Service Quality in the Turkish Banking Sector

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For my wife and son

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ABSTRACT

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SERVICE QUALITY IN THE TURKISH BANKING SECTOR

This study attempts to introduce an evaluation model of service quality by using multivariate statistical techniques such as factor analysis and structural equation models in the Turkish Banking Sector. The thesis presents a theoretical framework that explains the service quality system with customer expectations and their perceptions, and it makes use of a dynamic intertemporal service quality model to determine the intertemporal service performance and quality in the Turkish Banking Sector.

Chapter 1 demonstrates the growing size and increasing importance of the service sector in the economy and describes the nature and characteristics of the service sector. Chapter 2 reviews the service quality literature and applies SERVQUAL (a multiple-item scale for measuring customer perceptions of service quality) instrument for banking sector. Last chapter explains some findings with respect to the application of SERVQUAL to the banking sector by the use of multivariate statistical techniques and presents a dynamic model of service performance and service quality for the Turkish Banking Sector.

Key Words

Service Quality	Multivariate Analysis	Dynamic Intertemporal Model
Lisrel, SPSS	SERVQUAL	Structural Equation Models

KISA ÖZET

MUSTAFA SEMİH ŞAHİN **TEMMUZ 2004**

TÜRK BANKACILIK SEKTÖRÜNDE HİZMET KALİTESİ

Bu çalışma, esas olarak Türk Bankacılık Sektörü'nde faktör analizi ve yapısal indirgenmiş modeller gibi çok değişkenli istatistiksel teknikleri kullanarak hizmet kalitesinin değerlendirilmesini ortaya koymaya çalışmaktadır. Bu tez, hizmet kalite sistemini müşteri beklenti ve görüşleri ile açıklayan teorik bir çerçeve sunmakta olup, bankacılık sektöründe hizmet performans ve kalitesini artırmak için zamanlararası dinamik bir hizmet kalite modeli kullanmaktadır.

İlk bölüm, hizmet sektörünün ekonomideki büyüyen yapısı ve artan önemini gösterip hizmet sektörünün yapısı ve özelliklerini açıklamaktadır. İkinci bölümde, hizmet kalite literatürü incelendikten sonra bankacılık sektörüne uyarlamak amacıyla SERVQUAL (hizmet kalitesinde müşteri görüşlerini ölçen çok değişkenli bir anket) modeli tasarlandı. Son bölümde, SERVQUAL anket uygulamasıyla elde edilen sonuçlar çok değişkenli istatistiksel teknikler kullanılarak açıklandı ve Türk Bankacılık Sektörü için hizmet performans ve kalitesi ile ilgili dinamik bir model oluşturuldu.

Anahtar Kelimeler

Hizmet Kalitesi	Çok Değişkenli Analiz	Zamanlararası Dinamik Model
Lisrel, SPSS	SERVQUAL	Yapısal İndirgenmiş Model

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INTRODUCTION

Service quality has become a critical issue in the service industry and even more important for financial service providers who generally offer services in a competitive sector. Many banks apply modern marketing ideas to serve customer and the traditionally important consideration of providing customers with a good service has emerged as an important corporate strategy for maintaining and increasing market share. It is important to analyze the means of measuring and evaluating the service quality in a developing economy.

This thesis consists of three parts. First chapter discusses the importance of service sector in the world and in Turkey and explains the distinctive features of services. Advances in service management and service quality can not occur without understanding the nature of services. For that reason, this chapter also specifies a classification of services, a distinction between goods and services, the concept of service package and service encounters, and the importance of customer in service system.

In the second chapter, the theoretical conceptualization of the service-quality construct is discussed. Service quality is defined as the result of a comparison of expectations with perceived service performance. In this chapter, the dimensionality of the service-quality and development of a multiple-item scale for measuring banking sector service quality is studied using SERVQUAL methodology. In addition some brief comments are given with respect to the development of an appropriate scale to measure service quality for Turkish banking sector.

Last chapter presents an application of multivariate analysis for the Turkish Banking Sector. Multivariate analysis is a growing set of statistical techniques for

data analysis. In this chapter, principal components and common factor analysis known as factor analysis, multiple regression and structural equation modeling techniques are discussed. Factor analysis is a statistical approach that was used to analyze correlations among a great number of variables and to explain these variables in terms of general dimensions. Structural equation modeling (SEM) is a statistical technique that was used to analyze interrelationships between dependent and independent variables simultaneously and to portray a path diagram by the use of correlation or covariance matrix. In addition, an intertemporal (dynamic) model of service performance and service quality is used to determine the intertemporal equilibrium performance of quality in the Turkish Banking Sector.

1

SERVICE SECTOR

1.1. Introduction

Historical path of quality management is long and rich in manufacturing. In some countries, systems of rewards, punishments and measurements for production, product standards and inspections to these standards date back to thousands of years. The early forms of quality applications were mainly through inspection and test. After the industrial revolution there emerged new concepts. The industrial revolution provided a climate favorable for continuous quality improvement through product and process development. In this century, especially, since the 1950s, global severe competition has forced many manufacturing companies to develop quality management approaches for improving customer-based management, providing assurance, developing new strategies, creating new measurement techniques and diminishing waste. This force also has led to involvement of every member of the organization in these improving processes, and customer-organization relationships. Then, these new quality management approaches learned by manufacturing companies helped to improve quality in the service companies.

The service sector has grown over the past thirty years and many service sectors have appeared. New developed service sectors triggered each other and the service industry has gained great importance in the world. Many countries can now be described as service economies. In these countries service sectors employ just over 60% of the work-force. Moreover, service sector consists of 85% of total employment in developed countries if employees working in manufacturing and construction sectors are taken into account.

There has been a lot of interest in all aspects of service management in recent years. Service industries have grown to dominate the economies of many developed nations of the world. The changes and rapid expansions during the last decades in service activities especially in developed countries can mainly be explained by three factors.

First, demand for services increases with the general level of welfare in developed countries. Second, service sector provides inputs to good production. Finally, as this production increases in developed countries, more services-related researches, marketing, operations etc. are needed to ensure a good working production and sales systems.

Turkey as a developing country can also be regarded as a service economy. It can be easily seen in Table 1 that the gross national product (GNP) has grown steadily in the service sector in Turkey during the last three decades. In the 2000s, services produce 63.9% of annual (GNP) at current prices and the service industries account for approximately 67,1 percent of the national income at current prices in Turkey by the year 2005.

Table 1: Sectoral Shares in GNP

GNP	Sectoral Shares % In GNP					
	At current Prices			At Constant Prices(1970)		
Year	Agriculture	Industry	Services	Agriculture	Industry	Services
1970	36.7	16.6	46.7	30.7	17.5	51.7
1975	32.7	16.7	50.6	24.5	20.6	55.1
1980	25.5	18.3	56.2	24.2	20.5	55.4
1985	19.7	21.9	58.4	19.4	23.6	57.1
1990	16.8	24.8	58.4	16.3	25.9	57.9
1995	14.8	25.5	59.7	14.4	27.7	57.9
2000	13.5	22.3	63.9	13.1	27.8	59.1
2005*	12.1	21.1	67.1	12.5	26.1	63.4

*Estimated

International trade volume is another indicator that shows the breakthroughs in the service industry over the past years. As seen in Table 2, Turkey has had negative trade balance in the commodity trade but positive balance in the service trade. The trade deficit would have been much bigger if surplus had not been in positive value in service trade. In the year 2003 balance on goods equals to –14,034 million $. However, balance on services equals to 10,505 and this surplus decreases the balance of payment deficit.

Table 2: Balance of Payment (in millions of dollars)

	1999	2000	2001	2002	2003
CURRENT ACCOUNT	- 1,344	- 9,819	3,390	- 1,522	- 6,850
Exports f.o.b *	28,842	30,721	34,373	40,124	51,206
Imports f.o.b.	- 39,311	- 53,131	- 38,916	- 48,461	- 65,240
Balance on Goods	- 10,469	- 22,410	- 4,543	- 8,337	- 14,034
Services: Credit	16,800	20,364	16,030	14,783	19,025
Services: Debit	- 9,313	- 8,996	- 6,900	- 6,904	- 8,520
Balance on Goods and Services	- 2,982	- 11,042	4,587	- 458	- 3,529
Income: Credit	2,350	2,836	2,753	2,486	2,246
Income: Debit	- 5,887	- 6,838	- 7,753	- 7,040	- 7,673
Balance on Goods, Services, Income	- 6,519	- 15,044	- 413	- 5,012	- 8,956
Current Transfers	5,175	5,225	3,803	3,490	2,106

* Free on board

1.2. Service Classification

The classification schemes for services have been complex and unclear because there are many different concepts about services and these concepts are also not completely applicable to every service organizations simultaneously. Achieving a schedule of stage development of services will ensure to construct a clear categorization. A service classification scheme can assist to identify the characteristics of services in different dimensions. Once these characteristics are defined, marketers will be better equipped to evaluate consumer expectations, to make strategic marketing decisions (Rice et al., 1981; Zeithaml, 1981; Lovelock, 1983)[1]

Many approaches are developed for classifying services in the light of different criteria. Like that, many researchers have tried to explain services and their characteristics from their point of view. Table 3 presents a brief concept about service classification of these researches. For example, according to Judd (1964), services are examined in three groups. In the first and second groups, services are created through goods and depend on concrete factors such as hiring or ownership of a good. In the third group, on the other hand, services depend on individual experiences and abstract factors such as educational program.[2] The earliest distinction between goods and services are categorized into a tangibility classification scheme (Rathmell, 1974; Shostack et al., 1977). The other classification schemes were developed as interest in services marketing increased

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[1] Zeithaml Valarie, A., Parasuraman A., Berry L. (1988) "Problems and Strategies In Service Marketing", *Journal of Marketing*, 49 (Spring): pp. 33.
[2] Judd, Robert (1964), "The Case for Defining Services", *Journal of Marketing*, 28: pp. 58-59.

(Hill, 1977; Thomas, 1978; Bell and Lovelock, 1983; Mills and Margulies, 1987; Armistead, 1990).

Table 3: Service Evolution

RESEARCHERS	CLASSIFICATIONS
JUDD (1964)	Services depending on hiring a good. Services depending on ownership of a good. Services not depending on a good.
RATHMEL (1974)	Services are categorized according to the; -Type of salesman. -Type of customer. -Type of purchasing incentives. -Manner of purchasing. -Characteristics of services. -Degree of lawful regulations.
SHOSTACK (1977) SASER, OLSER and WYCKOFF	Explanation of services to the proportion of physical goods and their abstract effects in the service package.
HILL (1977)	Services for customers versus goods. Temporary versus permanent services. Services for physical necessities versus psychic necessities. Individual services versus collective services.
THOMAS (1978)	Technology intensive services. Labor intensive services
BELL and LOVELOCK (1983)	Quality of service. Relationship between service management and customers. Degree of personnel flexibility against customers. Presentation of services. Delivery system of services to customers.
MILLS and MARGULIES (1987)	Importance of reliability between service management and customers' interaction. Importance of successful processes between service management and customers interaction. Importance of customer satisfaction between service management and customers interaction.
ARMISTEAD (1990)	Services in service industry location. Services in customer location.

Source: Uyguç, Nermin (1998), " Hizmet Sektöründe Kalite Yönetimi" Dokuz Eylül Yayınları, pp. 15.

1.3. Characteristics of Services

The characteristics of services have same aspects in compared to those of goods. Even if the characteristics of services and goods remain basically the same,

these similarities change in the length of time[3]. For example, the existence of customers in service sector is as important as that in good sector, however customer is relatively more dominant factor for services than goods.

Overlooking the differences between manufacturing and services may cause failure in analyzing quality management concepts, but definition of characteristics of services provides great economic horizon.[4] There may be various characteristics mentioned about services. Among all, the most important can be counted as intangibility, inseparability, perishability, variability and labor intensive.

Intangibility characteristic specifies that services are not physical items. The customer acquires almost only intangible activities or outcomes, such as traveling by bus, educational activities, and banking services. Services are regarded as performances and purchasing a good does not result in ownership. Services cannot be inventoried, patented and readily displayed or communicated. Moreover, pricing is difficult. Furthermore, it is hard to reach logical strategies.

Inseparability characteristic specifies that services, customers and service providers constitute a triangle and they affect each other in different conditions. For example, employees affect the service outcome in a favorable or unfavorable manner. Services often cannot be separated from the customer or supplier. Permanency of services depends on only if there is a perpetual relationship between customers and service providers.

Perishability characteristic specifies that services can be used when offered because they are highly perishable things. Consider an empty airline seat, an

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[3] Roland T. Rust, Antony J. Zahorik, Timothy L. Keiningham (1996), *Service Marketing*, New York: Harper Collins, pp. 7-10.

unoccupied hospital or hotel room, or an hour without a patient in the day of a dentist. In each case, a lost of opportunity has occurred. Because a service cannot be stored, it is lost forever when not used. Thus, adjusting supply and demand of services is difficult. Goods, on the other hand, can be inventoried for use in the future times.

Variability characteristic specifies that a lot of services reach costumer in different ways and every costumer has various perceptions and exceptions.[5]

Finally, the characteristic of labor intensive explains that in most service organizations, labor is the key resource that determines the effectiveness of the organization. The interaction between customer and employee in services creates the possibility of a more complete human work experience. In services, work activity generally is oriented toward people rather than toward things.

1.4. Service Package

Service package is defined as a bundle of goods and services that is provided in some environment. Sasser et al. (1978), Shostack (1977), Leitinen (1983), Normann (1988) and Armistead (1990) used service package in their studies instead of service. They claimed that customers buy service package, not services. In fact, each element of service package has to meet customer requirements. It is not possible that the customer will be satisfied with the whole service bundle if one of the requirements is not satisfied.[6] If features of service package are explained and understood clearly, then one can analyze customers' expectations and perceptions. This bundle consists of following four features.

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[4] Fitzsimmons James A., Fitzsimmons Mona J. (1997), *Service Management*, Boston: McGraw-Hill, pp. 23-25.
[5] Fitzsimmons (1997), pp. 33.

First, supporting facilities explain that the physical resources must be present before a service can be offered. These resources are basic elements of service package. For example, car repair tools, ATMs, a bus, and a hotel.

Second, facilitating goods specify the material purchased or consumed by the customer or the auxiliary materials while offering services. Examples are, food items, legal documents, and medical supplies.

Third, explicit services are observable by the senses such as smooth-running automobile after a tune up, and the response time of a fire department.

Finally, implicit services are psychological benefits that the customer may sense only vaguely, or the extrinsic features of the service. Examples are the status of a degree from a school, the privacy of a loan office, and worry –free auto repair. It is hard to make general statements about service management because there are too many service variations to categorize in clear-cut distinction. But we may develop a model to evaluate the service package in the light of those four features.

