 2005).

Shared knowledge between the departments who need to put cooperative efforts to create a service, should have a direct impact on the quality of that service.

So, the model is improved to include service quality instead of IS Performance.

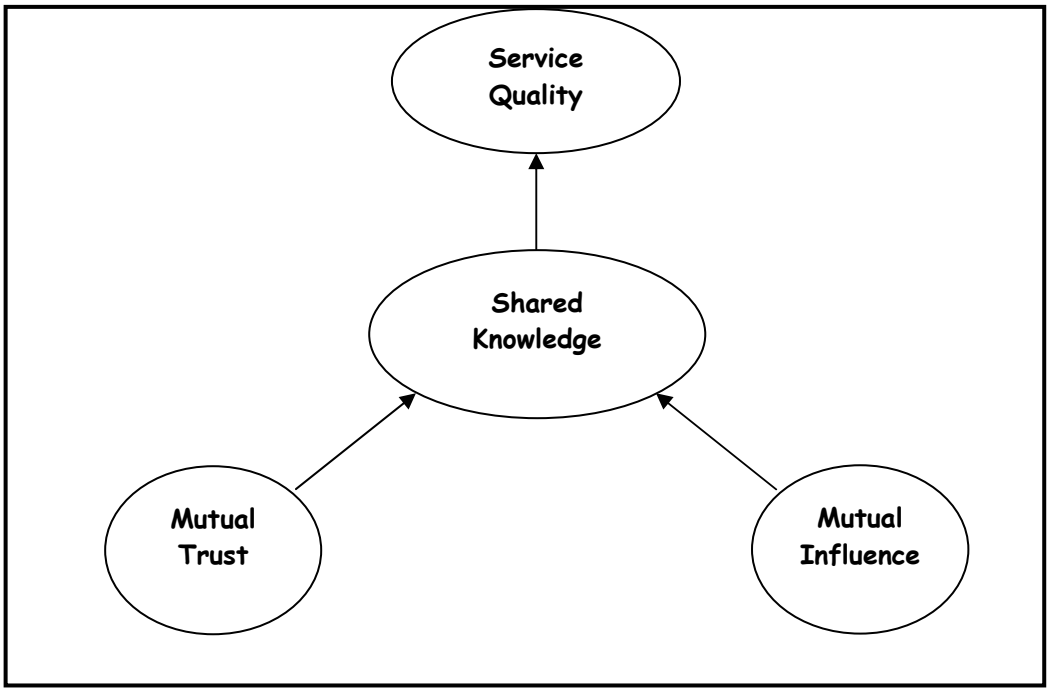

Figure 3.2 Improved Model of Shared Knowledge

Figure 3.2 presents the completed model of shared knowledge. This model illustrates two important aspects of shared knowledge. First, mutual trust and influence are presented as antecedents of shared knowledge. Second, shared knowledge is presented as a fully mediating variable between mutual trust and influence leading to service quality.

3.2. Scope

In this study, Internet banking service in Turkey is analyzed. The reasons behind this intention are:

- Internet Banking is a service created by at least two different departments' cooperative effort.
- All of the organizations (banks) have an IS department inside or outside the company.
- The size of the companies can be considered as large for all.

All of the reasons above make sure that all the banks in the country can be included to provide external validity of the study.

Internet banking is a service which requires the efforts of mainly two groups in the banks. One of the departments, usually called Business Development, is responsible for the clearly setting the business requirements for an Internet banking service. On the other hand, Information Systems Group designs and produces that service and maintains it. Since the service is developed with the efforts of both departments, the knowledge sharing between these departments becomes very important in terms of the quality of the service provided to the customers.

3.3. Methodology

3.3.1. Structural equation modeling (SEM)

1.1.1.4. History of structural equation modeling

Structural equation modeling offers a means of developing and evaluating ideas about complex (multivariate) relationships. It is this property that makes SEM of interest to the practitioner of science (Grace, 2006).

Structural equation modeling can be defined as a class of methodologies that seeks to represent hypotheses about the means, variances, and covariances of observed data in terms of a smaller number of "structural" parameters defined by a hypothesized underlying

model (Kaplan, 2000). To put it in a different phrase, SEM is a combination of methodologies that is used to represent complex models.

Structural equation modeling represents the hybrid of two separate statistical traditions. The first tradition is factor analysis developed in the disciplines of psychology and psychometrics. The second tradition is simultaneous equation modeling developed mainly in econometrics, but having an early history in the field of genetics.

The origins of factor analysis can be traced to the work of Galton (1869) and Pearson (Pearson and Lee, 1908) on the problem of inheritance of genetic traits. However, it is the work of Spearman (1904) on the underlying structure of mental abilities that can be credited with the development of the common factor model. Spearman's theoretical position was that the intercorrelations among tests of mental ability could be accounted for by a general ability factor common to all of the tests and specific ability factors associated with each of the tests.

The work of Spearman and others (e.g., Thomson, 1946; Vernon, 1961) formed the so called British school of factor analysis. However, in the 1930s, attention shifted to the work of L. L. Thurstone and his colleagues at the University of Chicago. Thurstone argued that there is not one underlying general factor of ability accompanied by specific ability factors as postulated by Spearman (1904). Rather, Thurstone argued that there existed major group factors referred to as primary mental abilities (Thurstone, 1935). According to Mulaik (1972), Thurstone's search for group factors was motivated by a parsimony principle which suggested that each factor should account for as much covariation as possible in non-overlapping sets of observed measures. Factors displaying this property were said to exhibit simple structure. In the context of Thurstone's (1947) multiple factor models, the general ability factor exists at a higher level of the ability hierarchy and is postulated to account for the intercorrelations among the lower order primary factors.

By the 1950s and 1960s factor analysis gained tremendous popularity, owing much to the development and refinement of statistical computing capacity. Indeed, Mulaik characterized this era as a time of agnostic and blind factor analysis (Mulaik, 1972). However, during this era, developments in statistical factor analysis were also occurring, allowing for the explicit testing of hypotheses regarding the number of factors.

Specifically, work by researchers such as Jöreskog (1967), Jöreskog and Lawley (1968), and Lawley and Maxwell (1971) led to the development of a maximum likelihood based approach to factor analysis. The maximum likelihood approach allowed a researcher to test a hypothesis that a specified number of factors were present to account for the intercorrelations among the variables. Minimization of the maximum likelihood fitting function led directly to the likelihood ratio chi-square test of the hypothesis that a proposed model fits the data. A generalized least squares approach was later developed by Golderberger (1972).

Developments by the researchers such as Anderson and Rubin (1956) and later by Jöreskog (1969) led to the methodology of confirmatory factor analysis that allowed for testing hypothesis regarding the number of factors and the pattern of loadings.

Exploratory and confirmatory factor analyses remain to this day very popular methodologies in quantitative social science research. In the context of structural equation modeling, however, factor analysis constitutes a part of the overall framework. Indeed, structural equation modeling represents a method that allows for the assessment of complex relationships among factors. These complex relationships are often represented as systems of simultaneous equations.

Structural equation modeling represents a melding of factor analysis and path analysis into one comprehensive statistical methodology. The path analytic origins of structural equation modeling had its beginnings with the biometric work of Sewell Wright (1918, 1921, 1934, and 1960). Wright's major contribution was in showing how correlations among variables could be related to the parameters of a model as represented by a path diagram – a pictorial device that Wright was credited with inventing. Wright also showed how the model equations could be used to estimate direct effects, indirect effects, and total effects.

Wright (1918) first applied path analysis to the problem of estimating size components of the measurements of bones. Interestingly, this first application of path analysis was statistically equivalent to factor analysis and was developed apparently without the knowledge of the work of Spearman (1904). Wright also applied path analysis to problems of estimating supply and demand equations and also treated the problem of model

identification. These issues formed the core of later econometric contributions to structural equation modeling (Golderberger, 1972).

A second line of development occurred in the field of econometrics. Mathematical models of economic phenomena have had a long history, beginning with Petty in 1676 (Spanos, 1986). However, the form of econometric modeling of relevance to structural equation modeling must be credited to the work of Haavelmo (1943).

Structural equation modeling is one of the most popular statistical methodologies available to quantitative social scientists. The popularity of structural equation modeling can be attested to by the creation of a scholarly journal devoted specifically to structural equation modeling (Structural Equation Modeling : A Multidisciplinary Journal) as well as the existence of SEMNET, a very popular and active electronic discussion list that focuses on structural equation modeling and related issues.

Among the important modern developments has been the extension of new estimation methods to handle non-normal distributions. Owing it to the seminal work of Browne (1984) and Muthen (1978, 1984), it is now possible to estimate the parameters of complex structural equation models when the data are non-normal – including mixtures of dichotomous, ordered-categorical, and continuous variables.

In addition to estimation with non-normal variables, many recent developments in structural equation modeling allow researchers to estimate models in the presence of other data-related problems. For example, Muthen et al. (1987) and Allison (1987) have shown how we can use standard structural equation modeling software to estimate the parameters of structural equation models when missing data are not missing completely at random.

1.1.1.5. Basics of structural equation modeling

One of the primary objectives of multivariate techniques is to expand the researcher's explanatory ability and statistical efficiency (Hair et al., 1998). Multiple regressions, factor analysis, multivariate analysis of variance and discriminant analysis all provide the researcher with powerful tools for addressing a wide range of managerial and theoretical questions. But they all share one common limitation: each technique can examine only a single relationship at a time. Even the techniques allowing for multiple dependent

variables, such as multivariate analysis of variance and canonical analysis, represent only a single relationship between the dependent and independent variables.

Structural equation modeling (SEM) examines a series of dependence relationships simultaneously. It is particularly useful when one dependent variable becomes an independent variable in subsequent dependence relationships. This set of relationships, each with dependent and independent variables, is the basis of SEM.

Structural equation modeling has been used in almost every conceivable field of study, including education, marketing, psychology, sociology, management, testing and measurement, health, demography, organizational behavior, biology and genetics. The reasons for its attractiveness to such diverse areas are two-fold:

It provides a straightforward method of dealing with multiple relationships simultaneously while providing statistical efficiency, and its ability to assess the relationships comprehensively and provide a transition from exploratory to confirmatory analysis.

This transition corresponds to greater efforts in all fields of study toward developing a more systematic and holistic view of problems. Such efforts require the ability to test a series of relationships constituting a large-scale model, a set of fundamental principles, or an entire theory. These are tasks for which structural equation modeling is well suited.

Structural equation modeling encompasses an entire family of models known by many names, among them covariance structure analysis, latent variable analysis, confirmatory factor analysis, and often simply LISREL analysis. Resulting from an evolution of multiequation modeling developed principally in econometrics and merged with the principles of measurement from psychology and sociology, SEM has emerged as an integral tool in both managerial and academic research (Austin and Calderon, 1996; Bentler, 1980, 1986; Blalock, 1985; Breckler, 1990; Duncan, 1975; Fassinger, 1977; Golderber and Duncan, 1973; James et al., 1982; Jöreskog, 1970; Long, 1983; Neale et al., 1989; Trembley and Gardner, 1996). SEM can also be used as a means of estimating other multivariate models, including regression, principal components (Dolan, 1996), canonical correlation (Fan, 1997) and even MANOVA (Bagozzi, 1980).

As might be expected for a technique with such widespread use and so many variations in applications, many researchers are uncertain about what constitutes structural equation modeling. All SEM techniques are distinguished by two characteristics:

- Estimation of multiple and interrelated dependence relationships, and
- The ability to represent unobserved concepts in these relationships and account for measurement error in the estimation process.

1.1.1.6. Multiple interrelated dependence relationships

The most obvious difference between SEM and other multivariate techniques is the use of separate relationships for each of a set of dependent variables. In simple terms, SEM estimates a series of separate, but interdependent, multiple regression equations simultaneously by specifying the structural model used by the statistical program. First, the researcher draws upon theory, prior experience, and the research objectives to distinguish which independent variables predict each dependent variable.

1.1.1.7. Latent variables

The estimation of multiple interrelated dependence relationships is not the only unique element of structural equation modeling. SEM also has the ability to incorporate latent variables into the analysis. A latent variable is a hypothesized and unobserved concept that can only be approximated by observable and or measurable variables. The observed variables, which we gather from respondents through various data collection methods (e.g., surveys, tests, observations), are known as manifest variables. Using latent variables has both practical and theoretical justification by improving statistical estimation, better representing theoretical concepts, and accounting for measurement error.

Statistical theory specifies that a regression coefficient is actually composed of two elements: the “true” or structural coefficient between the dependent and independent variable and the reliability of the predictor variable. Reliability is the degree to which the independent variable is “error-free” (Blalock, 1982). In all the multivariate techniques, it is assumed that there is no error in variables. But, it is known from both theoretical and practical perspectives that a concept cannot be perfectly measured and that there is always some degree of measurement error. For example, when asking about something as

straightforward as household income, some people would answer incorrectly, either overstating or understating the amount or not knowing it precisely. The answers provided have some measurement error and thus affect the estimation of the "true" structural coefficient (Rigdon, 1994).

The impact of measurement error (and the corresponding lowered reliability) can be shown from an expression of the regression coefficient as:

$\beta_{yx} = \beta_s \text{ X } \rho_x$

where β_{yx} is the observed regression coefficient, β_s is the "true" structural coefficient, and ρ_x is the reliability of the predictor variable. Unless the reliability is 100 %, the observed correlation will always understate the "true" relationship. Because all dependence relationships are based on the observed correlation (and resulting regression coefficient) between variables, the correlations used in the dependence model should be strengthened and made more accurate estimates of the structural coefficients by first accounting for the correlation attributable to any number of measurement problems.

Measurement error is not just caused by inaccurate responses but occurs when we use more abstract or theoretical concepts, such as attitude toward a product or motivations for behavior. With concepts such as these, the researchers try to design the best questions to measure the concept (Predhazur and Schmelkin, 1992). The respondents also may be somewhat unsure about how to respond or may interpret the questions in a way that is different from what the researcher intended. Both situations can give rise to measurement error. But if the magnitude of the problem is known, reliability can be incorporated into statistical estimation and improve our dependence model.

SEM provides the measurement model, which specifies the rules of correspondence between manifest and latent variables. The measurement model allows the researcher to use one or more variables for a single independent and dependent concept and then estimate (or specify) the reliability. For example, the dependent variable might be a concept represented by a set of questions. In the measurement model the researcher can assess the contribution of each scale measures to the concept (its reliability) into the estimation of the relationships between dependent and independent variables. This

procedure is similar to performing a factor analysis of the scale items and using the factor scores in the regression.

1.1.1.8. Developing a modeling strategy

One of the most important concepts a researcher must learn regarding multivariate techniques is that there is no single "correct" way to apply them. Instead, the researcher must formulate the objectives of the research and apply the appropriate technique in the most suitable manner to achieve the desired objectives. In some instances, the relationships are strictly specified and the objective is a confirmation of the relationship. At other times, the relationships are loosely recognized and the objective is the discovery of relationships. In each extreme instance and points in between, the researcher must formulate the use of the technique in accordance with the research objectives.

The application of SEM follows this same tenet. Its flexibility provides the researcher with a powerful analytical tool appropriate for many research objectives. But the researcher must define these objectives as guidelines in a modeling strategy. The use of the term strategy is designed to denote a plan of action toward a specific outcome. In the case of SEM, the ultimate outcome is always the assessment of a series of relationships. However, this can be achieved through many avenues. There are three distinct strategies in SEM: confirmatory modeling strategy, competing models strategy, and model development strategy.

