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THE GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES

INDUSTRIAL ENGINEERING

ESTABLISHING SERVICE QUALITY MANAGEMENT SYSTEM:
IMPELEMENTATION AT TAKSİM – 4. LEVENT METRO LINE

Master Thesis

İsmail DURMAN

Supervisor: Associate Professor Tunç BOZBURA

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ABSTRACT

ESTABLISHING SERVICE QUALITY MANAGEMENT SYSTEM:
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Durman, İsmail

Industrial Engineering Program

Supervisor: Yrd. Doc. Dr. Tunç Bozbura

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This study deals with service quality in Urban Public Transport systems and service quality management system that has been established for Taksim - 4.Levent metro as a sample implementation. Service quality is crucial tool for attracting customer and competing with other companies. However defining and measuring quality of service are harder than manufacturing products. Factors are not distinctive and they are changeable according to service type. Besides, understanding and collecting customer opinion and ideas are tough. Hence, establishing a management system, which provides systematic and sustainable approaches, is essential for supplying sufficient quality for customers.

Urban public transport systems have been hardly competing with private cars which comfort has been increasing. In order to provide attractive public transport passengers' requirements and expectations should be followed, and services should be designed with respect to them. In this study, customer satisfaction survey, performance measurement system and service delivery standards are investigated within the framework of SQMS. In the study, for Taksim-4.Levent Metro Line service delivery standard is designed which describes how to create a service area in stations and trains. In order to monitor the success of the implementing the service delivery standard, performance measurement system is established. Mystery shopper survey and direct measurement method, which are measurement tools, are implemented in the metro line. The results point that objective measurement system is major factor for sustaining and improving quality of services. A survey has done at the metro line in order to collect customer perceptions and expectations, which are presented as well.

Key Words: Service Quality, Urban Public Transport, Customer Perceptions and Expectations

ÖZET

HİZMET KALİTESİ YÖNETİM SİSTEMİNİN KURULMASI:
M2 TAKSİM – 4. LEVENT METRO HATTINDA UYGULANMASI

Durman, İsmail

Endüstri Mühendisliği Programı

Danışman: Yrd. Doc. Dr. Tunç Bozbura

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Bu çalışma kent içi toplu taşıma sistemlerinde hizmet kalitesini ve M2 Taksim-4.Levent metro hattında hizmet kalitesi yönetim sisteminin kurulmasını ele almaktadır. Hizmet kalitesi müşterilerinin ilgisini çekmek ve rakipler ile rekabeti sağlayabilmek için oldukça önemli bir araçtır. Ancak hizmtlerin kalitesinin tanımlanması ve ölçülmesi üretim sektörüne göre zordur. Fakörler tam belirgin olmayıp, hizmet yapısına göre farklılık göstermektedir. Ayrıca müşterilerin fikirlerini ve düşüncelerini toplamak da zor bir süreçtir. Bu sebeple, bir yönetim sistemin oluşturulması müşterilerin yeterli kaliteyi elde etmek için esas şart olup, sistematik ve sürdürülebilir bir yaklaşık sağlayackatır.

Kent içi toplu taşıma sistemleri her geçen gün konforu artan özel araçlarla rekabet edememektedir. Toplu taşımayı cazip hale getirmek için yolcuların ihtiyaç ve beklentileri izlenmeli ve hizmetlerin tasarımı bu ihtiyaç ve beklentilerin dikkate alınması sonucu yapılmalıdır. Bu çalışmada, hizmet kalitesi yönetim sistemi kapsamında müşteri memnuniyeti araştırması, performans ölçüm methodları ve hizmet standartlarının oluşturulması incelenmiştir. Bu çalışma ile M2 Taksim-4.Levent metro hattı için istasyon ve trenlerde nasıl hizmet sunulacağını anlatan hizmet standartları oluşturulmuştur. Hizmet standartlarının uygulamadaki başarısını görmek için performans ölçüm sistemi geliştirilmiştir.Performans ölçüm metodu olarak gizli müşteri araştırması ve doğrudan ölçüm metodları metro hattında uygulanmıştır.Bu ölçüm methodlarının sonuçları, objectif performans ölçüm sisteminin hizmet kalitesinin sürekli gelişmesi için temel faktör olduğunu ortaya koymuştur. Müşterilerin algılarını ve beklentilerini toplamak amacıyla metro hattında bir araştırma yürütülmüş ve sonuçlar bu çalışmada sunulmuştur.

Anahtar Kelimeler: Hizmet Kalitesi, Kentiçi Toplu Taşıma, Müşteri Algısı ve Beklentileri

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LIST OF ABBREVIATIONS

Importance-Satisfaction	:	IS
Passenger Environment Survey	:	PES
Service Quality Management System	:	SQMS
Transit Cooperative Research Program	:	TCRP
Urban Public Transport	:	UPT

1. INTRODUCTION

Quality is important for service industries in order to compete with other companies. In urban public transport (UPT) sector service quality is critical for metropolitans, which are facing traffic problems. Although UPT is more economic, the comfort of private cars has been increasing and this encourages that people to have. Thus, the number of cars has become alarming level and the traffic has become the most important problem for metropolitans. UPT is the unique solution for the traffic congestion. Service quality management system (SQMS) is crucial to provide attractive public transport. Passenger-oriented system is an obligation as other service companies. Passenger requirements and expectations should be considered in designing services. Sustainability is important, in order to supply sustainable service quality, service delivery standard should be established. The targets and performance measurement system are important issues in management systems. Targets and performance reveals the quality of services. Performance of the system should be measured periodically in order to provide improvement. The results should be compared with the target. The weak points are recognized by measurement system and they should be eliminated promptly.

2. GENERAL INFORMATION

2. 1 DEFINITION OF SERVICE QUALITY

Quality is much easier to define when manufacturing tangible products and manufacturing quality may simply involve conformance to specifications (Metters et al. 2003) In services, evaluating the level of quality is much more difficult. Because the services are an elusive and indistinct construct (Parasuraman et al.1985) The assessment of quality is made during the service delivery process and each customer contact is referred to as a moment of truth, an opportunity to satisfy or dissatisfy the customer (Fitzsimmons and J. Fitzsimmons 2008) Customers are assessing the quality of service, according to their needs and expectations. If the service performance does not address individual customer needs, the customer will not require the service (Sampson 1999).

Although, quality needs investing money, quality service pays off, because it creates true customers who are glad that they selected a firm after the service experiences, who will use the firm's service again, who will sing the firm's praises to others (Metters et al. 2003). Acquiring a new customer costs five times more money to retain a current customer (Rust et al.1995). In the light of this views, quality of service provides high competitive power and higher profit as a result of customer satisfaction and customer retention.

2. 2 INTRODUCTION OF ISTANBUL ULASIM

2.2.1 General Information

In 1988, Istanbul Metropolitan Municipality founded Istanbul Ulasim in order to operate the rail systems as UPT (Istanbul Ulasim 2009). As responsible for the operation and maintenance of metro, light rail, tramway, funicular and cable car in the city, Istanbul Ulasim AS serves over 800.000 passengers with over 800 employees coordinated centrally from its headquarters in Esenler (Istanbul Ulasim 2009) With a 72 km long urban rail system, Istanbul Ulasim AS serves more than 280 million passengers a year (Istanbul Ulasim 2009)

Istanbul Ulasim operates metro, tram, funicular and 2 cableway systems in Istanbul. Besides, the entire maintenance and repair of the rolling stocks as well as rail system projects and research and development works are being carried out diligently at Istanbul Ulasim. Characteristics of lines are shown in table 2.1.

Table 2.1 : Characteristics of the lines

Lines	**Length**	**Number of Stations**	**Number of Passengers (per day)**
M1 Aksaray Havalimanı Metro	20	20	200.000
M2 Taksim 4.Levent Metro	14	10	200.000
T1 Zeytinburnu Kabataş Tram	14	24	230.000
T2 Güngören Bağcılar Tram	5	9	50.000
T3 Kadıköy Moda Tram	2,6	10	2.000
T4 Edirnekapı-Sultançiftliği Tram	12,5	18	90.000
F1 Taksim Kabataş Funicular	0,6	2	26.000
Eyüp, Maçka Cableway	0,7	4	2.500
Total	**70**	**97**	**800.000**

Source: Istanbul Ulasim, 2009

2.2.2 M2 Taksim – 4.Levent Metro Line

The line was constructed between 1992-2000 and it started to operate on September 16, 2000 (Istanbul Ulasim, 2009) Line length is 8 km and there are 6 stations on the line which services almost 200.000 passenger per day.

The stations are;

a. Taksim
b. Osmanbey
c. Şişli
d. Gayrettepe
e. Levent
f. 4.Levent

There are three different working hours during the week period because the passenger flow differs according to weekdays and weekend.

Monday-Thursday: 06:15- 00:30

Friday-Saturday : 06:15- 01:00

Sunday : 06:30- 00:30

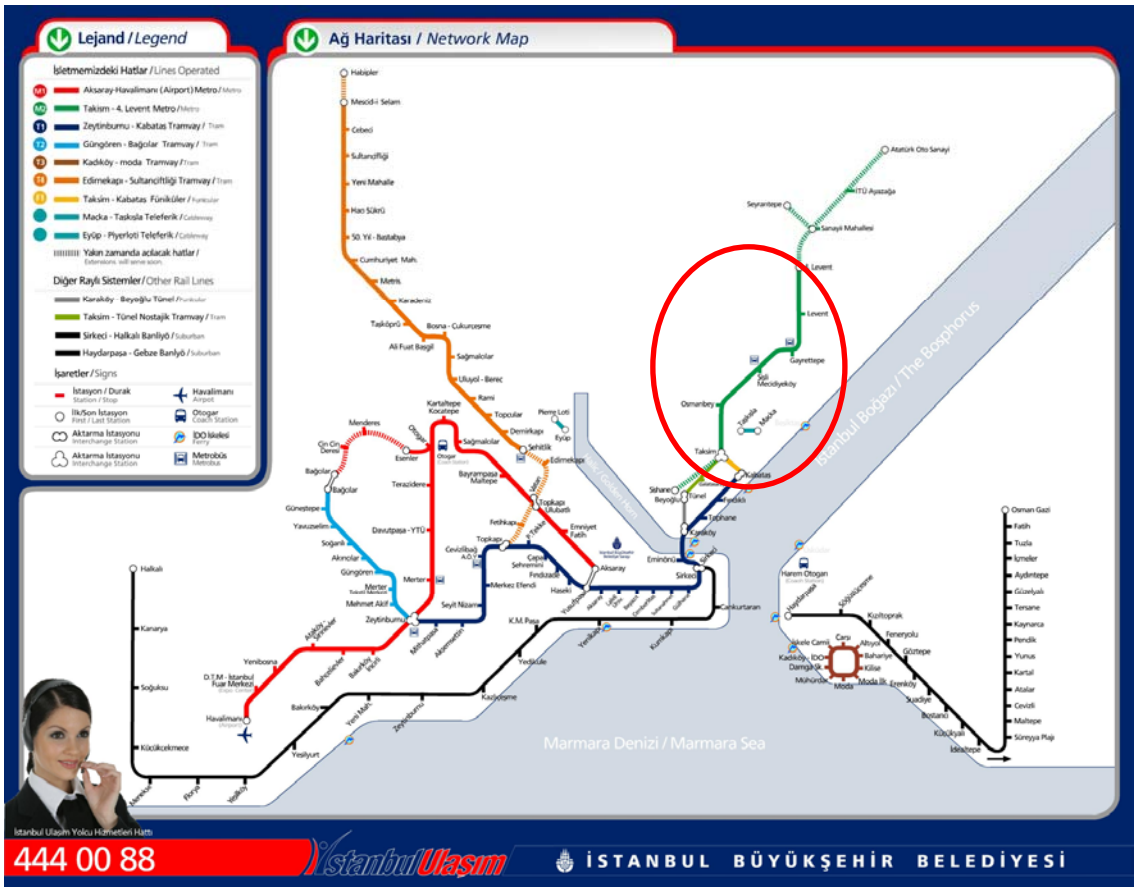

Figure 2.1 : Istanbul railsytem network map
Source: İstanbul Ulasim

The marked part shows M2 Taksim-4.Levent line in the above map.

2.2.3 Future Situation of M2 Taksim-4. Levent Line

In the beginning of 2009, two provisional lines started at two sides. Şişhane station at Taksim side; and Sanayi Mah., İTÜ and Atatürk Oto Sanayi station at 4. Levent has become operational. These two lines works as ring lines to transfer passengers to M2 Taksim 4.Levent line. Taksim-Şişhane and 4.Levent-Atatürk Oto Sanayi lines haven't changed operating plans of M2 Taksim-4.Levent. It is aimed that the two lines are linked to M2 Taksim-4.Levent by the end of 2009, and there will be one line. Therefore, a passenger getting on the metro at Şişhane station transfer to Atatürk Oto Sanayi station.

2.3 SERVICE QUALITY

2.3.1 The Model Of Service Quality

Customers assess service by comparing the service they receive (perceptions) with the service they desire (expectations) (Parasuraman et al. 1990). Customer perceptions and expectations are determinative factors for quality of service in addition to company performance. Therefore Company should determine performance targets considering with customer expectations and perceptions. Excellent companies know their customers; they know their customers' needs and requirements (Metters et al. 2003). Besides, company should monitor their performance whether targets meet. Ideally, the level of performance, target, perception and expectation should be equal in order to deliver high quality service. However, there are differences between these issues in implementation phase. In line with this thinking, Zeithmal, Berry, and Parasuraman (1985, p.44) developed service quality model. This figure summarizes the key insights gained about the concept of service quality and its factors affecting it. The service quality model chart is shown below illustrates the relationship between customers and company.

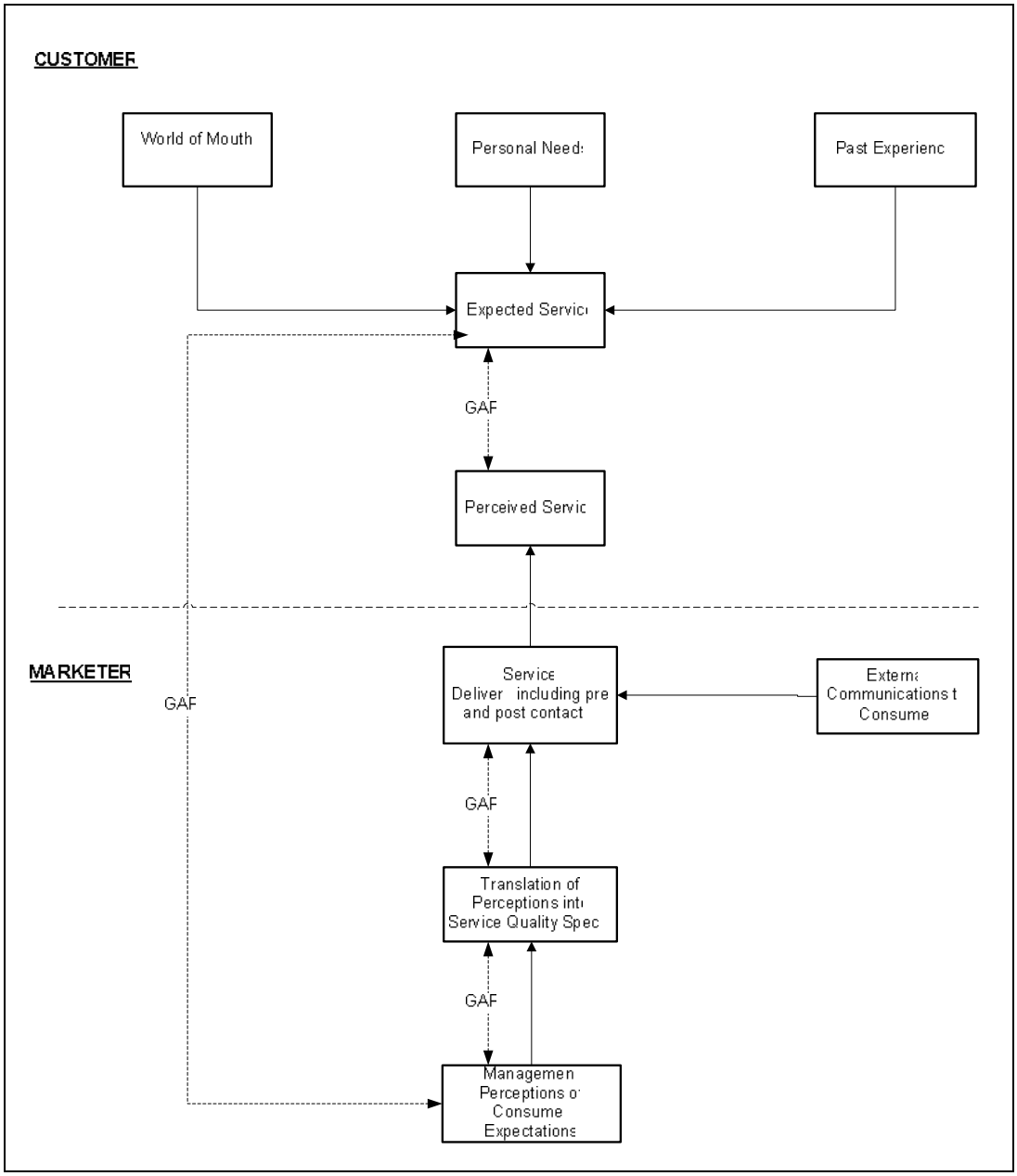

Figure 2.2 : The model of service quality
Source: A. Parasuraman, A.V. Zeithamal, L.L. Berry, 1985, A conceptual model for achieving customer satisfaction, Fascile of management and technological engineering.

In the model factors affecting service quality are defined in two sides that are customer and marketer. In customer side expectations and perceived service are main factors that are affected by world of month, personal needs and past experiences and performance of service delivery. In marketer side managements try to define the customer expectation and perceptions according to their experience and marketing tools such as marketing researches, suggestion and complaints systems. The services

are revised according to perceived expectations and perceived quality. Delivering service is one of main factors is affected management perceptions of expectations and revisions of services. It can help managers identify the source of the problem about services quality by way of that service providers propose the requirements what achieved the expected service quality (Jing et al. 2006)

In the model the differences between the factors of the services are defined as Gaps. These differences, or gaps, can be used to identify the relative strengths and weaknesses in service quality of an organization (Grapentine 1999). In model there are 5 gaps that first four are those on the provider side of service and the fifth relates to the customer side of service. A company can achieve a strong reputation for service quality when the gaps are kept in low level.

The gaps determine the quality level of the services.

GAP 1: Costumer expectation — management perception gap

These are discrepancies between executive perceptions and consumer expectations. Company executives may not always understand what features connote high quality to consumers in advance, what features a service must have in order to meet consumer needs, and what levels of performance on those features are needed to deliver high quality service.

GAP 2: Management perception — service quality specifications

There may be constraints (resources, or market conditions), which prevent management from delivering what the consumer expects, or there may be an absence of total management commitment to service quality.

GAP 3: Service quality specifications — service delivery gap

There may be difficulty in standardizing employee performance even when guidelines exist for performing services well and treating consumers correctly.

GAP 4: Service delivery — external communications gap

Media advertising and other communications by an agency can affect consumer expectations. Promising more than can be delivered will raise initial expectations but lower perceptions of quality when the promises are not fulfilled. Also, companies can neglect to inform consumers of special efforts to assure quality that are not visible to consumers, thereby affecting consumer perceptions of the delivered service.

GAP 5: Expected service — perceived service gap

This is how consumers perceive the actual service performance in the context of what they expected. The quality that a consumer perceives in a service is a function of the magnitude and direction of the gap between expected service and perceived service.

2.3.2 Dimensions of Service Quality

Although there is an agreement in literature that perceived service quality has multidimensional nature, it is still the debate subject on what the number is and what the content of dimension of service quality is (Novakevic 2008). Gronross (1994 pp. 36-44) states that there are two quality dimensions, which are functional and technical quality. Technical quality is defined as basic services which customer get. For instance if a passenger uses rail system, customers are taken to specific destination. Functional quality is the reason of getting the services. For instance, for the rail system transport, punctuality and cleanliness of the vehicle are sample important factors. Rust and Oliver (1995, pp.1-19) establishes three-dimensional model by adding to Gronros model a dimension, which is service environment. Parasuraman, Zeithaml and Berry (1985, pp 44-48) having researched in four service branches: banking, credit card companies, stockbrokers and service companies for home gadgets repairs, found that expectations and perception of service quality are affected by the following ten determinants:

a. reliability
b. sensibility
c. competitiveness
d. accessibility
e. politeness
f. communicability
g. credibility
h. safety
i. understanding and consumer commitment and
j. tangibility

It is quite possible that the relative importance of the 10 determinants in molding customer expectations (prior to service delivery) may differ from their relative importance vis- a-vis consumer perceptions of delivered service (Parasuraman et al. 1985). The internal and external variables of the service delivery process that should be measured are customer expectations, perceptions of service experience, level of importance and level of satisfaction and priorities for improvement (Schmit,1998). In order to build upon these five service factors as a foundation for the Customer Measurement Tool, a conceptual model of their relationships shown below as Figure 2 has been developed.