1.5. Service Encounters

A service encounter, also known as a "moment of truth", can be defined as: "Any event in which the customer enters into relation with the organization and perceives the quality of its service. A customer experiences many encounters, and each encounter is an opportunity to influence the customer's perceptions about service quality."[7]

It must be emphasized that a service encounter may occur at any time and any place. Most customers equate service failures or quality problems with the

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[6] Fitzsimmons (1997), pp. 26-27.
[7] Albrecht, Karl (1998), *At America's Service*, New York: Warner Books, pp. 26.

organization that is responsible for the service. For example, when a customer is treated badly by an employee in a bank, the customer does not think that he faced with a rude person working in the bank. But he thinks he is dealing with a rude bank. When somebody waiting in the company and if he/she faces with dirty places, he/she thinks a dirty company.[8]

Service encounters may occur in various ways between customers and service providers. This relationship can be categorized as follows.[9]

Customers are always in an interaction on the social platform. They construct their daily life on concepts such as reliability, assurance and respect. Participants in the encounter are expected to follow certain rules of the society that apply to similar interactions between people.

Some service encounters may also be characterized as economic exchanges in which resources are exchanged between a customer and a service organization. Specifically, a service organization gives up its resources in the form of labor, skill, technology, or information to satisfy some need of a customer and/or provide a benefit. The customers sacrifice some of their resources, such as money, time, and labor.

Additionally, the service organization has to deploy its resources to satisfy customers' various needs. Technology, information, and facilities are used as resources, and desired result can be obtained by their proper use. Therefore, a service encounter is a production process in which resources are converted to satisfactions

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[8] Fitzsimmons (1997), pp. 239-254.
[9] Mills, P.K. (1998), *Managing Service Industries; Organizational Practices in a Postindustrial Ecomomy*, Cambridge: Ballinger, pp. 22-24.

and benefits for the customer. Although most resources will be supplied by the organization, sometimes the customer's resources will also be used.

Moreover a service encounter may work as a contractual relationship between a service organization and a customer. Some services require active participation of the customer in the creation of the service, such as a corporation executive preparing salad at the salad bar in a restaurant. In these cases, the customer provides the necessary labor, and hence, in a sense, is employed by the service organization.[10]

1.6. Customers

Customers are the most valuable assets for a company. Whether they are manufacturers or service providers, excellent companies know their customers; they know customers' needs and requirements. Each company develops different ways of knowing or discovering its customers' needs because customer satisfaction has great advantages for service organizations. First of all, satisfied customers recommend the organization to others, which is the cheapest and most effective form of promotion. Second, satisfied customers are loyal customers. It is estimated to be five to seven times more expensive to attract a new customer than to keep an old one. Third, satisfied customers are better customers as they buy more, and often are willing to pay higher prices.[11]

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[10] Czepiel J.A., Solomon, M.R., Surprenant, C.F., Gutman, E. G. (1999), *The Service Encounters Lexington*, MA: Lexington Books, pp. 3-15.

Table 4: Services and Service Processes

INPUTS	TANGIBLE	INTANGIBLE
	People Processing	*Mental Stimulus Processing*
Customer	Passenger transportation	Entertainment
	Heart transplant	Education
	Immunization	Art exhibit
	Physical therapy	Concerts
	Possession Peocessing	*Information Processing*
Assets	Dry cleaning	Internet services
	Landscaping	Banking
	Package delivery	Financial
		Insurance

Source: Christopher H. Lovelock (1983), Services Marketing, 3rd ed. pp. 29

Customers enter into the service system and act in different and complex structure. This complex structure should be summarized to categorize relationships in service sector. As seen in Table 4, service may consist of tangible actions applied to customers' bodies (such as physical therapy), tangible actions applied to their goods or physical assets (such as dry cleaning), intangible actions directed at their minds (such as education programs), or intangible actions directed at their intangible assets (such as banking).

1.6.1. Identification of Customers

The term "customer" is often used loosely; it can refer to an entire organization, a unit of larger organization, or a person.[12] Juran (1993) defined customer as anyone who is impacted by the product or process. He categorized customers in various categories: the purchaser, the end user/ultimate customer,

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[11] Lawrance, A. Crosby (1993), *The Service Quality Hadbook*, New York: AMACOM, pp. 389.
[12] Juran, J.M. (1998), *Quality Handbook*, McGraw-Hill International Editions, pp. 32-33.

processors, suppliers, original equipment manufacturers, potential customers, hidden customers.[13]

There are many types of customers – some obvious, others hidden. Customers who come to firms or organizations from outside can be called external customers. These customers have great influences. For service organizations, the list of external customers who have various needs may extend far in scope. This kind of customers plays the most important role while developing service quality models.

Internal customers include all functions impacted by the product or service at both the managerial and work force levels. For example, everyone inside an organization plays three roles: suppliers, processors, and customers. Each individual receives something from someone, does something with it to a third individual. Effectiveness in meeting the needs of these internal customers can have a major impact on serving the external customers. [14]

Suppliers should be viewed as extensions of internal customer department such as manufacturing. Thus, their needs must be understood and addressed during the planning for quality.

1.6.2. Customers and their Needs

Customers purchase goods and services to satisfy their needs. Customers commonly state their needs as seen from their viewpoint and in their language. Customers may state their needs in terms of the goods or services they wish to buy. However, their real needs are the benefits that believe they will receive.[15]

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[13] Juran, J.M. (1993), *Qality Planning and Analyzis*, New York: McGraw-Hill International Editions, pp. 240-241. See also Appendix B for definitions of these categories.
[14] Juran (1998), pp.41-42.
[15] Juran (1998), pp. 49.

Most organizations try to set up a mechanism satisfying customer needs. This might include conducting weekly meetings of department heads or publishing procedure manuals. However, these mechanisms often do not work because the needs of internal customers are not fully understood, and communications among the functions break down. This is why a major goal in the quality planning process is to identify who the internal customers are, discover their needs, and plan how those needs will be satisfied.

Discovering the needs of both internal and external customers for the product is important for a company. Some of the key activities required for effective discovery of customer needs include: Planning and collecting a list of customers' needs, analyzing and prioritizing customers' needs, translating their needs into our language, and establishing units of measurement and sensors.

However, discovering customer needs is a complex task. Experience shows that customers usually do not state, exactly what they want in simple terms. Because consumers differ in their lifestyles, tastes, expectations, and requirements. Therefore, it is not possible to categorize them in a few well-defined groups. Although, they may have some common characteristics, they may exhibit a great deal of variety. Additionally, consumers' lifestyles, tastes, expectations, and requirements change constantly and diversify through time.[16]

These changes are influenced by external and internal forces. External forces influence the individual life by perceiving the world around him, his thoughts, and his decisions on social dynamics such as culture, values, social status, groups,

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[16] Leon, G. Schiffman, Leslie, L. Kanuk, (ed.) (1993), *Consumer Behavior*, Upper Saddle River, NJ: Prentice Hall, pp. 9-10.

households and marketing activities. And, these dynamics can also be called as effective external influences for costumer's behaviors. Influences that originate within an individual's body or mind are called internal influences such as emotions, personality, learning, memory; perceptions can be effective internal influences for costumer behaviors.

1.7. Conclusion

In services, it is the human element that is central to effective operations. For services, the presence of the customer in the process materially alters what is viewed as the product. The unique characteristics of intangibility, inseparability, perishability, variability, and labor intensiveness introduce special challenges for service managements and understanding the importance of service encounters and constructing a service classification scheme will give insights for strategic service management. In the next chapter, these key concepts will be the basis of the service literature review.

2

SERVICE QUALITY

2.1. Introduction:

Quality has been one of the most important topics in the business world during the last decades. Manufacturers, service providers and researchers started to pay more attention to quality following severe competition in developing countries that resulted in loss of costumers and profits for many companies and loss of jobs for many of their employees. Today quality has become simply a prerequisite for being in business. Manufacturer or service providers who fail to produce quality products will not be able to continue their viability in the long run. Quality provides a lot of survival advantages to manufacturers and service providers such as higher customer loyalty, market share, returns of investors, loyal employees, lower costs, and vulnerability to price competition.

To understand the contribution of the service quality literature to the development of many of the TQM principles and practices, which originated from manufacturing, this chapter explains the theoretical conceptualization of the service quality.

2.2. Evolution of Quality

The Industrial Revolution provided a good trend for developing quality through product and process development. Originated in the late nineteenth century F.W. Taylor's system -Scientific Management- became the most attractive trend (Juran, 1993). This system regarded human as a machine for work and tried to establish piecework rates on a scientific basis. However, although Taylor's system raised the productivity, it could not meet human expectations and relations.

As the industrial revolution stimulated the rise of large industrial companies, it is required to provide reliability. First, the quality assurance developed, and then a new concept appeared "quality control systems". This concept was enforced by audits before and during the supply of goods (Juran, 1993).

Walter Shewhart (1950) was the first researcher who developed quality control. Following Shewhart, there were many other researches, which contributed important theories and applications about quality control. (Deming 1950, Rosander 1955, Halbert 1973, Jones 1974.)

There emerged a growing concept under which customers defined and mandated quality control systems. ISO's 9000 series of standards for quality control systems are established.

Companies lived revolution in managing for quality following the quality revolution in Japan. Twentieth century became the century of productivity, following the twenty-first century business world will be called as the century of quality. The major forces such as great complexity and precision of products; safety, environment and health problems; regulations; the effect of customers; international competition caused that revolution.

Countries had experienced huge weapons and mass destruction during the World War II. Multinational companies had started competing and large companies had found that foreign trade barriers were obstacles to export of their products.

The most spectacular twentieth-century demonstration of the power of competition in quality came from the Japanese. The inability to sell became an alarm

signal and a stimulus for launching the Japanese quality revolution. This quality revolution enabled Japan to become an economic superpower.[17]

In the 1958s, the Japanese achieved quality improvement a part of their quality target. In 1954, Juran presented new quality concepts and methodologies. He claimed that quality improvement is essential for quality leadership. Targets for improvement must include business processes as well as factory processes. Quality improvement must have been institutionalized – it must go on, year after year, forever.[18] Processes of managing for quality gained importance and three managerial processes; quality planning, quality control and quality improvement took great place universally.

The new technologies required complex designs and precise execution. The empirical methods of earlier centuries were unable to provide appropriate product and process designs, so process yields were low and field failures were high. Companies tried to deal with low yields by adding inspections to separate the good from bad. These solutions were costly and they did not reduce customer dissatisfaction. The need was to prevent defects and field failures from happening in the first place.

The growth of commerce introduced chains of suppliers and merchants to separate consumers from the producers, which led a new term "customer-focused" to be born.[19] The rise of the consumerism movement is important in this trend. Consumers welcomed the features offered by the new products but not the associated with new quality problems.

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[17] Juran, J.M. (1998), *Quality Handbook*, McGraw-Hill International Editions, pp. 15-20.
[18] Juran, J.M. (1995), *History of Quality*, Juran Foundation. Inc. Quality Press, Milwaukee: WI., pp. 654-659.

When products failed in service, consumers were frustrated by vague warranties and poor service. The "system" seemed unable to provide recourse when things have failed. Individual consumers were unable to fight the system, but they collectively were numerous and hence potentially powerful, both economically and politically. During the twentieth century a consumerism movement emerged to make this potential a reality and to help consumers deal more effectively with these problems. This same movement was also successful in stimulating new government legislation for consumer protection.[20]

Taylorizm was obsolete by 1980s and needed to be replaced. Companies experimented in order to learn which decisions and actions should be assigned to the workforce, it turned out that there were multiple options including self control, self-inspection, job enlargement, self-directing work teams, and quality improvement.

At the end of the century motivation for quality and training for quality concepts showed their necessities for companies. The quality was seen as a strategic issue and strategic quality planning (SQP) emerged in Japanese. Some of the Japanese contributors to the total quality management (TQM) literature have introduced a broader perspective to the concept of quality management than their US counterparts. Americans are united in the view that there must be company wide commitment to quality improvement and insist that TQM is the responsibility of all individuals in the firm. Japanese researchers extended the scope of quality issues

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[19] Juran, J.M. (1995), *A History of Managing Quality*, New York: ASQC Quality Press, pp. 626-630.
[20] Juran, J.M. (1970) "*Consumerism and Product Quality*", Quality Progress, 49, pp. 18-27.

beyond the organizational boundaries and consider its impact upon society as a whole.

2.3. Service Quality

The evolution of service quality is both American and Japanese oriented. First, many Japanese firms successfully achieved of applying the quality concepts. Then these quality management applications were named as total quality management (TQM) in the United States. In fact, the birth of TQM in the United States was in direct response to a quality revolution in Japan following World War II. After the war, major Japanese manufacturers converted from producing military goods for internal use to civilian goods for trade. Japanese reputation for shoddy exports preceded the products, and they were subsequently shunned by international markets. This led to Japanese organizations exploring new ways of thinking about quality. They welcomed input from foreign companies and lecturers, including American quality experts W. Edwards Deming and Joseph M. Juran, and adopted unprecedented strategies for creating a revolution in quality.

In the manufacturing industry, quality attempts started with controlling the quality of products in the 20th century. Walter Shewart (1931) developed statistical process control (SPC) charts to monitor quality in mass production manufacturing. SPC techniques enabled manufacturers to control the quality of products efficiently and to compete in growing markets. Policy makers discovered the potential power of SPC. Unfortunately, these techniques were also applied to the mass production of weapons and war materials during World War II.

After the World War II, Armand V. Feigenbaum (1983) labeled the term of total quality control (TQC), and W. Edwards Deming (1982, 1986), Joseph M. Juran

(1964, 1988, 1989) were invited by the Union of Japanese Scientists and Engineers to teach statistical process control techniques to the Japanese. Deming had been regarded as a hero who thought total quality management to Japanese and was awarded "Order of the Sacred Treasure" by Japanese Emperor. Kaoru Ishikawa (1985) who was trained by Deming and Juran developed company-wide quality control (CWQC) concept. In another research Philip Crosby (1979, 1984, 1992) developed quality management models about the public administration studying mostly on the cost of quality. After Ishikawa, Masaaki Imai (1986) developed continuous improvement concept "KAIZEN" and Genichi Taguchi (1988) has realized valuable methodological developments in statistics and engineering and his overall strategy of system, parameter and tolerance design have influenced improving manufactured quality worldwide.