The most direct application of structural equation modeling is confirmatory modeling strategy, wherein the researcher specifies a single model, and SEM is used to assess its statistical significance. Here the researcher is saying, "It either works or it does not." Although this may seem to be the most rigorous application, it actually is not the most stringent test of a proposed model. Research even has shown that the techniques developed for assessing structural equation models have a confirmation bias, which tends to confirm that the model fits the data (Robles, 1996). Thus, if the proposed model has acceptable fit by whatever criteria are applied, the researcher has not "proved" the proposed model but only confirmed that it is one of the several possible acceptable models. Several different models might have equally acceptable model fits. Thus, the more rigorous test is achieved by comparing alternative models.

Obtaining an acceptable level of fit for both the overall model and the measurement and the structural models does not assure the researcher that the best model has been found. Numerous alternative models may provide equal or even better fits. As a means of evaluating the estimated model with alternative models, overall model comparisons can be performed in a competing models strategy. The strongest test of a proposed model is to identify and test competing models that represent truly different hypothetical structural relationships. When comparing these models, the researcher comes much closer to test of competing theories, which is a much stronger test than just a slight modification of a single theory.

How does the researcher generate this set of competing models? One possible source of competing models is alternative formulations of the underlying theory. For example, in one formulation, trust may precede commitment, yet in another commitment may precede trust. This could be the basis for two competing models. Equivalent models provide a second perspective on developing a set of competing models. It has been shown that for any structural equation model, there is at least one other model with the same number of parameters and the same level of model fit that varies in the relationships portrayed. This implies that no model is unique in the level of fit achieved, and for any model for acceptable fit there is any number of alternative models with same level of fit. A series of generalized rules have been defined to identify the equivalent models for any structural model (Lee and Hershberger, 1990). As a general rule of thumb, the more complex a model, the more equivalent models exist.

The model development strategy differs from the prior two strategies in that although a model is proposed, the purpose of the modeling effort is to improve the model through modifications of the structural and/or measurement models. In many applications, theory can provide only a starting point for development of a theoretically justified model that can be empirically supported. Thus, the researcher must employ SEM not just to test the model empirically but also to provide insights into its re-specification. One note of caution must be made. The researcher must be careful not to employ this strategy to the extent that the final model has acceptable fit but cannot be generalized to other samples or populations. Moreover, the re-specification of a model must always be made with theoretical support rather than just empirical justification.

1.1.1.9. Stages in structural equation modeling

The true value of SEM comes from the benefits of using the structural and measurement models simultaneously, each playing distinct roles in the overall analysis. To ensure that both models are correctly specified and the results are valid, seven-stages process will be discussed. The introduction of this separate process of SEM does not invalidate the model-building approach for other multivariate techniques, but just accentuates the uniqueness of SEM.

This seven stages in structural equations modeling are (1) developing a theoretically based model, (2) constructing a path diagram of causal relationships, (3) converting the path diagram into a set of structural and measurement models, (4) choosing the input matrix type and estimating the proposed model, (5) assessing the identification of the structural model, (6) evaluating goodness-of-fit criteria and (7) interpreting and modifying the model, if theoretically justified.

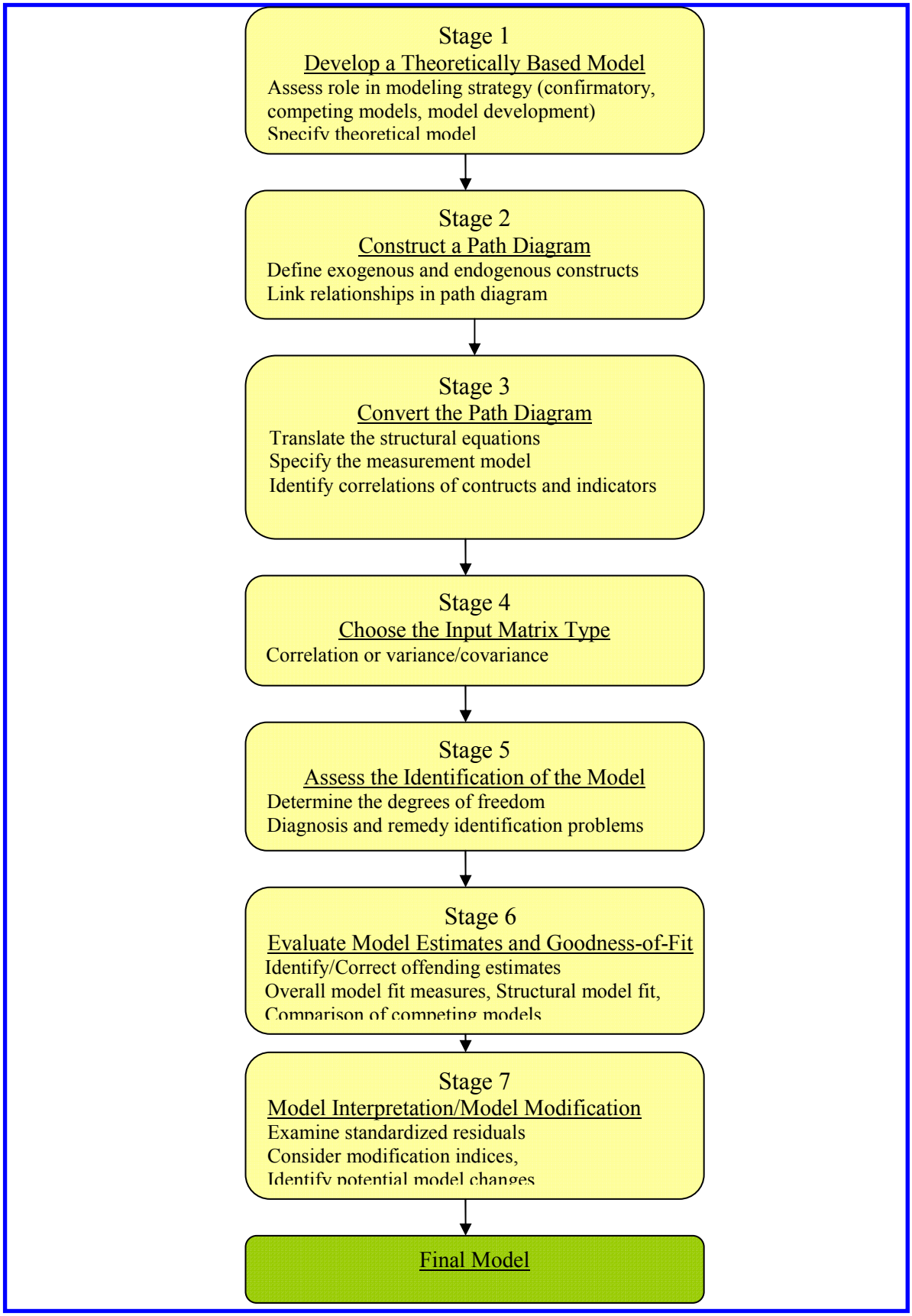

Figure 3.3 Seven Stage Process for Structural Equation Modeling (Hair et al., 1998)

Stage 1: Developing a Theoretically Based Model

Structural Equation Modeling is based on causal relationships, in which the change in one variable is assumed to result in a change in another variable (Heise, 1975). We encounter this type of statement when a dependence relationship is defined, such as in regression analysis. Causal relationships can take many forms and meanings, from the strict causation found in physical processes, such as a chemical reaction, to the less well defined relationships encountered in behavioral research, such as the causes of educational achievement or the reasons why we purchase one product rather than another. The strength and conviction with which the researcher can assume the causation between two variables lies not in the analytical methods chosen but in the theoretical justification provided to support the analyses. The requirements for asserting causation have deep roots in various views of philosophy of science (Bagozzi, 1988; Bullock et al., 1994; Hunt, 1990). There is general agreement with at least four established criteria for making causal assertions: (1) sufficient association between two variables (2) temporal antecedence of the cause versus affect (3) lack of alternative causal variables (4) a theoretical basis for the relationship. Although in many instances all of the established criteria for making causal assertions are not strictly met, causal assertions can possibly be made is the relationships are based on a theoretical rationale. Using these techniques in an exploratory manner is invalid and misleads the researcher more often than it provides appropriate results.

The most critical error in developing theoretically based models is the omission of one or more key predictive variables, a problem known as specification error. The implication of omitting a significant variable is to bias the assessment of the importance of other variables (MacCullum, 1986). For example, two variables, “a” and “b” are predictors of “c”. If “a” and “b” is included in the analysis, correct assessment of their relative importance can be made as shown by their estimated coefficients. But if “b” is left out of the analysis, the coefficient for variable “a” would be different.

The desire to include all variables, however, must be balanced against the practical limitations of SEM. Although no theoretical limit on the number of variables in the model exists, practical concerns occur even before the limits of most computer programs are met.

Stage 2: Constructing a Path Diagram of Causal Relationships

Relationships can also be portrayed as path diagrams, which are especially helpful in depicting a series of causal relationships. A path diagram is more than just a visual portrayal of the relationships because it allows the researcher to present not only the predictive relationships among constructs, but also associative relationships (correlations) among constructs and even indicators.

There are two basic elements of path diagrams. The first is the concept of the construct, which is a theoretically based concept that acts as a "building block" used to define relationships. A construct can represent a concept as simple as age, income, or gender, or as complex as socioeconomic status, knowledge, preference or attitude. Path diagrams are defined in terms of constructs and then variables to measure each construct.

The second basic element is the arrow, used to represent specific relationships between constructs. A straight arrow indicates a direct relationship from one construct to another. A curved arrow between constructs indicates simply a correlation between constructs. Finally, a straight arrow with two heads indicates a non-recursive, or reciprocal, relationship between constructs. With just these three types of arrows, all relationships in structural models can be depicted.

All constructs in a path diagram can be placed into one of two classes: exogenous or endogenous. Exogenous constructs, also known as source variables or independent variables, are not caused or predicted by any other variables in the model; that is, there are no arrows pointing to these constructs. Endogenous constructs are predicted by one or more other constructs.

Two assumptions underlie path diagrams. First, all causal relationships are indicated. Thus, theory is the basis for inclusion or omission of any relationship. It is just as important to justify why a causal relationship does not exist between two constructs as it is to justify the existence of another relationship. Yet it is important to remember that the objective is to model the relationships among constructs with the smallest number of causal paths or correlations among constructs that can be theoretically justified. The second assumption relates to the nature of the causal relationships that are assumed to be linear.

Stage 3: Converting the Path Diagram into a Set of Structural and Measurement Models

After developing the theoretical model and portraying it in a path diagram, model can be specified in more formal terms. This is done through a series of equations that define (1) the structural equations linking constructs, (2) the measurement model specifying which variables measure which constructs, and (3) a set of matrices indicating any hypothesized correlations among constructs or variables. The objective is to link operational definitions of the constructs to theory for the appropriate empirical test.

Translating a path diagram into series of structural equations is a straightforward procedure. First, each endogenous construct (any construct with one or more straight arrows leading into it) is the dependent variable in a separate equation. Then the predictor variables are all constructs at the ends, or tails, of the straight arrows leading into the endogenous variable. It is that simple.

Reviewing the foundations of factor analysis is required at this step. In factor analysis, each individual variable is explained by its loading on each factor. The objective is to best represent all the variables in a small number of factors. The factors related to underlying dimensions in the data, which then have to be interpreted and labeled. Factor analysis is often referred as an exploratory technique because there are no constraints on the variable loadings. Each variable has a loading on each factor.

The value for each factor (factor score) is calculated by the loadings on each variable. Also, the predicted value for each variable is calculated by the loadings of the variable on each factor; thus each factor is always a composite of all variables, although their loadings vary in magnitude. Therefore, a factor is actually a latent construct, defined by the loadings of all the variables.

To specify the measurement model, the transition is being made from factor analysis, in which the researcher has no control over which variables describe each factor, to a confirmatory mode, in which the researcher specifies which variables define each constructor (factor). The manifest variables collected from respondents are termed indicators in the measurement model, because they are used to measure or indicate the latent constructs.

The minimum number of indicators for a construct is one, but the use of only a single constructor requires the researcher to provide estimates of reliability. A constructor can be represented with two indicators, but three is preferred minimum number of indicators, because using only two indicators increases the chances of reaching an infeasible solution (Ding et al., 1995). Apart from the theoretical basis that should be used to select variables as indicators of a construct, there is no upper limit in terms of the number of indicators. As a practical matter, however, five to seven indicators should represent most constructs. The notable exception is the use of preexisting scales, which may contain many items, each acting as an indicator of the construct. In these instances, the researcher should assess the unidimensionality of the construct and the possibility of multiple sub-dimensions that can represented in a second-order factor model.

Once the measurement model has been specified, the researcher must then provide for the reliability of the indicators. At this stage, basic method of reliability should be determined. There are two principal methods to establish reliability: (1) empirical estimation and (2) specification by the researcher.

Empirical estimation of reliability is possible only if the construct has two or more indicators. For a construct with only one indicator, the researcher must specify the reliability. For empirical estimation, the researcher specifies the loading matrix, along with an error term for each indicator variable. When the structural and measurement models are estimated, the loading coefficients provide estimates of reliabilities of the indicators and the overall construct. In this approach, the researcher has no impact on reliability value used in the estimation of the model except by the sets of indicators included.

In some instances it is appropriate for the researcher to specify, or fix the reliabilities. The specification of reliabilities for indicators of any latent construct may seem to be counter to the objectives of structural equation modeling; however, in at least three situations it is justified and strongly recommended. In one instance, empirical estimation of the reliability is not possible, yet the researcher may know that measurement error still exists. In another, the indicators may have been used extensively; therefore the reliabilities are known before use. And finally, a two step approach in which the reliabilities are first assessed and then specified in the estimation process. This two-step approach explicitly separates the two empirical processes and provides insight into each separately.

With single item measures, it is not possible to empirically estimate reliability. Thus the researcher is faced with two possibilities. First, set the reliability at 1.0, indicating that there is no measurement error in the indicator. Yet, as discussed before, we know this is erroneous in almost all instances, if for no other reason than reliability is affected by the data collection. For example, gender may be perfect or very close (99 %), with error due only to coding errors. However, income may have a higher level of error (e.g. 10 %) owing to reporting bias and the level of measurement. Most often, therefore, the researcher should make some estimate of the reliability and specify the value for single-item indicators. A number of recommended approaches are provided by Hayduk (1987).

Many researchers propose a two-step process of structural equation modeling in which the measurement model is first estimated, much like factor analysis, and then the measurement model is fixed in the second stage when the structural model is estimated (Anderson and Gerbing, 1988; James et al., 1982; Kenny, 1979; Mulaik et al., 1989; Williams and Hazer, 1986). The rationale of this approach is that accurate representation of reliability of the indicators is best accomplished in two steps to avoid the interaction of measurement and structural models. Although, measurement and structural models cannot be evaluated in isolation, the potential for within construct versus between construct effects in estimation which must be considered.

A single step analysis with the simultaneous estimation of both structural and measurement models are the best approach when the model possesses strong theoretical rationale and highly reliable measures, resulting in more accurate relationships and decreasing the possibility for the structure or measurement interaction. However, when faced with measures that are less reliable, or theory that is only tentative, the researcher should consider a staged approach to maximize the interpretability of both measurement and structural models. Considerable debate has emerged on the appropriateness of this approach and about those instances in which it is justified, on both conceptual and empirical grounds.

To fix the reliability of an indicator in a correlation matrix, the researcher specifies the loading value as the square root of the desired or estimated reliability, or specifies the error term of that variable as one 1.0 (the desired reliability value). If a covariance matrix is used then the error term or loading value is multiplied by the variables' variance value. In

specifying the reliabilities, the researcher may specify the loading value, the error term, or both.