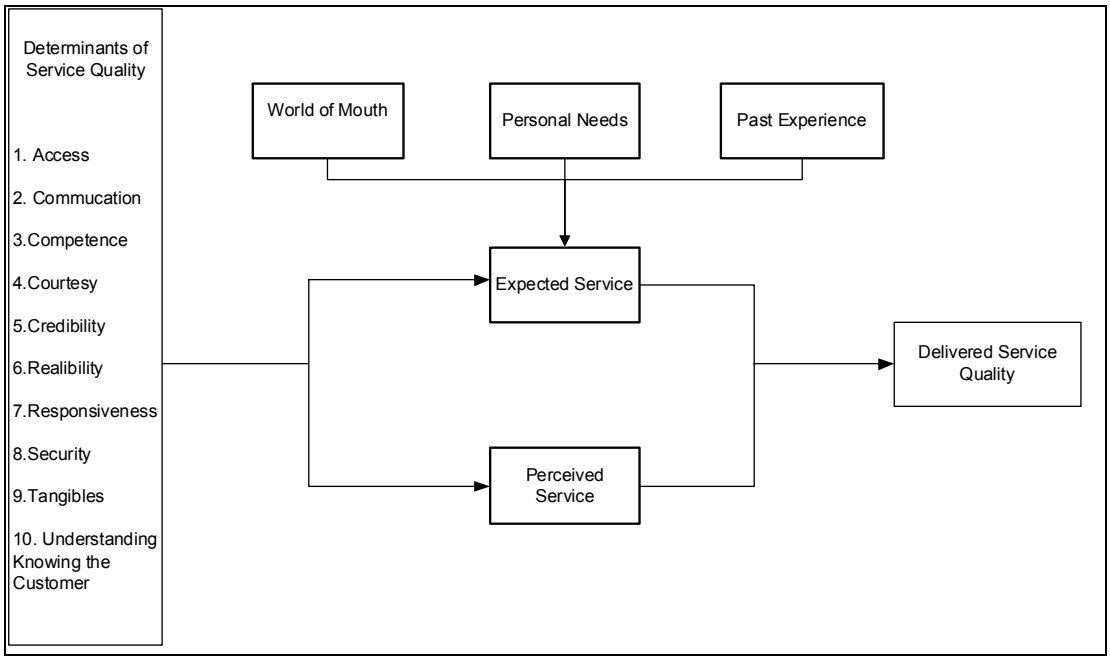

Figure 2.3 : Determinants of service quality
Source: A. Parasuraman, A.V. Zeithamal, L.L. Berry, 1985, A conceptual model for achieving customer satisfaction, Fascile of management and technological engineering.

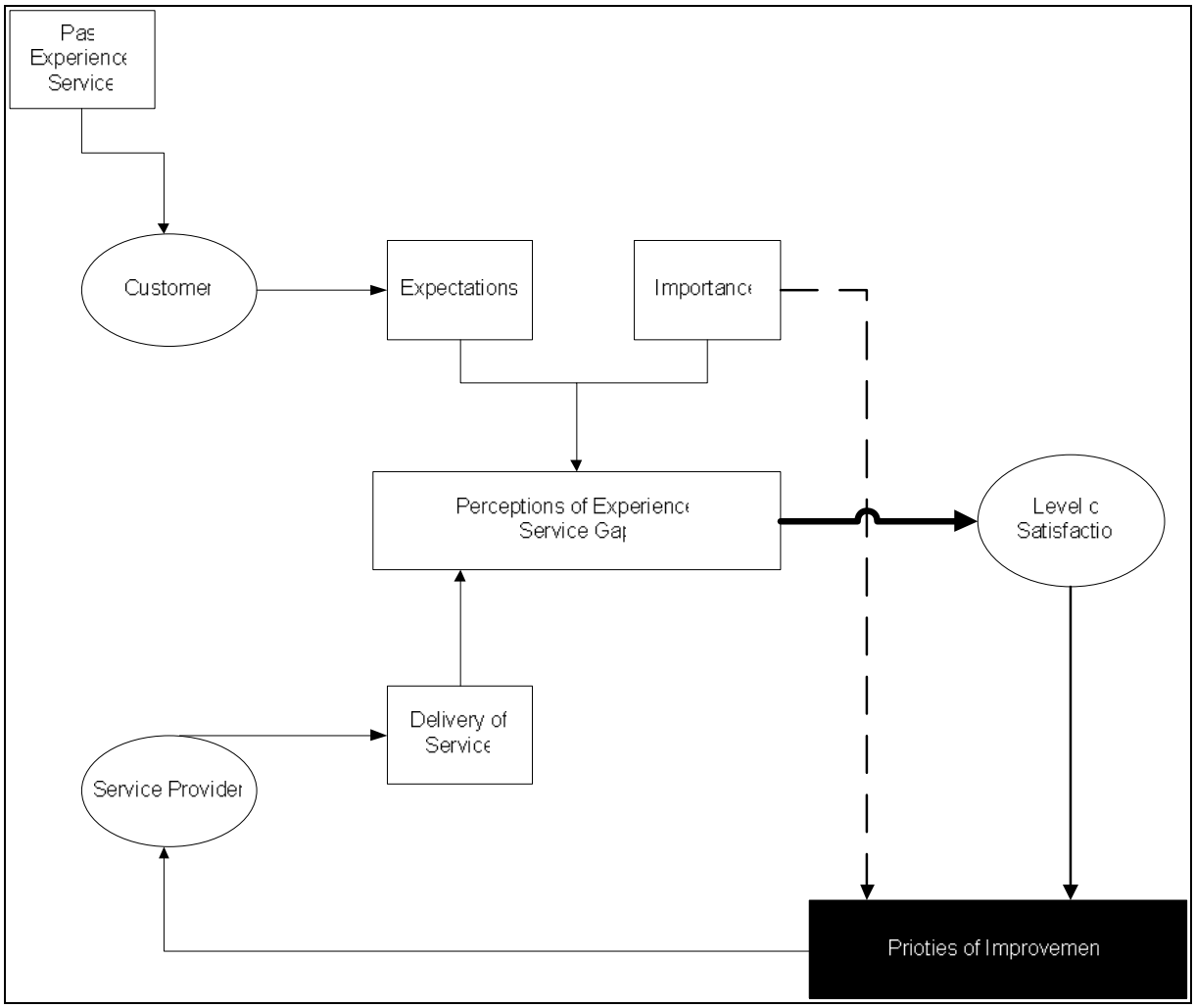

Figure 2.4 : Service delivery process
Source: F. Schmidt, T. Strickland, Client satisfaction surveying common measurements tool, Canada center for management development, 1998, Canada

In 1994 Parasuraman, Zeithaml and Berry, determined 5 dimensions which are helpful for understanding what customers expect from service providers dimensions follow as:

a. Tangibles: Tangibles include the physical evidence of the service, such as physical facilities, appearance of service providers, tools or equipment used to provide service, physical presentation of the service, and other customers in the service facility.
b. Reliability: Reliability involves consistency of performance and dependability. It means that the firm performs the service right the first time

and that honors its promises. Specifically, it involves accuracy in billing, keeping records correctly, and performing the service at the designated time.

c. Responsiveness: The willingness or readiness of employees to provide service. It involves timeliness of service including mailing a transaction slip immediately calling the customer back quickly, and giving prompt service.
d. Assurance: This dimension relates to the knowledge, competence, and courtesy of service employees and their ability to convey trust and confidence. Competence means possession of the required skills and knowledge to perform the service. Courtesy involves kindness, respect, consideration and helpfulness of contact personnel.
e. Empathy: The caring and individualized attention provided to customers includes the approachability and ease of contact with the service providers and their efforts to understand the customers' needs.

2.3.3 Performance Measurement System

The level of service quality has a close relationship with customer's service perception effect, and performance evaluation of service quality is an evaluation of the process and result of service, which may affect customer's satisfaction level. Therefore, evaluation research of performance in the process is very important in service management, which is taken much concern by researchers (Yiao and Zhou 2008).

Performance measurement system is helpful and provide effective and systematic basis for construction of service management (Jiao 2008). Performance measurement is also evolving at a considerable rate to combat new organizational realities; owing to the fight for industrial supremacy, the concept of performance as it is measured and evaluated, is undergoing a transformation in modern business organization (Folan and Browne 2005). Therefore companies need to install an ongoing service research process that provides regularly, relevant trend data that managers become accustomed to using in decision-making. Companies need to build a service quality information system, not just do a study. Conducting a service quality study is

analogous to taking a snapshot. Deeper insight and a sense for the pattern o f change come from continuing series of snapshots taken from many angles (Parasuraman, et al. 1994).

Jiao (2008, p.1) defines the 5 principles of designing performance measurement of service quality.

a. Comprehension: the indexes can evaluate quality of customer service in logistic companies comprehensively, so that companies monitor and control the whole process of customer service.
b. Typicality: there are so many influential factors of customer's service, but designers should find the most typical factors among them.
c. Economy: when designing a system, cost effectiveness should be considered fully, a balance between cost and benefit should be carried out.
d. Maneuverability: the evaluation project should be easy understood and related data should be available, which is one of the most important factors in design of system.
e. Stability: the stability is good at the development of the system; on the other hand, the stability doesn't affect the improvement of the system based on the changeable environment.

Table 2.2 is meant to convey the concept of systematic listening and not to offer definitive guidance on what a service quality information system should entail. The goal is to become a "listening company" ; the specifics of how will vary from company to company (Parasuraman et al.1994).

Table 2.2 : The ways of listening to customers

Type of Research	Frequency	Purposes
Customer Complaint Solicitation	Continuous	Identify dissatisfied customers to attempt recovery; identify most common categories of service failure for remedial action
Post-Transaction Survey	Monthly	Obtain customer feedback while service experience is still fresh; act on feedback quickly if negative pattern develop
Customer Focus group interview	Quarterly	Provide a forum for customes to suggest service-improvement ideas; offer fast, informal customer feedback on service issues
Mystery shopper surveys	Three times per year	Measure indiviual employee service behaivor for use in coaching, training, performance evaluation, recognition and reward; identify systematic strenghts and weakness in customer-contact service.
Employee Surveys		Measure internal service quality; identify employee-perceived obstacles to improved service; track employee morale and attitudes
Total market service quality surveys		Assesscompanu's servce performance compared to competitors; identify service-improvement priorities; track service improvement over time.

Source: A. Parasuraman, A.V. Zeithamal, L.L. Berry, 1994, Improving service quality in America: lessons learned.

2.4 SERVICE QUALITY IN URBAN PUBLIC TRANSPORT

The number of private cars has been increasing strictly in Istanbul (Istanbul Ulasim 2005) therefore the traffic congestion has become the most important problem in the city that it causes extra energy consumption, pollution emissions, accidents and wasting time. UPT should be more common and available in order to solve this problem. Policies which aim at increasing public transport usage should promote its image, but at the same time, public transport systems need to become more market-oriented and competitive, this requires an improvement in service quality, which can only be achieved by a clear understanding of travel behavior and customer needs and expectations (Beirao and Cabral 2007). In the light of customer needs and expectations the UPT companies should build their services and try to sustain the quality of services. Otherwise, people don't prefer UPT unless they have to use due to economical reasons.

For UPT, as in other service industries, increases in customer satisfaction translate into retained markets; increased use of the system, newly attracted customers, and a more positive public image. To accomplish these ends, public transit needs reliable and efficient methods for identifying the determinants of service quality from the customers' perspective (TCRP 1999).

As a result of improving transit service public transport companies and public get remarkable benefits (Litman 2008). The benefits are as follow:

i. Existing transit passengers (who would use transit even without the improvements);
ii. New transit passengers (who would only use transit if service is improved);
iii. Benefits society by reducing traffic problems (congestion, roadway and parking costs, consumer costs, accidents, energy consumption, and pollution emissions);
iv. Provides scale economies (increased ridership can create a positive feedback cycle of improved service, increased public support, more transit-oriented land use, and further ridership increases); and
v. Transit agencies by increasing fare revenue

2.4.1 Example of Quality Programs

European Union conducted a comprehensive program, called Quattro Research Project, which aims to increase the performance and the attractiveness of UPT in Europe. At the end of the program a final report was published and with respect to the report. EN 13816 Service Quality Standards for Public Transport Company is prepared and published by European Committee for Standardization (CEN).

In USA every company has specific quality programs, which based on customer-oriented approach and the quality programs include designing service standards and conducting performance measurement system (TCRP 2005). Customer satisfaction surveys are common and valuable tool for learning customer perceptions and passenger environment surveys are conducted in order to monitor performance of the cleanliness and ride comfort.

2.4.1.1 European example

The European Commission thinks quality as a major tool to increase the performance and the attractiveness of UPT in Europe. Before recommending the use of quality techniques European Commission obtained a clear and scientific view of what quality means for the public transport sector. The Quattro Research Project was undertaken within European Commission Transport RTD Programme in order to develop and improve quality of service in public transport sector. The project is conducted between 1996 and 1998 with consortium that is composed of 20 partners from 8 European Union countries, Norway and 3 Baltic Europe countries (Quattro 1998). The participant countries are Belgium, Estonia, Finland, France, Germany, Hungary, Italy, The Netherlands, Norway, Poland, Portugal and Spain, Denmark and United Kingdom.

In addition, the following associations participated the project;

i. The European Consumer's Organization (BEUC),
ii. Council of European Municipalities and Regions, (CEMR)
iii. CEN (European Committee for Standardization),
iv. European Foundation for Quality Management (EFQM),
v. The Euro Team of UITP (International Association of Public Transport).

The objectives, mentioned in the final report (1998 p.7) that is published at the end of the project, are:

a. to identify current and emerging quality management practices in the contracting and tendering of UPT provision with a particular emphasis on issues of quality definition and measurement, on the clarification of the contracting parties' responsibilities, as well as on evaluation procedures and their impact on continuous improvement programmes;
b. to evaluate these practices and to figure out how they could be improved by looking at quality management trends and best practices in other fields than UPT;
c. to propose a series of guidelines to authorities and operators involved or interested in tendering, contracting and performance monitoring in UPT, with a strong focus on quality.

The empirical scope of the project covers the European Union, Norway, Poland, Hungary and the Baltic States.

Quattro(1998, pp.13-14) recommended some basic issues in order to deliver high quality services for authorities, operator and vehicle manufacturer.

Quattro recommends for operator:

a. to know their market;
b. to appreciate their service performance as it is (good or poor), compared to demand and competition;
c. to consider their activity as more than a business: the impact of passenger transport activities on the local community and on the quality of life must be taken into consideration in UPT strategies, objectives and priorities;
d. to seek to establish a visible professional competence by reaching standards set for formal qualification (ISO 9000, XP X 50-805) and/or by implementing total quality management principles in the running of their operations;
e. to develop a customer satisfaction measurement system and to use its results in connection with those of the internal quality monitoring system;
f. to achieve excellence in management and operations through established management principles (e.g. EFQM);

g. to use front-line management development and continuous improvement programmes to improve customer-contact related performance;
h. to continuously assess customer satisfaction;
i. to innovate within secure business boundaries and principles;
j. to cultivate a positive “no blame” approach to the coaching of staff;
k. to adopt an open and honest approach to service problems and to compensate customers in case of service flaw;
l. to benchmark their performance with others, formally or informally, within the public transport sector or with other sectors.
m. not to forget that the people who ultimately influence service quality in public transport are the bus driver, traffic warden, the person in charge of complaints or vehicle maintenance, etc. Their working conditions will influence directly their willingness and capacity to provide good service. Listening to the staff, communicating with them on their working conditions, on the firm's traffic management strategy, on the results of their work and on the practical
n. consequences for them of the management's decisions is therefore essential;

Quattro recommends authorities:

a. to define an urban development strategy including traffic management strategies;
b. on that basis, to formally agree on a policy for the network and explain clearly to
c. the bidding operators “how we will do things around here”;
d. to be clear on transport policy, its expected impact on behaviors and its
e. consequences on priorities in terms of quality;
f. to be clear about what they do best in-house and what they can contract out to others for what concerns not only public transport provision but also land use planning, road network developments, etc.;
g. to act to involve all the competent authorities in influencing public transport performance and all the participants in the system (like police committees or other operators who are not under the control of the authority) in the search for better public transport; quality partnerships with operators may be used in

addition to tenders and contracts and may help in establishing tariff co-operation;

h. to use tenders to promote quality management techniques by attaching importance to know-how and well-thought-out proposals in this respect;
i. to be specific on whether they will accept non-compliant bids and, if so, how they will consider and implement innovations;
j. to design penalty-and-reward systems in such a way as to avoid penalising the operator for matters beyond his control;
k. to commit on the achievement of targets under their own control (concerning for example the availability and quality of road and/or rail infrastructure) and if necessary to submit to penalty-and-reward mechanisms so as to reassure the bidders/contractors on the credibility of these commitments or to compensate them for the costs they might incur as a result of any failure by the authority to deliver the agreed conditions);
l. to try to develop with the operator(s) a working relationship favouring a co-operative attitude and stimulating innovativeness on the part of both parties;
m. to be clear on what they expect from the contractual relationship;
n. to use a balanced basket of objective and subjective performance indicators to evaluate the effectiveness of their programme and to try to involve customers in service quality assessment;
o. to encourage a positive "no blame" culture in their organisation and to try to achieve excellence in management through established principles;
p. to act as a learning organisation within the system, resorting to internal and external benchmarking with other cities and with other sectors to identify improvement opportunities: benchmarking may provide innovative and implementable solutions by looking at how traffic/mobility/public transport management but also other sectors (tourism, leisure, shopping centres, etc.) work in other cities;
q. to build experience in real situations by regularly using public transport themselves;

r. in their specific regulatory system, to use contracts, tenders and licensing to stimulate the operators to take the decision and orientations described hereafter.

Quattro recommends vehicle manufacturer:

a. to recognise that customer demands are driving the market, not the operators or the authorities' wishes;
b. to be ready to respond and support innovation in equipment design;
c. to fully support the operator by the establishment of adequate after-sales
d. services;
e. to make customer-supplier chains an accepted business practice;
f. to benchmark against competitors and other industries;
g. to seek to establish a visible professional competence by reaching standards set
h. for formal qualification (ISO 9000, XP X 50-805) and/or by implementing total
i. quality management principles at their level;
j. to achieve excellence in management and operations through established
k. management principles (e.g. EFQM).

Quattro set and defined quality determinants for UPT with considering passengers' needs and expectations. There are 8 determinants, which are illustrated in Table 2.3 with their definitions. These determinants are useful when public transport companies set service commitments.

Table 2.3 : Definitions of quality determinants

Quality Determinants	Definition
Availability	basic coverage of the service, in geography, time and transport mode.
Accessibility	the interface with other transport modes and the physical access to transport services.
Information	covers the availability of information pertinent to the planning and execution of a journey or a pattern of journeys.
Time	used for planning and executing a journey or a pattern of journeys.
Customer care	contains the elements needed to make the journey(s) easier and more pleasant, typically through human presence.
Comfort	the physical comfort obtained though the design of or use of installations and vehicles/vessels, or resulting from ambient conditions.
Security	actual degree of safety from crime or accidents and the feeling of security resulting from that and from other psychological factors.
Environmental Impact	the different effects on the environment resulting from public transport.

Source: QUATTRO, 1998, Final report synthesis and recommendations, Brussels

The CEN established a quality standard, EN 13816 Service Quality Standard for Public Transports in connection with Quattro research and final report. The main purpose of the standard is promote a quality approach to public transport operations and focus interest on customers' needs and expectations, by specifying procedures most likely to:

i. Draw the attention of the responsible parties to matters to be considered;

ii. Lead to relevant and well-founded decisions particularly with regard to the allocation of responsibilities
iii. Enable customers, and others, to compare service quality claims from alternative reliably
iv. Contribute to the implementation of a process of continuous improvement

Four main topics following in Table 2.4 with their contents are mentioned in the standard as requirements.