It can be said that service quality literature has been influenced by the TQM manufacturing literature, so while analyzing and modeling any studies TQM principles display their effects immensely. However, the notion of service quality is arguably even more evasive than that of product quality due to the multiplicity of tangible and intangible elements, the subjectivity of customer evaluations of service and the other characteristics of service (Takeuchi and Quelch, 1983). [21]

To review the existing literature brings out three results about service quality. First, the evaluation of service quality is more difficult than the quality of goods for individuals. Second, service quality perceptions result from the comparison of

[21] Rhian, Silvestro (1998), "The Manufacturing TQM and Service Quality Lieratures", *International Journal of Quality,* 15 , pp.303-328.

consumer perceptions with actual service performance, Third quality outcomes involve the process of service delivery as well as the outcome.[22]

The intangibility of services has led Service Quality (SQ) to be more difficult than product quality for customers' evaluation due to characteristics such as intangibility, inseparability and heterogeneity (Berry 1980, Carman 1980, Zeithaml 1981). In services the intangibility of service provision means that services are difficult to specify (Rathmell 1996, Sasser et al. 1978). The fact that services are processes or experiences for which objective performance standards are difficult to define has resulted in a view of service quality which sees the construct as essentially subjective and based on customer perceptions in relation to some predefined set of standards or expectations (Gronross 1982, Lehtinen and Lehtinen1982, Parasuraman 1985).

Although there are a considerable number of different approaches in the literature to modeling service quality, three formal models can be clearly discerned: The Nordic School, the Gap Analysis School and, what is referred to here, as the Holistic School.[23]

The Nordic School, represented by research conducted by Grönroos (1983), argued that perceived service quality was primarily dependent upon two variables; expected service and perceived service. Grönroos, however, basing his findings on the work of Swans and Combs (1976), also regarded service quality as being influenced by a technical (instrumental) and a functional (psychological) dimension.

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[22] Berry, L., Shostack, G. and Upah, G. (1983), *Emerging Perspectives on Services Marketing*, American Marketing Association: Chicago, pp. 99-107.

[23] Howcroft, Barry, (1993), "Staff Perceptions of Service Quality", *International Journal of Service Industry Management*, 4, pp. 5-24.

Technical performance is directly concerned with the material content of the buyer-seller interchange and is determined by the efficiency of business systems. It therefore incorporates the "know-how" of a firm, including the knowledge and technical competence of staff. Functional performance, on the other hand, relates to the way in which a service is transferred to the buyer, which in a retail bank, for example, is concerned with the overall manner and attitude of staff towards customers. Specifically, this dimension of service quality divides into accessibility, appearance, long-term customer contacts, relationships within the firm, attitude, behavior and service-mindedness of service personnel. When combined together, the technical and functional dimensions of quality form the primary components of corporate image, but corporate image can also influence the buyer's expectations of service. Perceived service, therefore, is based upon the buyer's views of a bundle of service dimensions (technical and functional), which can be influenced by a firm's corporate image.

In the Gap School, consumers evaluate their performance in the direction of their expectation (Oliver 1980, Swartz 1989, Zeithaml et. al. 1990, Parasuraman et al. 1985, 1988, 1994). Customers evaluate a service by comparing their perceptions with their expectations about service (Oliver, 1980). Service quality applications first started with measuring difference "gap" scores (Parasuraman, Zeithaml, and Berry, 1985). In attempt to explain service quality in the scale of expectations-perceptions gap model, researchers developed the most important model, SERVQUAL (Parasuraman, Zeithaml & Berry, 1985,1988). In the SERVQUAL the source of expectations was defined into five categories; word of mouth communication, promotion, price, personal needs, and past experiences (Zeithaml et al.

1990).[24]Expectations are predictors of future and the expectations can be told through the concept of "will." (Prakash, 1984, Boulding, 1993.)

Considerable research in marketing and management has examined customer satisfaction with service experiences (e.g. Arnold and Price, 1993; Bitner et al. 1994; Bitner et.al. 1990; Keaveney, 1995; Ostrom and Lacobucci, 1995; Surprenant and Solomon, 1987; Zeithaml et.al. 1990). Definitions and measures of quality must therefore incorporate a degree of subjectivity. If the product is intangible, as with services such as higher education, then defining and measuring quality becomes more difficult. It is argued that the customer defines quality in terms of value to him/her of service received (Heskett, Sasser & Hart, 1990), i.e. quality is what customer say it is (Buzzell & Gale, 1987; Berry et al. 1990).

In the next chapter we construct SERVQUAL service quality model for Turkish banking sector and analyze its results with multivariate analysis technique. The SERVQUAL model is a service quality measurement instrument (a questionnaire), used in a range of service organizations. In this model, quality is defined as a comparison of expectations with perceptions of performance. Costumers have expectations and, on the other hand, service performances of firms create perceptions about services in the mind of customers.

In contrast to SERVQUAL dimensions, Lehtinen and Laitamaki (1991) developed three dimensions of service quality: physical quality (e.g. supporting facilities, equipments, service outcome), interactive quality (during the buyer and seller interaction) and corporate quality.

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[24] Grönross (1982:1984) added corporate image to these sources.

The main advocates of the Holistic School are Le Blanc and Nguyen (1988) who derived a conceptual model based on the other two formal models of service quality and which consisted of the five dimensions: Corporate image, internal organization, physical support of the service producing system, customer/staff interaction, and the degree of customer satisfaction. Their main contention was that these dimensions were important considerations in determining customer perceptions of service quality. This approach lends itself to the adoption of a people oriented policy, which apart from placing emphasis on buyers, also emphasizes employees by treating them as internal customers and their jobs as internal products. By satisfying the needs and wants of its internal customers through a policy of internal marketing, a service firm can better satisfy the needs and wants of its external customers. Available empirical evidence suggests that companies which promote the welfare of their customer and staff experience higher retention rates of both compared to companies, which do not. Similarly, there are grounds to believe that a strong relationship does exist between quality customer service, employee orientation and corporate success.

2.3.1. Dimensionality of Service Quality

David Garvin (1987) identified eight dimensions of quality as a framework for considering how customers define quality. This framework can be described as a multifaceted attempt to gauge quality on the basis of the following elements; performance, durability, features, serviceability, reliability, aesthetics, conformance, perceived quality.[25]

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[25] Garvin, David A. (1987), "*Competing on the Eight Dimensions of Quality*", Harvard Business Review, pp. 101-109.

This multi-dimensional, customer-focused view of quality shows how quality can be used as a competitive weapon in the struggle for international markets. The customer-oriented view of service quality may have gained wide acceptance. However, there has been a continuing debate in the literature regarding the dimensionality of the service quality construct. [26]

Measures used to evaluate quality must be based on valid service quality characteristics and reliable measures of customer satisfaction to anticipate, meet, and exceed customer expectations. Understanding how customers form expectations and perceptions is essential for improving service quality. In addition to the previously listed criteria, quality of services can be judged by the competence, courtesy, credibility, responsiveness, sense of security, and accessibility communicated by all employees providing the service (Milakovic 1982).[27]

In their original formulation Parasuraman et al. (1985) identified ten components in their first formulation about service quality. These components can be counted as reliability, courtesy, understanding customers, responsiveness, communication, tangibles, competence, credibility, access, and security.[28]

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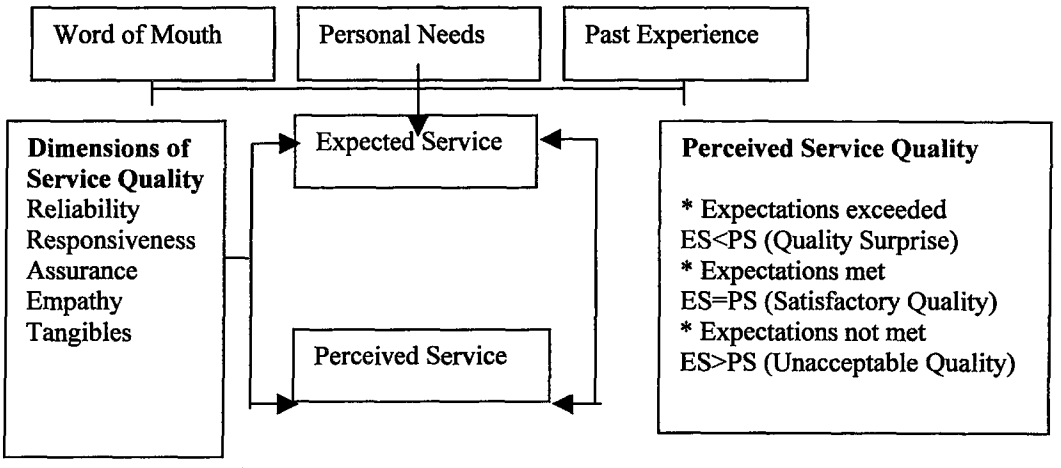
[26] Cronin, J.J. and Taylor, S.A. (1992), "Measuring Service Quality: A Re-examination and Extension", *Journal of Marketing*, 56, pp.55-68.
[27] Milakovich (1993), pp. 22.
[28] Zeithaml, Valerie A., Parasuraman. A., and Leonard, L. Berry (1990), *Delivering Quality Service: Balancing Customer Perceptions and Expectations*, New York: The Free Press, pp.15-33.

Figure 1: Perceived Service Quality



Source: Zeithaml, Valerie A., Parasuraman. A., and Leonard, L. Berry, (1985) "A Conceptual Model of Service Quality and Its Implications for Future Researches". "Journal of Marketing" 49, pp.48

First, Parasuraman et al. (1982) claimed that service quality is an attitude related to, but not equivalent to, satisfaction. The researchers during that time proposed that perceived service quality should be operationalized as a comparison between expectations and perceptions.[29] Expectations were defined in their analysis as desires or wants of consumers. For example, Parasuraman et al. (1985) defined expectations as what consumers feel a service provider should offer versus what a service provider would offer. He developed 97 items for expectations and 97 items for perceptions based on focus group interviews to operationalize their proposed conceptualization of service quality. Data for these items are gathered from 200 individuals using nail intercepts procedures. The result of the scale purification procedures reduces the initial scale from 97 items to 34 items and oblique rotation reduces the hypothesized ten dimensions to five dimensions. The reduced scale is then used to collect a second sample from 200 consumers again using mall

[29] See Figure 2.

intercepts. The second scale reduction procedure results in 22-item SERVQUAL scale as displayed in Table 5.

Table 5 : SERVQUAL dimensions

Dimensions	Defination	Items in scale
Reliability	The ability to perform the promised service dependably and accurately	4
Assurance	The knowledge and courtesy of employees and their ability to convey trust and confidence	5
Tangibles	The appearance of physical facilities, equipment, personnel and communication materials	4
Empathy	The provision of caring, individualized attention to customers	5
Responsiveness	The willingness to help customers and to provide prompt service	4

Source: Zeithaml, Valerie A., Parasuraman. A., and Berry, L. (1986), SERVQUAL: A Multi-item Scale for Measuring Customer Perceptions of Service Quality, "Journal of Marketing" 108, pp. 86

2.3.2. Comparing Tools for Service Quality Evaluation

The application fields of SERVQUAL have grown last decades, although there have been a number of criticisms about the SERVQUAL in the literature. For example, Cronin and Taylor (1994) find SERVQUAL inadequate to explain service quality. They claim that measurement of service quality as a gap measure includes problematic characteristics and service quality should not be measured by the use of difference scores. Measuring of service firm performance appears a more appropriate conceptualization and operationalization of service quality. Therefore, they developed the SERVPERF model that focuses on customers' perceptions. SQ was measured on a one-item scale taken from Cronin and Taylor (1994). Their study claims that SERVPERF gives better results than SERVQUAL and reduces the

number of questions presented to customers. They use confirmatory factor analysis via LISREL to support their hypothesis.

Babakus and Boller (1992) and Carmen (1990) suggest that expectations have no direct contribution to make in the assessment of SQ beyond the information already contained in the perception measures.

SERVQUAL focuses on the process of service delivery. However, outcomes of the service encounter should be formulated in the SERVQUAL (Cronin and Taylor 1992, Mongold and Babakus 1991, Richard and Allaway 1993). Another criticism about the SERVQUAL is on the dimensionality of the SERVQUAL scale (Lehtinen 1988, Paltschik 1989, Grönrooss 1984, Babakus and Boller 1992).

Teas (1993) developed Normed Quality model (NQ), which depends on generally expectations of customers. However, some studies claim that expectations have no great role in the conceptualization of service quality (Teas 1993, Iacobucci et. al. 1992).

Another methodology is called QUALITOMETRO proposed by Franceschini and Rosetto (1997). Its main aim is to evaluate the service quality in terms of on line service quality control.

In Table 6 different types of service quality measurement were displayed. In the table, it is classified according to theoretical method base-ground; customer-tool interference degree, special cases on interviewed customers and data types had also been considered in the categorization.[30]

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[30] Franceschini, F., Cignetti, M. (1998), "Comparing tools for service quality", *International Journal of Quality*, 3, pp. 357.

Table 6. Different Types of Service Quality

	SERVQUAL	TWO_WAY	SERVPERF	NORMED QUALITY	QUALITOMETRO
Theoretical baseground	Gap model. Differences between perceptions and expectations with importance weights	Service quality is evaluated by answers given by customers to questions about quality attributes and satisfaction levels	Perceptions without expectations and importance weights.	Discriminate between ideal expectation/and feasible expectation.	Customer expectations and perceptions are evaluated in two distinct moments. Quality evaluation is carried out by means of expectations and perceptions profiles using MCDA
Data collection sample feature	Two telephone, insurance companions; two banks	Banks, restaurants, laundries, supermarket	Two banks, fast foods	Three big department stores	Library facility at DISPEA Department
Sample size	290 to 487	330	660	120	100
Items number	22+22	not declared	22	10+10+10+10+10+10	8+8
Response scale	7-point semantic differential	5-point semantic	7-point semantic differential	7-point semantic differential	7-point semantic comparative
Dimension importance	Weights evaluation with constant sum	not needed	Weights evaluation with constant sum	Weights evaluation with constant sum	7-point semantic comparative
Questionnaire dispensing	Mail	not declared	Mail	Interview	Expectations before service use and perceptions after delivering
Customer-tool interference degree	High	Medium	High	High	Low
Idiosyncratic effect	High	Medium	Medium	High	Low
Data pre-elaboration	Scalarization	Scalarization	Scalarization	Scalarization	Without Scalarization
Data analysis	Factorial analysis followed by oblique rotation	Factorial analysis	Factorial analysis followed by oblique rotation	Factorial analysis followed by oblique rotation	MCDA methods and "p" control chart
Reliability (Cronbach's alpha coefficient)	0.8 to 0.93	not declared	0.63 to 0.98	Calculated other validity and reliability coefficients	Global qulity indicators as reliability factor
Dimensions number	five Tangibles Reliability Assurance Responsiveness Empathy	five Performance Security Completeness Ease of use Environment	five Tangibles Reliability Assurance Responsiveness Empathy	five Tangibles Reliability Assurance Responsiveness Empathy	five Tangibles Reliability Assurance Responsiveness Empathy

2.3.3. Measuring Service Quality in Banking: Development of Scale

Quality of service has always been an important consideration for banks. The traditionally important consideration of providing customers with a good service has emerged as an important corporate strategy for maintaining and increasing bank market share. As a consequence, fundamental questions such as how best to achieve a genuine and consistently high quality of customer service within the organization, and how best to communicate this fact to the marketplace have become indicative of the sort of quality issues which banks are currently attempting to resolve.