In addition to the structural and measurement models, the researcher also specifies any correlations between the exogenous constructs or between the endogenous constructs. Many times exogenous constructs are correlated, representing a shared influence on the endogenous variables. Correlations among the endogenous constructs, however, have fewer appropriate applications and are not recommended for typical use because they represent correlations among the structural equations that confound their interpretation. Finally, the indicators in the measurement model can also be correlated separately from the construct correlations.

Stage 4: Choosing the Input Matrix Type and Estimating the Proposed Model

Compared to other multivariate techniques, much more is required of specifying the model in SEM, with the possible exception of conjoint analysis. SEM differs from other multivariate techniques in that it uses only the variance-covariance or correlation matrix as its inputs data. Individual observations can be input into the programs, but they are converted into one of these two types of matrices before estimation. The focus of SEM is not on individual observations but on the pattern of relationships across respondents. The measurement model specifies which indicators correspond to each construct, and the latent construct scores are then employed in the structural model.

SEM shares three assumptions with other multivariate techniques: independent observations, random sampling of respondents, and the linearity of all relationships. In addition, SEM is more sensitive to the distributional characteristics of the data, particularly the departure from multivariate normality or a strong kurtosis in the data. Generalized least squares, an alternative estimation method, can adjust for these validations but this method quickly becomes impractical as the model size and complexity increase; thus its use is limited (Wang et al., 1996). A lack of multivariate normality is particularly troublesome because its substantiality inflates the chi-square statistic and creates upward bias in critical values for determining coefficient significance (Muthen and Kaplan, 1985).

Because the programs accept only the correlation or variance-covariance matrices, the researcher must perform all of the diagnostic tests on the data before they are used in the estimation procedure.

An important issue in interpreting the results is the use of variance-covariance matrix versus the correlation matrix. The covariance matrix has the advantage of providing valid comparisons between different populations or samples, a feature not possible when models are estimated with a correlation of matrix. Interpretation of the results, however, is somewhat more difficult when using covariances because the coefficients must be interpreted in terms of the units of measure for the constructs.

In summary, the researcher should employ the variance-covariance matrix any time a true test of theory is being performed, as the variances and covariances satisfy the assumptions of the methodology and are the appropriate form of the data for validating causal relationships. The most widely used means of computing the correlations or covariances between manifest variables is the Pearson product-moment correlation.

Even though individual observations are not needed, as with all other multivariate methods, the sample size plays an important role in the estimation and interpretation of SEM results. Sample size, as in any other statistical method, provides a basis for the estimation of sampling error. The critical question in SEM involves how large a sample is needed. Although there is no single criterion that dictates the necessary sample size, there are at least four factors that impact the sample size requirements (Raykou and Widaman, 1995). (1) Model misspecification (2) model size (3) departures from normality (4) estimation procedure.

Sample size impacts the ability of the model to be correctly estimated and identify specification error if desired. Thus, if the researcher has concerns about the impact of specification error, sample size requirements should be increased over what would otherwise be required. The absolute minimum sample size must be at least greater than the number of covariances or correlations in the input data matrix. However, more typical is a minimum ratio of 10 respondents per parameter considered most appropriate.

Only the structural and measurement models are specified and the input data type is selected, the researcher must choose how the model will be estimated. Early attempts at structural equation model estimation were performed with ordinary least squares (OLS) regression. But these efforts were quickly supplanted by maximum likelihood estimation, which is efficient and unbiased when the assumption of multivariate normality is met.

The sensitivity of maximum likelihood estimates (MLE), the most common estimation procedure, to non-normality, however created a need for alternative estimation techniques and such methods as weighted least squares (WLS), generalized least squares (GLS) and asymptotically distribution free (ADF) become available (Hayduk, 1996). The ADF technique has received particular attention recently due to its insensitivity the non-normality of the data. Its primary drawback is the increased sample required.

In addition to the estimation technique employed, the researcher can also choose among several estimation processes. These processes range from the direct estimation of the model, which is similar to other multivariate techniques, to methods that generate thousands of model estimation from which final model results are obtained. Four basics processes are discussed – direct estimation, bootstrapping, simulation, and jackknifing.

The most common estimation process is that of the direct estimation, in which a model is estimated directly with a selected estimation procedure. Bootstrapping is accomplished in four basic steps. First, the original sample is designed to act as the population for sampling purposes. In the second step, the original sample is re-sampled a specified number of times (perhaps up to several thousand) to generate a large number of new samples each at random subsets of the original sample. In the third step, the model is estimated is estimated for each new sample and the estimated parameters are saved in the last step. The final parameter estimates are calculated as the average of the parameter estimated across all of the samples. Simulation techniques rely on multiple samples and estimated models. Simulation process is different from bootstrapping in that during the process of generating the new samples. The simulation programme may change certain characteristics of the sample to meet the researcher's objectives. In the Jackknife procedure, repeated samples are created from the original sample. The jackknife differs from the simulation and bootstrapping procedures, however, in the method of creating the new samples. Instead of

creating a large number of new random samples, the jackknife process creates N new samples, where N is the original sample size.

Once the estimation procedure selected, the next step is to select computer program used for actually estimating the model. The most widely used program is LISREL (Linear Structural Relations) (Jöreskog and Sorbom, 1996a; 1996b, 1996c, Jöreskog et al., 2001). A number of alternative programs exists among them EQS (Bentler, 1995; Bentler and Wu, 1995), AMOS (Arbuckle, 1994; Byrne, 2001; ITS, 2007), POC CALIS of SAS (Hatcher, 1996) or COSAN (Fraser, 1980). AMOS has gained increased popularity in recent years due to its simple interface for the user and it has been compared recently to LISREL and EQS (Hox, 1995).

Stage 5: Assessing the Identification of the Structural Model

An identification problem in simple terms is the inability of the proposed model to generate unique estimates. For purposes of identification, the researcher is concerned with the size of the covariance or correlation matrix relative to the number of estimated coefficients. This difference between the number of correlations or covariances and the actual number of coefficients in the proposed model is the termed of degrees of freedom.

Although there is no single rule that will establish the identification of a model, the researcher does have a number of rules or heuristics available (Becker et al., 1994; Davis, 1993; Reilly, 1995). The two most basic rules are the rank and the order conditions. The order conditions state that the model's degrees of freedom must be greater than or equal to zero. This corresponds to what are termed just-identified or over-identified models.

If an identification problem is indicated, the researcher should look three common sources (1) a large number of estimated coefficients relative to the number of covariances or correlations, indicated by a small number of degrees of freedom – similar to the problem of over-fitting the data found in many other multivariate techniques; (2) the use of reciprocal effects (two way causal arrows between two constructs); (3) failure to fix the scale of a construct. The only solution for an identification problem is to define more constraints on the model – that is, to eliminate some of the estimated coefficients.

Stage 6: Evaluating Goodness of Fit Criteria

The first step in evaluating the results is an initial inspection for offending estimates. Once the model is established as providing acceptable estimates, the goodness of fit must then be assessed at several levels: first for the overall model and then for the measurement and structural models separately.

The results are first examined for offending estimates. These are estimated coefficients in either the structural or measurement models that exceed acceptable limits. The most common examples of offending estimates are (1) negative error variances or non-significant error variances for any construct, (2) standardized coefficients exceeding or very close to 1.0, or (3) very large standard errors associated with any estimated coefficient. If offending estimates are encountered, the researcher must first resolve each occurrence before evaluating any specific results of the model, as changes in one portion of the model can have significant effects on other results.

If correlations in the standardized solutions exceed 1.0, or two estimates are correlated highly, then the researcher should consider elimination of one of the constructs or should ensure that true discriminant validity has been established among the constructs.

Once the researcher has established that there are no offending estimates, the next step is to assess the overall model fit with one or more goodness of fit measures. Goodness of fit measures the correspondence of the actual or observed input (covariance or correlation) matrix with that predicted from the proposed model.

In developing any statistical model, the researcher must guard against "over-fitting" the model to the data. The researcher should strive for a large number of degrees of freedom, all other things being equal. In doing so, the model achieves parsimony – the achievement of better or greater model fit for each estimated coefficient. The better fit we can achieve with fewer coefficients, the better the test of the model and the more confidence we can have that the results are not a result of over-fitting the data.

Goodness of fit measures is of three types: (1) absolute fit measures, (2) incremental fit measures, or (3) parsimonious fit measures. Absolute fit measures assess only the overall model fit (both structural and measurement models collectively) with no adjustment for the

degree of over-fitting that might occur. Incremental fit measures compare the proposed model to another model specified by the researcher. Finally, parsimonious fit measures adjust the measures of fit to provide a comparison between models with differing numbers of estimated coefficients, the purpose being to determine the amount of fit achieved by each estimated coefficient.

The researcher is faced with the question of which measures to choose. No single measure or set of measures emerges as the only measures needed. As SEM has evolved in recent years, goodness of fit of a model is more a relative process than one with absolute criteria. The application of multiple fit measures will enable the researcher to gain a consensus across type of measures as to the acceptability of the proposed model.

Once the overall model fit has been evaluated, the measurement of each construct can then be assessed for uni-dimensionality and reliability. Unidimensionality is an assumption underlying the calculation of reliability and is demonstrated when the indicators of a construct have acceptable fit on a single-factor (one-dimensional) model. The use of reliability measures, such as cronbach's alpha (Cronbach, 1951), does not ensure unidimensionality but instead assumes it exists. The researcher is encouraged to perform unidimensionality tests on all multiple-indicator constructs before assessing the reliability. The next step is to examine the estimated loadings and to assess the statistical significance of each one. If statistical significance is not achieved, the researcher may wish to eliminate the indicator or attempt to transform it for better fit with the construct.

Beyond examination of the loadings for each indicator, a principal measure used in assessing the measurement model is the composite reliability of each construct. Reliability is a measure of internal consistency of the construct indicators, depicting the degree to which they indicate the common latent (unobserved) construct. More reliable measures provide the researcher with greater confidence that the individual indictors are all consistent in their measurements. A commonly used threshold value for acceptable reliability is .70, although this is not an absolute standard, and values below .70 have been deemed acceptable if the research is exploratory in nature.

We should note, however, that reliability does not ensure validity. Validity is the extent to which the indicators accurately measure what they are supposed to measure. For example,

several measures of how and why consumers purchase products may be quite reliable, but the researcher may mistakenly assume they measure brand loyalty when in fact they are indicators of purchase intentions. In this instance, the indicators are reliable set of measures but an invalid measure of brand loyalty. The issue of validity rests on the researcher's specification of indicators for a latent construct. The means for assessing validity in its many forms are reviewed in Bollen (1989).

The reliability and variance extracted for a latent construct must be computed separately for each multiple indicator construct in the model.

The most obvious examination of the structural model involves the significance of estimated coefficients. Structural equation modeling methods provide not only estimated coefficients but also standard errors and calculated t values for each coefficient. If the appropriate significance level can be specified, then each estimated coefficient can be tested for statistical significance for the hypothesized causal relationship. However, given the statistical properties of MLE and its characteristics at smaller sample sizes, the researcher is encouraged to be conservative in specifying a significance level, choosing smaller levels (0.025 or 0.01) instead of the traditional 0.05 level.

The selection of a critical value also depends on the theoretical justification for the proposed relationships. If a positive or negative relationship is hypothesized, then a one tailed test of significance can be employed. However, if the researcher cannot pre-specify the direction of the relationship, then a two-tailed significance test must be used. The difference is in the critical t values used to assess significance.

As a measure of the entire structural equation, an overall coefficient of determination (R^2) is calculated, similar to that found in multiple regression. Although no test of statistical significance can be performed, it provides a relative measure of fit for each structural equation.

The results of SEM can be affected by multicollinearity, just as was found in regression. Here the researcher must be aware of the correlations among construct estimates in the SEM results. Computer programs provide a correlation matrix of the estimated values for the latent constructs. If large values appear, then corrective action should be taken. This

action may include the deletion of one construct or the reformulation of causal relationships. Although no limit has been set that defines what are considered as high correlations, values exceeding .90 should always be examined, and many times correlations exceeding .80 can be indicative of problems.

The more common modeling strategies – a competing model or model development strategy – involve the comparison of model results to determine the best fitting model from a set of models. In a competing models strategy, the researcher postulates a number of alternative models. The objective is to fit the best from among the set of models. In a model development strategy, the researcher starts with an initial model and engages in a series of model respecifications, each time hoping to improve model fit while maintaining accordance with the underlying theory.

To assist in comparing models, a large number of measures have been developed to assess model fit. One class of measures assesses the overall model fit in absolute terms, providing specific measures of the fit. One drawback to these measures is that they do not account for the number of relationships used in obtaining the model fit. To measure model parsimony, a series of parsimonious fit measures have been proposed. Their objective is to determine the fit per coefficient because the absolute fit will always improve as estimated coefficients are added.

Table 3.1 Goodness of fit measures for structural equation modeling and their recommended values for an acceptable fit. Table is narrated from the information provided by Hair et al., (1998).

Goodness of Fit Measure	Level of Acceptable Fit
χ^2 (Chi-square) statistic	Statistically insignificant chi-square is required
Normed χ^2 (χ^2/degree of freedom)	Acceptable values are between 1.0 to 2.0
GFI (Goodness of Fit Index)	Above 0.90 is preferred (Higher values indicate better fit)
RMSR (Root Mean Square Residual)	Values ranging from 0.05 to 0.08 are deemed acceptable

TLI (Tucker Lewis Index)	Ranges from 0 to 1. Values greater than 0.90 are recommended
NFI (Normed Fit Index)	Ranging from 0 (no fit at all) to 1 (perfect fit). Commonly recommended value is 0.90 or greater
CFI (Comparative Fit Index)	More appropriate in small samples. Values lie between 0 and 1; larger values indicate higher levels of goodness of fit.

Stage 7: Interpreting and Modifying the Model

Once the model is deemed acceptable, the researcher should first examine the results for their correspondence to the proposed theory. Are the principal relationships in the theory supported and found to be statistically significant? Do the competing models add insight in alternative formulations of the theory that can be supported? Are all of the relationships in the hypothesized direction (positive or negative)? All of these and many more questions can be addressed from the empirical results. In the course of addressing these questions, the researcher may find the need to consider two issues of interpretation: the use of the standardized versus unstandardized solutions and model respecification.

One aspect of evaluating an estimated relationship is the assessment of the actual size of the parameter. But just as for other multivariate techniques, such as multiple regression, there is a market difference in the standardized and unstandardized solutions in terms of their interpretation and use in structural equation models, the standardized coefficients all have equal variance and a maximum value of 1.0, thus closely approximating effect sizes, as was shown by beta weights in regression. Coefficients near 0 have little, if any, substantive effect, whereas an increase will correspond to increased importance in the causal relationships. The standardized coefficients are useful for determining relative importance, but are sample specific and not comparable across samples.

The unstandardized coefficients correspond to regression weights in multiple regression in that they are expressed in terms of the construct's scale, in this case, its variance. This makes these coefficients comparable across samples and retains their scale effect. Because

the scale varies for each construct, however, comparison between coefficients is more difficult than with the standardized coefficients. Once model interpretation is complete, the researcher most likely is looking for methods to improve model fit and/or its correspondence to the underlying theory. In such cases, the researcher may engage in model respesification, the process of adding or deleting estimated parameters from the original model. Before, addressing some approaches for identifying model modification, the researcher has to make such modifications with care and only after obtaining theoretical justification for what empirically is deemed significant. Modifications to the original model should be made only after deliberate consideration. If modifications are made, the model should be cross-validated. (I.e. estimated on a separate set of data) before the modified model can be accepted.

3.3.2. Level of analysis

The level of analysis of the study is the IS organizations serving specific lines of the business and business development departments interacting with the IS function. The intent of the study is to explain the behavior and attitudes of the IS organization and business development departments rather than those of individuals. The primary service of the IS organization should be system development for the business lines to make sure that there is an interaction between these departments.