Table 2.4 : Main topics and requirements according to EN 13816

Main Topics	Requirements
Quality Management	• Defining services by setting quality criteria • Statement service standard • Level of achievement, expressed, where appropriate, as a ratio of passengers affected • Specification of Performance level to be targeted • Threshold unacceptability
Performance Measurement	• Selection of measurement methods • Decision about frequency of measurement • Decision about methods for computation of results, and appropriate validation • Documentation of results
Corrective Action	• Corrective action in the case performance targets are not met • Corrective action in the case of unacceptable performance • Appropriate communication
Customer Satisfaction Survey	• Delivered and perceived quality • Expected and perceived quality

Source: European Committee for Standardization, 2002, EN-13816 Transportation-Logistics and services-public passenger transport- service quality definition, targeting and measurement, Brussels

Service quality is defined as quality criteria under 3 Level. Quattro Project sets level 1 as service determinants, Level 2 and CEN team sets Level 3. Table 2.5 illustrates

the quality criteria according to their level. The operator should select additional criteria from Level 2 and Level 3 in accordance with his needs and preference for the particular service being defined (CEN, 2002)

Table 2.5 Distribution of quality criteria according to their level

Level 1	Level 2	Level 3
Availability	Modes	-
	Network	Distance to stop/stations; need for transfers; area covered
	Operation	Operating hours; frequency
	Suitability	-
	Dependability	-
Accessibility	External interface	Pedestrians; cyclist; taxi users; private car users;
	Internal interface	Entrances / exits to stops / stations; internal movement in vehicles
	Ticketing availability	Home ticketing; ticketing within system; ticketing at other locations
Information	General information	Availability; accessibility; time customer care; comfort; security; environment
	Travel information in normal conditions	Street directions; stop/station identity; vehicle direction; route; time; fare; type of ticket
	Travel information abnormal conditions	Current network status; suggested alternative; refund/redress; suggestions and complaints; lost property
Time	Length of travel time	Trip planning, access, egress, at platforms ,transfer points, in vehicle
	Adherence to schedule	Punctuality, reliability

Source: European Committee for Standardization, 2002, EN-13816 Transportation-Logistics and services-public passenger transport- service quality definition, targeting and measurement, Brussels

Table 2.5 : Distribution of Quality criteria according to their level (continued)

Customer Care	Commitment	Customer orientation, innovation and initiative
	Customer interfaces	Inquiries, complaints, redress, suggestions
	Staff	Availability, attitude, skills, appearance
	Physical assistance	At service disruptions; for customers needing help
	Ticketing options	Flexibility, Concessionary tariffs(discounts); through ticketing; payment options, consistent price calculations
Comfort	Usability of Passenger Facilities	At stop/Stations On Vehicle
	Seating and Personal Space	On Vehicle, at stops/stations
	Ride Comfort	Driving, Starting/Stopping, During Travel
	Ambient conditions	Air quality, whether protections, cleanliness, brightness, congestion, noise, other undesired activity
	Complementary Facilities	Toilets/washing, luggage other objects, communication, refreshments, commercial services, entertainment
	Ergonomy	Ease of movement, furniture design
Security	Safety from crime	Preventative design, lighting, visible monitoring, staff/police presence, identified help points
	Safety from accidents	Presence/visibility of supports e.g. handrails, availability/visibility of hazards, active safeguarding by staff
	Emergency management	Facilities and plan
Environmental Impact	Pollution	Exhaust, noise, visual pollution, vibration, dust&dirt, odor, waste, electromagnetic interference
	Natural resources	Energy, space
	Infrastructure	Effect of vibration, wear on road/rail etc, demands on available resources, disruption by other activities

Source: European Committee for Standardization, 2002, EN-13816 Transportation-Logistics and services-public passenger transport- service quality definition, targeting and measurement, Brussels

In measuring the quality of service performance for each criterion , appropriate methods shall be used. EN 13816 recommends three measurement methods, which are customer satisfaction survey, mystery shopping survey and direct performance measurement.

2.4.1.2 America example

American Transit Cooperative Research Program (TCRP) implemented a comprehensive research program, with analyzing performance measurement system of American public transport companies, in order to establish a guidebook for developing a transport performance measuring system. At the end of the research (2003), a report is published by TCRP. The report includes the service delivery standards and performance measurement methods of the public transport operators.

2.4.1.2.1 Service dimensions and service criteria in American companies

American public transport companies set service dimensions within performance management program. In the program the service dimensions and quality criteria are defined and measured as well as the economical performance. They set in generally in four service dimensions as performance indicators within service delivery. They indicate the quality of service for the public transport operators. Table 2.6 illustrates the quality dimensions and definitions.

Table 2.6 : Quality dimensions defined by American companies

Quality Dimensions	Definitions
Reliability	How often service is provided when promised
Customer Service	Measures assessing the quality of direct contract between passengers and agency staff, and overall measures of service quality
Passenger Loading	Measures of the Level Crowding on Transit Vehicle
Goal accomplishments	How well an agency has achieved its shorter term project goals

Source: TCRP, 2003, A guidebook for developing a transit performance measurement system, Washington: Transit Research Board

Table 2.7 illustrates the detail of programs conducted by public transport companies. It includes dimensions and the quality criteria which companies are measured. Within the frame of quality program, each quality criterion is defined in detail in order to establish service delivery standard and every criterion has a performance target. Although there are some differences in implementation phase between European and American approaches in quality programs, EN 13816, established by CEN, includes all the quality criteria, which are considered within performance measurement program by American Transport Company.

Table 2.7 : The details of American quality programs

Dimension	Quality Criteria	Example Target values	Data Requirement
Reliability	Headway Regularity	Service regularity: 85 for peak conditions and 90 % off peak conditions	• Field surveys or Automatic Vehicle Location Data
	Missed Trips	• %98 completed trip	• Schedule • Dispatching Logs
	Percent Of Scheduled Vehicles	• %99 %scheduled buses were placed into service	• Schedule • Dispatching Logs
	Equipment Reliability	• Reliability of escalator is %96	• Repair Log • Length of Service Day
Customer Service	Complaint Rate	• 17 complaints per 100,000 boarding	• Boarding Passengers • Documented Complaints
	Percent of Missed Phone Calls	• %99 calls connected with agent	• Phone Monitoring System
	Percent of Call Held Excessively Long	• Maximum time on hold 2 minutes	• Phone Monitoring System
	Customer Service Response Time	Response within • 2 working days for phone inquiries; • 6 working days for letter inquiries	• Date and time of response
	Staff Courtesy	• %80 positive rating in a customer survey	• Mystery Shopping Survey • Customer Complaints • Customer Satisfaction Surveys • Focus Groups
	Passenger Environment (Rail Vehicles)	• %93 of Trains have no litter or light litter • %98 trains have no broken door panels	• Checklist results
	Passenger Environment (Rail Stations)	• %90 of Stations have no litter or light litter	• Checklist results
Passenger Loading	Passenger Load-	• Less than value of 1.50	• Passenger Counts • Area per passenger

Table 2.7 : The details of American quality programs (continued)

Dimension	Quality Criteria	Example Target values	Data Requirement
Goal accomplishments	Action Achieved	• Award contract for Southeast Corridor design/build package	• List of planned projects, with their scheduled and actual completion date
	Percent of Goal Achieved	• Acquire right of way for Southeast Corridor, • Thornton park-and-ride expansion, %50 targeted	• List of planned projects, with their scheduled and actual completion date and number of people or items affected

Source: TCRP, 2003, A guidebook for developing a transit performance measurement system. Washington: Transit Research Board

2.4.1.2.2 Performance measurement methods

Although most agencies do not have the resources to conduct the same level of customer satisfaction surveys, larger systems often have the resources for annual sector (TCRP 2003). In the surveys, customer perceptions and expectations are defined. Passenger Environment Survey (PES) measures quality criteria such as cleanliness. The following sections briefly describe the PES programs developed by two agencies, MTA-NYCT and the Bay Area Rapid Transit District (BART).

2.4.1.2.3 MTA-NYCT example

MTA-NYCT's PES is a customer-oriented set of indicators generated quarterly by operations planning to measure customer perceptions of the environment in subway stations, subway cars, and buses (TCRP 2003). Table 2.8 provides PES indicators, criteria, and descriptions for metro vehicles. Table 2.9 provides similar information for subway and busway stations.

Table 2.8 : MTA-NYCT passenger environment survey indicators: vehicle

Indicator	Criteria	Description/Definition
Cleanliness And Appearance	Presence of litter(measured at the terminal)	None, Light, Moderate, or Heavy
	Cleanliness of floors and seats (measured at the terminal)	None, Light, Moderate, or Heavy
	Presence of litter (through out the day)	None, Light, Moderate, or Heavy
	Cleanliness of floors and seats (throughout the day)	None, Light, Moderate, or Heavy
	Present cars with no interior graffiti	Yes, No
	Present cars with no exterior graffiti	Yes, No
	Percent cars with no graffiti on windows	Yes, No
	Percent cars with no broken or cracked Windows	Yes, No
Customer Information	Percent cars with all system maps correct/legible	Yes, No
	Percent cars with all signage correct	Yes, No
	Percent cars with public address announcement	Percent of correct announcements versus total potential announcements expected
Functioning Equipment	Percent cars with no broken door panels	
	Lighting conditions in cars	Percent cars with at least %90 of lights on; car surveyed outside during daylight hours are not rated
	Climate conditions in cars	Percent cars with average interior temperature between 50F and 78F or at least 75% of fans operating when above 78F
Operations	Percent conductors proper uniform	

Source: TCRP, 2003, A guidebook for developing a transit performance measurement system, Washington: Transit Research Board

Table 2.9 : MTA-NYCT passenger environment survey indicators: stations

Indicator	Criteria	Description/Definition
Cleanliness And Appearance	Presence of litter	None, Light, Moderate, or Heavy
	Cleanliness of floors and seats	None, Light, Moderate, or Heavy
	Presence of litter	None, Light, Moderate, or Heavy
	Cleanliness of floors and seats	None, Light, Moderate, or Heavy
	Presence of graffiti	None, Light, Moderate, or Heavy
Customer Information	Station delay announcements	Understandable / Correct, Partially Understandable / Correct, Marginally Understandable / Correct, Not Understandable/Correct
	Percent stations with legible correct system maps	At least one map in both paid and unpaid areas; minor service changes must be updated within the quarter
	Percent stations with correct Passenger Information Center	Minor service changes must be updated within the quarter
	Percent Station Control Areas with a metro map available	Minor service changes must be updated within the quarter
Functioning Equipment	Percent Stations with functional enunciator (where applicable)	Percent cars with at least %90 of lights on; car surveyed outside during daylight hours are not rated
	Percent escalators/elevators in operation	Percent cars with average interior temperature between 50F and 78F or at least 75% of fans operating when above 78F
	Percent station public telephones in working order	Degree of understandability / correctness per delay occurrence
	Percent trash receptacles usable in stations	Measured by placing a call and/or listening for a dial tone
	Percent station control areas with working sale office microphone	Yes, No
	Percent working turnstile	High entrance and exit turnstiles not included
Operations	Percent sale agents wear uniform	Yes, No
	Percent sale agents properly displaying badges	Yes, No

Source: TCRP, 2003, A guidebook for developing a transit performance measurement system, Washington: Transit Research Board

PES is similar measurement methodology with Mystery Shopper Survey, which is recommended by EN 13816 as a measurement tool.

2.4.1.2.4 BART example

The PES program is intended to make sure that a high-quality riding environment is provided and that the quality improves over time. Table 2.10 illustrates the indicators and criteria considered in the PES.

Table 2.10 : BART passenger environment survey indicators

Indicator	**Criteria**
Facilities management	• station patio cleanliness • parking lot cleanliness • landscape appearance
Station operations	• station restroom cleanliness • station graffiti • advertising signs in stations • brochures in kioks
Station agent	• agent available or sign in place • agent in uniform • agent wearing name badge
BART police	• BART police personnel in stations • BART police personnel in parking lots/garages • BART police personnel on trains;
Public address announcements	• station arrival announcements • transfer announcements • destination announcements
Rolling stock	• train exterior graffiti • train doors operative • train interior graffiti • train interior cleanliness • train window etching • temperature on trains • advertising signs on trains

Source: A. Weinstein, R. Album, 1998. Securing objective data on the quality of the passenger environment transit riders: Redesign of the passenger environment measurement system for the Bay Area Rapid Transit District.

In addition to PES, recording performance detail automatically uses a measurement system. This measurement is similar with direct performance measurement, which is recommended by CEN.

Table 2.11 : Measurements by recording automatically

Criteria	**Sub criteria**
Elevator/escalator availability	▪ station elevator availability ▪ escalator availability (street) ▪ escalator availability (platform);
Fare collection availability	▪ fare gate availability ▪ ticket vending machine availability
On-time performance	▪ train on time

Source: A. Weinstein, R. Albom, 1998. Securing objective data on the quality of the passenger environment transit riders: Redesign of the passenger environment measurement system for the Bay Area Rapid Transit District.

3. DATA AND METHOD

3. 1 ISTANBUL ULASIM IMPLEMENTATION

SQMS consists of two main parts, which are establishing Service Delivery Standard and developing Performance Measurement Methods. Service Delivery Standard is a key factor that how passengers' needs and expectations are met. Hence, passengers' needs and expectations are important input for the standard. In addition, technical and economical capacities are determinative factors for the standard. After the standard is began to implement, the performance and perceive level is measured by performance measurement methods and customer satisfaction surbey. Figure 3.1, based on EN 13816 Standard's Service Quality Loop, summarizes instruction of the SQMS which is developed within this study at M2 metro line.

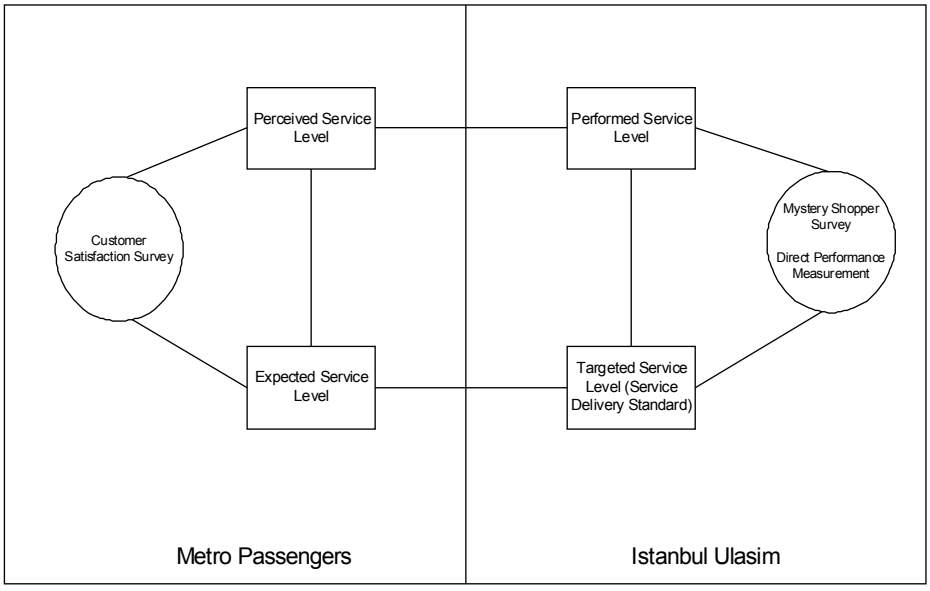

Figure 3.1 : Service quality loop
Source: European Committee for Standardization, 2002, EN-13816 Transportation-Logistics and services-public passenger transport-service quality definition, targeting and measurement, Brussels

3.1.1 Service Delivery Standard

Service Delivery Standard, explains how to deliver services to customers in stations, trains, and supporter services such as call center, web site. In order to establishing standard, the quality criteria have to be determined. Determinants and criteria are determined for metro line with respect to table 2.4, which is published by EN 13816. Determinants and quality criteria are shown in table 3.1.

Table 3.1 : Determinants and quality criteria

Determinants	**Quality Criteria**
Availability	Availability of escalators, lifts and moving walkways (travelators)
	Availability of ticket machines
	Availability of validation devices
Information	Permanent information in stations
	Permanent information in trains
	Client information in case of planned traffic disturbance
Time	Waiting for trains
Comfort	Cleanliness and neatness of metro stations
	Cleanliness and neatness of trains
	Passengers comfort in trains
	Passengers comfort in trains during the off-peak hours
Customer Care	Reception and information in station on the offer of services
	Contact Centre
	Web site
	Replying Written Complaints
Security	Fight Against Fare-dodging

AFNOR, which is French Certification Company, published NF 286 Specific Certification Rules of Urban Public Transport Services with respect to EN 13816. Service delivery standard for metro line is established according to NF 286 after determining quality criteria.

In addition to service determinants and quality criteria, standard covers service criteria, reference service, and requirement level, unacceptable situations that are defined in detail. Reference services, express the detail of the services for each criterion. Requirement level is a target that performance of the criterion should be reached. unacceptable situations are undesired situations.

3.1.1.1 Reference Services

Reference services are established for all quality criteria. In tables 3,2, 3.3, 3.4, 3.5, 3.6, 3.7, references services are defined according to service determinants and quality criteria.

Table 3.2 : Reference services of quality criteria related with availability

Quality Criteria	Reference Services
Availability of escalators, lifts and moving walkways (travelators)	When a passenger wants to use escalators and elevators, these devices must be in operation (except the cases of restoration and maintenance).
Availability of ticket machines	In each station, at every equipped access, the traveler can upload his Akbil(=electronic ticket) at Akbil machines. The customer must pay the exact amount and he gets a confirmation of the upload. In each station, at every equipped access, the traveler can buy a token at token machines. He recovers his change and gets information on the monitor.
Availability of validation devices	The traveler can validate his ticket (akbil or token) no matter what validation machine he's addressing to. One of the validation devices is accessible to all categories of users (PRM included).

Table 3.3 : Reference services of quality criteria related with information

Quality Criteria	Reference Services
Permanent information in stations	In the station relevant to the line, the traveler has at his disposal at least the following information legible and up-to-date: • The name of the station visible from the whole length of the train; • Useful information about where he can get a ticket; • Different directions, exits and possible connections; • Accessible maps of the rail system network; • Indication of frequencies during the day, timetable in the evening and mention of the right time of the first and the last passage; • Accessible district map with indication of accesses for the PRM; • The principal current fares; • The phone number of the Contact Centre • A clear signaling of the services, conveniences (included for PRM) and security rules applicable in the station;
Permanent information in trains	Outside (First and last carriages) : • The line number (front and rear indicators); • The vehicle destination (front indicator). • Inside, the traveler has at least, on every platform, all the following information about the line, legible and up-to-date : • A map of the line; • Rules and advices about the use of the train, defined by the company; • A map of the Metro network if technically possible (defined by the company); • An audible announcement of the stops.

Table 3.3 Reference services of quality criteria related with information (continued)

Quality Criteria	Reference Services
Client information in case of planned traffic disturbance	The duration of the disturbance doesn't exceed 1 day: All the clients concerned by an expected operational incident affecting directly or indirectly the metro traffic, receives messages in Turkish. They are spread regularly to all of the clients concerned in order to inform them on the foreseeable waiting time and the eventual means of substitution. *At the stations:* posters/ board at the concerned stations passes across the information 5 days before the disturbance. This information should contain the estimated date, time and place. Verbal information is delivered by the staff at the critical places''. *Metro trains*: the driver on the affected parts of the line spreads verbal information in the compartment. *Contact Center*: information is available. The duration of the disturbance is more than 1 day : All the clients concerned by an expected operational incident affecting directly or indirectly the Metro traffic receives messages in Turkish. They are spread regularly on the whole line 5 days in advance, in order to inform the clients on the foreseeable waiting time and the eventual means of substitution. *At the stations :* The information by poster and/or notice board is set in every operational point concerned at the latest 5 days before the beginning of the disturbance. The means of substitution are clarified on them. This information consists of a foreseeable date and hour of beginning and ending of the disturbance. The agents at key places give verbal information, the days of the disturbance. *Metro trains*: the driver at the affected parts of the line spreads verbal information in the compartments, the days of the disturbance. *Contact centre*: Information is available 5 days in advance. *Web Site:* Information is available 5 days in advance of the disturbance.

Table 3.4 : Reference services of quality criteria related with time

Quality Criteria	Reference Service
Waiting for trains	The travelers wait for the metro on the platform: From Monday to Friday: ▪ Less than 6 minutes in the rush hours ; ▪ Less than 8 minutes in the off-peak hours ; ▪ Less than 12 minutes during the early morning and night hours. On Saturdays, Sundays, public holidays or equivalent : ▪ Less than 12 minutes during the day and night hours.