First, to assess service quality and to reach high quality level in banking sector a survey, which is based on the service quality literature discussed above, was presented. Next, a model, which is related to service quality, was constructed and the empirical results were examined.

2.3.3.1. Sample and Data Collection

The study was performed in three different banks; Asya Finans, Akbank, and Oyakbank in Turkey. The total sample includes 654 questionnaires. These questionnaires were circulated to 50 branches of banks and answered by banks' clients in Turkey. The clients completed the self-administered questionnaire during their banking stay and assistance could be obtained from the banking staff if needed.

2.3.3.2. Structure of the Questionnaire

It was decided to analyze the results using the second school (Parasuraman's Gap School) approach. The questionnaire consists of 7 major dimensions. The major parts are; tangibles, reliability, responsibility, assurance, empathy, services, electronic banking, auditing and management. In this section, 46-item list of expectations, 46-item perceptions and 3-item including repurchase intention; overall

satisfaction and quality were designed. Respondents were asked to indicate the service performance that should be met by the banks. Each item was measured on a seven-point scale ranging from strongly disagree to strongly agree.

In the literature, there is no clear identification to analyze which scores (i.e. expectations, perceptions or difference gap) will be used for SERVQUAL. Parasuraman et al. (1986) used the difference scores. Carman (1990) acclaimed that neither the difference scores nor the expectations should be analyzed. The most appropriate measurement base should be perceptions. In our study, perceptions scores will be analyzed statistically, because the expectations of customers are very high and the volatility of the expectations are very low.

2.4. Conclusion

The recent studies display that service quality is an important construct to be considered in future research and practice in the service sector. The SERVQUAL is a promising scale, which can play significant role in operationalizing service quality. This chapter analyzes SERVQUAL in closer detail in terms of its adaptation to service quality for banking sector. The next chapter investigates the validity and reliability of SERVQUAL for banking sector in Turkey.

3

MULTIVARIATE ANALYSIS IN SERVICE QUALITY

Multivariate analysis provides the ability to analyze complex sets of data in which there are many independent and possible dependent variables that are correlated to each other to varying degrees. Multivariate analysis refers to an assortment of descriptive and inferential techniques that have been developed to handle situations where sets of variables are involved either as predictors or as measures. Many multivariate techniques are extensions of univariate analysis and bivariate analysis. For example, simple regression (with one predictor variable) is extended in the multivariate case to include several predictor variables. Other multivariate techniques, however, are uniquely designed to deal with multivariate issues, such as factor analysis, which identifies the structure underlying a set of variables, or discriminant analysis, which differentiates among groups based on a set of variables.[31]

Multivariate analysis is an ever-expanding set of techniques for data analysis. In this chapter, among the multivariate techniques, we will discuss Principal Components and Common Factor Analysis, Multiple Regression and Multiple Correlation, and Structural Equation Models.

3.1. Factor Analysis

The main applications of factor analytic techniques are to reduce the number of variables and to detect structure in the relationships between variables, thus classify variables. Therefore, factor analysis is applied as a data reduction or

[31] Hair J. F., Anderson R. E., Tatham R.L., Black W.C. (1995), *Multivariate Data Analysis*, New Jersey: Prentice Hall.

structure detection method.[32] Factor analysis is suitable for analyzing the patterns of complex, multidimensional relationships encountered by researchers. It defines and explains in broad, conceptual terms the fundamental aspects of factor analytic techniques. Factor analysis can be utilized to examine the underlying patterns or relationships for a large number of variables and to determine whether the information can be condensed or summarized in a smaller set of factors or components.

Factor analysis is a generic name given to a class of multivariate statistical methods whose primary purpose is to define the underlying structure in a data matrix. It addresses the problem of analyzing the structure of the correlations among a large number of variables by defining a set of common underlying dimensions, known as factors. With factor analysis, the researcher can first identify the separate dimensions of the structure and then determine the extent to which each variable is explained by each dimension. Once these dimensions and the explanation of each variable are determined, the two primary uses for factor analysis-summarization and data reduction- can be achieved.[33]

Factor analysis is an interdependence technique in which all variables are simultaneously considered, each related to all others, and still employing the concept of the variate, the linear composite of variables. In factor analysis, the variates are formed to maximize their explanation of the entire variable set, not to predict a dependent variable. One can look at each factor as a dependent variable that is a function of the entire set of observed variables. Either analogy illustrates the

[32] The term factor analysis was first introduced by Thurstone, (1931)
[33] Hair (1995), pp. 88-91.

differences in purpose between dependence (prediction) and interdependence techniques.[34] In this section, factors are analyzed from an exploratory or noncomformity viewpoint, because exploratory data analysis provide researcher with maximizing insight into a data set, uncovering underlying structure, extracting important variables, determining optimal factor setting.

As it stated above, factor analysis is used to uncover the latent structure (dimensions) of a set of variables. It reduces attribute space from a larger number of variables to a smaller number of factors and as such is a "non-dependent" procedure. Factor analysis could be used for any of the following purposes: [35]

a) To reduce a large number of variables to smaller number of factors for modeling purpose.
b) To select a subset of variables from a larger set based on which original variables have the highest correlations with the principal component factors.
c) To create a set of factors to be treated as uncorrelated variables as one approach to handle multicollinearity in such procedures as a multiple regression.
d) To validate a scale or index by demonstrating that its constituent items load on the same factor, and to drop proposed scale items which cross-load on more than one factor.
e) To establish that multiple tests measure the same factor, thereby giving justification for administering fewer tests.

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[34] For more information see Hair (1995), pp. 91.
[35] Lawley D. N. and Maxwell A. E. (1971), *Factor Analysis as a Statistical Method,* London: Butterworth and Co., pp. 5-9.

f) To identify clusters of cases and/or outliers.

g) To determine network groups by determining which sets of people cluster together.

3.1.1. Application in Banking Sector

In our research, there are seven dimensions some of which are stated in chapter 2. These dimensions consist of tangibility, reliability, assurance, responsiveness, empathy, services, electronic banking, and audit and management which are measured by 95 questions including expectations, perceptions, repurchase intention, overall quality and satisfaction.

3.1.2. Correlations and Assumptions

The data matrix should have enough correlations to justify the application of factor analysis. If visual inspection reveals no substantial number of correlations greater than 0.30, then factor analysis is probably inappropriate. The correlations among variables can also be analyzed by computing the partial correlations among variables by taking the effects of other variables into account. If true factors exist in the data, the partial correlation should be small.

The assumptions underlying the coefficient of correlation are those of linearity, normality, and homoscedascity. These assumptions are shared by most methods of the general linear model of statistics. Correlation matrix of Asya Finans, for example, reveals that the 78% of correlations are significant at one percent level. This is also adequate for the factor analysis.[36]

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[36] The correlation matrix is not presented in this study due the large dimensions of the correlation matrix. However, it is available upon request.

3.1.3. Appropriateness of Factor Analysis

The Bartlett test, a statistical test for the presence of correlations among the variables, is one of the measurement techniques. Bartlett's test (Snedecor and Cochran, 1983) is used to test if k samples have equal variances. Equal variances across samples are called homogeneity of variances. Some statistical tests, for example the analysis of variance, assume that variances are equal across groups or samples. Another measurement technique is measurement of sampling adequacy (MSA). To compute Kaiser-Meyer-Olkin (KMO) overall, the numerator is the sum of squared correlations of all variables in the analysis. The denominator is this same sum plus the sum of squared partial correlations of each variable i with each variable j, controlling for others in the analysis. MSA measures the degree of inter-correlations among the variables and appropriateness of factors. This index changes from 0 to 1. The diagonal elements on the anti-image correlation matrix are the KMO individual statistics for each variable.

Table 7: KMO and Barlett's test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.909
Bartlett's Test of Sphericity		10688.085
	Approx. Chi Square	1176
	degrees of freedom (d.f.).	.000
	Sig.	

In Table 7, calculation of sample adequacy values and significance level are presented. According to the results, MSA is .909. The value is very high and is significant at the level of one percent for examination of values in anti-image matrix. In this matrix diagonal values measure sampling adequacy for individual variables, and off-diagonal values measure anti-image correlations (partial correlations).

According to the Bartlett's test the correlation matrix has significant correlations among at least some of the variables at the one percent significance level.

3.1.4. Component Factor Analysis

Principal component analysis is a statistical technique applied to a single set of variables to discover which sets of variables in the set form coherent subsets that are relatively independent of one another. Component analysis considers the total variance and derives factors that contain small proportions of unique variance and, in some instances, error variance. Factor analysis procedures are based on the initial computation of a complete table of inter-correlations among the variables (correlation matrix). This correlation matrix is then transformed through estimation of a factor model to obtain a factor matrix. The loadings of each variable on the factors are then interpreted to identify the underlying structure of the variables.[37]

The factor analysis is obtained by finding the characteristic roots (eigenvalues) and vectors (v) of the correlation matrix with the squared multiple correlations each variable with other variables in the main diagonal. On the other hand, the principal components analysis is obtained by finding the characteristic roots (eigenvalues) and vectors (v) of the correlation matrix with 1`s in the main diagonal. Thus the principal components analysis examines the total variance of variables included in the analysis, and factor analysis examines the variance common to the variables analyzed.

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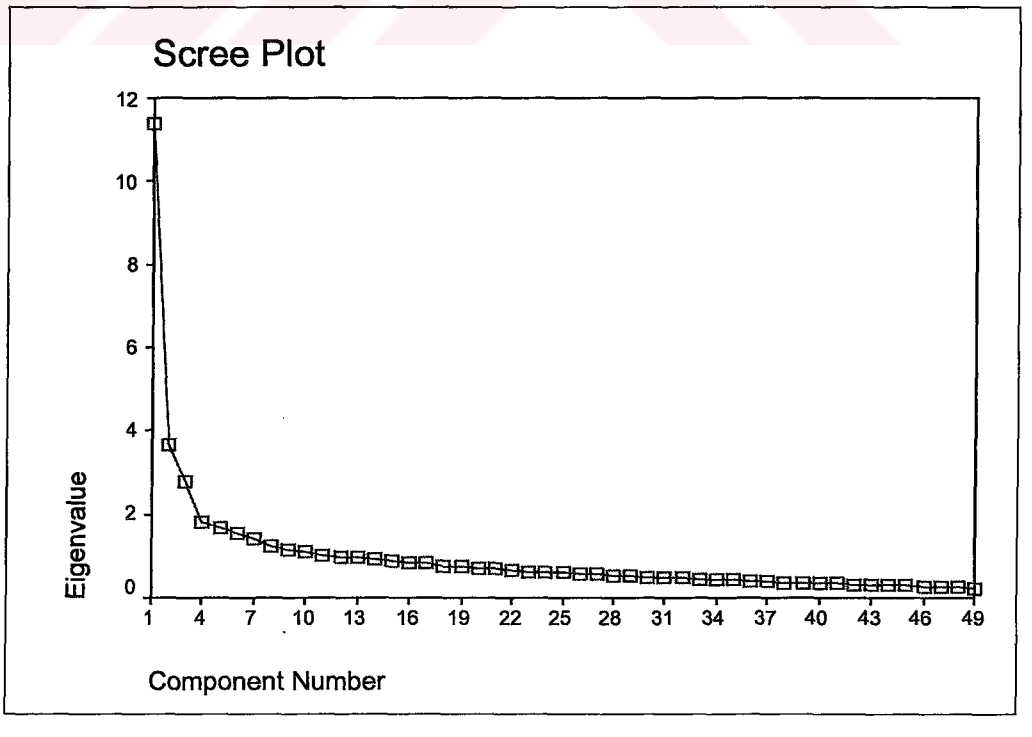
[37]Hair (1995), pp. 123.

3.1.5. Latent Root Criterion

In the latent root criterion, any individual factor should account for the variance of at least a single variable if it is to be retained for interpretation. Eigenvalues are the sum of squares of the loadings in a column in the factor matrix. Eigenvalues are also referred to as latent roots and represent the amount of variance accounted for by a factor. Each variable contributes a value of 1 to the total eigenvalue. Thus, only the factor having latent roots or eigenvalues greater than 1 are considered significant. In Table 8, 49 possible factors and their relative explanatory power are expressed by their eigenvalues. If we apply to latent root criterion 11 components will be retained. These 11 factors represent 58.7 percent of the variance of the 46 variables. (See also Figure 2)

Figure 2: Eigenvalues and Scree Plot



In Table 8, we find the variance on the new factors that were successively extracted as shown in the second column stated as eigenvalue. These values are expressed as a percent of the total variance in the third column. As it can be seen, factor 1 accounts for 23 percent of the variance, factor 2 for 8 percent, and so on. The third column contains the cumulative variance extracted. The variances extracted by the factors are called the *eigenvalues*.

Table 8. Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	11.392	23.248	23.248	11.392	23.248	23.248	5.404	11.028	11.028
2	3.676	7.501	30.749	3.676	7.501	30.749	4.319	8.815	19.843
3	2.760	5.633	36.382	2.760	5.633	36.382	3.439	7.019	26.862
4	1.792	3.657	40.039	1.792	3.657	40.039	2.681	5.472	32.333
5	1.668	3.405	43.444	1.668	3.405	43.444	2.399	4.897	37.230
6	1.528	3.119	46.563	1.528	3.119	46.563	2.127	4.341	41.571
7	1.418	2.895	49.458	1.418	2.895	49.458	2.083	4.250	45.822
8	1.234	2.519	51.977	1.234	2.519	51.977	1.934	3.947	49.769
9	1.164	2.375	54.352	1.164	2.375	54.352	1.912	3.903	53.672
10	1.102	2.249	56.601	1.102	2.249	56.601	1.234	2.519	56.191
11	1.028	2.098	58.700	1.028	2.098	58.700	1.229	2.509	58.700
12	.964	1.967	60.666						
13	.949	1.937	62.603						
:	:	:	:						
:	:	:	:						
:	:	:	:						
41	.344	.701	95.420						
42	.328	.669	96.090						
43	.311	.635	96.725						
44	.295	.601	97.326						
45	.287	.586	97.912						
46	.278	.567	98.479						
47	.261	.533	99.013						
48	.250	.511	99.523						
49	.234	.477	100.000						

* Extraction Method: Principal Component Analysis.