Study respondents will be chosen based on a key-informant methodology (Phillips and Bagozzi, 1986). For each IS and business organization, respondents will include management from within the IS and line groups.

A key informant is a person (or group of persons) who has unique skills or professional background related to the issue/intervention being evaluated, is knowledgeable about the project participants, or has access to other information of interest to the evaluator. A key informant can also be someone who has a way of communicating that represents or captures the essence of what the participants say and do. Key informants can help the evaluation team better understand the issue being evaluated. Key informants can be surveyed or interviewed individually or through focus groups (Frechtlig and Westat, 1997).

In the hypothetical project, key informants can assist with (1) developing evaluation questions, and (2) answering formative and summative evaluation questions.

The advantages of the key informant methodology are:

- Information concerning causes, reasons, and/or best approaches from an "insider" point of view
- Advice/feedback increases credibility of study
- Pipeline to pivotal groups
- May have side benefit to solidify relationships between evaluators, clients, participants, and other stakeholders

On the other hand there are different disadvantages of the key informant methodology:

- Time required to select and get commitment may be substantial
- Relationship between evaluator and informants may influence type of data obtained
- Informants may interject own biases and impressions
- May result in disagreements among individuals leading to frustration/ conflicts

The dependent variable is service quality instead of IST performance. The idea is based on the theoretical assumption that shared knowledge between two departments should determine the quality of service that they are both involved in. For example, if two departments are working on the service of Internet banking, the shared knowledge between these two departments should determine the quality of this service. The quality of the service will be evaluated with an instrument derived from SERVQUAL.

An instrument is developed for a cross-sectional field study. This instrument is for evaluating the mutual trust, mutual influence and shared knowledge between IS units and business line units.

Two types of measures are used to assess the organizational characteristics of shared knowledge, trust, and influence. The first type is a general measure. Each informant is asked to assess the overall level of interaction for a specific characteristic of a particular relationship. For example, one question might ask respondents to evaluate "the level of

appreciation that the IS organization and the line organization have for each other's accomplishments." The second type of measure is a multiplicative or interaction measure. Each informant is asked to assess separately the role of IS and the line for each characteristic. For example, the questionnaire might contain the following two statements: "the level of appreciation that the line organization has for the accomplishments of the IS organization" and "the level of appreciation that the IS organization has for the accomplishments of the line organization." Using the conceptualization of fit as interaction (Venkatraman, 1989), we are going to operationalize this measure as "IS role * line role," multiplying the two responses together. The actual indicators for each construct appear in the Appendix A.

There are a number of advantages to this measurement scheme. The two types of measures (general and multiplicative) can be thought of as different methods, from a Campbell and Fiske (1959) perspective. Using measures in this way provides a stronger test of the validity of the measurement scheme than would be possible if only one type of measure was used for each indicator. That is, the extent to which these two kinds of indicators agree provides a much stronger test of validity than would be possible if only one or the other type of indicator was used. Further, using both types of measures balances possible threats to validity inherent in either type alone. For example, the general assessments require a complex set of summarizations and interpretations by respondents, leading to potential error due to the large cognitive burden such assessments place on key informants (Silk and Kalwani, 1982).

The questions used for the multiplicative assessment, however, are very specific about the role and characteristic of interest, placing a much smaller cognitive burden on respondents. Similarly, the operationalization of the multiplicative indicators as "IS Role * Line Role" is one of several possible operationalizations of interaction (Venkatraman, 1989). The general questions, on the other hand, are direct assessments of the fit relationship in question. To the extent that these two very different types of indicators show convergent and discriminant validity in their measurement of the constructs in question, we can have a higher level of confidence about the validity of the measures.

The level of analysis of the study is organizations in terms of shared knowledge and its antecedents which are mutual trust and mutual influence. On the other hand, the service

quality will be evaluated with a survey that will be applied to individual customers. To be able to put both at the same level, all of the results will be accrued to organization level.

Structural Equation Modeling (SEM) is selected to be used as the analysis method for the research. SEM is a statistical technique for building and testing statistical models, which are sometimes called causal models. It is a hybrid technique that encompasses aspects of confirmatory factor analysis, path analysis and regression, which can be seen as special cases of SEM.

SEM encourages confirmatory, rather than exploratory, modeling; thus, it is suited to theory testing, rather than theory development. It usually starts with a hypothesis, represents it as a model, operationalizes the constructs of interest with a measurement instrument, and tests the model. With an accepted theory or otherwise confirmed model, one can also use SEM inductively by specifying a model and using data to estimate the values of free parameters. Often the initial hypothesis requires adjustment in light of model evidence, but SEM is rarely used purely for exploration.

Among its strengths is the ability to model constructs as latent variables — variables which are not measured directly, but are estimated in the model from measured variables which are assumed to tap into the latent variables. This allows the modeler to explicitly capture unreliability of measurement in the model, in theory allowing the structural relations between latent variables to be accurately estimated.

SEM is an extension of the general linear model that simultaneously estimates relationships between multiple independent, dependent and latent variables.

SPSS 12.0 will be the statistical program to analyze the reliability of the data. AMOS 7.0 is going to be the program to be used for SEM analysis.

3.3.3. Sampling method

The study is going to be applied to all of the banks which have Internet banking service. So, there is no need for sampling in terms of organization.

On the other hand, while evaluating the service quality of Internet banking, since the survey is going to be applied to the customers of the banks, it is not feasible to apply it to all customers since the population is very large.

We will use the following equation to calculate adequate sample size (Nişel, 2005).

$$n = \left(\frac{N * \sigma^2}{(N-1)D + \sigma^2} \right)$$

The definitions for the symbols are:

n: Required sample size (to be calculated)

N: Population size

$$\sigma^2 = (\frac{Range}{4})^2$$

range = Xmax – X min

Xmax: Maximum value of data

Xmin: Minimum value of data

$$D = \left(\frac{B^2}{z^2} \right)$$

B: Tolerated error of estimation

z: is the abscissa of the normal curve that cuts off an area at the tails

To calculate the required sample, we use the following values.

N: Number of Internet banking customers in Turkey are 3,069,573 according to the data provided by Turkish Banking Association (2007). So, this figure is the population size (N).

Range: Since we are using a likert scale between 1 and 7, Xmin and Xmax are 1 and 7 respectively. So the range becomes 6.

B is the tolerance error and if we use 0.25 for B, that means 0.25 is tolerated in the range between 1 and 7. (0,25 = 0,04 % of 6 which is in the acceptable range according to Cochran (1977).

z: it is 1.96 for 95 % confidence level

Applying all in the following formula will yield:

$$n = \left(\frac{N * \sigma^2}{(N-1)D + \sigma^2} \right) = 138$$

Factors Affecting Sample Size

This part is narrated from sampling techniques proposed by Cochran(1977), Kalton(1983), Kish(1995), and Moore and McCabe (1999).

Three factors are used in the sample size calculation and thus, determine the sample size for simple random samples. These factors are: 1) the *margin of error*, 2) the *confidence level*, and 3) the *proportion (or percentage) of the sample that will choose a given answer* to a survey question. Each one of these will be discussed below.

The *margin of error* (also referred to as the confidence interval) measures the precision with which an estimate from a single sample approximates the population value. For example, in a national voting poll the margin of error might be + or – 3%. This means that if 60% of the people in a sample favor Mr. Smith, you could confident that, if you surveyed the entire population, between 57% (60-3) and 63% (60+3) of the population would favor Mr. Smith. The margin of error in social science research generally ranges from 3% to 7% and is closely related to sample size. A margin of error will get narrower as the sample size increases. The margin of error selected depends on the precision needed to make population estimates from a sample. If it's acceptable to have an interval of + or -7% around a given estimate, then the sample size needed will be smaller than if an interval of + or -3% is the largest acceptable interval.

The *confidence level* is the estimated probability that a population estimate lies within a given margin of error. Using the example above, a confidence level of 95% tells you that you can be 95% confident that between 57% and 63% of the population favors Mr. Smith. Common confidence levels in social science research include 90%, 95%, and 99%. Confidence levels are also closely related to sample size. As the confidence level increases, so too does the sample size. A researcher that chooses a confidence level of 90% will need a smaller sample than a researcher who is required to be 99% confident that the population estimate lies within the margin of error. Looking at it another way, with a confidence level of 95%, there is a 5% chance that an estimate derived from a sample will fall outside the confidence interval of 57% to 63%. Researchers will choose a higher confidence level in order to reduce the chance of making a wrong conclusion about the population from the sample estimate.

Most of the time, the *proportion (or percentage) of a sample that will choose a given answer* to a survey question is unknown, but it's necessary to estimate this number since it is required for calculating the sample size. Most researchers will use a proportion (or percentage) that is considered the most conservative estimate – that is, that 50% of the sample will provide a given response to a survey question. This is considered the most conservative estimate because it is associated with the largest sample size. Smaller sample sizes are needed if the proportion of a sample that will choose a given answer to a question is estimated at 60% (or 40%) while an even smaller sample size is needed if the estimated proportion of responses is either 70% (or 30%), 80% (or 20%), or 90% (or 10%). Thus, when determining the sample size needed for a given level of accuracy (i.e., given confidence level and margin of error), the most conservative estimate of 50% should be used because it is associated with the largest sample size.

Sample Size Formula.

The formula for calculating the sample size for a simple random sample without replacement is as follows:

$$n = \left(\frac{z}{m}\right)^2 p(1-p)$$

where,

z is the z value (e.g., 1.645 for 90% confidence level, 1.96 for 95% confidence level, and 2.575 for 99% confidence level);

m is the margin of error (e.g., .07 = + or – 7%); and

p is the estimated value for the proportion of a sample that will respond a given way to a survey question (e.g., .80 for 80%).

Using our factors for the principal investigator population, PIs_1, and solving for the sample size equation, we find:

$$n = \left(\frac{1.96}{.07}\right)^2 .8(1-.8) = 125$$

3.4. Hypotheses

Knowledge sharing and shared team vision are critical for superior product development process in terms of cost, time, and quality which are critical competencies in the dynamic global competitive business environment (Rauniar, 2005).

Hypothesis 1: Shared knowledge between information systems groups and business unit leads to improved service quality.

The attainment of mutual trust leads to shared knowledge (Nelson and Cooprider, 1996). By alleviating the fear of the unexpected and facilitating interactions and involvement (Bradach and Eccles, 1989), trust encourages a climate conducive to the sharing of knowledge. Competing teams develop trust relationships followed by a sharing of knowledge on solving a common problem (Sherif, 1966).

Hypothesis 2: The perception of increased levels of mutual trust between the IS and business unit leads to increased levels of shared knowledge between these groups.

Social communication and social influence processes are interwoven with the processes of knowledge creation and dissonance reduction (Festinger, 1957). By seeking social support for ideas, individuals and groups seek to either influence others into accepting these ideas or be influenced by others' ideas and attitudes. This influence process is necessary for achieving mutual understanding between groups (Churchman and Schainblatt, 1965). Through this social influence mechanism, cognitive elements are exchanged between groups leading to shared knowledge (Nelson and Cooprider, 1996).

Hypothesis 3: The perception of increased levels of mutual influence between IS and business unit leads to increased levels of shared knowledge between these groups.

The following hypothesis is a combination Hypothesis 1 and Hypothesis 2.

Hypothesis 4: Shared knowledge acts as a mediating variable between mutual trust and service quality.

The following hypothesis is a combination Hypothesis 1 and Hypothesis 3.

Hypothesis 5: Shared knowledge acts as a mediating variable between mutual influence and service quality.

4. ANALYSIS OF THE RESULTS

4.1. Reliability Results

In this section the data is analyzed for each construct and variables within for reliability (Cronbach's alpha) using SPSS 15.0.

4.1.1. Service quality components

Service Quality is conceptualized with five components: efficiency, fulfillment, availability, privacy and recovery.

1.1.1.10. Efficiency

Table 4.1 Case Processing Summary (Efficiency)

		N	%
Cases	Valid	141	99,3
	Excluded(a)	1	,7
	Total	142	100,0

a Listwise deletion based on all variables in the procedure.

Table 4.2 Reliability Statistics (Efficiency)

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,846	,854	5

Table 4.3 Summary Item Statistics (Efficiency)

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	5,182	4,596	5,589	,993	1,216	,156	5
Item Variances	1,750	1,287	2,700	1,413	2,098	,317	5

Table 4.4 Item-Total Statistics (Efficiency)

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
efficiency1	20,40	18,057	,634	,505	,820
efficiency2	20,82	17,675	,749	,583	,790
efficiency3	20,32	19,347	,645	,488	,819
efficiency4	20,77	18,677	,678	,521	,810
efficiency5	21,31	16,202	,618	,422	,836

1.1.1.11. Fulfillment

Table 4.5 Case Processing Summary (Fulfillment)

		N	%
Cases	Valid	142	100,0
	Excluded(a)	0	,0
	Total	142	100,0

a Listwise deletion based on all variables in the procedure.

Table 4.6 Reliability Statistics (Fulfillment)

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,790	,790	4

Table 4.7 Summary Item Statistics (Fulfillment)

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	5,190	4,761	5,556	,796	1,167	,130	4
Item Variances	1,536	1,438	1,715	,277	1,192	,015	4

Table 4.8 Item-Total Statistics (Fulfillment)

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
fullfillment1	16,00	8,709	,600	,384	,738
fullfillment2	15,35	9,067	,603	,379	,735
fullfillment3	15,20	9,298	,581	,359	,746
fullfillment4	15,73	9,194	,609	,388	,733

1.1.1.12. Availability

Table 4.9 Case Processing Summary (Availability)

		N	%
Cases	Valid	142	100,0
	Excluded(a)	0	,0
	Total	142	100,0

a Listwise deletion based on all variables in the procedure.

Table 4.10 Reliability Statistics (Availability)

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,703	,704	2

Table 4.11 Summary Item Statistics (Availability)

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	5,313	5,120	5,507	,387	1,076	,075	2
Item Variances	1,470	1,386	1,553	,166	1,120	,014	2

Table 4.12 Item-Total Statistics (Availability)

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
availability1	5,12	1,553	,543	,295	N/A
availability2	5,51	1,386	,543	,295	N/A

1.1.1.13. Privacy

Table 4.13 Case Processing Summary (Privacy)

		N	%
Cases	Valid	141	99,3
	Excluded(a)	1	,7
	Total	142	100,0

a Listwise deletion based on all variables in the procedure.

Table 4.14 Reliability Statistics (Privacy)

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,838	,841	4

Table 4.15 Summary Item Statistics (Privacy)

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	5,207	4,979	5,433	,454	1,091	,035	4
Item Variances	1,942	1,576	2,445	,869	1,552	,156	4

Table 4.16 Item-Total Statistics (Privacy)

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
privacy1	15,58	11,402	,669	,480	,800
privacy2	15,85	12,113	,674	,467	,793
privacy3	15,66	12,483	,735	,551	,769
privacy4	15,40	13,598	,620	,391	,817

1.1.1.14. Recovery

Table 4.17 Case Processing Summary (Recovery)

		N	%
Cases	Valid	136	95,8
	Excluded(a)	6	4,2
	Total	142	100,0

a Listwise deletion based on all variables in the procedure.

Table 4.18 Reliability Statistics (Recovery)

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,808	,808	4

Table 4.19 Summary Item Statistics (Recovery)

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4,434	4,213	4,559	,346	1,082	,026	4
Item Variances	2,183	2,057	2,377	,321	1,156	,021	4

Table 4.20 Item-Total Statistics (Recovery)

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
recovery1	13,18	14,418	,521	,332	,805
recovery2	13,32	13,524	,551	,440	,795
recovery3	13,18	12,991	,680	,562	,732
recovery4	13,52	12,103	,757	,642	,692

4.1.2. Shared knowledge

Data is collected for shared knowledge, mutual trust and mutual influence from 32 departments responsible for 16 banks.