Table 3.5 : Reference services of quality criteria related with comfort

Quality Criteria	Reference Service
Cleanliness and neatness of metro stations	▪ On his way, the traveler goes through stations that are clean and in good state. ▪ These notions are evaluated on the following aspects : ▪ Odour (smell), ▪ lighting, ▪ cleanliness, ▪ good state of the premises and equipment (details are defined in service standard guidelines for mystery shoppers.)
Cleanliness and neatness of trains	▪ On his way, the traveler uses trains that are clean and in good state. ▪ These notions are evaluated according to the following aspects : ▪ Odour (smell), ▪ lighting ▪ inside and outside cleanliness, ▪ state of equipment (details are defined in service standard guidelines for mystery shoppers).
Passengers comfort in trains	There is no more than 4 passengers per m² in the train
Passengers comfort in trains during the off-peak hours	There is no more than 4 passengers per m² in the train

Table 3.6 : Reference services of quality criteria related with customer care

Quality Criteria	Reference Service
Reception and information in station on the offer of services	Station zone chief, sale agents and security staff visible by the travelers: ▪ Are courteous and welcoming, ▪ Have a good presentation, ▪ Wear the identification of the company, ▪ Advice the travelers on travel possibilities tickets and fares. In the operating hours, near turnstiles area at least one sale office is open and sale office is; ▪ Easily noticeable, correctly lighted, orderly and clean. ▪ Given information is up-to-date and useful. ▪ On his demand, the traveler gets a metro map and/or information about the fares.. ▪ The agents deliver the ticket the client needs. If needed, he takes back the ticket he just delivered. ▪ The traveler is allowed to pay cash.
Contact Centre	Istanbul Dualism Contact Center-444 00 88- is available whole weekdays and weekends (included holidays). Contact center serves in two ways which are automated audible announce and passenger assistant. Passenger assistant (Monday-Saturday 07:30-21:00 Sunday 08:30-19:00): ▪ Must be courteous and help the passengers about suggestions and complaints, lost properties, current fares and journey alternatives ▪ Assures reply of all calls in less than one minute (except for traffic disturbances or unexpected security problems on the lines) Automated audible announce system works 24 hours. Passengers are informed via Automated audible announce about: ▪ Timetables ▪ Current fares ▪ General Information about the rail systems in the city
Web site	Passengers can reach the up-date information which is: (www.istanbul-ulasim.com.tr / www.istanbululasim.com) ▪ Lines and timetables ▪ Ticket types and current fares ▪ Network map ▪ Passenger rules and safety rules ▪ Information about where and how to complaint and lost properties ▪ Contact Centre ▪ Information about planned traffic disturbance
Replying Written Complaints	Passengers can send their complaints by: ▪ Contact centre ▪ e-mail ▪ web site ▪ complaint boxes located in the stations ▪ kiosks ▪ fax The complaints made by passengers: ▪ Are investigated and personal reply adapted to the client is given in seven working days ▪ If the investigation takes more than seven working days, the passengers are informed about the situation and at the end of the investigation, the complaints are replied completely

Table 3.7 : Reference services of quality criteria related with security

Quality Criteria	Reference Service
Fight Against Fare-Dodging	In the operating hours, at least one security staff must stand in each turnstiles area. Security staff pays attention at the passengers and intervenes if there is a passenger who tries to pass without using ticket. Security staff controls free cards and gives permission to pass the turnstiles.

3.1.1.2 Requirement levels

Requirement levels express service performance target level that should be reached at the metro line. Requirement levels determined for metro line are shown in Table 3.8. Requirement Levels points that the percentage of passengers who are delivered services with respect to reference services.

Table 3.8 : Requirement levels of quality criteria

Quality Criteria	Requriment Levels (%)
Availability of escalators, lifts and moving walkways (travelators)	90
Availability of ticket machines	95
Availability of validation devices	95
Permanent information in stations	90
Permanent information in trains	98
Client information in case of planned traffic disturbance	80
Waiting for trains	98
Cleanliness and neatness of metro stations	80
Cleanliness and neatness of trains	80
Passengers comfort in trains	90
Passengers comfort in trains during the off-peak hours	80
Reception and information in station on the offer of services	80
Contact Centre	80
Web site	80
Replying Written Complaints	80
Fight Against Fare-dodging	90

3.1.1.3 Unacceptable Situations

Unacceptable situations shouldn't be faced during delivering services. Customers will be dissatisfied in case the situations occurred. Hence, the staff and managers should be careful in order of the situations. Unacceptable situations are defined in table 3.9, 3.10, 3.11, 3.12, 3.13, 3.14 according to quality criteria and service determinants.

Table 3.9 : Unacceptable situations of quality criteria related with availability

Quality Criteria	Unacceptable Situations
Availability of escalators, lifts and moving walkways (travelators)	An escalator or an elevator is to be out of order more than 1 hour without any announcements. ▪ Any passenger is to be kept into an elevator more than 15 minutes. ▪ Maintenance of an escalator in peak hours (07:30-09:29 and 17:00-19:59) when other escalators do not run and thus, the elevator cannot run (except breakdown cases). ▪ Although 24 hours have passed over escalators and elevators get out of order, there is no announcement about when they start to serve again.
Availability of ticket machines	▪ The traveler can't upload his Akbil in the station ▪ The traveler can't buy token in the station ▪ The change is not given (except warning message). ▪ The traveler, who paid the price of the ticket, didn't get it
Availability of validation devices	▪ The travelers couldn't validate their ticket. It means that no device works at an access ▪ A valid ticket isn't held back in the validation device and don't give the permission to pass the validation devices.

Table 3.10 : Unacceptable situations of quality criteria related with information

Quality Crtieria	Unacceptable Situations
Permanent information in stations	▪ The station remains more than 2 days without one of these information or more than 1 day with a wrong information (except on Saturdays, Sundays and public holidays). ▪ District map or current fares not up-dated or absent during more than 2 months. ▪ A traveler is misleading due to missing or wrong or ineligible information.
Permanent information in trains	▪ A traveler is misleading due to missing or wrong or ineligible information.
Client information in case of planned traffic disturbance	▪ The traveler present for 15 minutes in the Metro station affected by a planned traffic disturbance didn't get any verbal information. ▪ The traveler who arrived in a station where a disruption is in progress for more than 2 hours isn't informed of the disturbance and the possible means of substitution.

Table 3.11 : Unacceptable situations of quality criteria related with time

Quality Criteria	Unacceptable Situations
Waiting for trains	The waiting time for travelers on the platforms is; ▪ 9 minutes in the rush hours; ▪ 12 minutes in the off-peak hours of the day; ▪ 18 minutes in the early morning and night hours. ▪ 18 minutes on Saturdays, Sundays, public holidays or equivalent

Table 3.12 : Unacceptable situations of quality criteria related with comfort

Quality Criteria	Unacceptable Situations
Cleanliness and neatness of metro stations	▪ The traveler is injured or his clothes are damaged because of the degradations or the bad maintenance of the installations. ▪ A litter (dirt) is not cleaned one hour after it has been reported ▪ A station is not cleaned during 24 hours
Cleanliness and neatness of trains	▪ The traveler is injured or his clothes are damaged because of the bad maintenance of the equipment. ▪ The train runs with a tag more than 3 working days after reporting ▪ A dirty or bad smelling train stays in circulation after it passed by a terminal while the situation has been reported
Passengers comfort in trains	▪ A traveler cannot board in the train or in the following one
Passengers comfort in trains during the off-peak hours	▪ A traveler cannot board in the train or in the following one

Table 3.13 : Unacceptable situations of quality criteria related with customer care

Quality Criteria	Unacceptable Situations
Reception and information in station on the offer of services	▪ A traveler is misleading due to wrong information. ▪ The agent ignores on purpose the client. ▪ The agent's presentation is obviously incorrect. ▪ The agent is rude to the traveler. ▪ At sale office: ▪ The agent refuses a sale because of a lack of change ▪ The agents refuse to take back the ticket he/she just delivered. ▪ The agent is not able to deliver a map and/or information about the fares.
Contact Centre	▪ Contact center can't service for more than 2 hours due to technical problem ▪ Don't give the reply in less than 3 minutes (except for special situation such as major problem or unexpected security problems) ▪ Passenger assistant gives wrong information about the services given or is not courteous ▪ Automated audible announce system gives wrong or non-updated information about services given
Web site	▪ Passengers can't reach the web site for more than 2 days (except Saturday, Sunday and holidays) ▪ The information which is not up-date stays on the web site for more than 2 days (except Saturday, Sunday and holidays)
Replying Written Complaints	▪ The complaint isn't replied after it was received 14 working days. ▪ Client receives a standard and technical reply ▪ Engagements done by reply are not respected

Table 3.14 : Unacceptable situations of quality criteria related with security

Quality Criteria	Unacceptable Situations
Fight against fare-dodging	In turnstiles area, there is no security staff more than 30 minutes in Metro

3.1.2 Performance Measurement System

3.1.2.1 Mystery shopping survey

Mystery shopping survey is conducted by mystery shoppers who visit the company in order to review the issues related with service delivered. Mystery shoppers act as a real customer so that the quality of service is evaluated by customer–sight. Mystery shopping survey reveals the customer experiences and views about the services. The views and evaluation of the service are reported after the survey is fulfilled. It is a beneficial method in order to determine the level of service quality.

The company's goal is to offer excellent service to their customers so that they keep their customers, and gain new customers. Customers always expected excellent service and they don't tolerate the mistakes. Even one mistake after several successful services delivered they conclude the company cannot be counted on (Parasuraman et al. 1994). Hence the companies ought to provide sustainable excellent service which means that customers are offered excellent service in every service points and anytime. The big challenge is providing the same quality in each branch. In order to deal with this challenge, first step is measuring the branches regularly. The company may have several branches in different districts or cities. In the wide area employing staff for measuring their service quality is unaffordable since the transportation, accommodation costs are high. In addition, the measurements, which aren't objective view, are not reliable. Whereas Mystery Shopper Survey is an efficient and economic tool for measuring the branches of the company since mystery shoppers whom survey firm employs works part time. In different districts and cities different mystery shoppers can work so that they don't need to travel and stay in hotels. Therefore, the measurements are done economically as well as the results of measurements are taken in a short time. Moreover, the measurements are objective because mystery shoppers are independent from the company and they aren't recognized as an auditor by the staff. The mystery shopping survey embodies several characteristics that differentiate it from other evaluation procedures, as a technique for collecting individual evaluation data. First, it involves data collectors who are external to the system; second, it is a process that progresses differently for each evaluated employee, since it depends on the specific

way in which the interaction between the evaluator and the employee evolves; third, the data are usually collected as a one-time study, and an evaluation process follows each interaction, usually representing a narrow-activity span evaluated during a very short time; and fourth, the employee is unaware that he or she is being observed, though usually employees are aware of the fact that such a procedure is being used in the organization (Ilan and Shultz 2005)

Mystery shopping survey is used widely as a performance measurement system in service businesses such as banking, retail companies, automotive industry, hotels, oil stations, restaurants, fast food chains, call centers, cinema, theatre, entertainment places, e-commerce services. In addition, Public transport companies are interested in fulfilling mystery shopping surveys in order to improve quality of services.

Mystery shopping survey compares the performed services and the service promised. The results point the gap between performed and promised. In the services, the weakness and strengthens points are revealed with an objective way. The survey marks the mistakes that is made frequently affects the satisfaction of customer negatively. Besides, the service points such as branches, stations can be compared according to results. Their managers try to compete with others that provide increasing the level of service quality. Mystery shopping survey provides that follow the staff performance. Firstly, The results mark the requirement training programs and its effects on the staff performance after the training program is conducted. Secondly, the staff is aware of their performance and they concentrate on customer/work more than before.

3.1.1.2.1 Designing and implementing mystery shopper survey

In order to obtain reliable results with mystery shopper survey, the designing procedure is crucial. Designing procedure has 10 stages, which are shown in Figure 3.2. Although fulfilling the survey which is one of the stages seems to be uncomplicated, there are other stages which need to be planned and organized clearly. The toughest issue is evaluating the service objectively and fairly which depends on the achievement of the designing the related stages which are forming checklist, selecting and training mystery shoppers, establishing standards and

determining survey methodology. Designing these stages, which need to be worked in detail and long, are very important for successful survey.

Figure 3.2 : Stages of mystery shopping survey

3.1.1.2.2 Determining scope

The scope of survey is determined with respect to relationship between customer and company. Service points are differed according to type of services but services can be considered into three parts as before services, delivering services, after services. Before and after delivering services, customers may require to contact with the company in order to get information, buy ticket, booking, making complaint etc. Hence, before and after services need to be considered while determining scope of the survey in addition to delivering services so that the result represents the whole

services. Call centers, web sites, help desks that are commonly used for supporting before and after services, can be evaluated by mystery shoppers.

The services which are delivered to customers in metro line are defined in the reference service of metro. Hence, The scope of mystery shopping survey conducted in metro line is determined according to the reference service. Customers are delivered services in stations and train while they travel in metro line. Besides, call center, and web site, are the supporter service points which supply required information about the services such as frequency of journey, rail system map, journey alternatives, current fares etc. Customers can make complaints about the services delivered in the metro line. Collecting and replying complaints are defined in reference service so that mystery shoppers measure complaint management service. Consequently, the survey conducted at the metro line covers the criteria of stations, trains, and call center, web site and complaint management system.

3.1.1.2.3 Forming the checklist

The checklist is essential for collecting data and reporting the results. Designing the checklist is crucial since the reliability of results depends on it. Firstly the criteria, which should be located in the checklist, are determined. All criteria, which are mentioned in service delivery standard, should be located in the checklist. The service criteria are clear for metro line since they are defined in the reference service. The question should be answered is which criteria is measured by mystery shopping survey. The answer depends on two issues, which are the ability of mystery shopping survey. In the other words, every criterion cannot be measured by mystery shoppers since they have act as real customers. The measurements of mystery shoppers have limit time for measuring the service but some criteria may require much more time than they have. Beside, there is always risqué that mystery shoppers are recognized by the staff. In that case the measurement is given up since the data is not realistic and reliable. Therefore, both coordinators of survey and mystery shoppers are supposed to be careful while they are planning and fulfilling the survey. In table 3.15 illustrates the measurement system according to criteria.

Table 3.15 : Definition of measurement system according to criteria

Quality Criteria	Definition of Measurement System
Information	**Mystery shoppers visit stations to measure how well the information provided to passengers conforms to agreed standards.** "Mystery shoppers" visit stops to measure how well the information provided to passengers conforms to agreed standards.
Time	**Overall and Excess Average Weighted Journey Times** This measure monitors progress towards minimizing customers' journey time. Performance data and sample surveys are used to determine the average time taken for a journey on the system.
Customer Care	**%Customers Welcomed in Accordance with Agreed Standard** Ticket offices are visited by a " mystery shopper" who measures how well the reception provided to customers conforms to agreed standards. The measure checks that the service experienced by the customer conforms with the standard in the following areas: a. Ticket office easy to find b. Cleanliness of window c. Lighting and organization d. Staff availability and politeness e. Choices of payment methods
Comfort	**MSS Ambience** Mystery Shoppers travel around the network choking attributes identified as being important by customers. Specific journeys are assigned to surveyors who rate aspects of the service, such as crowding levels and cleanliness against pre-defined standards.

Source: European Committee for Standardization, 2002, EN-13816 Transportation-Logistics and services-public passenger transport- service quality definition, targeting and measurement, Brussels

The criteria which are measured by mystery shopper survey is shown below:

a. Availability of ticket machines
b. Availability of Turnstiles
c. Permanent Information at Stations
d. Permanent Information in Trains
e. Welcoming and Information in Station on the offer o services
f. Availability of Escalators, Elevators and Moving Walkways
g. Cleanliness and Neatness of Metro Stations
h. Cleanliness and Neatness of Trains
i. Contact Center
j. Web Site
k. Replying Written Complaints
l. Fight Against Fare-dodging

The criteria which aren't measured by mystery shopper survey is as shown below.

Waiting for Times: It is measured by direct measurement system since the data of actual train movement can be collected.

Passenger Comfort in Trains: The passenger density in trains must be known in order to calculate service level. The number of passengers cannot be counted by mystery shoppers.

Client Information In case of Planned Traffic Disturbance: Planned Traffic Disturbances doesn't occur regularly in metro line. In case planned traffic disturbance occurs the service can be measured with specific checklist by auditing staff belongs the company since the measurement of the criterion doesn't required mysterious.

Passenger Comfort During Off-Peak Hours: The criterion has same measurement methodology with passenger comfort in trains.

After the main criteria are determined, the sub criteria are defined in the checklist. While sub criteria are defined the reference services are considered. Reference services consist of separated sub criteria. For some main criteria the reference service is defined in general since the sub criteria may change according to line, station, period or staff. These criteria are cleanliness and neatness of stations, cleanliness of neatness of trains, reception and information on the offer of services (in station).

For cleanliness and neatness of metro stations consists of four definitions, which are smell, lighting cleanliness and good state of the equipment. The metro stations have three partitions, which are entrance, mezzanine and platform.

Smell: It is evaluated for whole station with one sub criterion. There shouldn't be any disturbing smell in the station.

Lighting: It is evaluated for three partitions with three sub criteria. The lighting is supposed to be enough to supply a secure and safe journey.

Cleaning: It is evaluated for three partitions with several sub criteria. The way which customers used for their travel in metro stations, is supposed to be clean. On their way, they face mostly with floors, stairs, bins, walls, ceilings, windows, advertisement boards, vending machines, and seats in the stations. All of these materials are evaluated according to their cleaning condition in mystery shopper survey. In addition, graffiti, which is a kind of dirtiness, is checked whether it exists or not.

Good State of the premises and equipment: In mystery shopper surveys, the changeable criteria are measured in order to supply targeted service level. The physical condition of station isn't evaluated in detail since it doesn't change strictly among the measurements. Besides, physical condition doesn't require mysterious measurement. Hence, it should be evaluated internal audits in detail. In the survey, the equipment which condition can be change easily because of broken is evaluated according to their state such as ceiling, window, and seats.

The sub criteria of cleanliness and neatness of metro stations are shown in Table 3.16.

Table 3.16 : Sub Criteria of cleanliness and neatness of metro stations

Cleanliness and neatness of metro stations	There is no disturbing smell in the stations.
	ENTRANCE
	5.2.1 There is no graffiti on the entrance area.
	5.2.2 The bins are empty.
	5.2.3 Stairs are clean
	5.2.4 Floors are clean
	5.2.5 Lighting is enough
	5.2.6 The walls are clean
	5.2.7 The ceilings are clean and neat
	5.2.8 Windows are clean and neat.
	5.2.9 Advertisement Boards are clean
	5.2.10 Vending machines are clean (ATMs, Pepsi, Ulker)
	5.3 MEZANINE
	5.3.1 There is no graffiti on the mezzanine area.
	5.3.2 The bins are empty.
	5.3.3 Stairs are clean
	5.3.4 Floors are clean
	5.3.5 Lighting is enough
	5.3.6 The walls are clean
	5.3.7 The ceilings are clean and neat
	5.3.8 Turnstiles are clean
	5.3.9 Windows are clean and neat.
	5.3.10 Advertisement Boards are clean
	5.3.11 Vending machines are clean (ATMs, Pepsi, Ulker)
	5.4 PLATFORM
	5.4.1 There is no graffiti
	5.4.2 The bins are empty.
	5.4.3 Floors are clean
	5.4.4 Lighting is enough
	5.4.5 The walls are clean
	5.4.6 Seating are clean and neat
	5.4.7 Advertisement Boards are clean
	5.4.8 Vending machines are clean (ATMs, Pepsi, Ulker)

3.1.1.2.4 Establishing service standards

In mystery shopper survey the big challenge is preventing the subjectivity of the result. In other words all mystery shoppers are supposed to evaluate the service in same manner. They shouldn't evaluate the same service in different views and

results. In order to supply the objectivity, firstly the service standards should be defined accurately by the company. The standards should explain the acceptable and unacceptable situations which mystery shoppers evaluate the service according to . For instance, the cleaning is perceived differently. People have different opinions about the clean and dirty conditions. Therefore, a place may be evaluated as dirty, semi-clean or clean by mystery shoppers if they aren't told what clean is for the place measured. The standards supplies that the difference of the view is eliminated. Beside, the place can be clean or dirty but the decision of cleanliness has to be made by the company. Otherwise, the results aren't reliable and cannot be used for improving the service quality since the evaluation methodology isn't known. In addition the results may differ in every month even the performance in same level when the standards aren't defined. After a while the staff doesn't count on the results. Hence, firstly the standards of all service criteria should be defined and secondly explaining method should be determined. A guideline should be prepared for explaining method and it is a beneficial way that the standards are explained via photographs. For instance, the situations accepted as dirty and clean can be told via different sample photographs, which help mystery shoppers, that they can understand the standards easily and they can measure the service objectively.

The standards should be shared with the staff that is related with any kind of service issues as well as mystery shoppers. Owing to standards staff understands the result easily since the evaluation criteria are known and the problems can be dealt with easily.