3.1.6. Unrotated Factor Loadings

Principal component analysis (PCA) seeks a linear combination of variables such that the maximum variance is extracted from the variables. It then removes this variance and seeks a second linear combination, which explains the maximum proportion of the remaining variance. This is called principal axis method and results in orthogonal (uncorrelated) factors. The factor loadings, also called component loadings in (PCA), are the correlation coefficients between the variables and factors.[38] Apparently in Table 9, each factor is not generally more highly correlated with the variables constructed before the data analysis in the Servqual inquiry. The results are not meaningful to construct latent factors. The factor matrix should be rotated to redistribute the variance from the earlier factors to the later factors.

[38] Dunteman, George H. (1989), *Principal Components Analysis*, Thousand Oaks, CA: Sage Publications, pp.69.

Table 9. Unrotated Component Matrix

	Component										
	1	2	3	4	5	6	7	8	9	10	11
PERGVC_2	.641	-.270	-4,92E+01	-.146	-8,45E+01	.102	-8,47E+01	1,39E+01	.120	-2,30E+01	-1,55E+00
PEREMP_4	.632	-1,11E+01	4,34E+01	-7,13E+01	-.297	-.129	-8,61E+01	-.231	-.135	1,47E+01	-.147
PERELB_7	.628	.394	-.286	-9,52E+00	8,72E+01	-6,39E+01	-4,94E+01	4,92E+01	-8,93E+01	6,73E+01	-5,02E+01
PERELB_5	.619	.198	-.341	-4,08E+01	3,27E+01	3,49E+00	-3,43E+01	.119	7,25E+01	-3,29E+01	-7,90E+01
PERELB10	.613	.244	-.429	6,46E+01	-9,61E+00	-6,57E+01	4,46E+01	.144	-6,61E+01	.113	-.103
PERGVC_1	.592	-.311	-.169	-.180	-.126	8,72E+01	-.117	3,64E+01	.110	-.120	4,37E+01
PEREMP_1	.592	-.316	.254	-.138	-.155	-3,06E+01	-9,82E+01	-1,07E+01	1,71E+01	.157	.192
PERELB_9	.589	.393	-.259	-2,50E+01	.118	-9,52E+01	1,83E+01	.113	-2,58E+01	.120	-5,23E+01
PERGVC_3	.584	-.356	-.111	-.278	-.107	1,93E+01	-.143	4,61E+01	.176	-5,25E+01	2,93E+01
PERSRM_3	.579	-.393	-6,94E+01	-.216	-2,73E+01	4,44E+01	3,23E+01	3,38E+01	-8,64E+01	1,73E+01	2,52E+01
PEREMP_3	.573	-.148	.149	-.248	-.330	-8,24E+01	3,51E+01	-.169	-8,17E+01	.185	-1,24E+01
PERELB_8	.561	.398	-.263	2,99E+01	.118	-.186	-3,95E+01	5,45E+01	6,87E+01	.115	-1,42E+01
S_1	.557	2,66E+01	.187	.195	.120	.292	-.319	-.219	.137	2,24E+01	-.118
PERGVC_4	.557	-.271	3,55E+01	-.227	-8,43E+00	4,50E+01	-4,96E+01	.115	.234	-.263	-.222
PERGVN_3	.555	-.435	-.117	.194	.175	5,14E+01	.221	6,89E+01	-9,94E+01	-7,10E+01	-8,22E+01
PERELB_3	.548	.438	.159	-9,14E+01	.177	9,65E+01	-.120	-2,45E+01	7,67E+00	-.271	6,84E+01
PERGVN_2	.540	-.406	2,66E+01	.255	.166	8,32E+01	.145	-4,77E+00	-.193	.159	-8,78E+01
PERSRM_2	.536	-.403	9,50E+01	-.171	.119	-5,11E+01	-7,42E+01	.160	-3,79E+00	4,96E+01	.110
PEREMP_2	.527	-5,73E+00	-4,75E+01	-.119	-.371	-.296	5,19E+01	-.145	-.232	1,65E+01	-.184
PERELB_4	.526	.366	-.123	-.153	9,97E+01	-2,95E+00	-1,16E+01	2,90E+01	3,37E+01	5,52E+01	-7,32E+01
PERGVN_4	.525	-.382	-3,96E+00	.326	.207	.122	.186	8,17E+01	-.196	4,55E+01	9,24E+01
PERGVN_5	.523	-.254	-.248	.201	3,48E+01	9,86E+01	.188	-5,03E+01	-.311	-.179	-.142
PERGVN_1	.500	-.278	6,65E+01	.249	.135	6,84E+01	5,54E+01	-1,58E+01	-4,58E+00	.101	9,77E+01
Q_1	.495	8,32E+00	.192	.167	.163	.274	-.390	-.328	4,60E+01	-1,52E+01	-.170

* Extraction Method: Principal Component Analysis. (11 Components extracted)

Table 9. Unrotated Component Matrix (Cont.)

PERELB_1	.493	.401	3,80E+01	-.224	.184	-5,15E+01	2,26E+01	-.139	-.185	-.121	.169
PERSRM_1	.486	-.312	5,82E+01	-.181	3,20E+01	9,47E+01	4,23E+01	.257	.192	-.123	-.126
PERELB_2	.477	.423	-.196	-.263	.247	-4,92E+01	-2,00E+01	-8,56E+01	-.204	-.108	4,46E+01
PERDY_2	.449	.202	-8,17E+01	.357	-.317	-.240	4,29E+00	5,43E+01	-.110	.123	.192
PERGVC_5	.446	-5,79E+00	.286	-2,84E+00	-.272	-.282	-6,60E+01	8,81E+01	-1,38E+01	-.228	1,21E+01
PEREMP_5	.443	-3,19E+01	.286	-.217	-.263	-2,51E+01	9,23E+01	-.197	-.159	.148	-4,43E+01
PERMV_3	.429	-.265	-2,65E+00	.100	.228	-.286	.110	1,85E+01	.112	-.181	1,61E+01
PERELB_6	.426	.178	-7,20E+01	-.110	.269	.187	-8,67E+01	-8,45E+01	-1,87E+01	.329	9,85E+01
PERDY_5	.410	.253	-5,14E+01	.357	-.340	-2,77E+01	.143	4,47E+00	.291	-7,74E+01	-.167
PERGVN_6	.408	-.129	7,12E+01	.233	6,29E+01	.206	.355	-.156	-.108	-9,51E+01	2,55E+01
PERELB11	.408	.206	-.310	1,87E+01	-.123	.272	-7,21E+01	.144	5,38E+01	.110	.215
PERMV_4	.395	.115	.263	.181	6,00E+01	-.220	.153	-.219	6,24E+01	-.230	-2,60E+01
PERSRM_4	.355	-.165	.267	-.193	9,60E+01	1,20E+01	7,78E+01	.222	6,97E+01	.167	.354
PERHIZ_3	.409	.419	.288	-3,19E+01	3,79E+00	.155	8,74E+01	-4,82E+01	-8,87E+01	-.337	3,16E+01
PEREMP_6	.191	.216	.653	6,44E+01	4,92E+01	-3,50E+01	-9,25E+01	.440	-.172	.128	-.178
PEREMP_7	.209	.190	.546	9,55E+01	7,72E+01	-7,84E+01	-.200	.470	-.241	3,50E+01	-.231
PERDY_1	.394	-4,12E+01	-.510	.176	-.164	-.106	-1,27E+01	.143	.108	4,84E+01	7,27E+01
PERDY_3	.257	.122	.291	.363	-.281	-6,30E+01	-.102	-3,80E+01	1,49E+01	3,30E+01	.361
PERMV_2	.361	8,90E+01	.219	8,78E+01	.358	-.417	.135	-8,54E+01	.321	7,60E+01	6,29E+01
PERMV_1	.400	-8,59E+01	.235	4,49E+01	.283	-.415	-4,76E+01	-.196	.205	2,41E+01	.152
PERHIZ_2	.292	.344	.308	-.141	-.143	.392	.291	-3,53E+00	-2,30E+01	-4,82E+01	.175
PERHIZ_1	.304	.312	.131	-.161	-9,35E+01	.254	.456	2,85E+01	.136	-5,50E-01	.118
RP_1	.355	-5,42E+01	2,32E+01	.203	-8,82E+00	.172	-.441	-.177	-4,94E+01	.132	2,27E+01
PERDY_4	.371	.261	.101	.335	-.228	.236	2,65E+01	.151	.377	2,05E+01	-7,86E+01
PERMV_5	4,04E+01	.102	.239	-.172	7,01E+01	2,02E+01	.371	-.180	.225	.464	-.382

* Extraction Method: Principal Component Analysis. (11 Components extracted)

3.1.7. Communialities

Factor analysis is a statistical technique used to identify a smaller number of underlying dimensions, or factors that can be used to represent relationships among interrelated variables. The amount of the common factorial variance is initially unknown and has to be estimated. The most often used method for obtaining the communality estimate is to find the squared multiple correlations of each variable with all other variables. This could be a formidable task if larger data sets were analyzed. However, squared multiple correlations can be obtained directly from the diagonal of the inverted correlation matrix.[39]

The use size of the communality is a useful index for assessing how much variance in a particular variable that is accounted for by the factor solution. Large communialities indicate that a large amount of the variance in a variable has been extracted by the factor solution. For example, the communality .452 for PERMV_4 indicates that it has less in common with the other variables included in the analysis than does variable PERMV_2, which has a communiality of .635.[5]

Table 10 : Communalities

Dimensions	Initial	Extraction		Dimensions	Initial	Extraction
PERMV_1	1,000	.583		PERHIZ_1	1,000	.547
PERMV_2	1,000	.635		PERHIZ_2	1,000	.611
PERMV_3	1,000	.456		PERHIZ_3	1,000	.583
PERMV_4	1,000	.452		PERELB_1	1,000	.590
PERMV_5	1,000	.686		PERELB_2	1,000	.640
PERGVN_1	1,000	.440		PERELB_3	1,000	.660
PERGVN_2	1,000	.648		PERELB_4	1,000	.470
PERGVN_3	1,000	.657		PERELB_5	1,000	.569
PERGVN_4	1,000	.677		PERELB_6	1,000	.471
PERGVN_5	1,000	.637		PERELB_7	1,000	.663
PERGVN_6	1,000	.461		PERELB_8	1,000	.615
PERSRM_1	1,000	.515		PERELB_9	1,000	.623
PERSRM_2	1,000	.550		PERELB10	1,000	.678
PERSRM_3	1,000	.554		PERELB11	1,000	.481

[39] Hair (1995), pp. 85.

PERSRM_4	1,000	.484	PERDY_1	1,000	.526
PERGVC_1	1,000	.575	PERDY_2	1,000	.602
PERGVC_2	1,000	.547	PERDY_3	1,000	.524
PERGVC_3	1,000	.626	PERDY_4	1,000	.608
PERGVC_4	1,000	.628	PERDY_5	1,000	.618
PERGVC_5	1,000	.499	RP_1	1,000	.446
PEREMP_1	1,000	.630	S_1	1,000	.667
PEREMP_2	1,000	.631	Q_1	1,000	.703
PEREMP_3	1,000	.621			
PEREMP_4	1,000	.612			
PEREMP_5	1,000	.492			
PEREMP_6	1,000	.799			
PEREMP_6	1,000	.773			

3.1.8. Rotating the Factor Structure

There are various rotational strategies that have been proposed. The goal of all of these strategies is to obtain a clear pattern of loadings. That is, factors that are somehow clearly marked by high loadings for some variables and low loadings for other variables. There are two basic coordinate systems: Orthogonal coordinate system with angles separating coordinates from each other equal to 90 degrees, and oblique coordinate systems with an angle separating the coordinates not equal to 90 degrees. The orientation of coordinates is often arbitrary and the coordinates can be rotated, as to optimize some property of the measured system. There is infinite number of possible orientations of a coordinate system. Therefore, selection of a particular orientation depends to a degree on the researcher's perception of properties of the solution to be stressed. The arbitrariness of coordinate systems can be well illustrated by considering the geographical system of latitudes and longitudes. For example, the passage of the zero meridian through Greenwich is optimal only to the England home based navigators. [40]

[40] Gorsuch, R.L. (1983), *Factor Analysis*, Hillsdale, NJ: Lawrence Erlbaum, p.p. 1-3.

In factor analysis, reference axes are rotated to increase interpretability of factors. Factor loadings can be rotated; i.e., described by a different system of coordinates, either visually or analytically. Depending on angular separation of the reference axes, the rotation can be either orthogonal or oblique. The best orthogonal analytic rotation method is Kaiser's Varimax. Other orthogonal rotation methods are quartimax and equimax. Oblique analytical methods of rotation show far greater variety of methods than the orthogonal rotation methods. Promax, maxplan and direct and indirect oblimin are among the known techniques of oblique rotations.

The VARIMAX rotated factor loadings are presented in Table 11. As seen in the table, the total amount of variance extracted is the same in the rotated solution as it was in the unrotated one. But the variance has been redistributed so that the factor-loading pattern and the percentage of variance for each of the factors are different. In rotated factor matrix, significantly loaded variables for each factor are indicated bold faces.