Table 4.21 Case Processing Summary (Shared Knowledge)

		N	%
Cases	Valid	32	100,0
	Excluded(a)	0	,0
	Total	32	100,0

a Listwise deletion based on all variables in the procedure.

Table 4.22 Reliability Statistics (Shared Knowledge)

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,820	,822	5

Table 4.23 Summary Item Statistics (Shared Knowledge)

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	5,225	5,000	5,438	,438	1,088	,034	5
Item Variances	1,649	1,403	1,802	,399	1,284	,023	5

Table 4.24 Item-Total Statistics (Shared Knowledge)

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Understanding1	20,75	17,548	,507	,383	,814
Appreciation1	20,91	14,862	,731	,703	,748
Understanding2	20,69	18,867	,284	,204	,878
Appreciation2	21,13	14,500	,814	,725	,724
Appreciation3	21,03	14,418	,794	,785	,728

4.1.3. Mutual trust

Table 4.25 Case Processing Summary (Mutual Trust)

		N	%
Cases	Valid	32	100,0
	Excluded(a)	0	,0
	Total	32	100,0

a Listwise deletion based on all variables in the procedure.

Table 4.26 Reliability Statistics (Mutual Trust)

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,746	,750	3

Table 4.27 Summary Item Statistics (Mutual Trust)

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	5,531	5,438	5,625	,188	1,034	,009	3
Item Variances	1,111	,887	1,289	,402	1,453	,042	3

Table 4.28 Item-Total Statistics (Mutual Trust)

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Trust1	11,06	2,964	,610	,379	,620
Trust2	10,97	3,644	,585	,351	,657
Trust3	11,16	3,362	,537	,288	,705

4.1.4. Mutual influence

Table 4.29 Case Processing Summary (Mutual Influence)

		N	%
Cases	Valid	32	100,0
	Excluded(a)	0	,0
	Total	32	100,0

a Listwise deletion based on all variables in the procedure.

Table 4.30 Reliability Statistics (Mutual Influence)

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,782	,793	6

Table 4.31 Summary Item Statistics (Mutual Influence)

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	5,021	4,750	5,188	,438	1,092	,023	6
Item Variances	1,389	,770	1,935	1,165	2,513	,193	6

Table 4.32 Item-Total Statistics (Mutual Influence)

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Influence1	25,38	15,597	,581	,791	,737
PotentialInfluence1	25,06	17,093	,514	,780	,754
Influence2	25,16	17,039	,479	,703	,764
PotentialInfluence2	24,94	17,738	,484	,684	,760
Influence3	25,06	18,706	,585	,475	,745
PotentialInfluence3	25,03	17,838	,605	,502	,736

4.2. Model Validation

Data is aggregated according to 16 organizations. In the aggregation procedure 142 sample data collected for service quality is reduced to 16 grouping by organizations. The aggregation process is also applied to the 32 data collected for shared knowledge, mutual trust and mutual influence based on the organizations. They are brought together as can be seen in Table 4.33.

Table 4.33 Data at Organizational Level

Bank	**Shared Knowledge**	**Mutual Trust**	**Mutual Influence**	**Service Quality**
Akbank	11,83	12,25	17,50	4,57
Alternatif Bank	9,67	9,50	11,92	2,78
Anadolu Bank	21,00	15,25	16,00	3,99
Denizbank	21,17	22,50	19,08	4,89
Finansbank	22,00	16,75	17,58	4,64
Fortis	26,00	22,50	19,00	5,11
Garanti	26,00	24,50	23,17	5,33
Is	14,50	9,25	11,67	5,26
Kuveyt Türk	20,67	19,25	13,92	4,93
Oyakbank	15,33	22,00	16,00	4,91
Sekerbank	16,50	16,00	13,83	5,05
TEB	24,67	20,50	23,75	5,94
Türkiye Finans	23,83	23,00	26,08	5,93
Vakifbank	24,83	16,50	15,17	4,98
YKB	19,50	22,00	21,67	4,64
Ziraat	26,00	21,00	31,08	5,45

4.2.1. Default model

Using AMOS 7.0, the following hypothesized model is applied to the data.

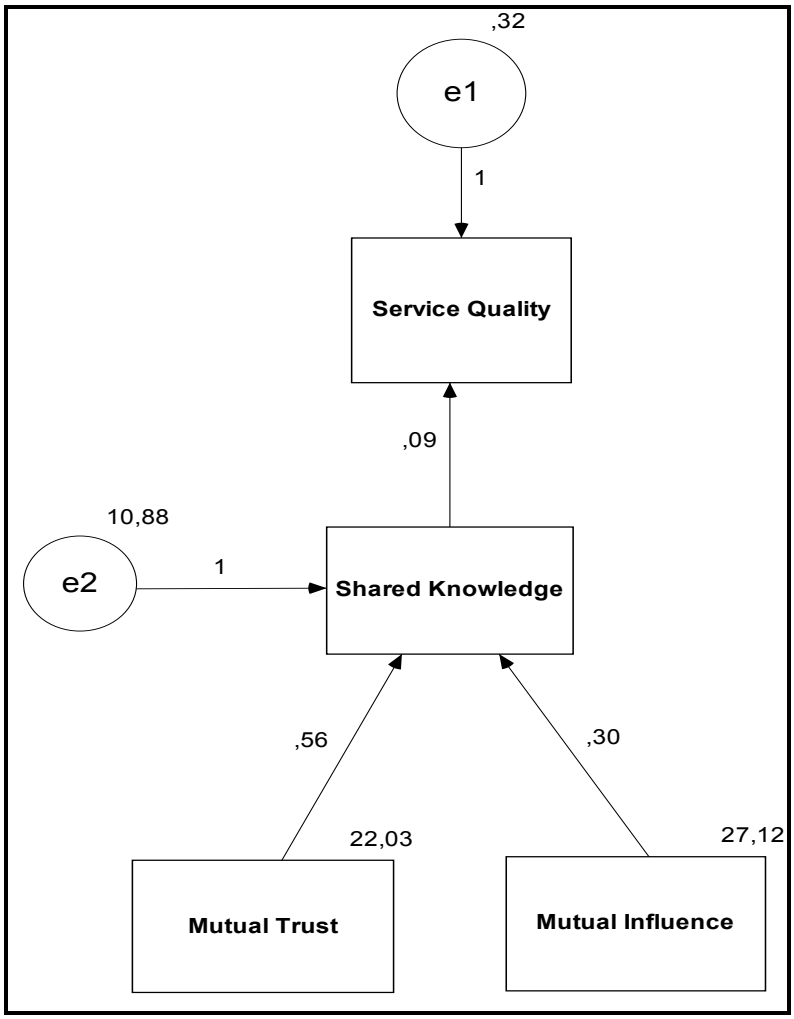

Figure 4.1 Default model output path diagram in AMOS 7.0

Analysis Results

Observed, endogenous variables
- Quality
- SK

Observed, exogenous variables
- MT
- MI

Unobserved, exogenous variables
- e1
- e2

Number of variables in your model:	6
Number of observed variables:	4
Number of unobserved variables:	2
Number of exogenous variables:	4
Number of endogenous variables:	2

Number of distinct sample moments:	10
Number of distinct parameters to be estimated:	7
Degrees of freedom (10 - 7):	3

Result

Minimum was achieved
Chi-square = 10,601
Degrees of freedom = 3
Probability level = ,014

Regression Weights:

			Estimate	S.E.	C.R.	P	Label
SK	<---	MT	,563	,182	3,104	,002	
SK	<---	MI	,295	,164	1,806	,071	
Quality	<---	SK	,090	,032	2,788	,005	

Model Fit

The first assessment of the model fit must be done for the overall model. The first measure is the likelihood ratio of Chi-Square statistic. The value (chi-square = 10,601, 3 degrees of freedom) has a statistical significance level 0,014, below the minimum 0,05 (Hair et al., 1998). This statistic shows that the differences of the predicted and actual matrices are significant, indicative of non-acceptable fit. So, no need to check for the other goodness of fit indexes. It can be concluded that this model is not valid. From the regression weights table, we can easily see that, the relationship between mutual influence and shared knowledge is not significant, since it has a P value of 0,071. So, this relation seems to be the reason of invalid model. Changing the model by canceling the relation between mutual influence and shared knowledge, and putting an arrow coming directly from mutual influence to service quality might be our next revised model to check.

4.2.2. Revised Model 1 : Direct Impact of Mutual Influence on Service Quality

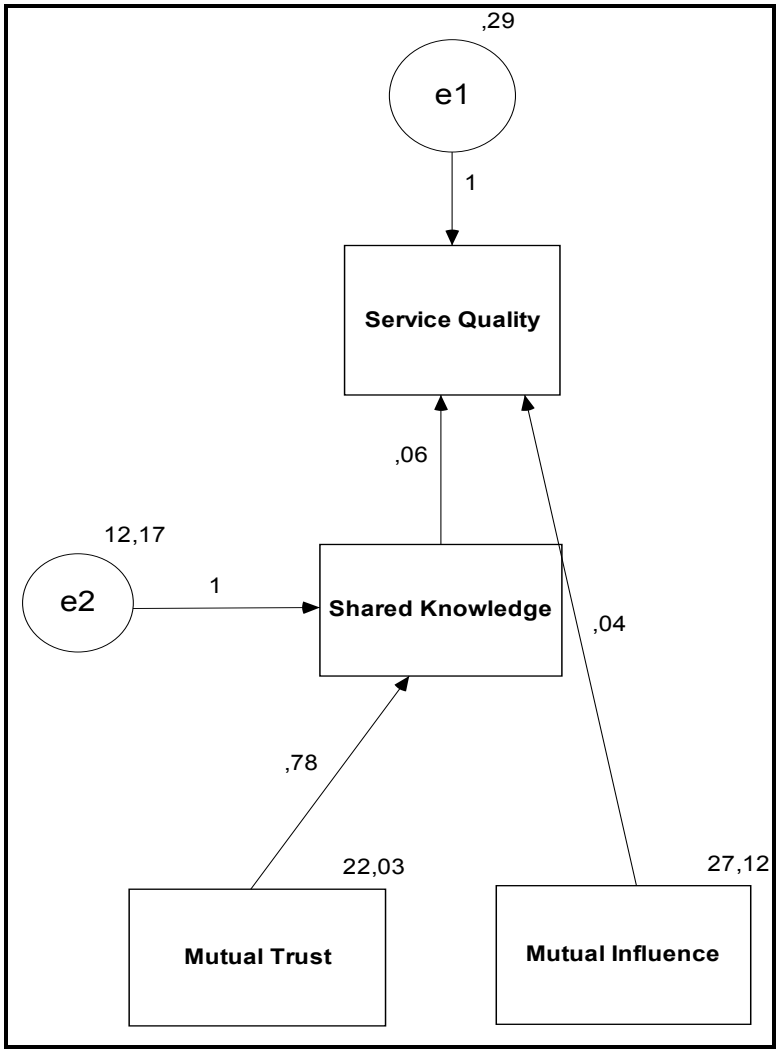

Figure 4.2 Revised model: direct impact of mutual influence on service quality output path diagram in AMOS 7.0

The new proposed model is based on the idea that mutual influence has a direct impact on the service quality. In this model, shared knowledge is not anymore a mediating variable between mutual influence and service quality.

Analysis Summary

The model is recursive.
Sample size = 16

Variables

Observed, endogenous variables
- Quality
- SK

Observed, exogenous variables
- MT
- MI

Unobserved, exogenous variables
- e1
- e2

Number of variables in your model:	6
Number of observed variables:	4
Number of unobserved variables:	2
Number of exogenous variables:	4
Number of endogenous variables:	2

Parameter summary

	Weights	Covariances	Variances	Means	Intercepts	Total
Fixed	2	0	0	0	0	2
Labeled	0	0	0	0	0	0
Unlabeled	3	0	4	0	0	7
Total	5	0	4	0	0	9

Computation of degrees of freedom

Number of distinct sample moments:	10
Number of distinct parameters to be estimated:	7
Degrees of freedom (10 - 7):	3

Result

Minimum was achieved
Chi-square = 11,082
Degrees of freedom = 3
Probability level = ,011

Regression Weights:

			Estimate	S.E.	C.R.	P	Label
SK	<---	MT	,785	,192	4,090	***	
Quality	<---	SK	,063	,027	2,304	,021	
Quality	<---	MI	,040	,027	1,475	,140	

Model Fit

To assess the overall fit of the model, again we first start with the likelihood of chi-square statistic. The value (chi-square = 11,082, 3 degrees of freedom) has a statistical significance level of 0,01 below the minimum level 0,05. So, no need to go further analysis and it can be stated that this model is not valid too. In the above table, it can be easily seen from the Quality ←MI relation row that, the relation between mutual influence and service quality is insignificant (P value 0,14 greater than 0,05) and it is the probable reason of the invalidity of the revised model 1. The next model would be setup by drawing a relation from mutual influence and mutual trust. By this way, the model is proposing that mutual influence is affecting shared knowledge through trust as a mediating variable.

4.2.3. Final Model

The final model is developed based on the idea that mutual influence has a direct impact on the mutual trust and has an indirect impact on the shared knowledge and service quality. Nelson and Cooprider's (1996) are explaining the relationship between communication, trust and influence in the following statement: "Communication is an antecedent of mutual trust and influence. These constructs, although distinct in nature, are closely linked to each other. The establishment of a history of communications in the context of quality interactions impacts trust, while the frequency of these communications in the context of social mechanisms leads to influence. It is likely that some interaction between mutual trust and influence is a result of communication quality, and frequency."