Service Standards Guideline for Mystery Shoppers are prepared for the services delivered at the rail system. This guideline is common for all lines, which belongs to Istanbul Ulasım. In the guideline mystery shoppers are told how to evaluate the main criteria and sub criteria located in the checklist. The situations accepted as positive and negative explained via sample photographs. Beside, the unacceptable situations and detection methods are defined in the guideline. The guideline is prepared with consensus of the operation and quality department. In the other words operation department participates process of determining the evaluation methodology. Therefore the staff accepts the results of mystery shopping survey and the

improvement and corrective activities are taken in a short time. A part of Service Standards Guideline for Mystery Shoppers can found as Appendices A.5.

3.1.1.2.5 Determining the survey methodology

The survey methodology expresses how the survey will be fulfilled. Customer activity cycle, which remarks the relations with customer and company, is useful for determining the scenario. Customers have different activities for each service types. For instance, most metro customers buy the ticket during journey in the station, for the airlines, the customers can buy the ticket from call center in advance. Consequently, the scenarios of metro and airlines surveys are supposed to be different.

The mystery shopper survey covers the services delivered by metro line, call center, web site and complaint management system areeasured by mystery shopper. While the frequency of measurement is calculated, the cost of measurements and adequate number of measurement for reliable data are considered. Since all lines are integrated and they are located in Istanbul the accommodation cost is zero and transportation cost is low. After all this issues are considered, the decision is doing measurements once a week in every station. In other words, Taksim-4.Levent metro line is measured 24 times in each month. Table 3.17 illustrates the frequencies of measurements according to stations.

Table 3.17 : Distribution of measurements according to stations

Station	Measurements per month
Taksim	4
Osmanbey	4
Şişli	4
Gayrettepe	4
Levent	4
4.levent	4
TOTAL	**24**

Distribution of measurements according to time periods are shown in Table 3.18. There are five time periods, which consists of peak hours and off peak hours.

Table 3.18 : Distribution of measurements according to time periods

Time Period	Time	Measurements per year
Morning Peak Hours	07:30-09:30	58
Morning Off Peak Hours	09:30-12:00	57
Afternoon	12:00-17:00	58
Evening Peak Hours	17:00-20:00	58
Evening Off Peak Hours	20:00-00:30	57

Distribution of measurements according to support services are shown in Table 3.19. There are two types of services, which are information and complaints.

Table 3.19 : Distribution of measurements according to supporter services

Service type	Service points	Measurements per months
Information	Web Site	4
	Call Center	15
Complaints	Complaint boxes	15
	Mail	10
	Call Center	5

The scenario is formed according to customer activity cycle of a standard customer. There are two alternatives for buying a ticket that are shown in the table below.
In metro line customers can buy their tickets in two ways, which are using sale office and ticket machines. Akbil and jetton are ticket types that customer can buy from ticket machines. The numbers of measurements are shown in Table 3.20 according to buying ways.

Table 3.20 : Distribution of measurements according to buying ways of ticket

Buying Ticket		**Number of Measurements/Month**
Sale Office		2
Ticket Machine	Akbil Uploadding (Akbil24/Jetonmatik)	1
	Buying Jetton	1

In measurements mystery shopper uses the machine for uploading his/her akbil or buying jetton according to his /her scenario which are notified to him/her before the measurement. The machine is supposed to be available when mystery shopper arrives in front of the machine. Mystery shopper tries to upload the akbil or buy a jetton from the machine. If he uploads the akbil or buy a jetton without any problem, the service accepted as "positive". Otherwise, it is accepted as "negative". After he uploads or buys a jetton, he is supposed to get confirmation that the operation is completed successfully. If he gets the confirmation, the service accepted as "yes".

After the ticket is bought, mystery shopper arrives in front of the turnstiles in order to validate or use it. Since there are several turnstiles in metro stations mystery shopper select a turnstile so as to pass through. In case there is a broken turnstile having information about the failure, it is not selected. Mystery shopper uses his jetton or validates his akbil just before pass through a turnstile. The turnstile is supposed to open so that mystery shopper can pass. If he passes without any problem just after using or validating the ticket, the service accepted as "positive".

If there is a broken machine which mystery shopper has problem with, mystery shopper tries the other machines (until pass through) in order to carry on the measurement. In turnstile area at least one turnstile is supposed to be available for all categories of user (disadvataged passenger.) Mystery shopper checks the turnstile whether it is available. If disadvantaged passenger's pass is available, this service is accepted as "Yes". In case of failure or maintenances of disadvantaged passenger pass, an alternative pass is supposed to be available for disadvantaged passenger.

In stations, customers are supplied information via infopanos or signs. Infopanos located around ticket office and at platforms (perone) have following information:

a. Travel timetable
b. Accessible district map with indication of accesses for the PRM
c. Indication of frequencies during the day, timetable in the evening and mention of the right time of the first and the last passage
d. Accessible maps of the rail system network.
e. The phone number of the Contact Centre, the website
f. Pictograms and texts showing travel and security rules
g. The principal current fares (also must take place at ticket offices)

Mystery shopper selects an infopano located in his way, checks it whether information exists and is up-to-date or not. Since auditing up-date is complicated mystery shopper checks the revision number of the publishment seen on the infopano. The revision number is notified to mystery shopper and he checks whether it is conformed or not. Signs located in the stations have this information:

a. The name of the station visible from the whole length of the train
b. Different directions, exits and possible connections;
c. Useful information about where he can get a ticket;

Mystery shopper checks the signs defined above while he is travelling in station and train.

Before mystery shopper gets on the train, he checks the information, which are the line number (front and rear indicator) and the vehicle destination (front indicator) located outside of trains. When mystery shopper travels in the train , he checks the information which are a map of the line, pictograms and texts showing travel and security rules and a map of the metro network. The information is located in every platform (door area) in the train. Mystery shopper measures only a platform, which he stands.

Within the criterion of reception and information in station on the offer of service, sale office, sale agents and security staff are measured. Distribution of four measurements is shown in Table 3.21.

Table 3.21 : Distribution of measurements according to staff

Measurement Alternatives	Number of Measurements/Month
Sale office/agents	2 (2 of 4 audits)
Security Staff	4 (4 of 4 audits)

Mystery shopper evaluates the sale office and agents while s/he buys a jetton from sale office. Mystery shopper evaluates the following issues

a. Information given by sale office/agents
b. Cleanliness and neatness of sale agents
c. Courteousy and welcoming of sale agents
d. Presentation of sale agents

Mystery shoppers can ask sale agents a question about travel alternatives and a network map. Sale agents are supposed to help mystery shopper about travel alternatives and give them a network map when they ask. Security staff stands near turnstile area in order to help customers in case they have problem during validation of ticket. They give information customers about travel alternatives when customers ask. In addition they try to supply a secure and safety area for customers. Mystery shopper checks the security staff while s/he passes turnstile area and asks staffs a question about travel alternatives. Security staff is supposed to answer the question asked by mystery shopper.

In every station there are escalators and lifts in order to provide accessible stations for customers. In Taxi station customers have to walk a long distance to access the train. In order to decrease access of train there are moving walkways in the station.

For escalator/lift/moving walkway measurement mystery shopper uses the equipment located on his way and according to the scenario. In the measurement mystery shopper checks whether they work or not. In case there is a broken in escalator/lift/moving walkway they check whether there is available information about the failure on the equipment. Table 3.22 illustrates the distribution of the measurements.

Table 3.22 : Distribution of measurements according to equipments

Audit Scenario	Number of Measurement
Escalator	3
Lift	1
Moving walkway	When it is used

Mystery shopper evaluates the cleanliness and neatness of metro stations according to checklist and service delivery standard. On his way he checks the smells, cleaning, lighting and neatness of stations. The criteria are measured in three parts of stations, which are entrance, mezzanine and platform. The measurements are started just after mystery shopper enters the station and they are just after mystery shopper boards the train. Mystery shopper is supposed to define the stituations in detail if he faces a problem related with the criterion. In the measurement mystery must be supplied the reference services. During measurements, if adverse weather conditions occur, mystery shopper marks out "Weather conditions" for "Stairs are clean" and "Floor space is clean" criteria, which belongs to entry part. If there is an extraordinary dirtiness in stations, mystery shopper writes down and explains the situation in detail on the checklist. The criterion loses 15 points from the total score, when extraordinary dirtiness occurs in the stations.

Mystery shopper evaluates the cleanliness and neatness of trains according to checklist and standards. While he is on board he checks smells, cleaning, lighting and neatness of trains. The measurements start just after boarding the train and ends just after alighting the train. If the train is overcrowded, the floor and seats aren't seen therefore mystery shopper can't measure "Floor is clean" and "The seats are clean and no damaged" criteria. In this case he marks "Not seen" on the checklist.

Call Center is measured 15 times in a month in order to check the information given by call center. Mystery shopper calls the Istanbul Ulasim Call Center, 444 00 88, as a real customer. Firstly, mystery shopper checks the automated audible announcement whether the information is available and up to date. Secondly he is put through passenger assistant and checks her performance.

Timetables, current fares and general information are given by automated audible announcements. While mystery shopper measures the performance of passenger

assistant, he checks waiting times on the phone, courtesy and helpfulness of passenger assistant.

Web Site is measured four times in a month in order to check the information given. Mystery shopper accesses the web site with www.istanbululasim.com or www.istanbul-ulasim.com.tr . Mystery Shopper checks the information whether they are available and up to date. The information supplied by web site is shown below:

a. Lines and timetables
b. Ticket types and current fares
c. Network map
d. Passenger rules and safety rules
e. Information about where and how to complaint and lost properties
f. Contact Center
g. Information about planned traffic disturbance

The criterion of replying complaints is measured in three ways, which are illustrated in Table 3.23.

Table 3.23 : Distribution of measurements according to complaints way

Complaints way	**Number of Measurements /Month**
Complaint boxes	15
Mail- halkailiskiler@istanbul-ulasim.com.tr	10
Contact Center -444 00 88	5

While measuring the criterion, mystery shoppers make a complaint in accordance with issues observed and complaints scenarios prepared in advance. Mystery shopper leaves his/her contact detail while he makes a complaint in order to check reply of the complaint. Complaints made by customers must be replied in seven working days. He checks the duration of the reply process and response of the complaint. The response must be true and understandable.

3.1.1.2.6 Selecting and training mystery shoppers

Selecting and training procedure is seriously important since the service level of company is determined with the measurements done by mystery shoppers. They are supposed to be capable of remembering and explaining the situations in detail what they have experienced during the service. While mystery shoppers are being selected, they have a test which examines the strengthens of their memories. Mystery shoppers have to pass the test in order to participate the survey.

In training procedure, the service standards of the company are told and explained in detail. The standards should be published as a guideline that may explain the service standards with photographs is beneficial for mystery shoppers. Mystery shoppers can use the guideline even after the training.

In the training of mystery shopper survey conducted at the metro line , the following subjects are mentioned:

a. Survey methodology
b. Survey rules
c. Service Standards Guideline for Mystery Shoppers
d. When and how to implement the scenarios
e. When and How to fill the checklist

3.1.1.2.7 Installing calculation method of service level

After the checklists are collected and edited, the quality level is calculated by using the data. The calculation methods provide to figure out the service level that expresses the quality of service and performance of the company. It projects operation departments and staff performance. The results may effect the management decision for improving the service. Therefore, calculation method should be installed carefully and it should be tested for a while in order to ensure that it works well and the results are reliable and valuable.

Calculation methodology should consider the question shown below

a. How quality level of the main criteria will be calculated?
b. How the results of the branches/stations/offices will affect the quality level?
c. Will the total quality level be calculated? If yes, how?

Service level expresses the performance of the company and quality level of the service delivered to customers. Calculation method answers the question that is “how the performance and quality level is calculated”. Metro service level goals are based on how many customers get the promised services such as “90 percentage customers benefit the reference service”. Therefore, the results are weighted according to density of customers in stations and trains in the calculation methodology. In addition to calculation of service level, density of customers’ calculation is defined in the calculation methodology.

Calculation process for the quality criteria has two stages that are unweighted service score and weighted service score. Unweighted service score is calculated by two ways that are absolute service level and sub-scored. Absolute service level expresses that the service needs to be delivered completely. In other words, all sub criteria are supposed to be delivered successfully since some services can’t be separated. For instance, the criterion of availability of ticket machine (Akbil 24) has two sub criteria that are related with uploading akbil and getting change and the confirmation information. In case uploading akbil is supplied well and getting change isn’t supplied, the customer will dissatisfy from the availability of machine due to the problem. In this case, the service level is supposed to be zero, because the lack of service affects customers terribly. Besides, absolute service level is a good way in order to build a high quality service since the mistakes and faults influences the results strictly. SQMS has to ensure that the staff is very proactive in order to eliminate mistakes in a short time and supply complete service.

If all sub criteria are accepted as positive in the measurement, service level of main criteria is accepted as conformal service, if any sub criterion is accepted as negative in the measurement, service level of main criteria is accepted as no conformal service. Conformal and no conformal situations are stated precisely and then these statements are transmuted numeric values. During transmuting, conformal statements are accepted as 100, no conformal statements are accepted as 0.

The criteria calculated with absolute service level are availability of ticket machines, availability of validation machines, permanent information in stations, permanent information in trains, fight against fare-dodging, contact center, replying written complaints.

In sub-scored methodology every sub criterion have a score in order to calculate the unweighted service score. Sub-scored is useful for the services having lots of separable sub criteria that do not influence the total service level strictly when one or two of them are lack. For instance, the criterion of the Cleanliness and Neatness of Metro Stations has four parts and 30 sub criteria so that the criterion is calculated with sub-scored. In addition, some services depend on the human performance, which is managed more difficultly and needs more tolerance than the machine's performance. Hence the criteria, which depend on the human performance, are calculated with sub-scored. Each sub criterion is given scores by their summation is 100. If criterion is accepted as "positive", it gets the score assigned, if criterion is accepted as negative and it gets 0 (zero) score. After the audit, summation of all sub criteria's scores express the unweighted service score for the main criteria. The criteria calculated with sub- scored are reception and information on the offer of services, cleanliness and neatness of metro stations, cleanliness and neatness of trains and website.

The sub criteria of Cleanliness and Neatness of Metro Stations are scored according to their priority. In the score system, 1, 3, 4 and 5 point are used. In this sub-scoring;

First priority: Areas and places where travelers pass and use. Orderly bin takes first priority for purpose preventing pollution which may effect of our passenger's health.

Second priority: Areas and places that our passenger may come across.

Third priority: Places that our passengers pass and use less.

Fourth priority: Places that include commercial issues such as adversarial and vending machines

Scores are shown in 3.24 according to sub criteria.

Table 3.24 : The scores of cleanliness and neatness of metro stations

CRITERIA 7: CLEANLINESS AND NEATNESS OF METRO STATIONS (M2)	SCORE
7.1 There is no annoying smell	4
7.2 ENTRANCE	
7.2.1 There is no graffiti in entrance	4
7.2.2 The Orderly bins are empty.	5
7.2.3 The Stairs are clean.	5
7.2.4 The floor space is clean.	5
7.2.5 The lighting is enough.	4
7.2.6 The walls are clean.	3
7.2.7 The ceiling is clean.	2
7.2.8 The windows are clean.	2
7.2.9 Advert clipboards are clean.	1
7.2.10 Vending machines are clean (Ulker, Pepsi etc.)	1
7.3 MEZZANINE	
7.3.1 There is no graffiti in mezzanine section.	4
7.3.2 The orderly bins are empty.	5
7.3.3 The stairs are clean.	5
7.3.4 The floor space is clean.	5
7.3.5 The lighting is enough.	4
7.3.6 The walls are clean.	3
7.3.7 The ceiling is clean.	2
7.3.8 Tourniquets are clean.	4
7.3.9 The windows are clean.	2
7.3.10 Advert clipboards are clean.	1
7.3.11 Vending machines are clean (Ulker, Pepsi etc.)	1
7.4 PLATFORM	
7.4.1 There is no graffiti in platform.	4
7.4.2 The orderly bins are empty	5
7.4.3 The floor space is clean.	5
7.4.4 The lighting is enough.	4
7.4.5 The walls are clean	4
7.4.6 The banks are clean and neat.	4
7.4.7 Advert clipboards are clean.	1
7.4.8 Vending machines are clean (Ulker, Pepsi etc.)	1
Total	**100**

In stations, there may be an extraordinary dirtiness that causes dissatisfy of customer. In that case according to the Table 3.24 the service level would lose maximum five points and the criterion would get 95 points despite of the extraordinary dirtiness problem. Therefore, if there is extraordinary dirtiness mystery

shopper defines on the checklist. In that case the criterion loses 15 points from total score.

All sub criteria have same priority for the cleanliness and neatness in trains therefore they have same score. The scores are shown in Table 3.25 according to sub criteria.

Table 3.25 : The scores of cleanliness and neatness in trains

Criteria 8: Cleanliness and Neatness in Trains	**Score**
8.1 Outer surface of the train is clean.	**10**
8.2 There is no graffiti on outer surface.	**10**
8.3 The floor space are clean inner of the train	**10**
8.4 Train's windows are clean.	**10**
8.5 There is no graffiti inner of the train.	**10**
8.6 There is no bad smell inner of the train.	**10**
8.7 The lighting is enough.	**10**
8.8 The train's handholds are clean.	**10**
8.9 The train's seats are clean and well kept	**10**
8.10 The tags inner of the train are clean and neat.	**10**
Total	**100**

The score system consists of four and eight points for reception and information on the offer services. In this sub scoring,

First priority: The criteria that the company needs to focus more in order to improve the quality of the main criterion.

Second priority: The criteria are less important for the customers

The scores are shown in Table 3.26 according to sub criteria.

Table 3.26 : The scores of reception and information on the offer of services

Sub criteria	**Score**
Sales agent's collar identity card is put	8
Sales agent's behaviors are generally positive	4
Sales agent answered to the question kindly and politely.	4
Sales agent's answer is clear, correct and enough.	8
Sales agent's personal care is proper.	4
Sales agent's apparel is compatible with corporation standards	4
Security Staff's collar identity card is put and his name is visible.	8
Security Staff's behaviors are generally positive	4
Security Staff answered to the question politely.	4
Security Staff's answer is clear, correct and enough.	8
Security Staff's personal care is proper.	4
Security Staff's apparel is compatible with corporation standards.	4
Security staff behaves compatible with formal position standards	8
Sale office can be recognized easily.	4
There is no information not corporate or not up-to-date on sale office.	8
There is a network map at sale office.	4
There is a list of fares on sale office.	8
Sale office is light, clear and blazes.	4
Total	**100**

During these auditions, the situation of unvisited areas is accepted as conformal service.

The Score system consists of 15 and 10 points for web site. 15 points are used for casual information criterion, 10 points are used for the criterion that is about planned traffic disturbance that is located in the web site in case the traffic disturbance occurs. The scores are shown in Table 3.27 according to sub criteria.

Table 3.27 : The scores of web site

Sub criteria	Score
1. Timetable stands	**15**
2. Ticket types and Current fares stand	**15**
3. Network map exists.	**15**
4. Information about where and how to make complaint and lost property is indicated	**15**
5. Contact Centre and SMS GSM Suggestion Number stands–**444 00 88-**	**15**
6. Passenger rules and safety rules are expressed	**15**
7. Information about planned traffic disturbance is indicated.	**10**
TOTAL	**100**

While calculating weighted service score of the criteria related with station the results are weighted according to passenger density of stations. In order to calculate the density of stations, the numbers of customers are collected from the turnstiles, which the customers have to pass while they go to the train. The formulation used for calculating weighted service score is shown as 3.1.

$$\mathbf{Ws}=\sum_{i=1}^{n}(Pd)_i(Us)_i \qquad \textbf{(3.1)}$$

Ws: Weighted service score

n: Number of stations in line

Pd: Passenger density ratio in stations

Us: Calculated unweighted service score of station

i=1,2,3,4,5,6

For instance, in all stations of M2 line, unweighted service score, passenger density, weighted service score of availability of ticket machines criteria are going as in Table 3.28. According to formulation the crowded stations such as Taksim are more important and in case there is a problem with the service in that station the service

level is influenced strictly. Hence, the crowded situations should be focused on more than the others.

Table 3.28 : Sample calculation for weighted service score

Stations	Taksim	Osmanbey	Şişli	Gayrettepe	Levent	4.Levent	General
Unweighted Service Score	100	100	0	50	100	100	
Passenger Density (%)	24	15	20	5	16	20	100
Weighted Service Score (%)	24	15	0	2.5	16	20	77.5

Here, data of one month before is used as passenger density data of month which audit is done at.