Table 11. Varimax Rotated Component Matrix

	Component										
	1	2	3	4	5	6	7	8	9	10	11
PERELB_7	**.766**	8.093E-02	.116	.142	8.956E-02	.116	6.098E-02	4.800E-02	9.028E-02	-2.431E-02	-1.154E-02
PERELB_9	**.748**	8.505E-02	9.941E-02	8.902E-02	7.805E-02	3.660E-02	9.615E-02	7.832E-02	.109	5.274E-02	2.995E-02
PERELB10	**.734**	.143	.234	.136	-4.872E-02	-9.630E-03	-4.004E-02	-1.465E-02	.202	4.265E-03	-2.116E-02
PERELB_8	**.727**	5.642E-02	3.483E-02	8.041E-02	1.266E-02	7.020E-02	.205	2.486E-02	.161	2.131E-02	3.860E-02
PERELB_2	**.672**	4.448E-02	5.936E-03	.105	.284	7.435E-02	.116	-1.031E-02	-.253	-8.134E-02	-7.125E-02
PERELB_5	**.644**	.303	.131	5.606E-02	5.105E-02	7.171E-02	2.232E-02	-3.524E-02	.168	-3.015E-02	-5.851E-02
PERELB_4	**.603**	.151	-1.133E-02	9.637E-02	.194	.108	8.773E-02	6.729E-02	4.236E-02	.102	-6.129E-03
PERELB_1	**.511**	2.137E-02	1.079E-02	.186	.419	.106	.220	4.230E-02	-.205	-.107	4.141E-02
PERELB11	**.465**	.159	6.440E-02	-2.525E-02	.134	.121	-.238	-.120	.237	-.107	.251
PERELB_6	**.452**	6.954E-02	.111	-1.088E-02	.114	.311	1.953E-02	-1.375E-02	-.129	.200	.288
PERDY_1	**.429**	.210	.193	5.898E-02	-.240	-7.742E-02	-4.565E-02	-.225	.333	-.160	6.626E-02
PERGVC_4	.116	**.714**	.122	9.049E-02	9.628E-02	9.749E-02	.127	6.728E-02	7.081E-02	3.021E-02	-.190
PERGVC_3	.168	**.705**	.108	.212	-3.310E-02	.123	4.909E-02	-.112	1.936E-02	-4.331E-02	.101
PERSRM_1	7.454E-02	**.656**	.206	-1.242E-03	7.501E-02	-1.342E-03	5.847E-02	.132	6.968E-02	7.382E-02	-1.445E-02
PERGVC_1	.199	**.636**	.185	.190	1.584E-02	.138	-1.202E-02	-.140	6.494E-02	-.122	5.281E-02
PERGVC_2	.199	**.593**	.218	.213	5.669E-02	.199	3.960E-02	-5.454E-02	8.513E-02	-3.905E-03	9.131E-02
PERSRM_2	9.312E-02	**.558**	.285	.134	-4.721E-02	7.530E-02	.165	.126	-.130	-3.859E-02	.249
PERSRM_3	.153	**.552**	.348	.268	1.313E-02	4.879E-02	-5.389E-04	-4.577E-02	-.112	-1.486E-03	.125
PEREMP_1	1.402E-02	**.473**	.187	.397	6.204E-02	.194	.153	9.313E-02	3.020E-02	-1.445E-02	.373
PERGVN_4	8.715E-02	.206	**.754**	1.593E-02	6.729E-03	.108	9.495E-02	6.559E-02	3.883E-02	-6.251E-02	.166
PERGVN_2	8.253E-02	.226	**.706**	.143	-8.029E-02	.175	8.110E-02	8.939E-02	8.146E-03	.102	9.722E-02
PERGVN_3	.125	.372	**.696**	4.423E-02	-3.827E-02	2.348E-02	.112	-1.355E-02	3.447E-02	-2.693E-03	-3.924E-02
PERGVN_5	.234	.202	**.658**	.183	3.298E-02	4.945E-02	-6.165E-02	-8.041E-02	1.114E-02	-.126	-.213
PERGVN_6	2.604E-02	5.836E-02	**.560**	9.531E-02	.312	8.510E-02	8.836E-02	-8.002E-02	.109	4.648E-02	-2.182E-02
PERGVN_1	7.838E-02	.220	**.500**	5.992E-02	2.224E-03	.214	.181	2.817E-02	.108	2.260E-03	.201
PEREMP_2	.284	.183	.128	**.687**	-1.705E-02	-4.187E-02	5.449E-02	2.318E-02	7.673E-02	-1.305E-02	-.127
PEREMP_3	.125	.350	.110	**.631**	.108	.101	4.628E-02	1.870E-03	3.053E-02	.133	.172
PEREMP_4	.267	.252	.136	**.617**	6.490E-02	.224	8.575E-02	1.781E-02	.105	-9.739E-03	-7.469E-02
PEREMP_5	4.849E-02	.179	9.134E-02	**.576**	.233	.107	4.170E-02	9.476E-02	-2.670E-02	.166	.114
PERGVC_5	5.044E-02	.277	6.876E-03	**.407**	.128	-1.202E-02	.264	.265	.201	-.236	-3.568E-02
PERHIZ_2	.100	2.299E-02	2.429E-02	.108	**.714**	3.611E-02	-.111	9.934E-02	.126	.101	.171
PERHIZ_3	.239	2.334E-02	2.436E-02	.119	**.622**	.146	.129	.210	7.602E-02	-.132	-.136
PERHIZ_1	.197	7.899E-02	4.866E-02	4.574E-02	**.604**	-.149	-1.051E-02	-3.068E-02	.191	.234	.133
PERELB_3	.457	.145	-3.979E-02	2.269E-02	**.486**	.281	.225	.186	6.521E-03	-.156	-6.415E-02

Q_1	.134	.163	.162	8.711E-02	.115	**.760**	.125	7.652E-02	3.682E-02	3.178E-02	-9.484E-02
S_1	.173	.218	.179	4.934E-02	.147	**.691**	.126	9.427E-02	.164	5.504E-02	-7.304E-03
RP_1	.131	8.339E-02	.120	.132	-.105	**.585**	-3.069E-02	2.953E-02	7.613E-02	-.120	.122
PERMV_2	.201	6.462E-02	7.227E-02	-1.954E-02	2.707E-02	1.714E-02	**.725**	8.296E-02	7.633E-02	.181	.112
PERMV_1	.100	.151	8.802E-02	.126	-3.503E-02	.153	**.691**	2.557E-02	-3.861E-02	1.134E-02	.152
PERMV_4	8.110E-02	5.686E-03	.179	.209	.261	9.960E-02	**.487**	7.026E-02	.155	-4.161E-02	-.155
PERMV_3	.112	.318	.338	2.299E-02	-6.348E-02	-4.696E-02	**.459**	-3.676E-03	2.283E-02	-8.453E-02	-5.525E-02
PEREMP_7	6.850E-02	1.920E-02	1.921E-02	6.078E-02	6.137E-02	9.069E-02	5.158E-02	**.865**	2.806E-02	-3.240E-02	7.112E-03
PEREMP_6	4.326E-03	-8.206E-03	-4.187E-03	7.597E-02	.162	6.598E-02	7.373E-02	**.855**	6.573E-02	8.961E-02	.114
PERDY_5	.245	4.532E-02	8.821E-02	.168	.128	5.191E-02	.106	-1.078E-02	**.679**	3.816E-02	-.163
PERDY_4	.175	.110	3.652E-02	-5.758E-02	.221	.207	-4.368E-04	.130	**.666**	9.082E-02	3.164E-02
PERDY_2	.351	-.119	.185	.366	-3.972E-02	-4.584E-04	.106	6.405E-02	**.424**	-.238	.208
PERDY_3	-4.348E-02	-.128	5.595E-02	.243	.151	.192	.180	.117	**.387**	-.284	.327
PERMV_5	-3.787E-03	-5.551E-02	-2.175E-02	.123	9.491E-02	-1.933E-02	.110	5.424E-02	3.314E-02	**.801**	3.208E-03
PERSRM_4	2.907E-02	.342	.119	3.402E-02	.180	-4.958E-02	.171	.165	-6.785E-02	2.525E-02	**.504**

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
a Rotation converged in 13 iterations.

As a result of a group of analysis we categorized the variables for each factors. But, before naming each factor, a minimum acceptable level of significance for factor loadings must be selected. Variables with higher loadings influence to a greater extent the name or label selected to represent a factor.

3.2. Structural Equation Modeling

Structural equation modeling (SEM) is a multivariate technique, which combines multiple regression and factor analysis methods to estimate a series of interrelated dependence relationships simultaneously. SEM techniques have two special characteristics different from the other multivariate techniques. First, SEM provides multiple and interrelated dependence relationship and second, it has ability of analyzing unobserved concepts and measurement error in the estimation process. This relationship will be constructed by the use of LISREL.

SEM estimates unknown coefficients in a set of linear structural equations. Variables in the equation system are usually directly observed variables, and/or unmeasured latent variables that are not observed but related to observed variables.

SEM shares three assumptions with the other multivariate methods: independent observations, random sampling of respondents, and the linearity of all relationships. In addition, SEM is sensitive to the distributional characteristics of the data, particularly the departure from multivariate normality (critical in the use of LISREL) or a strong kurtosis (skewness) in the data.[41]

In this part of the chapter, the multiple interrelated dependence relationship will be constructed in a single model. In this model one dependent variable in one

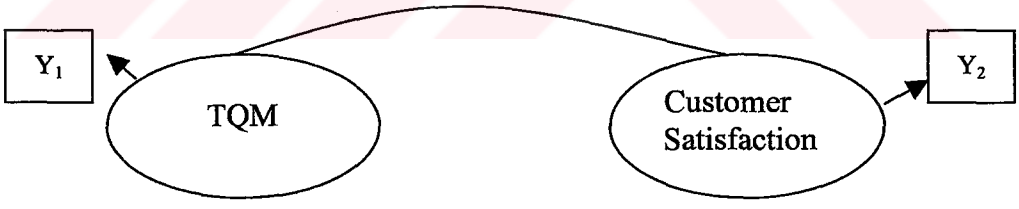
[41] Hair (1995), pp. 596-601.

equation can be an independent variable in other equations. To better portray the interrelated relationships, a pictorial portrayal of the relationships, known as path diagram will be created in the next sections for the Turkish Banking Sector. Path analysis calculates the strength of each relationship depicted in the relationships using only a correlation or covariance matrix as input.[42]

3.2.1. Preparing a Measurement Model

In factor analysis each individual variable explained by its loading on each factor. It is concerned with the exploring the patterns of relationships among a number of variables. According to these patterns of relationships we had eleven loadings, and these loading will be illustrated with TQM and Customer Satisfaction latents. The path diagram, including the variables measuring each construct, is shown in Figure 3.

Figure 3: Path Diagram



Indicators:
X_1: Intangibility
X_2: Reliability
X_3: Responsibility
X_4: Assurance
X_5: Empathy
X_6: Services
X_7: Electronic Banking
X_8: Auditing & Management

Indicators:
X_9: Repurchase Intention
X_{10}: Satisfaction
X_{11}: Quality

As seen in figure 3, the study used eleven variables to measure the respondents' perceptions. Interrelationships between TQM and satisfaction, stated

[42] Hair (1995), pp. 587.

above, are represented with the curved line to connect the two constructs in Figure 3. Eleven variables of the two constructs are considered exogenous. The relationship can be represented mathematically as follows:

Endogenous Variables	=	Exogenous Variables	+	Endogenous Variables	+	Error
Y_1		$X_1\ X_2\ X_3\ X_4\ X_5\ X_6\ X_7\ X_8$		Y_2		δ_1
Y_2		$X_9\ X_{10}\ X_{11}$				δ_2

In addition to the structural and measurement models, the correlations should be set between the variables and constructs. While the exogenous constructs are correlated, the influence on the endogenous variables should be constructed. SEM uses only the variance-covariance matrix or correlation matrix while constructing the model. The correlation matrix is used widely in many applications. Correlation matrices have a common range that makes possible direct comparison of the coefficients within a model. Use of correlations is appropriate understanding pattern of relationships between constructs and making comparisons across different variables. Therefore, the relationship will be constructed in the path diagram and explained by using the correlation matrix.[43]

3.2.2. Estimating a Path Model with SEM

The model will be represented by two constructs (TQM and Customer Satisfaction). In Table 13, LISREL notation of the model is displayed through correlation matrix data.

Table 13: LISREL Notation for the Measurement

Exogenous Indicator		Exogenous Constructs		Error
X_1	=	$\lambda^x_{11}\varsigma_1$	+	δ_1
X_2	=	$\lambda^x_{21}\varsigma_1$	+	δ_2
X_3	=	$\lambda^x_{31}\varsigma_1$	+	δ_3
X_4	=	$\lambda^x_{41}\varsigma_1$	+	δ_4
X_5	=	$\lambda^x_{51}\varsigma_1$	+	δ_5
X_6	=	$\lambda^x_{61}\varsigma_1$	+	δ_6
X_7	=	$\lambda^x_{71}\varsigma_1$	+	δ_7
X_8	=	$\lambda^x_{81}\varsigma_1$	+	δ_8
X_9	=	$\lambda^x_{92}\varsigma_2$	+	δ_9
X_{10}	=	$\lambda^x_{102}\varsigma_2$	+	δ_{10}
X_{11}	=	$\lambda^x_{112}\varsigma_2$	+	δ_{11}

Correlations among Exogenous Construct (ϕ)

	ς_1	ς_2
ς_1	———	
ς_2	ϕ_{21}	———

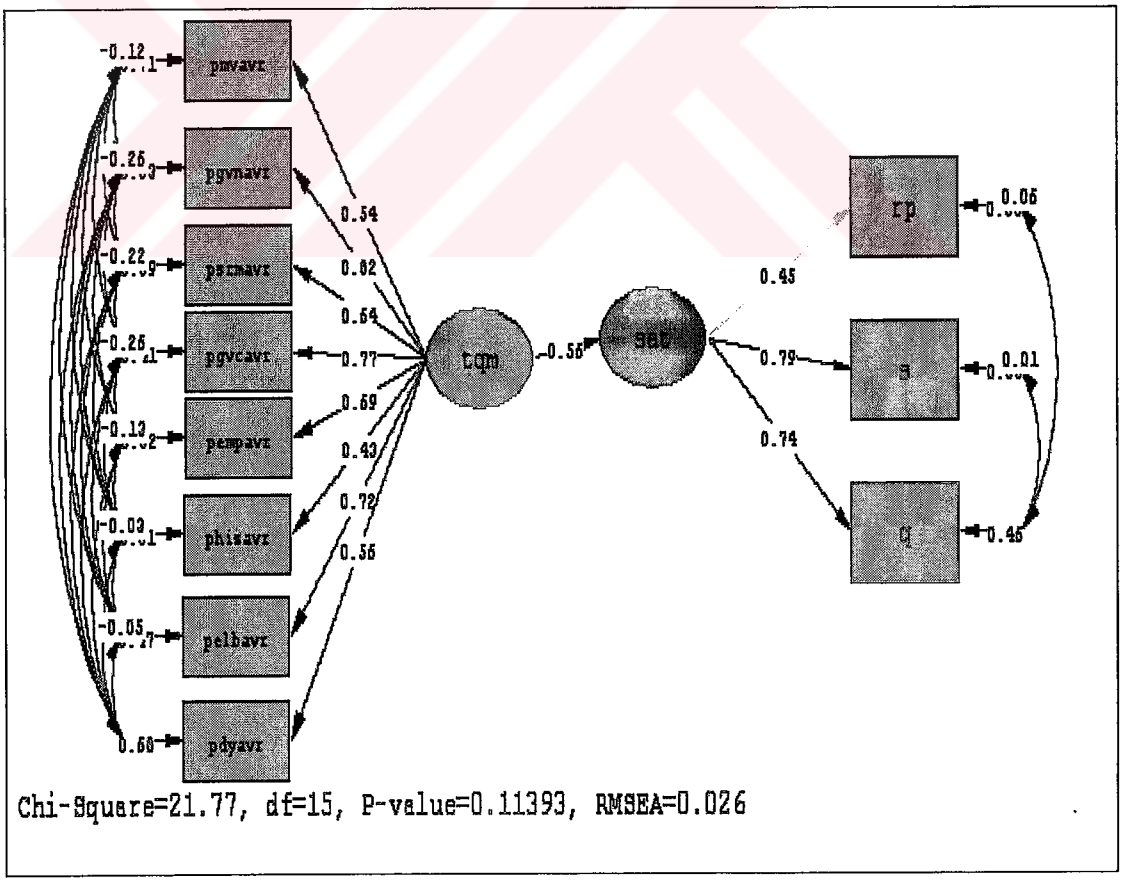
The model related to perceptions about the banks under examination will give both relative importance of values determining TQM and different dimensions of customers' satisfaction. This structure and the relationship are presented in figure 4 with a path diagram by the use of LISREL. The correlations of perceptions are displayed in Table 14.