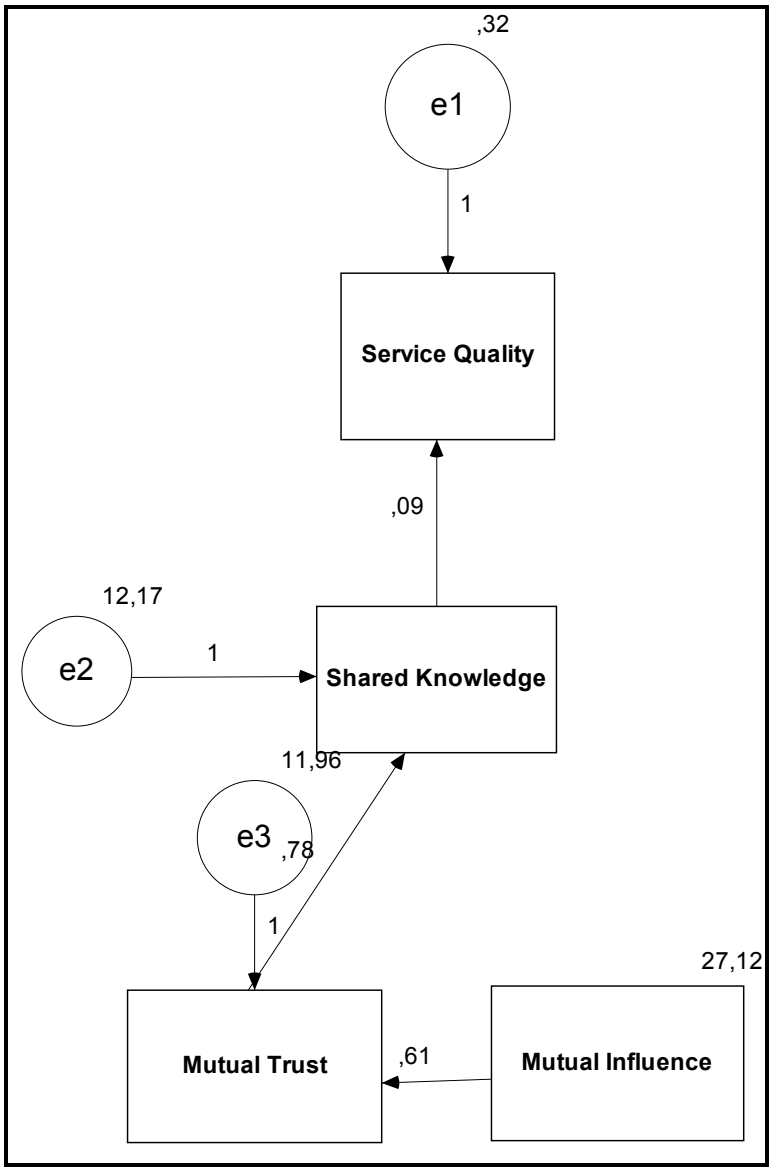

Figure 4.3 Final model output diagram from AMOS 7.0

Analysis Summary

The model is recursive.
Sample size = 16

Variables

Observed, endogenous variables
- Quality
- SK
- MT

Observed, exogenous variables
- MI

Unobserved, exogenous variables
- e1
- e2
- e3

Number of variables in your model:	7
Number of observed variables:	4
Number of unobserved variables:	3
Number of exogenous variables:	4
Number of endogenous variables:	3

Parameter summary

	Weights	Covariances	Variances	Means	Intercepts	Total
Fixed	3	0	0	0	0	3
Labeled	0	0	0	0	0	0
Unlabeled	3	0	4	0	0	7
Total	6	0	4	0	0	10

Computation of degrees of freedom

Number of distinct sample moments:	10
Number of distinct parameters to be estimated:	7
Degrees of freedom (10 - 7):	3

Result

Minimum was achieved
Chi-square = 3,116
Degrees of freedom = 3
Probability level = ,374

Regression Weights:

		Estimate	S.E.	C.R.	P	Label
MT	<--- MI	,609	,171	3,553	***	
SK	<--- MT	,785	,192	4,090	***	
Quality	<--- SK	,090	,029	3,144	,002	

Variances

	Estimate	S.E.	C.R.	P	Label
MI	27,119	9,902	2,739	,006	
e3	11,960	4,367	2,739	,006	
e2	12,170	4,444	2,739	,006	
e1	,316	,115	2,739	,006	

Minimization History

Iteration		Negative eigenvalues	Condition #	Smallest eigenvalue	Diameter	F	NTries	Ratio
0	e	1		-,020	9999,000	25,458	0	9999,000
1	e*	0	7,500		1,311	3,367	19	,768
2	e	0	5,180		,076	3,124	1	1,076
3	e	0	4,515		,014	3,116	1	1,034
4	e	0	4,472		,001	3,116	1	1,002

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	7	3,116	3	,374	1,039
Saturated model	10	,000	0		
Independence model	4	31,105	6	,000	5,184

RMR, GFI

Model	RMR	GFI
Default model	1,418	,920
Saturated model	,000	1,000
Independence model	9,411	,447

Baseline Comparisons

Model	NFI Delta1	TLI rho2	CFI
Default model	,900	,991	,995
Saturated model	1,000		1,000
Independence model	,000	,000	,000

Model Fit

The value of chi-square 3,116 at 3 df has a significant level of 0,374 which is above the minimum level of 0,05. This statistic supports that the differences of the predicted and actual matrices are non-significant, indicative of acceptable fit. The goodness of fit (GFI)

has a value of 0,92 which is quite high. Finally, the root mean square residual (RMSR) indicates that the average residual correlation 0,051, deemed acceptable since it falls between 0,05 and 0,08.

The next type of goodness-of-fit measure assesses the incremental fit of the model compared to a null model. In this case, the null model is hypothesized as a single factor model with no measurement error. TLI (Tucker Lewis Index) and Normed Fit Index (NFI) are calculated based on the null model chi-square and degrees of freedom. TLI value 0,991 and NFI value 0,90 exceed or reach the recommended level of 0,90, further supporting acceptance of the proposed model.

CFI (Comparative Fit Index) is appropriate in a model development strategy or when a smaller sample is available (Rigdon, 1994). The value 0,995 which is very close to a perfect fit of 1.0.

Lastly, the normed chi-square (chi-square/df) has a value of 1,039. This falls well within the recommended levels of 1.0 to 2.0.

Now that the overall model has been accepted, each of the constructs can be evaluated separately by examining the indicator loadings for statistical significance.

First, P values for each construct is significant (*** means a value lower than 0,00). Thus all variables are significantly related to their specified constructs, verifying the posited relationships among indicators and constructs.

4.3. Testing the Hypotheses

The model is tested using Structural Equation Modeling as described above. Using SEM, the default model is tested first. As the default model could not pass the goodness of fit tests, the model is changed to reach a better model as described in the Stage 7 (Model Modification) of Hair et al. (1998).

Considering our final model as the one which has passed all of the goodness of fit tests, we will examine the hypothesis in the light of the relations in that model.

Hypothesis 1:

Shared knowledge between information systems groups and their line customers, lead to improved service quality.

As can be seen from the Figure 4.3, Figure 4.3 Final model output diagram from AMOS 7.0the relation between shared knowledge (SK) and service quality (Quality) has an estimation of regression weight of 0,09. To explain in a different way, one can say that when shared knowledge goes up by 1, service quality goes up by 0,09. The regression weight table of the final model also shows that the relation between shared knowledge and service quality is significant at 0,002. That means the probability of getting a critical ratio as large as 3,144 in absolute value is ,002. In other words, the regression weight for shared knowledge(SK) in the prediction of Service Quality (Quality) is significantly different from zero at the 0,01 level (two-tailed).

Since shared knowledge between two parties has a positive impact on service quality, we accept H1.

Hypothesis 2:

The perception of increased levels of mutual trust between the IS and line groups leads to increased levels of shared knowledge between these groups.

As can be seen from the Figure 4.3, the relation between mutual trust (MT) and shared knowledge (SK) has an estimation of regression weight of 0,785. This is a very strong explanation of shared knowledge by mutual trust. When mutual trust goes up by 1, shared knowledge goes up by 0,785. The regression weight table of the final model also shows that the relation between mutual trust and shared knowledge is significant at 0,001. That means the probability of getting a critical ratio as large as 4,09 in absolute value is less than ,001. In other words, the regression weight for mutual trust (MT) in the prediction of shared knowledge (SK) is significantly different from zero at the 0,001 level (two-tailed).

Since mutual trust has a positive impact on shared knowledge significantly, we accept H2.

Hypothesis 3:

The perception of increased levels of mutual influence between IS and line groups leads to increased levels of shared knowledge between these groups.

Since the default model which includes the relation between mutual influence (MI) and shared knowledge (SK) in Figure 4.1 Default model output path diagram in AMOS 7.0 is not acceptable, there is no support for this hypothesis.

On the other hand, in our final model, there is a significant positive relation between mutual influence and mutual trust. The probability of getting a critical ratio as large as 3,553 in absolute value is less than 0,001 in this relation. In other words, the regression weight for mutual influence (MI) in the prediction of mutual trust (MT) is significantly different from zero at the 0,001 level (two-tailed).

So there is an indirect positive relation between mutual influence and shared knowledge according to our final model.

Since, analysis results are not supporting the positive direct relation between mutual influence and shared knowledge, we cannot accept H3.

Hypothesis 4:

Shared knowledge acts as a mediating variable between mutual trust and service quality.

As the final model shows, shared knowledge is acting as a mediating variable mutual trust and service quality. So, we accept H4.

Hypothesis 5:

Shared knowledge acts as a mediating variable between mutual influence and service quality.

In the final model, both mutual trust and shared knowledge are acting as mediating variables between mutual influence and service quality. So we accept H5.

4 out of 5 hypotheses were accepted according to the new model.

5. CONCLUSION and RECOMMENDATIONS

As we have stated in the introduction, this study has been investigating the following questions:

What are the major components or triggers of shared knowledge ?

What are the components and triggers of service quality ?

What is the nature of the relationships among the shared knowledge, its components and service quality?

During the study, we tried to explore the above questions. For the first one, based upon the relevant literature we conceptualized the two antecedents of sharing knowledge: mutual trust and mutual influence. We collected data from 32 managers in 16 banks.

In order to be able to answer the second question, we made a broad literature survey to answer how to measure service quality. Based on the relevant research we have decided to apply a slightly changed version of a model developed by Parasuraman, Zeithaml and Malhotra (2001) for measuring quality of online services to the banking context. We designed a questionnaire of 21 items for the online service quality and we measured it using five components: efficiency, fulfillment, availability, privacy and recovery. 142 sample data were collected from the Internet banking customers.

For the third question, a model has been conceptualized which depicts the theoretical relations between mutual trust, mutual influence, shared knowledge and service quality. Reliability of the collected data has been tested with cronbach alpha. Then, data brought to organization level in order to be able to make validity tests of the model. To test the validity, model fed into AMOS 7.0. The default model could not pass the goodness of fit tests. The model has changed to reach a fitting model. Since, mutual influence seems to be the reason of the non-fitting of the default model, the relation of the mutual influence was changed from direct impact on shared knowledge to direct impact on service quality. In this first revised model, which mutual influence was assumed to be directly related to service quality, could not pass the validity tests too. Lastly, mutual influence was depicted

to be related directly with mutual trust. This final model showed a perfect fit in terms of all required goodness of fit tests.

The result of final model shows that:

- There is a positive direct relationship between shared knowledge and service quality.
- Shared knowledge mediates the relationship between mutual trust and service quality.
- Mutual influence between IS and business unit significantly affects mutual trust.
- So the final model shows a chain relationship starting with mutual influence, continues with mutual trust and shared knowledge and finally ends up with service quality.

Taking into consideration the huge investment banks make in Internet infrastructure, customer satisfaction and retention are turning into the crucial factors for success in online banking meaning that the generation of positive customer value on the Internet requires the establishment of long-term customer relationships (Bauer, Hammerschmidt and Falk; 2005). For the banks, one of the ways for achieving high customer satisfaction is offering high quality services. Measuring and increasing service quality of online services becomes very important in this respect.

This study showed that, shared knowledge is a very important component of the service quality. So, increasing the shared knowledge in the company definitely results a higher quality of the services provided by the organization. Especially, services which requires the efforts of more than one department in the organization, in our case Internet banking, requires collaboration between these departments in order to provide a quality service.

As the study confirmed the theoretical approach, mutual trust between groups has a huge impact on the shared knowledge. In order to increase the shared knowledge, one needs to understand the trust and its antecedents.

Apart from the Nelson and Cooprider (1995), our new very well fitting model proposes that mutual influence have an indirect impact on shared knowledge through mutual trust, instead of having direct impact on shared knowledge.

5.1. Limitations of the Research and Future Recommendations

Firstly, we have to stress on that we did not come across research in Turkey relevant to this paper. We believe that perhaps this is the first of its kind. We hope to carry on further research and also hope that other scholars interested in this subject conduct further research.

Service quality, shared knowledge, mutual trust and mutual influence are all ongoing issues. This cross-sectional study was a picture of a static point in time. So, longitudinal studies are required to go deeper in this area of research.

This study is being conducted in Turkey. So, this might prevent it somewhat generalizing to the other countries before more studies carried on in the other countries. New studies in different countries or multinational studies could probably further support our findings.

5.2. Implications for Managers

Knowledge management researchers argue that shared knowledge practices yield an improvement in the business performances. Researchers in product development also point out that knowledge sharing and shared team vision are critical for superior product development process in terms of cost, time, and quality which are critical competencies in the dynamic global competitive business environment (Rauniar, 2005).

Managers can learn much from the results of this research. Study shows that shared knowledge has a direct impact on the service quality. In other words, companies those would like to increase the quality of their service and hence would like to increase their customer's loyalty should invest on the knowledge sharing aspects. Increasing knowledge sharing in the organization increases cooperative work and helps to easily reach the common goals. An organization's overall performance is dependent on the cooperative work between the different departments. There is mutual interdependence in every organization. No one department by itself can move the organization further without the cooperation of the other departments. So, looking at the organization as a whole and

providing platforms and motivating the knowledge sharing within the organization will certainly lead to increasing quality of the services and products provided by the companies.

The critical question is how to increase shared knowledge in the organization. This study shows us that the main contributor to the shared knowledge is mutual trust. So, an organization whose members have a high level of trust on each other will definitely share their knowledge. This is related with the company culture. A transparent management will be one of the key drivers of the trust in the organization. Managers should open the channels of communication in the organization.

Nowadays, high level of interdependencies between different parts of the organizations is inevitable. So, opening of the communication channels such as organizing committees open to the people from different departments will increase mutual influence between departments. Since mutual influence is a driver of trust as we have concluded from the model, open communication channels should be encouraged by the management.

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7. APPENDIX A: SURVEYS

We used two surveys in our research. The first one was Service Quality Survey to calculate the Internet banking survey. We applied it to the customers of the bank. The second survey was designed based on the Nelson and Coopriders (2001) work to calculate the shared knowledge, mutual trust and mutual influence in the organization. The surveys were applied in Turkish. We will give both version (Turkish and English) of the surveys here.

7.1. Service Quality Survey (Turkish)

Internet Bankacılığı Anketi

Yeditepe Üniversitesi Sosyal Bilimler Enstitüsü'nde, Internet Bankacılığı ile ilgili bir araştırma yürütüyoruz.

Birden çok bankanın Internet şubesini kullanıyorsanız, Lütfen Internet Şubesini en sık kullandığınız bankayı dikkate alınız.

Anketi doldurarak araştırmaya vereceğiniz destek için şimdiden teşekkür ederim.