While calculating weighted service score of the criteria, which is related with trains, the results are weighted according to passenger density in trains. The calculation of passenger density in trains is more complicated than the density of the stations. Three ways can be used for calculating the passenger density in trains. The most reliable way is that the counter, counts the boarding and alighting passengers, and is located above doors in the train. Since in metro line there are 32 trains and each train has 8 doors, 196 devices are required for whole line. All devices work while the train is in service and it means the data is collected during service is delivered. The passenger density in trains can be monitored anytime of service. Although this way supplies reliable data, it is very expensive way in order to calculate passenger density in train. Hence, this technology hasn't implemented in metro line yet.

Manual counting is the second way, which supplies less reliable data than automated counter. It is required that all passengers are counted in order to determine the matrices of the passenger density in trains. The matrix consists of time period and the areas, which expresses the trains' route such as between Taksim and Osmanbey.

In order to obtain reliable data, the counting should be done four times in a year and each counting should be done during three days. Thus, the counting requires high budget. That's why the method isn't chosen.

Using customer satisfaction survey and turnstile data is the third way. Although the third way is less reliable, calculating the passenger density in trains is much more cheaper than the others. At metro line, there are entry and exit turnstiles which customer's uses when enter and leave station. Entry turnstiles record every passes and the records are collected for figuring out the number of passenger who travels on the metro line. However, the exit turnstile doesn't record passes. Therefore the passenger flows can't be known and the passenger density in trains can't be calculated with turnstile data. In customer satisfaction survey the customers are asked the start and end point of their journey in order to figure out their flows on metro line. The turnstiles data become valuable after the survey. In simply, the numbers of customers, enter from Taksim, is known and if their journey direction is known than the passenger density in trains can be calculated.

In Table 3.29 shows the customer flows with respect to survey done in 2007.

Table 3.29 : 2007 Customer satisfaction survey: customer flows

		EXIT						
		Taksim	Osmanbey	Şişli	Gayrettepe	Levent	4.Levent	Total
ENTER	Taksim	X	12.4%	32.8%	8.1%	13.4%	33.3%	100%
	Osmanbey	31.1%	X	20.5%	4.9%	16.4%	27.0%	100%
	Şişli	39.6%	15.0%	X	0.5%	11.8%	33.2%	100%
	Gayrettepe	50.0%	15.6%	15.6%	X	3.1%	15.6%	100%
	Levent	37.9%	15.5%	33.0%	2.9%	X	10.7%	100%
	4.Levent	39.5%	12.0%	37.7%	4.8%	6.0%	X	100%

In order to calculate the density of the train, the formulation shown below is used. The values, which are found after formulation is run, express the numbers of customers that travels in the trains between the stations.

$$T_{ij}=T_{(i-1)}-I_{ij}+Yi\sum_{I=1}^{n}C_{ij} \quad \textbf{(3.2)}$$

T_i: Passenger density in the train

I_{ij}: Passenger who exits from i^{th} station in j^{th} station

C_{ij}: the percentage of passenger going jth direction in i^{th} station

Y_i: the numbers of passengers entering the i^{th} station

i=1,2,...n j=1,2

The density matrix shown in Tables 3.30 and 3.31 is determined after the formulation is run. The values located in the matrix refer the density of the each train according to time period and area. For instance, to Taksim direction, between 4.Levent and Levent, in 09:30-10:00 time period, the passenger density in trains is 319. In Table 3.30 and Table 3.31 show density matrix of weekdays and density matrix of weekend, respectively.

Table 3.30 : Density matrix of weekdays

TAKSİM YÖNÜ						4.LEVENT YÖNÜ					
Time Period	**4.L-L**	**L-G**	**G-Ş**	**Ş-O**	**O-T**	**Time Period**	**T-O**	**O-Ş**	**Ş-G**	**G-L**	**L-4.L**
06:00-06:29	80	115	112	88	74	**06:00-06:29**	35	50	51	47	30
06:30-06:59	27	38	37	29	25	**06:30-06:59**	12	17	26	24	18
07:00-07:29	118	160	156	141	117	**07:00-07:29**	53	74	69	63	25
07:30-07:59	118	160	156	141	117	**07:30-07:59**	53	74	69	63	25
08:00-08:29	311	381	372	315	264	**08:00-08:29**	82	138	124	114	39
08:30-08:59	373	457	447	377	317	**08:30-08:59**	98	166	146	134	44
09:00-09:29	383	467	459	404	343	**09:00-09:29**	229	296	234	210	87
09:30-09:59	319	389	382	336	286	**09:30-09:59**	191	247	197	177	75
10:00-10:29	270	346	344	309	259	**10:00-10:29**	84	139	124	115	33
10:30-10:59	270	346	344	309	259	**10:30-10:59**	84	139	124	115	33
11:00-11:29	212	283	286	263	226	**11:00-11:29**	114	168	144	132	52
11:30-11:59	255	339	343	315	271	**11:30-11:59**	136	202	170	156	60
12:00-12:29	268	365	373	348	307	**12:00-12:29**	164	252	211	195	81
12:30-12:59	268	365	373	348	307	**12:30-12:59**	164	252	211	195	81
13:00-13:29	470	581	591	536	479	**13:00-13:29**	288	431	349	320	139
13:30-13:59	403	498	507	459	411	**13:30-13:59**	247	369	301	276	121
14:00-14:29	358	529	544	540	479	**14:00-14:29**	328	466	371	339	140
14:30-14:59	358	529	544	540	479	**14:30-14:59**	328	466	371	339	140
15:00-15:29	348	531	554	554	485	**15:00-15:29**	378	498	387	353	147
15:30-15:59	299	455	475	475	416	**15:30-15:59**	324	427	334	305	128
16:00-16:29	326	498	523	548	484	**16:00-16:29**	420	545	420	382	159
16:30-16:59	326	498	523	548	484	**16:30-16:59**	420	545	420	382	159
17:00-17:29	241	389	415	483	427	**17:00-17:29**	363	478	371	338	125
17:30-17:59	281	454	485	563	499	**17:30-17:59**	423	557	431	393	144
18:00-18:29	247	421	443	539	469	**18:00-18:29**	569	661	487	436	174
18:30-18:59	212	361	380	462	402	**18:30-18:59**	488	567	420	376	151
19:00-19:29	191	322	343	421	377	**19:00-19:29**	403	503	383	346	139
19:30-19:59	229	387	412	505	452	**19:30-19:59**	484	603	457	412	164
20:00-20:29	141	235	248	300	269	**20:00-20:29**	299	369	284	256	109
20:30-20:59	169	282	297	360	322	**20:30-20:59**	359	443	338	305	128
21:00-21:29	101	206	213	253	216	**21:00-21:29**	274	309	232	207	90
21:30-21:59	121	247	256	304	259	**21:30-21:59**	329	371	275	246	105
22:00-22:29	128	219	223	276	232	**22:00-22:29**	230	267	204	183	60
22:30-22:59	107	182	186	230	194	**22:30-22:59**	191	222	172	154	52
23:00-23:29	69	95	97	102	96	**23:00-23:29**	215	235	177	157	93
23:30-23:59	58	79	81	85	80	**23:30-23:59**	179	196	150	133	80
00:00-00:29	27	42	43	45	42	**00:00-00:29**	175	174	129	114	75
00:30-00:59	44	70	71	75	71	**00:30-00:59**	291	289	207	181	117
01:00-01:29	16	28	30	32	31	**01:00-01:29**	181	176	129	114	78

Table 3.31 : Density matrix of weekend

TO TAKSİM						TO 4th LEVENT					
Time Period	**4.L-L**	**L-G**	**G-Ş**	**Ş-O**	**O-T**	**Time Period**	**T-O**	**O-Ş**	**Ş-G**	**G-L**	**L-4.L**
06:00-06:29	92	113	109	88	76	**06:00-06:29**	33	50	54	50	29
06:30-06:59	61	75	73	59	50	**06:30-06:59**	22	33	41	38	24
07:00-07:29	197	222	216	183	155	**07:00-07:29**	64	95	89	82	34
07:30-07:59	169	190	185	157	133	**07:30-07:59**	55	82	79	72	31
08:00-08:29	420	533	534	468	399	**08:00-08:29**	220	305	248	227	92
08:30-08:59	360	457	458	401	342	**08:30-08:59**	188	262	215	197	81
09:00-09:29	246	332	337	314	265	**09:00-09:29**	163	214	176	161	63
09:30-09:59	345	465	472	440	371	**09:30-09:59**	229	300	240	220	82
10:00-10:29	227	305	316	285	240	**10:00-10:29**	138	185	155	144	59
10:30-10:59	227	305	316	285	240	**10:30-10:59**	138	185	155	144	59
11:00-11:29	393	460	475	372	313	**11:00-11:29**	188	241	195	182	90
11:30-11:59	393	460	475	372	313	**11:30-11:59**	188	241	195	182	90
12:00-12:29	210	296	339	314	275	**12:00-12:29**	172	243	202	194	88
12:30-12:59	210	296	339	314	275	**12:30-12:59**	172	243	202	194	88
13:00-13:29	215	318	346	329	287	**13:00-13:29**	205	277	224	209	95
13:30-13:59	215	318	346	329	287	**13:30-13:59**	205	277	224	209	95
14:00-14:29	217	320	346	328	294	**14:00-14:29**	225	312	253	235	114
14:30-14:59	217	320	346	328	294	**14:30-14:59**	225	312	253	235	114
15:00-15:29	203	319	355	361	327	**15:00-15:29**	269	370	297	276	129
15:30-15:59	203	319	355	361	327	**15:30-15:59**	269	370	297	276	129
16:00-16:29	164	279	316	330	311	**16:00-16:29**	313	426	338	312	160
16:30-16:59	164	279	316	330	311	**16:30-16:59**	313	426	338	312	160
17:00-17:29	134	218	254	270	259	**17:00-17:29**	284	381	303	280	146
17:30-17:59	134	218	254	270	259	**17:30-17:59**	284	381	303	280	146
18:00-18:29	273	474	561	537	495	**18:00-18:29**	395	562	448	424	215
18:30-18:59	234	406	481	461	424	**18:30-18:59**	339	482	386	365	186
19:00-19:29	241	381	419	402	396	**19:00-19:29**	334	512	417	386	211
19:30-19:59	281	444	489	469	462	**19:30-19:59**	390	597	484	448	243
20:00-20:29	118	206	224	234	217	**20:00-20:29**	176	254	212	196	97
20:30-20:59	142	247	269	281	261	**20:30-20:59**	211	305	251	232	113
21:00-21:29	95	172	183	215	219	**21:00-21:29**	196	308	259	236	122
21:30-21:59	47	86	92	107	109	**21:30-21:59**	98	154	137	126	69
22:00-22:29	64	139	144	164	143	**22:00-22:29**	161	192	155	140	68
22:30-22:59	32	69	72	82	71	**22:30-22:59**	80	96	85	77	41
23:00-23:29	44	74	77	87	83	**23:00-23:29**	147	170	137	124	73
23:30-23:59	22	37	39	43	41	**23:30-23:59**	147	150	116	104	68
00:00-00:29	19	27	28	28	26	**00:00-00:29**	54	59	56	51	36
00:30-00:59	19	27	28	28	26	**00:30-00:59**	54	59	56	51	36
01:00-01:29	1	5	5	7	7	**01:00-01:29**	1	5	20	19	17

In order to calculate weighted service score the formulation shown as 3.3 is used.

$$\mathbf{Ws}= \sum_{I=1}^{n} (Pd)_i \, X \, (Us)_{\,i} \qquad \textbf{(3.3)}$$

Ws: Weighted service score

n: Number of measurements

Pd: Passenger density ratio in trains

Us: Calculated unweighted service score of i^{th} measurement

i=1,2,...,24

The trains are measured 24 times in each month and every single measurement has a unweighted service score calculating with absolute service level or sub-scored. In order to calculate the weighted service score of each audit, passenger density ratio and unweighted service scores are multiplied. Table 3.32 illustrates the calculating methodology for the cleanliness and neatness of trains and permanent information in the trains. Required data is located in Table 3.32 for calculating the weighting service score such as boarding station, exit station, day, and boarding time, which are essential for determining the passenger density in trains

Table 3.32 : Sample calculation methodology of weighted service score

Boarding Station	Exit Station	Day	Boarding Time	Passenger density in trains	Passenger density ratio (%)	Unweighted Service Score of Cleanliness and Neatness of Trains	Unweighted Service Score of Permanent Information in the Trains
4 Levent	Gayrettepe	Wednesday	12:34:00	268	4.5	100	100
Osmanbey	Taksim	Wednesday	12:03:00	307	5.1	100	100
Gayrettepe	Taksim	Wednesday	12:55:00	373	6.2	100	100
Şişli	Taksim	Monday	08:26:00	315	5.2	100	100
Levent	Taksim	Monday	10:16:00	346	5.8	100	100
Taksim	Şişli	Monday	07:54:00	53	0.9	100	100
Şişli	4 Levent	Wednesday	10:52:00	124	2.1	100	100
4 Levent	Taksim	Wednesday	11:15:00	212	3.5	100	100
Taksim	Şişli	Wednesday	10:31:00	164	2.7	100	100
Levent	4 Levent	Thursday	17:49:00	144	2.4	100	100
Osmanbey	Gayrettepe	Thursday	17:03:00	478	8.0	100	100
Gayrettepe	Levent	Thursday	17:25:00	338	5.6	100	100
Gayrettepe	4 Levent	Sunday	20:57:00	232	3.9	100	100
4 Levent	Taksim	Sunday	21:20:00	95	1.6	100	100
Osmanbey	Gayrettepe	Sunday	20:35:00	305	5.1	100	100
Levent	4 Levent	Sunday	13:20:00	95	1.6	100	100
Şişli	Levent	Sunday	12:54:00	202	3.4	100	100
Taksim	Şişli	Sunday	12:28:00	172	2.9	100	100
Osmanbey	Taksim	Thursday	10:05:00	259	4.3	100	100
Gayrettepe	Osmanbey	Thursday	09:50:00	382	6.4	100	100
Levent	Şişli	Friday	21:54:00	247	4.1	100	100
Taksim	4 Levent	Friday	17:24:00	363	6.0	90	100
Şişli	Taksim	Friday	21:15:00	253	4.2	90	100
4 Levent	Taksim	Friday	17:53:00	281	4.7	80	100

After Table 3.32, the formulation is run and the weighted service score is calculated. weighted service score of cleanliness and neatness of trains is 98,03 percentage and weighted service score of permanent information in the Trains 100 percentage.

3.1.1.2.8 Fulfilling the survey

When the mystery shoppers become the service points, they start to evaluate the service criteria. They get the service according to scenario defined by company. While they are getting service, they behave as a real customer and they try not to be

recognized by the staff. They never behave as an auditor in the service points and they only check the areas where they can see or pass while they are getting the service. After they get the service, they leave the station and go an available place in order to fill the checklist according to service delivered by the company. It is important that the checklist is filled in a short time after the service is got so that they don't forget the details of service. The scenario and the service points are notified to mystery shopper before the measurements. All required organization should be done completely by the company before the measurements.

The survey is fulfilled in two main areas, which are metro stations/trains and information and complaints management system. Mystery shopper rides metro as a real customer in order to measure performance of metro stations and trains. The measurement starts just after mystery shoppers enter the station. It finishes just after mystery shoppers alight the train.

Information and complaints management system includes call center, complaints and web site. The measurements are done according to scenario and the service is evaluated with respect to mystery shopper standards.

3.1.1.2.9 Collecting and editing data

The data can be collected in two ways in mystery shopping surveys. Mystery shoppers fill the checklist via document or personal digital assistant (PDA). Collecting data via documents is conventional and common method. Collecting data via PDA is quicker way especially when the survey is fulfilled in wide area. The data can be shared with the survey company as soon as mystery shopper fills the checklist via PDA. Although PDA requires investment in the beginning, collecting data via PDA is more economical since operation cost is very low.

Editing data is a critical procedure in order to get reliable data and results. Mystery shoppers may make mistakes while they evaluate the service. Filling the checklist wrongly and evaluating the service conflict with standards are the common mistakes made by mystery shoppers. Hence, the editing process has two stages which are editing filling checklist and evaluating the service in order to eliminate the mistakes. In PDA the checklist rules run automatically and software skips the question, which doesn't have to be evaluated. For instance, when the mystery shopper selects the scenario type, the related questions are only seen on the monitor.

An editor who knows the standards well should edit the evaluation of the service. S/he is supposed to get the mystery shoppers training programme and s/he should do pilot measurements in order to learn the standards and service details. Mystery shoppers are supposed to explain in detail the situations that they think they are unacceptable situations. Editor checks the explanation and evaluation so as to be sure that they are conformable. After editor validates the checklist filled by mystery shoppers, the checklist become valid for the results. If an editing and validating system doesn't install, the staff may not count on the results of mystery shopping survey since the mistakes are recognized and they may be used as cover.

In mystery shopper survey conducted in metro line the data is collected via PDA after the service is evaluated. The checklist is put into the PDA with considering the scenarios and unacceptable situations. The data collected from PDA, is controlled and edited by an editor employed by the company, which conducts the survey. Editor checks all measurements, whether they are conformal according to "Service Standards Guideline for Mystery Shoppers". Editor tries to eliminate the mistakes madden by mystery shoppers during measurements. After the editor edits the measurements, s/he validates the results, which are sent to Istanbul Ulasim. Auditing staff, who works for Istanbul Ulasim, edits all measurements again in order to ensure reliable results. After the measurements are validated, the results are published in the company.

3.1.1.2.10 Reporting and publishing the results

Reporting is prepared regularly respect to calculation method such as weekly, monthly, quarterly. The reports of mystery shopper survey should be dynamic in order to detect the reason of the failure and solve them. Software can be useful for dynamic reporting system for the staff.

In the company the departments requires different details, which is supposed to be considered in the report. For instance, general manager probably pay attention to the basic results of the survey, the operation department requires every details of the evaluation and maintain department may considers only equipment performance.

The reports should be simple and meets the requirements of the departments. In order to supply a simple and useful report, all departments should see required results for them. Software is required for supplying results the departments in different level.

Every department has a count that they only monitor results related with them. Beside software provides shorter reporting period than published reports.

The period of the reporting should be short in order to detect and solve the failures promptly. For instance, a situation is informed after one month later, the operation department may not discover the reason of the failure and they may not prevent from occurring the mistakes again.

GMA Software is installed for reporting and publishing mystery shopping survey results. The software calculates the service level with respect to calculation methodology. The results are reported monthly via GMA software, which is available for all staff. In addition to software, the result is published in information boards for staff that don't use computer at work such as drivers, sale agents. The trend of service level and target level is shown in the result publishment. Hence all staff can understand whether the target is reached or not.

3.1.1.2.11. Evaluating results and implementing corrective actions

After the report is prepared, the results should be evaluated in order to eliminate mistakes, faults which can be defined easily by mystery shopper results or mystery shopper notes. The corrective action should be taken and related staff should be informed so that the problems which customers face at the metro line or supportive services are solved. Between Figure 3.3 and 3.11 show the result of mystery shopper survey according to months.

Target: 95 %

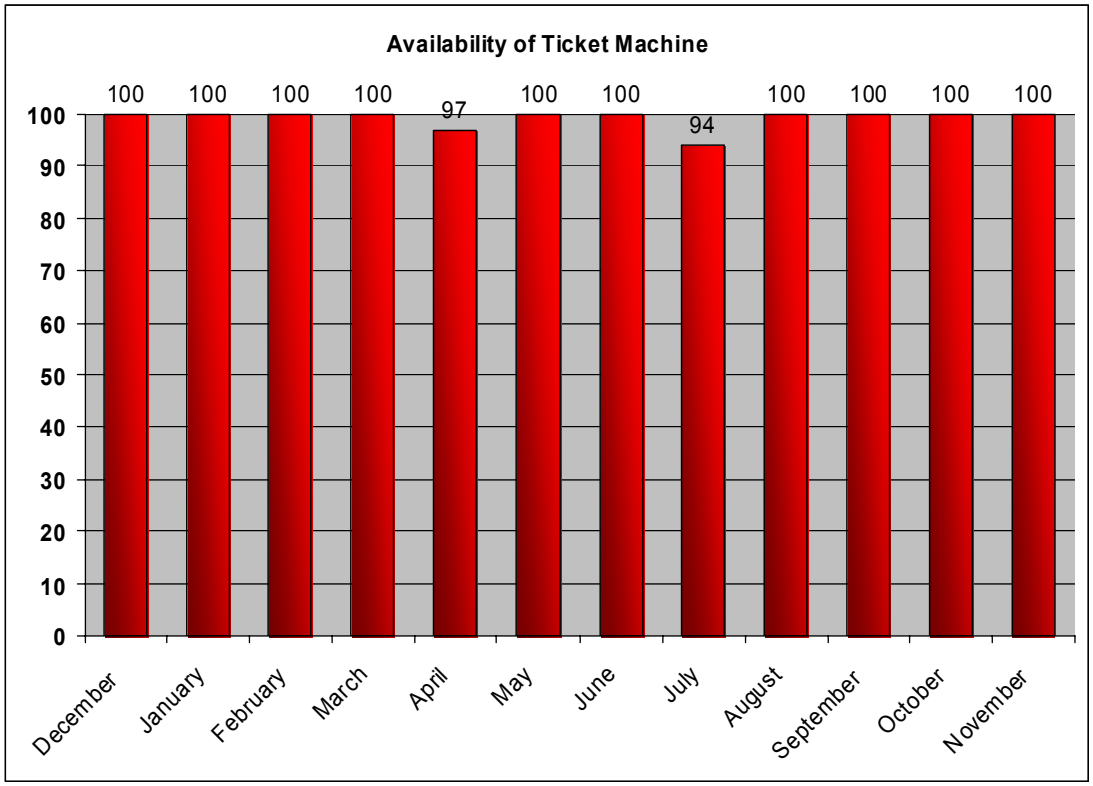

Figure 3.3 : Results of availability of ticket machine

The target is reached for all months except July with one point less. In the light of result the service performance is acceptable. Except April and July, the performance is excellent. The main reason of high performance, there are more than one ticket machine in each turnstile area. Even one machine is broken down, the customer have opportunity to buy ticket from other machine.