[43] Hair (1995), pp. 620-625.

Table14: Correlation Matrix of Servqual Perceptions

	X_9	X_{10}	X_{11}	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8
X_9	1.00										
X_{10}	.42	1.00									
X_{11}	.34	.58	1.00								
X_1	.09	.23	.23	1.00							
X_2	.23	.36	.32	.32	1.00						
X_3	.16	.26	.22	.28	.53	1.00					
X_4	.24	.35	.32	.29	.51	.60	1.00				
X_5	.17	.30	.30	.37	.37	.46	.52	1.00			
X_6	.02	.21	.18	.22	.13	.17	.21	.35	1.00		
X_7	.16	.31	.33	.30	.32	.28	.42	.39	.42	1.00	
X_8	.14	.26	.23	.23	.28	.16	.28	.33	.26	.44	1.00

Figure 4: Path Diagram (LISREL Results)[44]



[44] See definitions for latents' codes in Appendix C.

The path diagram provides the basis for specification of the structural equations and the proposed correlation between exogenous constructs and between structural equations. From the path model, the researcher can construct a series of structural equations to constitute the structural model. Then, the measurement model is specified wherein indicators are assigned to each construct (exogenous and endogenous). The eleven coefficients to be estimated in the structural equations can be expressed in Table 15. In our example, each exogenous construct is correlated with the other exogenous constructs. This explains the shared influences on the external constructs that are not specified in the model. Thus, the unobserved relationship will be correlated.[45]

Table 15: SEM Results

A- Structural Equation Coefficients (T Values under Parentheses)

	Exogenous Construct											Endogenous Construct	
Endog. Const.	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	TQM	C.S.
TQM	.54 (.077)	.82 (.076)	.64 (.051)	.77 (.050)	.69 (.048)	.43 (.078)	.72 (.077)	.56 (.079)	.00	.00	.00	.00	.56 (.088)
C.S.	.00	.00	.00	.00	.00	.00	.00	.00	.45 (.013)	.79 (.011)	.74 (.011)	.00	.00

B- Measurement Error for Indicator

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11
Error Variances	.71	.33	.59	.41	.52.	.81	.47	.69	.80	.38	.46

3.2.3. Goodness of Fit Criteria

Before evaluating the structural or measurement models, the overall fit of the model must be assessed. SEM has developed some measurement techniques and they are categorized in Table 16.

[45] Hair (1995), pp. 610-627.

Table 16: Goodness-Of-Fit Measures for SEM

Degrees of Freedom	15
Minimum Fit Function Chi-Square	21.96 (P=0.11)
Normal Theory Weighted Least Squares Chi Square	21.77 (P=0.11)
Estimated Non-Centrality Parameter (NCP)	6.77
90 Percent Confidence Interval for NCP	(0.0; 23.34)
Min Fit Function Value	0.034
Population Discrepancy Function Value (F0)	0.01
90 Percent Confidence Interval for F0	(0.0; 0.036)
Root Mean Square Error of Approximation (RMSEA)	0.026
90 Percent Confidence Interval for (RMSEA)	(0.0; 0.049)
P-Value for Test of Close Fit (RMSEA < 0,05)	0.96
Expected Cross-Validation Index (ECVI)	0.19
90 Percent Confidence Interval for (ECVI)	(0.18; 0.21)
ECVI for Saturated Model	0.20
ECVI for Independence Model	5.71
Chi-Square for Indep. Model with 55 Degrees of Freedom	3707.12
Independence AIC	3729.12
Model AIC	123.77
Saturated AIC	132.00
Independence CAIC	3789.43
Model CAIC	403.41
Saturated CAIC	493.89
Normed Fit Index (NFI)	0.99
Non Normed Fit Index (NNFI)	0.99
Parsimony Normed Fit Index (PNFI)	0.27
Comparative Fit Index (CFI)	1.00
Incremental Fit Index (IFI)	1.00
Relative Fit Index (RFI)	0.98
Critical N (CN)	910.36
Root Mean Square Residual (RMSR)	0.017
Standardized RMR	0.017
Goodness Fit Index (GFI)	0.99
Adjusted Goodness of Fit Index (AGFI)	0.97
Parsimonary Goodness of Fit Index (GFI)	0.23

The chi-square (χ^2) value of 21.96 with 15 degrees of freedom is statistically significant at one percent significance level, which indicates that the actual and predicted input matrices are not statistically different. The root mean square error of approximation has a value of 0.026, which falls outside the acceptable range of less or equal to .08 and the root mean square residuals are very low. Moreover, GFI is very high in the model.[46] AGFI and NFI are greater than expected level of .90. AGFI is adjusted by the ratio of degrees of freedom for the proposed model to the degrees of freedom for the null model. All the incremental measures exceed the .90 and true test occurs with the comparison of the proposed model against alternative model. The other measures generally fall within the desired limits.

3.3. A Dynamic Model of Service Quality

We will make use of the model developed by Kara (2003), the basic features of which are as follows. Consider a banking sector where banks provide a service, say x, to the customers. Let P_t be the *service performance* at time t, the measurement of which is based on a questionnaire given in the Appendix A. Let R^p_t be the *repurchase intention* in the sector, which indicates the degree to which customers are willing to repurchase the service at time t. R^p_t depends on the service performance at time t, and t-1, the *customers' satisfaction*, S_t, at time t, and the service quality, Q_t, at time t.

$$R^p_t = f(P_t, P_{t-1}, S_t, Q_t). \qquad (1)$$

We could reasonably assume that service quality could (or would) depend on present service performance.

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[46] The goodness-of-fit (GFI) index is a value ranging from 0 (poor fit) to 1 (perfect fit). It represents the overall degree of fit (the squared residuals from prediction compared with the actual data)

$$Q_t = h(P_t)$$

With this assumption, equation (1) can be rewritten as follows;

$$R^p{}_t = f(P_t, P_{t-1}, h(P_t, P_{t-1}), S_t) = f^p(P_t, P_{t-1}, S_t)$$

Therefore, the repurchase intention is ultimately a function of performance and satisfaction.

Let $R^s{}_t$ be the suppliers' *resale intention* in the sector, which indicates the degree to which suppliers are willing to "re-supply" the service at time t. Suppose that $R^s{}_t$ depends on present and past performances[47],

$$R^s{}_t = f^s((P_t, P_{t-1}). \qquad (2)$$

For analytical purposes, we will assume that the dependence of the repurchase and resale intention on the present and past performances and satisfaction have the following forms:

$$\ln R^p{}_t = \alpha_1 \ln P_t + \alpha_2 \ln P_{t-1} + \alpha_3 \ln S_t$$

and

$$\ln R^s{}_t = \beta_1 \ln P_t + \beta_2 \ln P_{t-1}$$

To theorize about the movements over time (i.e., the dynamic trajectory) of service performance (and the variables, such as repurchase intention, resale intention, customer satisfaction and expectation, which depend on it), we will make the following reasonable assumption, which is compatible with the logic of the market process: It is the relative strength (or magnitude) of the repurchase intention compared to the resale intention that provides the impetus for the performance to be adjusted upwards over time.

Formally,

$P_{t+1} / P_t = (R^p_t / R^s_t)^k$, where k stands for adjustment coefficient.

Taking the logarithmic transformation of both sides, we get:

$\ln P_{t+1} = \ln P_t + k\,(\ln R^p_t - \ln R^s_t)$.

We will call this the dynamic adjustment equation. Substituting the functional expressions (forms) for $\ln R^p_t$ and $\ln R^s_t$ specified above and rearranging the terms in the equation, we get the following:

$$\ln P_{t+1} + (k\beta_1 - k\alpha_1 - 1) \ln P_t + (k\beta_2 - k\alpha_2) \ln P_{t-1} = k\alpha_3 \ln S_t,$$

which is a second order difference equation, the solution of which is provided in (Kara 2003). The solution has set the parametric value of $\ln S_t$ to its average value, $\ln S_t^{\bullet}$

The solution in Kara (2003) shows that the intertemporal equilibrium performance, P^*, is:

$$P^* = e^{(\alpha_3 \ln S_t^{\bullet}) / [(\beta_1 + \beta_2) - (\alpha_1 + \alpha_2)]}.$$

To study whether this intertemporal equilibrium performance is high or low, and whether it remains stable over time, we need to empirically estimate the parameters involved. Therefore, next section analyzes the behavior of this equilibrium performance..

3.3.1. Empirical Analysis

3.3.1.1. The Sample

Data for this study was gathered using an adapted questionnaire, originally developed by Carman (1990). A few questions designed by Cronin and Taylor (1992) were added to the questionnaire. The questionnaire was distributed to three different private banks in Turkey. 654 customers were asked to respond to the

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[47] The measurement of the variables R^p_t, R^s_t, S_t are based on a questionnaire given in the Appendix A.

questions. The original version of the questionnaire was developed in English. This questionnaire was translated into the local language (Turkish). The local version was retranslated until a panel of experts agreed that the two versions were comparable. Each item was rated on a seven-point Likert scale anchored at the numeral 1 with the verbal statement "Strongly Disagree" and at the numeral 7 with the verbal statement "Strongly Agree". The questionnaire was pre-tested several times to ensure that the wording, format, and sequencing of questions were appropriate. The questionnaire is given in Appendix A.

3.3.1.2. Estimation of the parameters

To estimate the parameters involved, we formulate the following regression equations:

Repurchase intention: $\ln R^p_t = \alpha_1 \ln P_t + \alpha_2 \ln P_{t-1} + \alpha_3 \ln S_t + u_t$

Resale intention: $\ln R^s_t = \beta_1 \ln P_t + \beta_2 \ln P_{t-1} + v_t$

Where u_t and v_t are disturbance terms and t is time.

3.3.1.2.1. Repurchase intention equation

Since in the context of the banking sector under examination, buyer behavior appears to be linked largely to the present performance, we assume, for the sake of simplicity, that $\alpha_2 = 0$. Thus, we formulate the following special version of the repurchase-regression equation stated above:

$$\ln R^p_t = \alpha_1 \ln P_t + \alpha_3 \ln S_t + z_t$$

where z_t is the disturbance term. The regression-results are as follows:

$$\ln R^p_t = \underset{(11.218)}{0.544 \ln P_t} + \underset{(9.915)}{0.481 \ln S_t}$$

$R^2 = 0.99$. t-statistics are given in parentheses. Thus,

$\alpha_1 = 0.544$

$\alpha_3 = 0.481$

3.3.1.2.2. Resale intention equation

To estimate the parameters of the resale intention equation, we asked an official of the hospital questions, the answers of which were designed to give the values of the elasticities of resale intention with respect to the present and past performance. It turns out that the elasticity of resale intention with respect to present performance is equal to 0.9, and the elasticity of resale intention with respect to past performance is equal to 0.1, i.e.,

$\beta_1 = 0.9 \qquad \beta_2 = 0.1.$

3.3.1.2.3. The coefficient of adjustment (k)

For simplicity, we will assume that P_{t+1} / P_t is proportional to the ratio of repurchase intention to resale intention, and hence, $k = 1$.

Given the values of the parameters above, and the average value of ln S_t ,which is equal to 1.7165 for our sample, we can now determine the value of intertemporal equilibrium performance, which is;

$$P^* = e^{(\alpha_3 \ln S_t^{\bullet}) / [(\beta_1 + \beta_2) - (\alpha_1 + \alpha_2)]}$$

$$= e^{(0.8256) / [(0.75 + 0.25) - (0 + 0.876)]}$$

$$\cong 6.1.$$

In view of the performance scale of 1 to 7, an intertemporal equilibrium performance of 6.1 is high. As proven in Kara (2003), this high performance is also stable over time.

This high service performance has a considerable effect on the service quality. To analyze the performance-quality relationship in a formal manner,

suppose that service quality depends on the present performance in the following way:

$$\ln Q_t = \theta_1 \ln P_t + u_t$$

The regression results based on the data available are as follows:

$$\ln Q_t = 0.986 \ln P_t \qquad R^2 = 0.99.$$
$$(314,491)$$

Given the value of the intertemporal equilibrium performance, $P^* = 6.1$, we can now calculate the value of the intertemporal equilibrium quality Q^*. By the nature of intertemporal equilibrium, $P_t = P^*$ we can write the following;

$$\ln Q^* = 0.986 \ln P^*$$

, which can also be written as $Q^* = P^{* 0.986}$

Letting $P^* = 6.1$, and solving for Q*, we get,

$$Q^* = 5.94,$$

The value of the equilibrium quality is very high in the view of the quality scale from 1 to 7. Thus, the high intertemporal equilibrium performance induces a high intertemporal equilibrium quality in the Turkish banking sector.

3.4. CONCLUSION

Factor analysis is a useful and powerful statistical technique for effectively extracting information from large databases. An example related with Turkish Banking Sector was presented in this chapter. After the factor analysis, SEM introduced complex interrelated dependence relationships and incorporated the effects of measurement error on the structural coefficients simultaneously. SEM provided a statistically valid means of using the information we obtain through measurement to calibrate the relationships we hypothesize to exist between the

underlying (latent) non-measurable variables. The multivariate analysis has great benefits in both academic and industrial researches. The thesis also makes use of an intertemporal framework and empirically demonstrates that the sector in question displays stable high levels of performance and quality over time.

4.

CONCLUSION

The thesis suggest that service quality is an important construct to be considered in future research and practice in the Turkish Banking Sector and that SERVQUAL is a promising scale which can play significant role in operationalizing service quality although the results display that this instrument may not be easily be generalizable to all banking system.

Structural Equation Modeling in this work provides multiple and interrelated dependence relationship between SERVQUAL results; it has the ability of analyzing unobserved concepts such as TQM and customer satisfaction for the Turkish Banks by the use of LISREL.