Saygılarımla,
Abdulkadir KIRMIZI

1. Bankanızın adı
2. Internet şubesine çok hızlı erişebiliyorum.
   - ☐ Kesinlikle Katılmıyorum
   - ☐ Çok Az Katılıyorum
   - ☐ Az Katılıyorum
   - ☐ Az Çok Katılıyorum
   - ☐ Katılıyorum
   - ☐ Çok Katılıyorum
   - ☐ Kesinlikle Katılıyorum
3. Bankam, söz verdiğini mutlaka tam zamanında yapar.
   - ☐ Kesinlikle Katılmıyorum
   - ☐ Çok Az Katılıyorum
   - ☐ Az Katılıyorum
   - ☐ Az Çok Katılıyorum
   - ☐ Katılıyorum
   - ☐ Çok Katılıyorum
   - ☐ Kesinlikle Katılıyorum
4. Internet şubesi her zaman erişilebilir durumdadır.
   - ☐ Kesinlikle Katılmıyorum
   - ☐ Çok Az Katılıyorum
   - ☐ Az Katılıyorum
   - ☐ Az Çok Katılıyorum
   - ☐ Katılıyorum
   - ☐ Çok Katılıyorum
   - ☐ Kesinlikle Katılıyorum
5. Bankam, benim kişisel bilgilerimi kötüye kullanmaz.
   - ☐ Kesinlikle Katılmıyorum
   - ☐ Çok Az Katılıyorum
   - ☐ Az Katılıyorum
   - ☐ Az Çok Katılıyorum
   - ☐ Katılıyorum
   - ☐ Çok Katılıyorum
   - ☐ Kesinlikle Katılıyorum

6. Bankamın verdiği hizmetlere güvenirim.
   - ☐ Kesinlikle Katılmıyorum
   - ☐ Çok Az Katılıyorum
   - ☐ Az Katılıyorum
   - ☐ Az Çok Katılıyorum
   - ☐ Katılıyorum
   - ☐ Çok Katılıyorum
   - ☐ Kesinlikle Katılıyorum
7. Internet şubesinin tasarımının estetik olduğunu düşünüyorum.
   - ☐ Kesinlikle Katılmıyorum
   - ☐ Çok Az Katılıyorum
   - ☐ Az Katılıyorum
   - ☐ Az Çok Katılıyorum
   - ☐ Katılıyorum
   - ☐ Çok Katılıyorum
   - ☐ Kesinlikle Katılıyorum
8. Bankam, e-mail vb. araçları kullanarak yaptığım taleplere anında cevap verir.
   - ☐ Kesinlikle Katılmıyorum
   - ☐ Çok Az Katılıyorum
   - ☐ Az Katılıyorum
   - ☐ Az Çok Katılıyorum
   - ☐ Katılıyorum
   - ☐ Çok Katılıyorum
   - ☐ Kesinlikle Katılıyorum
9. Bankama gerekirse telefonla kolaylıkla ulaşabiliyorum.
   - ☐ Kesinlikle Katılmıyorum
   - ☐ Çok Az Katılıyorum
   - ☐ Az Katılıyorum
   - ☐ Az Çok Katılıyorum
   - ☐ Katılıyorum
   - ☐ Çok Katılıyorum
   - ☐ Kesinlikle Katılıyorum
10. Internet şubesinde aradığımı kolaylıkla bulabiliyorum.
    - ☐ Kesinlikle Katılmıyorum
    - ☐ Çok Az Katılıyorum
    - ☐ Az Katılıyorum
    - ☐ Az Çok Katılıyorum
    - ☐ Katılıyorum
    - ☐ Çok Katılıyorum
    - ☐ Kesinlikle Katılıyorum
11. Internet şubesinde yaptığım işlemler daima doğru ve hatasızdır.
    - ☐ Kesinlikle Katılmıyorum
    - ☐ Çok Az Katılıyorum
    - ☐ Az Katılıyorum
    - ☐ Az Çok Katılıyorum
    - ☐ Katılıyorum
    - ☐ Çok Katılıyorum
    - ☐ Kesinlikle Katılıyorum

12. Internet şubesine tıkladığımda bazen açılmıyor ve işlem yapamıyorum.
    - ☐ Kesinlikle Katılmıyorum
    - ☐ Çok Az Katılıyorum
    - ☐ Az Katılıyorum
    - ☐ Az Çok Katılıyorum
    - ☐ Katılıyorum
    - ☐ Çok Katılıyorum
    - ☐ Kesinlikle Katılıyorum
13. Internet şubesinden yaptığım işlemlerin güvenli olduğundan eminim.
    - ☐ Kesinlikle Katılmıyorum
    - ☐ Çok Az Katılıyorum
    - ☐ Az Katılıyorum
    - ☐ Az Çok Katılıyorum
    - ☐ Katılıyorum
    - ☐ Çok Katılıyorum
    - ☐ Kesinlikle Katılıyorum
14. Bankam, çok iyi tanınan ve çok güven duyulan bir bankadır.
    - ☐ Kesinlikle Katılmıyorum
    - ☐ Çok Az Katılıyorum
    - ☐ Az Katılıyorum
    - ☐ Az Çok Katılıyorum
    - ☐ Katılıyorum
    - ☐ Çok Katılıyorum
    - ☐ Kesinlikle Katılıyorum
15. Internet şubesinden yaptığım işlemlerde problemle karşılaşırsam, bankamın bunu hemen çözeceğinden eminim.
    - ☐ Kesinlikle Katılmıyorum
    - ☐ Çok Az Katılıyorum
    - ☐ Az Katılıyorum
    - ☐ Az Çok Katılıyorum
    - ☐ Katılıyorum
    - ☐ Çok Katılıyorum
    - ☐ Kesinlikle Katılıyorum
16. Internet şubesi müşteri ilişkileri servisindeki kişilere de gerekirse kolaylıkla erişebilirim.
    - ☐ Kesinlikle Katılmıyorum
    - ☐ Çok Az Katılıyorum
    - ☐ Az Katılıyorum
    - ☐ Az Çok Katılıyorum
    - ☐ Katılıyorum
    - ☐ Çok Katılıyorum
    - ☐ Kesinlikle Katılıyorum
17. Internet şubesinden işlemlerimi zaman kaybetmeden gerçekleştirebiliyorum.
    - ☐ Kesinlikle Katılmıyorum
    - ☐ Çok Az Katılıyorum
    - ☐ Az Katılıyorum
    - ☐ Az Çok Katılıyorum
    - ☐ Katılıyorum
    - ☐ Çok Katılıyorum
    - ☐ Kesinlikle Katılıyorum

18. Internet şubesinde işlemlerimi kolayca yapabiliyorum.
    - ☐ Kesinlikle Katılmıyorum
    - ☐ Çok Az Katılıyorum
    - ☐ Az Katılıyorum
    - ☐ Az Çok Katılıyorum
    - ☐ Katılıyorum
    - ☐ Çok Katılıyorum
    - ☐ Kesinlikle Katılıyorum

19. Internet şubesinin içerik düzenlemesi içinde dolaşmayı çok zorlaştırıyor.
    - ☐ Kesinlikle Katılmıyorum
    - ☐ Çok Az Katılıyorum
    - ☐ Az Katılıyorum
    - ☐ Az Çok Katılıyorum
    - ☐ Katılıyorum
    - ☐ Çok Katılıyorum
    - ☐ Kesinlikle Katılıyorum

20. Bankam, Internet şubesinden sunduğu hizmetlerle ilgili verdiği sözleri daima yerine getirir.
    - ☐ Kesinlikle Katılmıyorum
    - ☐ Çok Az Katılıyorum
    - ☐ Az Katılıyorum
    - ☐ Az Çok Katılıyorum
    - ☐ Katılıyorum
    - ☐ Çok Katılıyorum
    - ☐ Kesinlikle Katılıyorum

21. Cinsiyetiniz
    - ☐ Erkek
    - ☐ Kadın

22. Yaşınız

23. Internet Şubesini ne zamandan beri kullanıyorsunuz ?
    - ☐ 3 Aydan Az
    - ☐ 3-12 Ay
    - ☐ 1 Yıldan Fazla

24. Internet şubesinde ayda ortalama kaç finansal işlem yapıyorsunuz ?

7.2. Service Quality Survey (English)

Internet Banking Survey

We are conducting a research on Internet banking in Turkey.

If you are using more than one Internet branch, please consider the one you are using most often.

Thank you in advance for supporting our research by filling out this survey.

Regards,
Abdulkadir KIRMIZI

1. Name of your Bank ?
2. I am able to get on the site quickly.
   - ☐ Completely Disagree
   - ☐ Very Slightly Agree
   - ☐ Slightly Agree
   - ☐ Moderately Agree
   - ☐ Agree
   - ☐ Mostly Agree
   - ☐ Completely Agree
3. When the bank promises to do something by a certain time, it does so.
   - ☐ Completely Disagree
   - ☐ Very Slightly Agree
   - ☐ Slightly Agree
   - ☐ Moderately Agree
   - ☐ Agree
   - ☐ Mostly Agree
   - ☐ Completely Agree
4. The site is always available for business.
   - ☐ Completely Disagree
   - ☐ Very Slightly Agree
   - ☐ Slightly Agree
   - ☐ Moderately Agree
   - ☐ Agree
   - ☐ Mostly Agree
   - ☐ Completely Agree
5. The bank does not misuse my personal information.
   - ☐ Completely Disagree
   - ☐ Very Slightly Agree
   - ☐ Slightly Agree
   - ☐ Moderately Agree
   - ☐ Agree
   - ☐ Mostly Agree
   - ☐ Completely Agree

6. I have confidence in the bank's service.
   - ☐ Completely Disagree
   - ☐ Very Slightly Agree
   - ☐ Slightly Agree
   - ☐ Moderately Agree
   - ☐ Agree
   - ☐ Mostly Agree
   - ☐ Completely Agree
7. The website design is aesthetically attractive.
   - ☐ Completely Disagree
   - ☐ Very Slightly Agree
   - ☐ Slightly Agree
   - ☐ Moderately Agree
   - ☐ Agree
   - ☐ Mostly Agree
   - ☐ Completely Agree
8. The bank gives prompt responses to my requests by e-mail or other means.
   - ☐ Completely Disagree
   - ☐ Very Slightly Agree
   - ☐ Slightly Agree
   - ☐ Moderately Agree
   - ☐ Agree
   - ☐ Mostly Agree
   - ☐ Completely Agree
9. The bank is easily accessible by telephone.
   - ☐ Completely Disagree
   - ☐ Very Slightly Agree
   - ☐ Slightly Agree
   - ☐ Moderately Agree
   - ☐ Agree
   - ☐ Mostly Agree
   - ☐ Completely Agree
10. It is easy to find what I need on the website.
    - ☐ Completely Disagree
    - ☐ Very Slightly Agree
    - ☐ Slightly Agree
    - ☐ Moderately Agree
    - ☐ Agree
    - ☐ Mostly Agree
    - ☐ Completely Agree
11. My online transactions with the bank are always accurate.
    - ☐ Completely Disagree
    - ☐ Very Slightly Agree
    - ☐ Slightly Agree
    - ☐ Moderately Agree
    - ☐ Agree
    - ☐ Mostly Agree
    - ☐ Completely Agree

12. This site does not launches and runs right away sometimes.
    - ☐ Completely Disagree
    - ☐ Very Slightly Agree
    - ☐ Slightly Agree
    - ☐ Moderately Agree
    - ☐ Agree
    - ☐ Mostly Agree
    - ☐ Completely Agree
13. I feel safe in my transactions with the bank.
    - ☐ Completely Disagree
    - ☐ Very Slightly Agree
    - ☐ Slightly Agree
    - ☐ Moderately Agree
    - ☐ Agree
    - ☐ Mostly Agree
    - ☐ Completely Agree
14. The bank's name is well-known and has good reputation.
    - ☐ Completely Disagree
    - ☐ Very Slightly Agree
    - ☐ Slightly Agree
    - ☐ Moderately Agree
    - ☐ Agree
    - ☐ Mostly Agree
    - ☐ Completely Agree
15. The bank quickly resolves problems I encounter with my online transactions.
    - ☐ Completely Disagree
    - ☐ Very Slightly Agree
    - ☐ Slightly Agree
    - ☐ Moderately Agree
    - ☐ Agree
    - ☐ Mostly Agree
    - ☐ Completely Agree
16. The site has customer service representatives available online.
    - ☐ Completely Disagree
    - ☐ Very Slightly Agree
    - ☐ Slightly Agree
    - ☐ Moderately Agree
    - ☐ Agree
    - ☐ Mostly Agree
    - ☐ Completely Agree
17. It is quick to complete a transaction through the bank's website.
    - ☐ Completely Disagree
    - ☐ Very Slightly Agree
    - ☐ Slightly Agree
    - ☐ Moderately Agree
    - ☐ Agree
    - ☐ Mostly Agree
    - ☐ Completely Agree

18. The service delivered through the bank's website is quick.
    - ☐ Completely Disagree
    - ☐ Very Slightly Agree
    - ☐ Slightly Agree
    - ☐ Moderately Agree
    - ☐ Agree
    - ☐ Mostly Agree
    - ☐ Completely Agree

19. Using the bank's website does not require a lot of effort.
    - ☐ Completely Disagree
    - ☐ Very Slightly Agree
    - ☐ Slightly Agree
    - ☐ Moderately Agree
    - ☐ Agree
    - ☐ Mostly Agree
    - ☐ Completely Agree

20. The bank's site makes accurate promises about the services being delivered.
    - ☐ Completely Disagree
    - ☐ Very Slightly Agree
    - ☐ Slightly Agree
    - ☐ Moderately Agree
    - ☐ Agree
    - ☐ Mostly Agree
    - ☐ Completely Agree

21. Gender
    - ☐ Male
    - ☐ Female

22. Age

23. How long have you been using Internet Branch ?
    - ☐ Less than 3 months
    - ☐ 3-12 months
    - ☐ More than 1 year

24. On average, How many transactions are you doing on Internet Branch monthly ?

7.3. Shared Knowledge Survey (Turkish)

Çalışma Yöntemleri Anketi

Yeditepe Üniversitesi Sosyal Bilimler Enstitüsü'nde, doktora tez çalışmam için "Bilgi Paylaşımı Hizmet Kalitesini Nasıl Etkiler ?" konulu bir araştırma yürütüyorum. Aşağıdaki anketi doldurarak yapılacak araştırmaya katkı sağlamanızı rica ediyorum.

Anketi doldururken, çalıştığınız organizasyondaki Internet Bankacılığı İş Birimi ve Internet Bankacılığı Yazılım Geliştirme Birimi arasındaki mevcut iş ilişkisini genel hatlarıyla dikkate almanızı ve olması gerektiğini düşündüğünüz düzeyle karşılaştırarak cevaplarınızı işaretlemenizi rica ediyorum.

IB İş Birimi : Internet Bankacılığı hizmetlerinin iş geliştirme sorumluluğunu taşıyan birim.
IB Yazılım Geliştirme Birimi : Internet Bankacılığı yazılım geliştirme sorumluluğunu taşıyan birim.

Anketi doldurarak; araştırmaya vereceğiniz destek için şimdiden teşekkür ederim.

Saygılarımla,
Abdulkadir KIRMIZI

BÖLÜM 1

1. **IB İş Birimi** çalışanları ve yöneticilerinin :
IB Yazılım Geliştirme Birimi çalışma şartlarını (yapılan iş, üstlenilen rol ve karşılaştıkları problemler vs.) anlama düzeyi :

- ☐ Çok Düşük
- ☐ Düşük
- ☐ Kısmen Düşük
- ☐ Ortalama Düzeyde
- ☐ Kısmen Yüksek
- ☐ Yüksek
- ☐ Çok Yüksek

2. **IB İş Birimi** çalışanları ve yöneticilerinin :
IB Yazılım Geliştirme Birimi'nin başarılı çalışmalarını takdir etme düzeyi :

- ☐ Çok Düşük
- ☐ Düşük
- ☐ Kısmen Düşük
- ☐ Ortalama Düzeyde
- ☐ Kısmen Yüksek
- ☐ Yüksek
- ☐ Çok Yüksek

3. **IB İş Birimi**'nin, **IB Yazılım Geliştirme Birimi**'ne taahhüt ettiklerini yerine getirme düzeyi :

- ☐ Çok Düşük
- ☐ Düşük
- ☐ Kısmen Düşük
- ☐ Ortalama Düzeyde
- ☐ Kısmen Yüksek
- ☐ Yüksek
- ☐ Çok Yüksek

4. **IB İş Birimi** çalışanlarının ve yöneticilerinin :
IB Yazılım Geliştirme Birimi'nin önemli kararlarına ve politikalarına etkisinin düzeyi :

- ☐ Çok Düşük
- ☐ Düşük
- ☐ Kısmen Düşük
- ☐ Ortalama Düzeyde
- ☐ Kısmen Yüksek
- ☐ Yüksek
- ☐ Çok Yüksek

5. **IB İş Birimi** çalışanlarının ve yöneticilerinin :
IB Yazılım Geliştirme Birimi'nin önemli kararlarını ve politikalarını etkileme potansiyelinin düzeyi :

- ☐ Çok Düşük
- ☐ Düşük
- ☐ Kısmen Düşük
- ☐ Ortalama Düzeyde
- ☐ Kısmen Yüksek
- ☐ Yüksek
- ☐ Çok Yüksek

BÖLÜM 2

6. **IB Yazılım Geliştirme Birimi** çalışanlarının ve yöneticilerinin :
   IB İş Birimi tarafından yapılan iş, üstlenilen rol ve karşılaştıkları problemleri anlama düzeyi:

   ☐ Çok Düşük
   ☐ Düşük
   ☐ Kısmen Düşük
   ☐ Ortalama Düzeyde
   ☐ Kısmen Yüksek
   ☐ Yüksek
   ☐ Çok Yüksek

7. **IB Yazılım Geliştirme Birimi** çalışanlarının ve yöneticilerinin :
   IB İş Birimi'nin başarılı çalışmalarını takdir etme düzeyi :

   ☐ Çok Düşük
   ☐ Düşük
   ☐ Kısmen Düşük
   ☐ Ortalama Düzeyde
   ☐ Kısmen Yüksek
   ☐ Yüksek
   ☐ Çok Yüksek

8. **IB Yazılım Geliştirme Birimi**'nin, **IB İş Birimi**'ne taahhüt ettiklerini yerine getirme düzeyi :

   ☐ Çok Düşük
   ☐ Düşük
   ☐ Kısmen Düşük
   ☐ Ortalama Düzeyde
   ☐ Kısmen Yüksek
   ☐ Yüksek
   ☐ Çok Yüksek

9. **IB Yazılım Geliştirme Birimi** çalışanlarının ve yöneticilerinin :
   IB İş Birimi'nin önemli kararlarına ve politikalarına etkisinin düzeyi :

   ☐ Çok Düşük
   ☐ Düşük
   ☐ Kısmen Düşük
   ☐ Ortalama Düzeyde
   ☐ Kısmen Yüksek
   ☐ Yüksek
   ☐ Çok Yüksek

10. **IB Yazılım Geliştirme Birimi** çalışanlarının ve yöneticilerinin :
    IB İş Birimi'nin önemli kararlarını ve politikalarını etkileme potansiyelinin düzeyi :

    ☐ Çok Düşük
    ☐ Düşük
    ☐ Kısmen Düşük
    ☐ Ortalama Düzeyde
    ☐ Kısmen Yüksek
    ☐ Yüksek
    ☐ Çok Yüksek

BÖLÜM 3

11. **IB İş Birimi** ve **IB Yazılım Geliştirme Birimi**'nin birbirlerinin başarılı çalışmalarını takdir etme düzeyi :

    ☐ Çok Düşük
    ☐ Düşük
    ☐ Kısmen Düşük
    ☐ Ortalama Düzeyde
    ☐ Kısmen Yüksek
    ☐ Yüksek
    ☐ Çok Yüksek

12. **IB İş Birimi** ve **IB Yazılım Geliştirme Birimi** arasındaki karşılıklı güvenin düzeyi :

    ☐ Çok Düşük
    ☐ Düşük
    ☐ Kısmen Düşük
    ☐ Ortalama Düzeyde
    ☐ Kısmen Yüksek
    ☐ Yüksek
    ☐ Çok Yüksek

13. **IB İş Birimi** ve **IB Yazılım Geliştirme Birimi** çalışanlarının, birbirlerinin önemli kararlarına ve politikalarına etkisinin düzeyi :

    ☐ Çok Düşük
    ☐ Düşük
    ☐ Kısmen Düşük
    ☐ Ortalama Düzeyde
    ☐ Kısmen Yüksek
    ☐ Yüksek
    ☐ Çok Yüksek

14. **IB İş Birimi** ve **IB Yazılım Geliştirme Birimi** çalışanlarının birbirlerinin önemli kararlarını ve politikalarını etkileme potansiyelinin düzeyi :

    ☐ Çok Düşük
    ☐ Düşük
    ☐ Kısmen Düşük
    ☐ Ortalama Düzeyde
    ☐ Kısmen Yüksek
    ☐ Yüksek
    ☐ Çok Yüksek

BÖLÜM 4

15. Bulunduğunuz organizasyonda kaç yıldır çalışıyorsunuz ?

16. Hangi birimde çalışıyorsunuz ?

    ☐ IB İş Birimi
    ☐ IB Yazılım Geliştirme Birimi

17. Organizasyonunuzda **IB Yazılım Geliştirme Birimi** ile **IB İş Birimi** arasında iletişimi sağlayan (Sistem Analiz vs.) aracı bir birim var mı ?

    ☐ Evet
    ☐ Hayır

18. Organizasyonunuzda **IB Yazılım Geliştirme çalışmaları** banka organizasyonu dışında oluşturulmuş bir şirket tarafından mı yürütülüyor ?

    ☐ Evet
    ☐ Hayır

7.4. Shared Knowledge Survey (English)

Working Methods Survey

We are conducting a research on the "impact of shared knowledge on service quality" in Yeditepe University, Institute of Social Sciences. We are kindly requesting from you that you participate in this research and contribute to the research efforts.

While filling out the survey, please consider in general the business relations between Internet Banking Business Development Department and Internet Banking Application Development Department.

IB Business Development Unit : The department which is responsible for the business development issues of Internet Branch.

IB Software Development Unit : The department which is responsible for the software development of the Internet Branch.

Thank you in advance for supporting the research by filling out this survey.

Best Regards,
Abdulkadir KIRMIZI

PART 1

1. The level of understanding of the **IB Business Development Unit** for the work environment (problems, tasks, roles, etc.) of the **IB Software Development Unit** is :

☐ Extremely Weak
☐ Weak
☐ Moderately Weak
☐ About Average
☐ Moderately Strong
☐ Strong
☐ Extremely Strong

2. The level of appreciation that the **IB Business Development Unit** has for the accomplishments of the **IB Software Development Unit** is :

☐ Extremely Weak
☐ Weak
☐ Moderately Weak
☐ About Average
☐ Moderately Strong
☐ Strong
☐ Extremely Strong

3. The reputation of the **IB Business Development Unit** for meeting its commitments to the **IB Software Development Unit** is :

☐ Extremely Weak
☐ Weak
☐ Moderately Weak
☐ About Average
☐ Moderately Strong
☐ Strong
☐ Extremely Strong

4. In general, the level of influence that members of the **IB Business Development Unit** have on key decisions and policies of the **IB Software Development Unit** is :

☐ Extremely Weak
☐ Weak
☐ Moderately Weak
☐ About Average
☐ Moderately Strong
☐ Strong
☐ Extremely Strong

5. In general, the ability of members of the **IB Business Development Unit** to affect key policies and decisions of the **IB Software Development Unit** is :

☐ Extremely Weak
☐ Weak
☐ Moderately Weak
☐ About Average
☐ Moderately Strong
☐ Strong
☐ Extremely Strong

PART 2

6. The level of understanding of the **IB Software Development Unit** for the work environment (problems, tasks, roles, etc.) of the **IB Business Development Unit** is :

☐ Extremely Weak
☐ Weak
☐ Moderately Weak
☐ About Average
☐ Moderately Strong
☐ Strong
☐ Extremely Strong

7. The level of appreciation that the **IB Software Development Unit** has for the accomplishments of the **IB Business Development Unit** is :

☐ Extremely Weak
☐ Weak
☐ Moderately Weak
☐ About Average
☐ Moderately Strong
☐ Strong
☐ Extremely Strong

8. The reputation of the **IB Software Development Unit** for meeting its commitments to the **IB Business Development Unit** is :

☐ Extremely Weak
☐ Weak
☐ Moderately Weak
☐ About Average
☐ Moderately Strong
☐ Strong
☐ Extremely Strong

9. In general, the level of influence that members of the **IB Software Development Unit** have on key decisions and policies of the **IB Business Development Unit** is :

☐ Extremely Weak
☐ Weak
☐ Moderately Weak
☐ About Average
☐ Moderately Strong
☐ Strong
☐ Extremely Strong

10. In general, the ability of members of the **IB Software Development Unit** to affect key policies and decisions of the **IB Business Development Unit** is :

☐ Extremely Weak
☐ Weak
☐ Moderately Weak
☐ About Average
☐ Moderately Strong
☐ Strong
☐ Extremely Strong

PART 3

11. The level of appreciation that the **IB Business Development Unit** and the **IB Software Development Unit** have for each other's accomplishments is :

☐ Extremely Weak
☐ Weak
☐ Moderately Weak
☐ About Average
☐ Moderately Strong
☐ Strong
☐ Extremely Strong

12. The level of trust that exists between the **IB Business Development Unit** and the **IB Software Development Unit** is :

☐ Extremely Weak
☐ Weak
☐ Moderately Weak
☐ About Average
☐ Moderately Strong
☐ Strong
☐ Extremely Strong

13. In general, the level of influence that members of the **IB Business Development Unit** and the **IB Software Development Unit** have on each other's key decisions and policies is :

☐ Extremely Weak
☐ Weak
☐ Moderately Weak
☐ About Average
☐ Moderately Strong
☐ Strong
☐ Extremely Strong

14. In general, the ability of members of the **IB Business Development Unit** and **IB Software Development Unit** to affect each other's key decisions and policies is :

☐ Extremely Weak
☐ Weak
☐ Moderately Weak
☐ About Average
☐ Moderately Strong
☐ Strong
☐ Extremely Strong

PART 4

15. How long have you been working in your organization ? Years

16. Which unit are you working for ?

☐ IB Business Development Unit
☐ IB Software Development Unit

17. In your organization, does another department like System Analysis etc. exist between **IB Software Development Unit** and **IB Business Development Unit** ?

☐ Yes
☐ No

18. Is IB software development efforts are outsourced to another company ?

☐ Yes
☐ No

8. APPENDIX B : CHARACTERISTICS OF SHARED KNOWLEDGE, MUTUAL TRUST and MUTUAL INFLUENCE

Please characterize the general working relationship that currently exists between the [IS organization] and the [line/functional organization].

Note: Items in brackets will be customized to reflect the exact names of the participating organizations and functional groups.

Scale used to measure constructs:

1	2	3	4	5	6	7
Extremely Weak	Weak	Moderately Weak	About Average	Moderately Strong	Strong	Extremely Strong

8.1. Shared Knowledge

Shared Knowledge Indicator 1: Multiplicative Assessment:

The *product* of the responses for the following:
1. The level of understanding of the [line organization] for the work environment (problems, tasks, roles, etc.) of the [IS organization] is:

2. The level of understanding of the [IS organization] for the work environment (problems, tasks, roles, etc.) of the [line organization] is:

Shared Knowledge Indicator 2: Multiplicative Assessment:

The *product* of responses for the following:

1. The level of appreciation that the [line organization] has for the accomplishments of the [IS organization] is:

2. The level of appreciation that the [IS organization] has for the accomplishments of the [line organization] is:

Shared Knowledge Indicator 3: General Assessment:

The level of appreciation that the [IS organization] and the [line organization] have for each other's accomplishments is:

Shared Knowledge Construct:

The mean of the above indicators:

8.2. Mutual Trust

Mutual Trust Indicator 1 : General Assessment:

The level of trust that exists between the [IS organization] and the [line organization] is:

Mutual Trust Indicator 2: Calculated Assessment:

The *product* of the responses for the following:

1. The reputation of the [line organization] for meeting its commitments to the [IS organization] is:

2. The reputation of the [IS organization] for meeting its commitments to the [line organization] is:

Mutual Trust Construct = The mean of the above indicators:

8.3. Mutual Influence

Mutual Influence Indicator 1: General Assessment of Interaction:

The average of responses for the following:

1. In general, the level of influence that members of the [IS organization] and the [line organization] have on each other's key decisions and policies is:

2. In general, the ability of members of the [IS organization] and the [line organization] to affect each other's key decisions and policies is:

Mutual Influence Indicator 2: Calculated Assessment of Interaction:

The *product* of responses for the following:

1. In general, the level of influence that members of the [line organization] have on key decisions and policies of the [IS organization] is:

2. In general, the level of influence that members of the [IS organization] have on key decisions and policies of the [line organization] is:

Mutual Influence Indicator 3: Calculated Assessment of Interaction:

The *product* of responses for the following:

1. In general, the ability of members of the [line organization] to affect key policies and decisions of the [IS organization] is:

2. In general, the ability of members of the [IS organization] to affect key policies and decisions of the [line organization] is:

Mutual Influence Construct = The mean of the above indicators:

9. BIOGRAPHY

Communication Information

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Abdulkadir Kırmızı

Personal Information

Birth Date / Place 17/5/1970 – Adıyaman
Sex Male
Marital Status Married (have a 9 year old son)
Military Obligation Completed
Driving License B Class
Nationality Turkish

Professional Experience

03/2004-Present Fortis Turkey -- VP , Application Development İstanbul

In charge of management of a team who analyse, design and develop banking software projects related with credits, global trade, international transfers and risk management. Actively managing and/or co-managing company-wide and cross-border projects (re-branding, migration, BASEL II, WPS, SWIFT4U etc.) ; planning, designing, implementing, organizing and outsourcing activities are the primary tasks. One of the main projects managed was centralization of the credit operations which radically changed the bank's credit processes. After implementation of the project, efficiency has been increased almost 10 fold in some processes, e.g. foreign currency capital loans process time decreased from 20-30 minutes to 1-2 minutes. After acquisition by Fortis, has been designated as the IT Project Coordinator of re-branding projects of Disbank into Fortis which include more than 50 major tasks and almost all parties in IT. As the new products after acquisition, global cash management products such as FBIA, FBINT and RPI has been completed with a team of 4 people in less than 3 months. Coordinated a team of 80 people in a project aiming to migrate a part of banking applications from a client-server environment (Oracle) to the cutting edge technology n-tiered web based environment (.NET). Actively participated in reorganization of IST Group as a lean team-based structure instead of functional hierarchical organization. Selected to the Next Generation Leadership Programme (NGL) in 2006 which consist of the 52 high potential managers from all-over the world of Fortis. NGL is the global program of Fortis for the middle-line managers who shows an outstanding performance with demonstrated leadership potential and who have cross-border, cross-business mindset.

09/2003-Present YEDITEPE UNIVERSITY – Part Time Instructor, MBA İstanbul

Starting from 2003 Fall Semester, teaching courses on "IT Management" and "Knowledge Management" in Yeditepe University MBA program.

11/1999-02/2004 DISBANK A.S. (Fortis Turkey) -- VP, IT Audit İstanbul

Has been appointed to set-up IT Audit Department in Disbank. Beginning from scratch and no experience in terms of audit, the mission was challenging. After a short training period in US, developed audit policies, procedures and practices, formed the team, trained them

and carried out audits in global standards. Led and actively involved in the process to form policies, standards and procedures about information systems processes. Was one of the key persons who contributed to restructuring and reorganizing the Internal Audit Department in order to comply with Banking Supervision Authority standards. Became one of the first 6 people who achieved CISA certification in Turkey. Co-founder of the ISACA Chapter in Turkey. The experience of setting up a new department has improved planning, organizing and leading skills. The success has brought promotion to VP position in two years. Was awarded twice by top management as one of the best developing managers in management development programme. Was interviewed on TV, magazines and radio especially about information security.

9/1994-7/1998 Aknet A.Ş. -- Software Development Specialist İstanbul

Was a member of the team that designed and developed Import & Export project for Akbank. Project was the basis for Akbank to reorganize its international trade operations. After reorganization, Bank's market share jumped from 0.2 % to 2 % in two years.

2/1994-9/1994 Prosoft A.Ş. -- Software Engineer İstanbul

Designed, developed and maintained software for Eczacıbaşı Holding companies about budgeting and long term planning.

Academic Background

2002 – 2008 **Yeditepe University, Management and Organization, PhD.**
1996 – 1998 **Marmara University , Theory of Economy, M.E.**
1988 - 1994 **Boğaziçi University , Computer Engineering**
1985 - 1988 **Çelikhan Lisesi, Çelikhan – Adıyaman**

Memberships

Information, Management, Audit and Control Association (Co-Founder) – Istanbul
Çelikhan Üniversiteliler Derneği (Local fund to find scholarships for the university students who are in need)