Target : 95 %

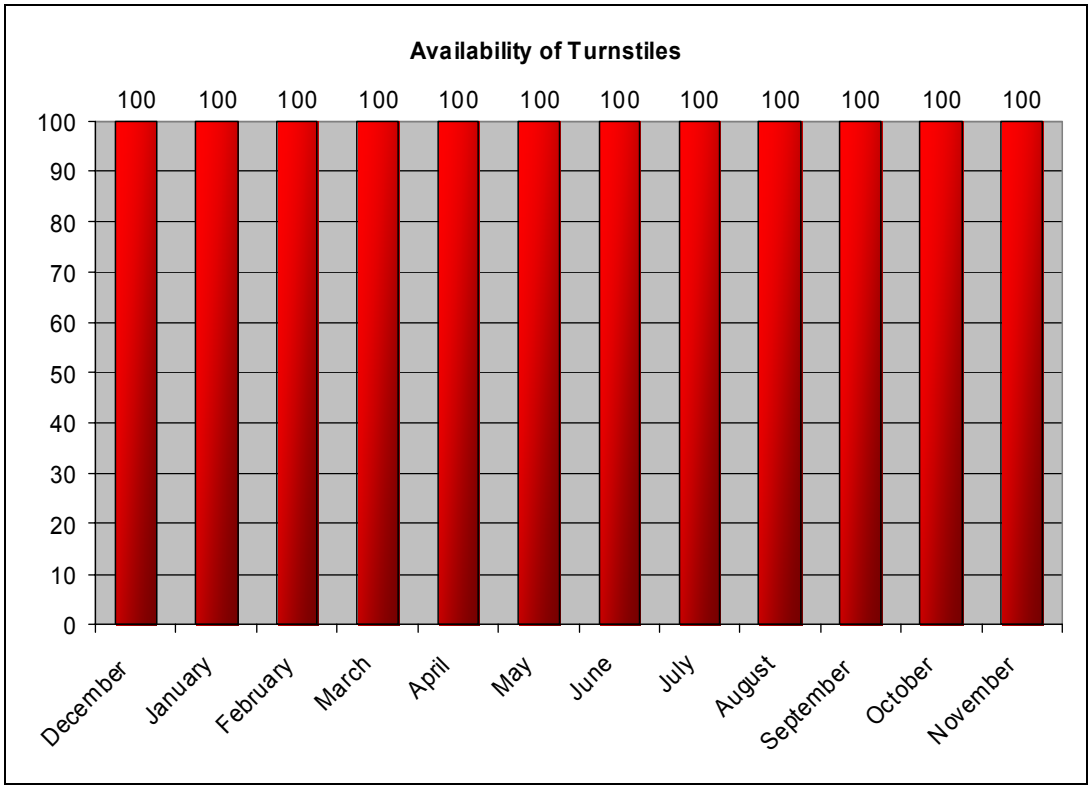

Figure 3.4 : Results of availability of turnstiles

The service level of turnstile is excellent according to results. Since there are at least five turnstile for each entrance, customers can get reference service even one or two of them aren't available. In addition, security staff place information promptly for broken turnstiles in order to customer doesn't try to use them. These issues provide a perfect service for turnstiles.

Target: %80

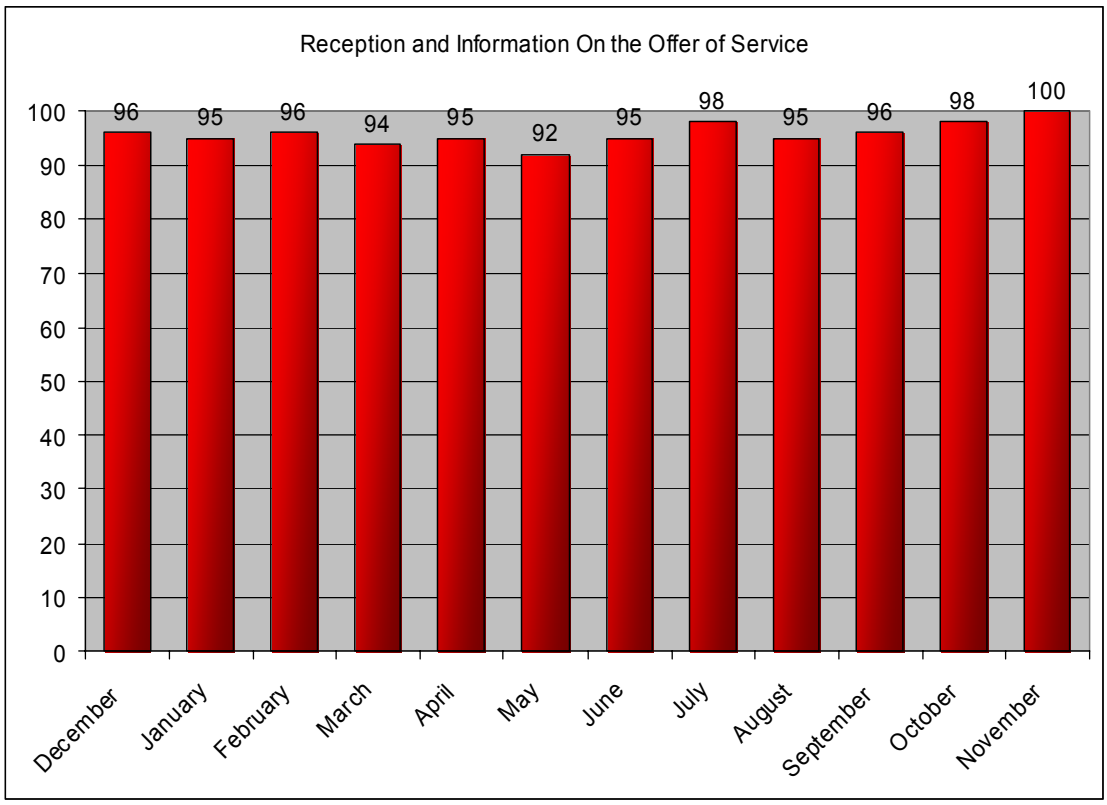

Figure 3.5 : Results of reception and information on the offer of service

The results are much more higher than target level. The security staff and sale agents have been notified about mystery shopper survey and service quality standards. A training program is conducted before mystery shopper survey is fulfilled for security staff and sale agents in order to explain the issues related with SQMS. In addition, staff is informed about customer expectations and requirements with results of customer satisfaction survey. After staff is told that they are monitoring via mystery shopper survey, their performance is increased strictly. That's why the results of mystery shopper survey are very high. In order to keep this performance level, the results are shared and discussed with staff.

Target: 90

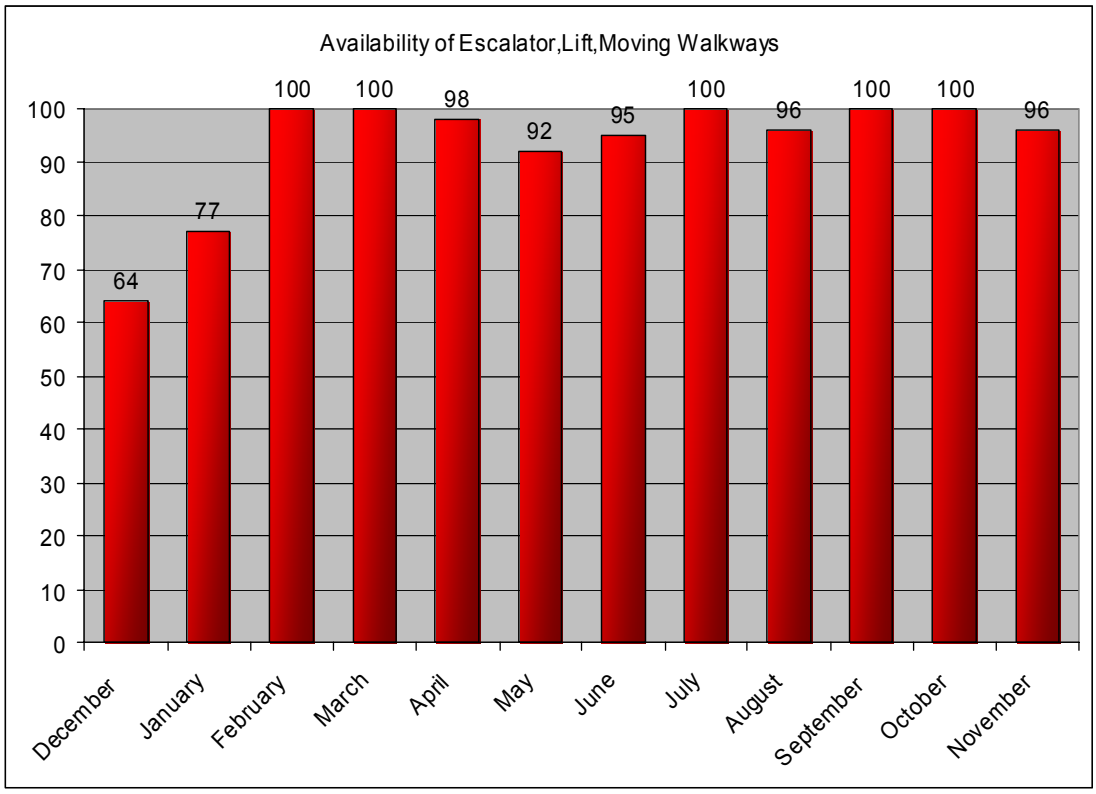

Figure 3.6 : Results of availability of escalator, lift, moving walkways

The service requires corrective actions since the gap between performance and target is high according to beginning results. In the view of results, a new equip, First Intervention Team (FIT), is founded in January in order to increase the performance of the escalator, lift and moving walkways. Before FIT, maintenance department is responsible for repairing in case the equipment is broken down in addition to periodic maintenance. In maintenance department there isn't assigned special staff for failures. Maintenance staff both repairs and maintains the equipment. That's why the equipment is intervened in a long time. In deed the maintenance department is located outside of the line. In the view of these issues, the maintenance and repairing work are separated. The main aim of team is to intervene and repair the failures promptly. Especially escalators can stop easily due to various reasons. FIT tries to provide that the escalator works again in a short time. If there is a big problem such as a new material should be placed, FIT supplies safety precaution for the escalator and the maintenance department repairs it. After FIT is founded, the performance of

escalator, lift, and moving walkways becomes acceptable level. Between February and November, service level is above the target level.

Target: 90

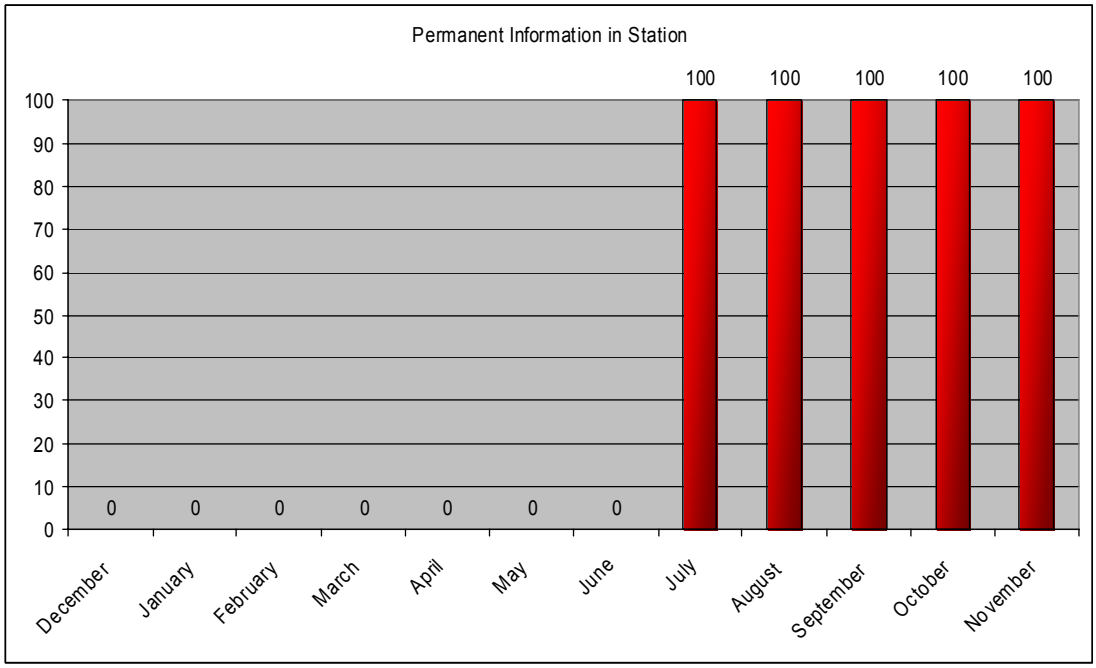

Figure 3.7 : Results of permanent information in station

Performance of Permanent Information in Station is accepted zero according to service calculation method Since Network map, District Map weren't supplied to customers between December and June. In July information boards have been placed in order to deliver information for customers. Information boards includes following information:

a. Travel timetable.
b. District map with indication of accesses for the PRM.
c. Indication of frequencies during the day
d. the first and the last passage of train for each station
e. Accessible maps of the rail system network.
f. The phone number of the Contact Centre, the website
g. Pictograms and texts showing travel and security rules
h. The principal current fares (also must take place at ticket offices)

After information boards the performance score reach 100 between June and November. In order to save this level, the presswork shop has been built so that signs and information are produced in short time period.

Target: %80

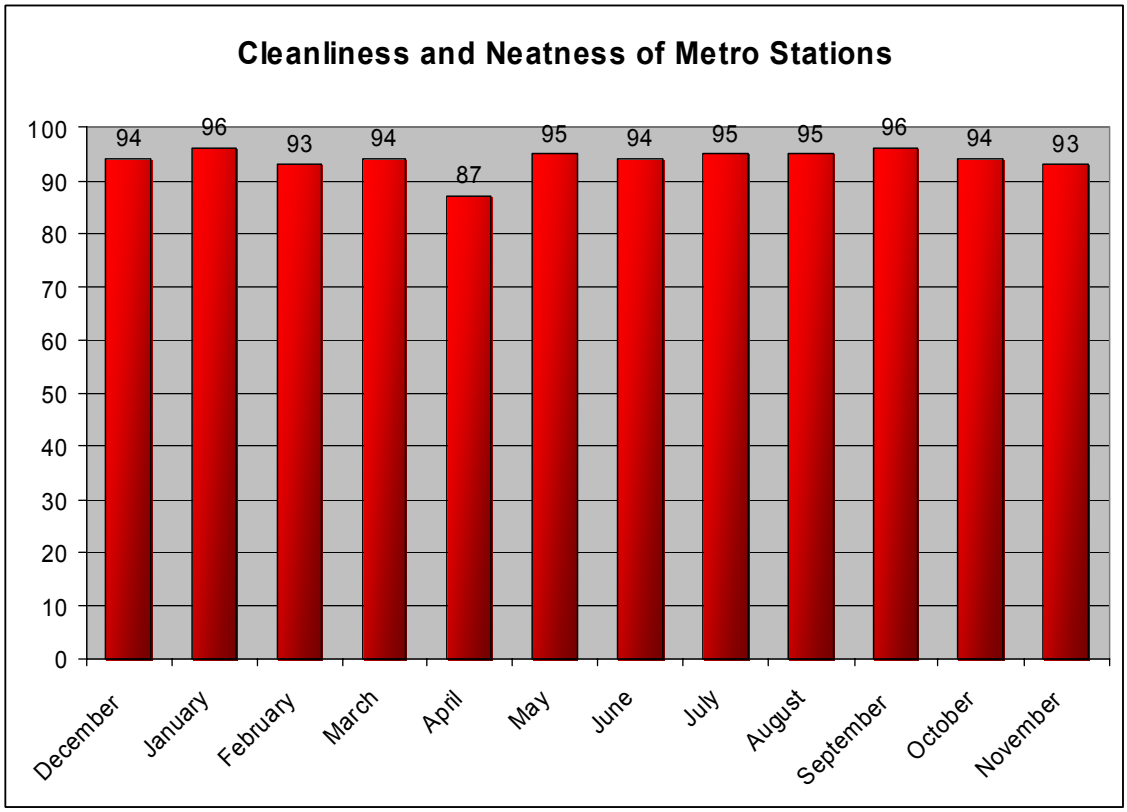

Figure 3.8 : Cleanliness and neatness of metro stations

Target: %80

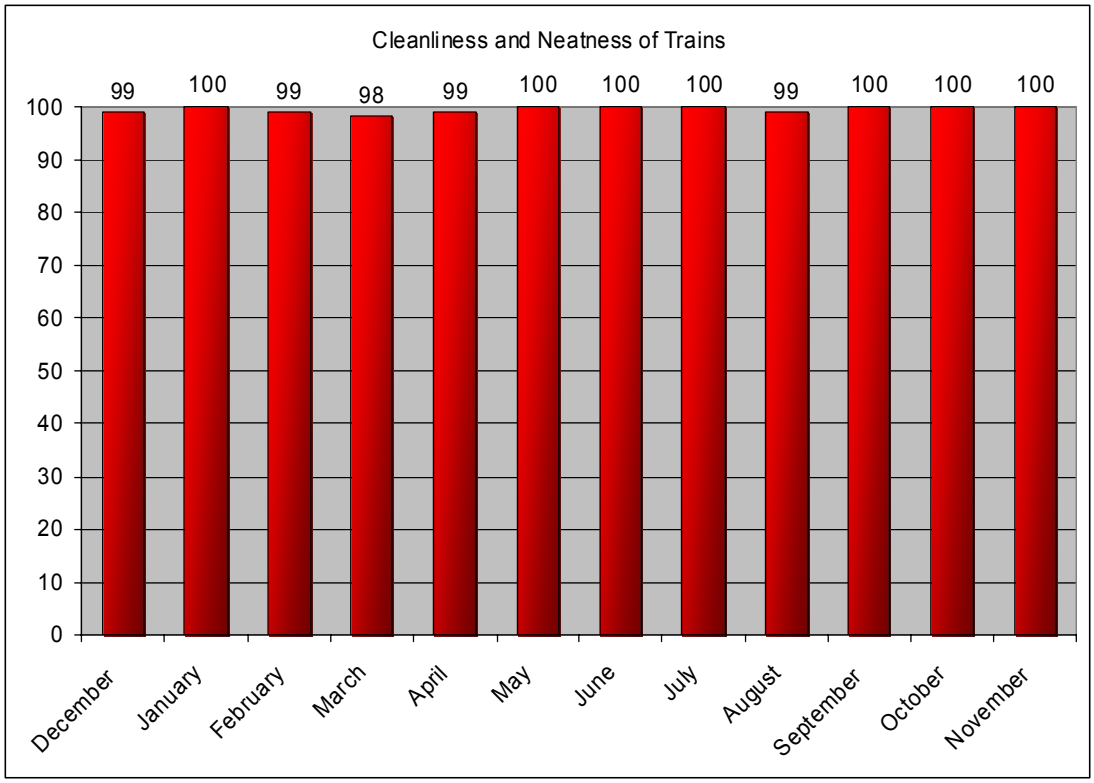

Figure 3.9 : Results of cleanliness and neatness of trains

The performance of Cleanliness and neatness of trains and cleanliness and neatness of metro stations are much more higher than target level. Since metro line started to operate, operation management and top management have featured cleanliness in trains and stations. Therefore all cleaning staff is aware of the importance cleanliness and they are careful while they are working. According to this issue there isn't any extra actions within SQMS. Mystery shoppers' view confirms the high level performance of the cleanliness and neatness.