Finally, the dynamic model of service performance and service quality displays that the banks in the Private Turkish Banking Sector performs high level service performance and service quality over the relevant period

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APPENDIX A

THE SERVQUAL INSTRUMENT

EXPECTATIONS

This survey deals with your opinions of banks. Please show the extent to which you think banks should posses the following features. What we are interested in here is a number that best shows your expectations about institutions offering bank services

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

PERCEPTIONS

The following statements relate to your feelings about the particular bank XYZ you chose. Please show the extent to which you believe XYZ has the feature described in the statement. Here, we are interested in a number that shows your perceptions about XYZ bank

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

	(E)		(P)	Gap Score P - E
Tangibles		**Tangibles**		
E1- Excellent banking companies should have modern looking equipment.	_____	P1. XYZ bank has modern looking equipment.	_____	_____
E2- The physical facilities at excellent banks should be visually appealing.	_____	P2. XYZ Bank's physical facilities are visually appealing.	_____	_____
E3- Employees at excellent banks should be neat appearing.	_____	P3. XYZ Bank's reception desk employees are neat appearing.	_____	_____
E4. Materials associated with the service (such as pamphlets or statements) should be visually appealing at an excellent bank.	_____	P4. Materials associated with the service (such as pamphlets or statements) are visually appealing at XYZ bank.	_____	_____
E5. Excellent banking companies should provide parking facilities to their customers	_____	P5. XYZ Bank provides parking facilities to its customers	_____	_____
		Average Tangibles SERVQUAL score		_____

Reliability	**E**	**Reliability**	**P**	**P - E**
E6. When excellent banks promise to do something by a certain time, they do.	_____	P6. When XYZ bank promises to do something by a certain time, it does so.	_____	_____
E7. When a customer has a problem, excellent banks should show a sincere interest in solving it.	_____	P7. When you have a problem, XYZ bank shows a sincere interest in solving it.	_____	_____
E8. Excellent banks should perform the service right the first time.	_____	P8. XYZ bank performs the service right the first time.	_____	_____
E9. Excellent banks should provide the service at the time they promise to do so.	_____	P9. XYZ bank provides its service at the time it promises to do so.	_____	_____
E10. Excellent banks should insist on error free records	_____	P10. XYZ bank insists on error free records	_____	_____
E11. Excellent banks should keep promise (give service) as advertised	_____	P11. XYZ Bank keeps promise (gives service) as advertised	_____	_____
		Average Responsiveness SERVQUAL score		_____
Responsiveness		**Responsiveness**		
E12. Employees of excellent banks should tell customers exactly when services should be performed.	_____	P12. Employees in XYZ bank tell you exactly when services should be performed.	_____	_____
E13. Employees of excellent banks should give prompt service to customers.	_____	P13. Employees in XYZ bank give you prompt service.	_____	_____
E14. Employees of excellent banks should help to customers.	_____	P14. Employees in XYZ bank help to customers.	_____	_____
E15. Employees of excellent banks should never be too busy to respond to customers' requests.	_____	P15. Employees in XYZ bank are never too busy to respond to your request.	_____	_____

Average Responsiveness SERVQUAL score _____

	E		P	P - E
Assurance		**Assurance**		
E16. The behavior of employees in excellent banks should instill confidence in customers.	_____	P16 The behavior of employees in XYZ bank instills confidence in you.	_____	_____
E17. Customers of excellent banks should feel safe in transactions.	_____	P17. You feel safe in your transactions with XYZ bank.	_____	_____
E18. Employees of excellent banks should be consistently courteous with customers.	_____	P18. Employees in XYZ bank area consistently courteous with you.	_____	_____
E19. Employees of excellent banks should have the knowledge to answer customers' questions.	_____	P19. Employees in XYZ bank have the knowledge to answer your questions.	_____	_____
E20. Excellent Banking companies have a well known name and image	_____	P20. XYZ Bank has a well known name and image	_____	_____
		Average Assurance SERVQUAL score		_____
Empathy		**Empathy**		
E21. Excellent banks should give customers individual attention.	_____	P21. XYZ bank gives you individual attention.	_____	_____
E22. Excellent banks should have operating hours convenient to all their customers.	_____	P22. XYZ bank has operating hours convenient to all its customers.	_____	_____
E23. Excellent banks should have employees who give customers personal attention.	_____	P23. XYZ bank has employees who give you personal attention.	_____	_____

E24. Excellent banks should have their customer's best interests at heart.	_____	P24. XYZ bank has your best interest at heart.	_____	_____
E25. The employees of excellent banks should understand the specific needs of their customers.	_____	P25. The employees of XYZ bank understand your specific needs.	_____	_____
E26. Excellent Banks should have convenient bank (branch) locations	_____	P26. XYZ bank has convenient bank (branch) locations	_____	_____
E27. Excellent banks ATMs' are easily accessible	_____	P27. XYZ Bank's ATMs' are easily accessible	_____	_____
		Average Empathy SERVQUAL scores		_____

Services	**E**	**Services**	**P**	**P - E**
E28. The cost of the services offered in excellent banks is lower	_____	P28. The cost of the services offered in XYZ bank is lower	_____	_____
E29. Excellent banks offer higher rates of return	_____	P29. XYZ bank offers higher rates of return	_____	_____
E30. Excellent Banks offer a wide range of services	_____	P30. XYZ Bank offers a wide range of services	_____	_____
		Average Services SERVQUAL score		_____

Electronic Banking / IT based Services	**E**	**Electronic Banking / IT based Services**	**P**	**P - E**
E31. Excellent Banks should have attractive web sites	_____	P31. XYZ Bank has an attractive web site	_____	_____
E32. Excellent banks' web sites contain information that customer needs (about services and products)	_____	P32. XYZ Bank's web site contains information that customer needs (about services and products)	_____	_____
E33. Excellent Banks provide a wide array of	_____	P33. XYZ Bank provides a wide array of products and	_____	_____

products and services online	_____	services online	_____	_____
E34. Excellent banks offer personalized services to customers in their online services	_____	P34. XYZ Bank offers personalized services to customers in their online services	_____	_____
E35. Online transactions in an excellent bank are accurate.	_____	P35. Online transactions in XYZ bank are accurate.	_____	_____
E36. Excellent Banks give a prompt and attentive e-mail response to the customers' e-mail complaints	_____	P36. XYZ bank gives a prompt and attentive e-mail response to the customers' e-mail complaints	_____	_____
E37. Excellent banks' online banking services are easy to use (easy to follow transactions)(all banking needs are included in menu options)(navigational functions of the web site)	_____	P37. XYZ Bank's online banking services are easy to use (easy to follow transactions)(all banking needs are included in menu options)(navigational functions of the web site)	_____	_____
E38. Excellent Banks show continuous improvement on online systems	_____	P38. XYZ Bank shows continuous improvement on online systems	_____	_____
E39. Excellent banks' online transaction speed (speed of the online systems) are fast (satisfactory)	_____	P39. XYZ bank's online transaction speed (speed of the online systems) are fast (satisfactory)	_____	_____
E40. Online transactions in an excellent bank are secure (security-privacy)	_____	P40. Online transactions in XYZ bank are secure (security-privacy)	_____	_____
E41. Online transactions in an excellent bank have lower or no fees for services	_____	P41. Online transactions in XYZ bank have lower or no fees for services	_____	_____
		Average Electronic Banking SERVQUAL score		_____

	E		P	P - E
Management & Auditing		**Management & Auditing**		
E42. Excellent Bank's banking operations are lawful	_____	P42. XYZ Bank's banking operations are lawful.	_____	_____
E43. Excellent banks try to enhance the community's standard of living an d welfare (vision of serving the community)	_____	P43. XYZ bank tries to enhance the community's standard of living an d welfare (vision of serving the community)	_____	_____
E44. Excellent banks provide interest free loans	_____	P44. XYZ bank provides interest free loans	_____	_____
E45. Excellent banks try to support their customers in recession times.		P45. XYZ bank tries to support their customers in recession times.		
E46. Excellent banks should be transparent to public		P46. XYZ bank is transparent to public.		
		Average Management & Auditing SERVQUAL score		_____

TABLE 1: CALCULATIONS TO OBTAIN UNWEIGHTED SERVQUAL SCORE

Average **Tangible** SERVQUAL score	_____
Average **Reliability** SERVQUAL score	_____
Average **Responsiveness** SERVQUAL score	_____
Average **Assurance** SERVQUAL score	_____
Average **Empathy** SERVQUAL score	_____
Average **Service** SERVQUAL score	_____
Average **Electronic Banking** SERVQUAL score	_____
Average **Management & Auditing** SERVQUAL score	_____
TOTAL	_____
AVERAGE (= Total / 8) UNWEIGHTED SERVQUAL SCORE	

Table 2: SERVQUAL IMPORTANCE WEIGHTS

Listed below are five features pertaining to banks and the services they offer. We would like to know how much each of these features is important to the customer. Please allocate 100 points among the five features according to how important it is to you. Make sure the points add up to 100.

1. The appearance of the banks physical facilities, equipment, personnel, and communication materials. _____ points

2. The banks ability to perform the promised service dependably and accurately. _____ points

3. The bank's willingness to help customers and provide prompt service. _____ points

4. The knowledge and courtesy of the bank's employees and their ability to convey trust and confidence. _____ points

5. The caring, individual attention the bank provides its customers. _____ points

Total: 100 points

Table 3: SERVQUAL WEIGHTED SCORES

SERVQUAL Dimension	Score from Table 1	X	Importance Weight from Table 2	=	Weighted Score
Average **Tangible**					
Average **Reliability**					
Average **Responsiveness**					
Average **Assurance**					
Average **Empathy**					
Average **Services**					
Average **Electronic Banking**					
Average **Management & Auditing**					
					TOTAL

AVERAGE (= Total / 8) WEIGHTED SERVQUAL SCORE _____

APPENDIX B – DEFINITIONS OF CUSTOMERS

***The purchaser*:** Anyone who purchases food for his or her family.

***The end user/ultimate customer*:** Someone who finally benefits from the product. e.g., the patient who goes to health care facility for diagnostic test.

Merchants: People who purchase products for resale, wholesaler, distributors, travel agents, and anyone who handles the product, such as supermarket a employee who places the product on the shelf.

Processors: Organizations and people who use the product or output as an input for producing their own product.

Suppliers: Those who provide input to the process.

Original Equipment Manufacturers: Purchaser of a product to incorporate into their own e.g., a computer manufacturer using another producer's disk drivers for its computers.

***Potential customers*:** Those are not currently using the product but capable of becoming customers.

***Hidden Customers*:** An assortment of different customers, who are easily overlooked because, they may not come to mind readily. They have great influence over the corporate policy makers.

APPENDIX C – DEFINITIONS OF VARIABLE AND LATENT CODES

NO	VARIABLE CODES	EXPLANATION
1	PERMV_1	Perceptions of respondents related to tangibles for question 1.
2	PERMV_2	Perceptions of respondents related to tangibles for question 2.
3	PERMV_3	Perceptions of respondents related to tangibles for question 3.
4	PERMV_4	Perceptions of respondents related to tangibles for question 4.
5	PERMV_5	Perceptions of respondents related to tangibles for question 5.
6	PERGVN_1	Perceptions of respondents related to reliability for question 1.
7	PERGVN_2	Perceptions of respondents related to reliability for question 2.
8	PERGVN_3	Perceptions of respondents related to reliability for question 3.
9	PERGVN_4	Perceptions of respondents related to reliability for question 4.
10	PERGVN_5	Perceptions of respondents related to reliability for question 5.
11	PERGVN_6	Perceptions of respondents related to reliability for question 6.
12	PERSRM_1	Perceptions of respondents related to responsibility for question 1.
13	PERSRM_2	Perceptions of respondents related to responsibility for question 2.
14	PERSRM_3	Perceptions of respondents related to responsibility for question 3.
15	PERSRM_4	Perceptions of respondents related to responsibility for question 4.
16	PERGVC_1	Perceptions of respondents related to assurance for question 1.
17	PERGVC_2	Perceptions of respondents related to assurance for question 2.
18	PERGVC_3	Perceptions of respondents related to assurance for question 3.
19	PERGVC_4	Perceptions of respondents related to assurance for question 4.
20	PERGVC_5	Perceptions of respondents related to assurance for question 5.
21	PEREMP_1	Perceptions of respondents related to empathy for question 1.
22	PEREMP_2	Perceptions of respondents related to empathy for question 2.
23	PEREMP_3	Perceptions of respondents related to empathy for question 3.
24	PEREMP_4	Perceptions of respondents related to empathy for question 4.
25	PEREMP_5	Perceptions of respondents related to empathy for question 5.
26	PEREMP_6	Perceptions of respondents related to empathy for question 6.
27	PEREMP_7	Perceptions of respondents related to empathy for question 7.
28	PERHIZ_1	Perceptions of respondents related to services for question 1.
29	PERHIZ_2	Perceptions of respondents related to services for question 2.
30	PERHIZ_3	Perceptions of respondents related to services for question 3.
31	PERELB_1	Perceptions of respondents related to elec. banking for question 1.
32	PERELB_2	Perceptions of respondents related to elec. banking for question 2.
33	PERELB_3	Perceptions of respondents related to elec. banking for question 3.
34	PERELB_4	Perceptions of respondents related to elec. banking for question 4.
35	PERELB_5	Perceptions of respondents related to elec. banking for question 5.
36	PERELB_6	Perceptions of respondents related to elec. banking for question 6.
37	PERELB_7	Perceptions of respondents related to elec. banking for question 7.
38	PERELB_8	Perceptions of respondents related to elec. banking for question 8.
39	PERELB_9	Perceptions of respondents related to elec. banking for question 9.
40	PERELB_10	Perceptions of respondents related to elec. banking for question 10.
41	PERELB_11	Perceptions of respondents related to elec. banking for question 11.
42	PERDY_1	Perceptions of respondents related to management for question 1.
43	PERDY_2	Perceptions of respondents related to management for question 2.
44	PERDY_3	Perceptions of respondents related to management for question 3.
45	PERDY_4	Perceptions of respondents related to management for question 4.
46	PERDY_5	Perceptions of respondents related to management for question 5.
47	RP_1	Perceptions of respondents related to repurchase intention.
48	S_1	Perceptions of respondents related to satisfaction.
49	Q_1	Perceptions of respondents related to overall quality.

NO	LATENT CODES	EXPLANATION
1	PMVAVR	Average perceptions of respondents related to overall tangibles
2	PGVNAVR	Average perceptions of respondents related to overall reliability
3	PSRMAVR	Average perceptions of respondents related to overall responsibility
4	PGVCAVR	Average perceptions of respondents related to overall assurance
5	PEMPAVR	Average perceptions of respondents related to overall empathy
6	PHIZAVR	Average perceptions of respondents related to overall services
7	PELBAVR	Average perceptions of respondents related to overall elec. banking
8	PDYAVR	Average perceptions of respondents related to overall management
9	RP	Average perceptions of respondents related to overall rep. int.
10	S	Average perceptions of respondents related to overall satisfaction.
11	Q	Average perceptions of respondents related to overall quality.