Target: %98

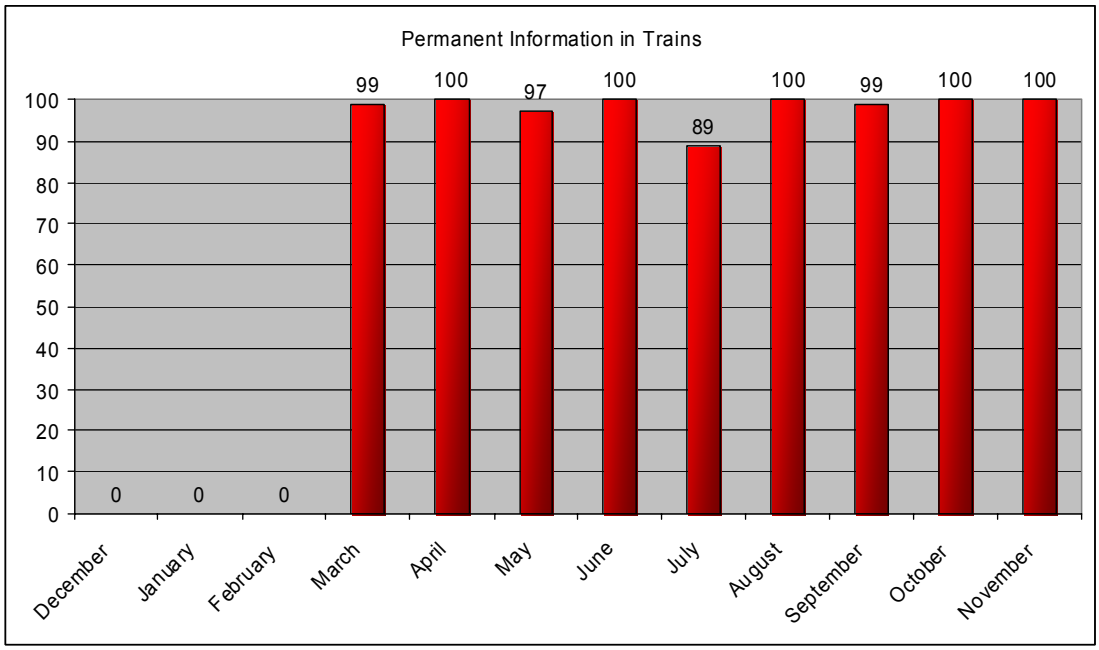

Figure 3.10 : Results of permanent information in trains

Between December and February, since some information was lack, the performance level is accepted as zero according to service level calculation method. The information wasn't supplied are a map of metro network, line number located outside of the train, rules and advices. A corrective action has implemented since In May and July the target wasn't reached according to results. The reason of gap between target and performance is failure of announcement system in some trains. Since the failures aren't prevented the announcement system requires to be renewed completely so as to supply targeted performance. Renewal operation needs high budget and takes long time, therefore an alternative way is chosen until the new announcement system is active. The driver is responsible for doing announcement with respect to text defined by the operation management in case the announcement system doesn't work. After corrective action is implemented the performance becomes acceptable level between August and November.

Target: % 80

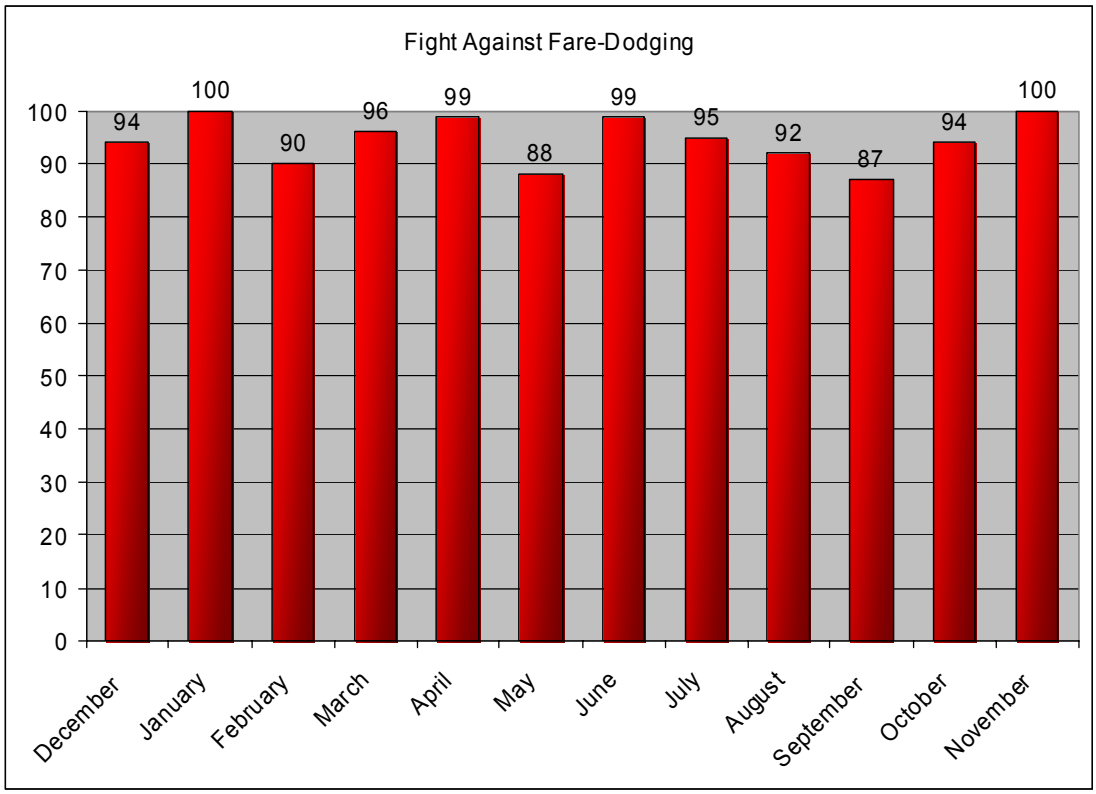

Figure 3.11 : Results of fight against fare dodging

The performance level is acceptable for fight against fare dodging. The results vary between 87 and 100, there isn't a steady performance like the other criteria. The reason of this picture is to use the staff for the newly opened line until the new security staff is employed. This rotation is done with respect to target performance level.

3.1.1.2 Direct performance measurement

Direct performance measurement is a performance method that uses related records in order to calculate the level of services. Recording data has to be done for the measurement that's why a process is required for it. In the metro line waiting times and passenger comfort is measured by this method.

3.1.1.2.1 Measurement of waiting times

Waiting Times criterion is measured via waiting times software. In the software departure time of the trains are collected. According to this data the headway performed is calculated. After that the headways and the waiting times defined in reference system are compared. The situations which headways are bigger than waiting times defines in reference system are determined. Then the service level is calculated according to waiting times formulation.

The service level calculation includes headway, the numbers of passenger and waiting times defined in reference system. Density Matrix is used for the numbers of passenger. Service Level, is calculated with ratio of the customer supplied reference service to total customers riding metro. The formulation is shown as 3.4.

$$\text{Service Level} = \left(\sum_{i=1}^{n} RY_{ij} / \sum T_{ij}\right) * 100 \qquad \textbf{(3.4)}$$

T_{ij}: the number of passenger at j^{th} area in i^{th} train
RY_{ij}: the number of passenger supplied reference service at i^{th} in j^{th} train
j=1,2,3,4,5
i=1,2…n

The number of passenger supplied reference service (RYij) is calculated according to the formulation shown as 3.5. In the calculation there is an assumption which is passenger enters the station in lineer distribution.

$$Ryij = Hj / (TBi) \qquad \textbf{(3.5)}$$

Ryij: the number of passenger who are delivered reference service
H : the headway of j^{th} train
TBi: the waiting times of i^{th} train
j=1,2,3,4,5
i=1,2…n

3.1.2.1.1 Measurement of passenger comfort

Density matrix is used for evaluation of passenger comfort in trains. This matrix is calculated by the profits of Customer Satisfaction Survey and the numbers of passengers collected via turnstile in stations. Density matrix is mentioned above as Table 3.17 and 3.18. Density matrix, is updated 4 times in a year. The update is achieved by counting the passengers in trains. Counting passengers is done in order to find the number of passengers traveling in the train. The time period (30 minutes) and the train region which correspond to the most intensive period in the density matrix are selected in order to determined the time of the counting passenger which is done during 30 minutes. For the period of 3 days, required measurements are made in the selected period and region. The staff that makes the calculation travels in trains and tries to find the number of passengers between the two predetermined stations.
The average passenger number in trains is found by taking the mean of the results of 3-day measurements.
If,

a. The number of passengers in trains is below the fullness matrix in trains, service level is accepted as 100%.
b. The number of passengers in trains is above the fullness matrix in trains, the matrix is updated. The update is done so: the passenger number achieved by the counting is proportioned to the passenger number in the matrix and thus, update coefficient is found.

$$Uc = Pn/Mn \quad \textbf{(3.6)}$$

Uc: Update coeffient
Pn: Passenger number
Mn: Number of passenger located in matrix

A new matrix is formed by multiplying all the matrix values by the update coefficient.

Example 1;

a. The value of the most intensive period and train region in the matrix is to be 600.
b. The passenger number obtained after the passenger counting in trains is to be 650.
c. A section of the matrix is to be shown as in Table 3.3.

Table 3.33 : Example figures of density matrix

Time Period	Taksim-Osmanbey	Osmanbey-Şişli	Şişli-Gayrettepe
13:00-13:29	275	300	350
13:30-13:59	300	350	300
14:00-14:29	300	325	300

Updated matrix values are obtained by multiplying with the update coefficient 1.08.

Table 3.34 : Sample figures of updated matrix

	Taksim-Osmanbey	Osmanbey-Şişli	Şişli-Gayrettepe
13:00-13:29	275	300	350
13:30-13:59	300	350	300
14:00-14:29	300	325	300

Example 2:

a. The value of the most intensive period and train region in the matrix is to be 600
b. The passenger number obtained after the passenger counting in trains is to be 650
c. A section of the matrix is shown as Table 3.21

Table 3.35 : Sample figures of density matrix

	Taksim-Osmanbey	Osmanbey-Şişli	Şişli-Gayrettepe
18:00-18:29	590	600	550
18:30-18:59	500	550	550
19:00-19:29	575	550	525

Updated matrix values are obtained by multiplying with the update coefficient 1.20

Table 3.36 : Sample figures of updated density matrix

	Taksim-Osmanbey	Osmanbey-Şişli	Şişli-Gayrettepe
18:00-18:29	690	**720**	660
18:30-18:59	600	660	660
19:00-19:29	690	660	630

According to table 3.36 shown above passengers aren't provided the reference service between Osmanbey and Şişli, at 18:00-18:29 time period. After the updated matrix is found, service level is calculated. Service level calculation, the total number of passengers who receive the service determined in service delivery standard is proportioned to the total passenger number corresponds to intensive time period.

Sl: Yh/Yt*100 **(3.7)**

Sl: Service Level
Yh: the total number of passengers who receive the service determined in service commitment
Yt: the total passenger number corresponds to intensive time period

Yh is the same for all M2 Taksim-4.Levent line trains because they have a single type and shown in the Table 3.37.

Table 3.37 : Train capacity

Capacity	Number of Passenger
Seat	224
Standing passenger	476
Total passenger number (4 passengers/m2)	**700**

3.1.3 Customer Satisfaction Survey

Customers expected to be satisfied when they patronize any service businesses cannot survive without satisfied customers (Chi and Gursoy 2009). Hence companies should meet customer requirements and expectations in order to satisfy their customers. After customers buy a service, they make a decision whether he/she should buy service again according to their perception and expectations. If the performance of service is not sufficient with respect to customers' perception and expectation, they will probably discontinue getting the service.

Perception is a customer idea that explains the quality of service performance according to customer side. However, perception may not reveal the exact level of service quality. Since it depends on the past experiences of customer about the service delivered. It is believed that when a customer had a bad experience once he or she thinks that the performance of service business is insufficient and dissatisfied. Nevertheless the company's overall performance may be spectacular and company may face very few problems.

Every customer has expectations about the service. Expectations are affected by past experiences and perceptions. It is believed that the future expectations will increase when satisfaction level increase due to past experiences (Vagra 1999) Hence the company should try to meet customer expectation which always improves just after the service level do. Although mostly the customer expectation level is higher than delivered service level, customers wish their expectation met. If experience of the service greatly exceeds the expectations that clients had of the service then satisfaction will be high and vice versa (Mori 2002) Examining the differences

between the desired level of a service and that actually delivered and weighting these gaps to take account of their relative importance to consumers reveals where improvements in the service mix are required (Strandling et al. 2007) Therefore company should ask them their expectations in order to improve the service level.

3.1.3.1 Designing and implementing a customer satisfaction survey

Customer satisfaction survey requires though working before the interview with customers in order to get reliable and valuable results. The customers who are made interview represent the all customers. Hence, determining the number of customers and characteristic of customers become crucial. In addition, how to implement survey should be determined within research methodology. Forming questionnaire, editing and checking the results, reporting the results are the main parts of the survey. In this study, the customer satisfaction survey's steps are investigated and implemented.

3.1.3.2 Research methodology

The research methodology is important to do a reliable survey. In the research methodology the survey is planned in detail. The issues considered are shown below:

a. How to implement the survey
b. Obtaining representative sample (Sample size, The characteristic view of sample)

In the beginning the rules of survey should be clarify and identify in detail. The main point is the method of the collecting answers, which can be done as self-administrated or personal interview. Customers are filling the questionnaire themselves in self-administrated method. Personal interview requires a staff that asks the questions and fills the questionnaire. The methods mostly used are as shown below:

a. Mail
b. Web site
c. Telephone
d. Face to face method (on board/station)

e. Post
f. Distributing checklist

Mails, web site, telephone, post are cheaper ways than face-to-face method. In addition these ways can take less time. However they can't be used for every survey. The survey can be required a special sample which is identified respect to the distribution customers. In that case the face-to-face method is useful for reaching all customer segmentations. This is one of the major advantages of on-board and intercept surveys that the survey can reach all riders whether or not they live in the service area, or have telephones, or are literate (Schaller 2005).

In the Taksim-4.Levent Metro face-to-face method is decided as an implementation method. As mentioned above reaching all customer segmentations, the long questionnaire, lack of details of customers are the main reasons to implement face-to-face method. .The location of the survey is important for personal interview. While survey is planning the question should be asked, "Where the survey will be implemented". The aim of the survey should be considered in order to determine the location. If the survey aims to define the needs and desired of current customers service points is a strong alternative for the survey. Station and trains/buses are main service points and the survey can be implemented in these points.

For M2 Taksim – 4.Levent metro line, the research is done at the stations at metro line. The people who just pass from turnstile in order to ride metro are asked the questionnaire to fulfill. The interview is made near turnstile and it takes between 8 and 12 minutes. One who conducts the survey has to obey the rule of serial samples. According to this rule, the fifth people passing turnstile is asked and the surveyor has to ask to the each fifth person passing turnstile and offers him/her to interview. The aim of this rule is to provide a random selection.

It is impossible to observe all the entire passengers of metro line in searching the level of passenger satisfaction. Trying to evaluate satisfaction of all the entire passengers will cause an impossibly demonstrated cost as well as an unnecessary time lost. Instead, a sample is designed in order to get the satisfaction level of customers with a little difference. The difference depends on the designing a correct sample and sample size. Sample size is based on how much error can be tolerated,

the desired confidence level, and how varied the population is with respect to the characteristics interest (TCRP 2003).

In order to designing a sample the profile of the customers should be known very well. The sample is supposed to be covered all customers or segmentations. In order to cover all customer, the behaviors or characteristics of customers are defined exactly. Schaller (2005, p.22) defines the example of the population characteristics as shown below:

a. Riders within a geographic study area,
b. Riders on one route or a group of routes,
c. Riders traveling within a time period (most often week-days), or
d. Riders traveling through a selected station.

The behaviors or characteristics of customers, which are shown below, are used for In Taksim -4.Levent Metro survey.

a. Stations (all the stations of the line): Stations may affect customer perception since the service may be differed according to stations. Stations are representing for the district area, which explains the customers profile such as household, education level.
b. Kinds of ticket used (token, standard and discounted akbil): Type of ticket can explain the frequency of travel. The token is used for single journey, standard akbil can be used for transferring other public transports and discounted akbil is more economical for the customers who rides metro/public transports frequently.
c. Days of the week (weekdays, Saturday, Sunday): The service can be differed according to days. The number of staff may decrease at the weekends and it may cause some problems about cleaning, queue on the sale office. Besides, the frequency may be higher at the weekend that means customers wait longer on the platform. On the other hand, stations and the trains are more crowded in weekdays, which affected the service quality negatively. All means that the quality of service is changed according to days of the week and some customers ride metro in weekdays, some of them ride at the weekend. Besides, the aims of the journey are changed according to days. In the weekdays most customers ride metro in order to travel between home and

work/school, at the weekend mostly they ride metro entertainment or social activities. Hence the survey in Taksim-4.Levent metro is done on weekdays, Saturday and Sunday.

d. Peak and non-peak hours : In peak hours the numbers of customers are much more higher than the non-peak hours. Hence the service is differed between two time periods. In peak hours the frequency of metro is less than non-peak hours. However, the density of stations and trains are higher in this time period. The crowded causes that the staff is less availability for the customers and they may do more faults while they are serving. Because of all these the survey is done in 5 time periods, which are shown in Table 3.38.

Table 3.38 : Time periods

Periods	Time Period
Morning Peak Hours	07:30-09:29
Morning Non Peak Hours	09:30-12:00
Noon and Afternoon	12:00-16:59
Evening Peak Hours	17:00-20:00
Evening Non-Peak Hours	20:01-00:00

After defining the characteristic of customers that means quotas for the survey the number of sample is defined. The cost and sample error are considered while the sample size is determining. When the error decreases the cost of survey increases. In Taksim-4.Levent Survey 750 customers participated, it means that standard error 3.75 percentage. Table 3.39 presents the required sample size for the sample errors.

Table 3.39 : Sample sizes according to sample error

Sample error (%)	Sample sizes
1	10000
3	1100
5	400
10	180

3.1.3.3 Doing field research

Field research consists of selection and training of the surveyors and doing the research. Training is important for explaining the rules of the survey. The surveyors are supposed to obey the rules otherwise the survey's reliability is threatened. Supervisors should audit the surveyors while they are doing surveys.

The training covers the issues shown below:

a. Survey purposes,
b. Work Plan,
c. How to approach passengers,
d. How to aid passengers who request assistance in completing the survey,
e. Where and How to ask questions and fill the questionnaire
f. Tracking refusals,
g. Safety,
h. Dress,
i. Behavior and courtesy,
j. Record keeping.
k. When and how to Delivery filled questionnaire

In addition to recruitment and training surveyors, effective supervision and monitoring is crucial for collecting reliable data. In the implementation, supervisor works at metro line to ensure that survey staff is at their assigned locations and carrying out survey procedures.

3.1.3.4 Controlling the reliability

After the field research is completed, for the consistency and reliability of the questionnaire forms, all of the forms are checked and edited and they are determined whether they are filled according to the rules.

In addition to supervision, some customer should be called via telephone in order to ensure that the survey fulfilled successfully. Surveyors may fill fake questionnaire or skip some questions to finish the interview in a short time. In addition to the customer is asked whether s/he part pates the survey, s/he asked some questions and the control staff checks the accordance the answers between at telephone and in questionnaire.

In Metro Survey, 30 percentage of customers who participate the survey, are called in order to be sure the questionnaire is asked fully, correctly and the characteristic of customer is true with questionnaire fulfilled. Incase the questionnaire fulfilled is different with customer's ideas and characteristics told on the phone then it doesn't accepted for the evaluation.

3.1.3.5 Key in data

After the telephone controls are implemented successfully, the data are transferred to the computer by the help of Microsoft Excel or SPSS statistics program. In metro survey SPSS is used for keying in data.

3.1.3.6 The questionnaire and reporting

The questionnaire consists of four parts that are customer profile, characteristic of journey, satisfaction and importance. Questions related with customer and journeys are shown in Table 3.40.

Table 3.40 : Questions related with customer and journey

Question Part	Questions
Customer Profile	Age
	Gender
	Income
	Marriage Situation
	Occupation
	Contact detail
Characteristic of Journey	The time period of journey
	Ticket type
	The station entered
	The frequency of travel
	The purpose of journey
	The station boarded
	The days mostly riding metro

Figures 3.12, 3.13, 3.14, 3.15 illustrate age distrubution, gender distrubution, education status and income status.

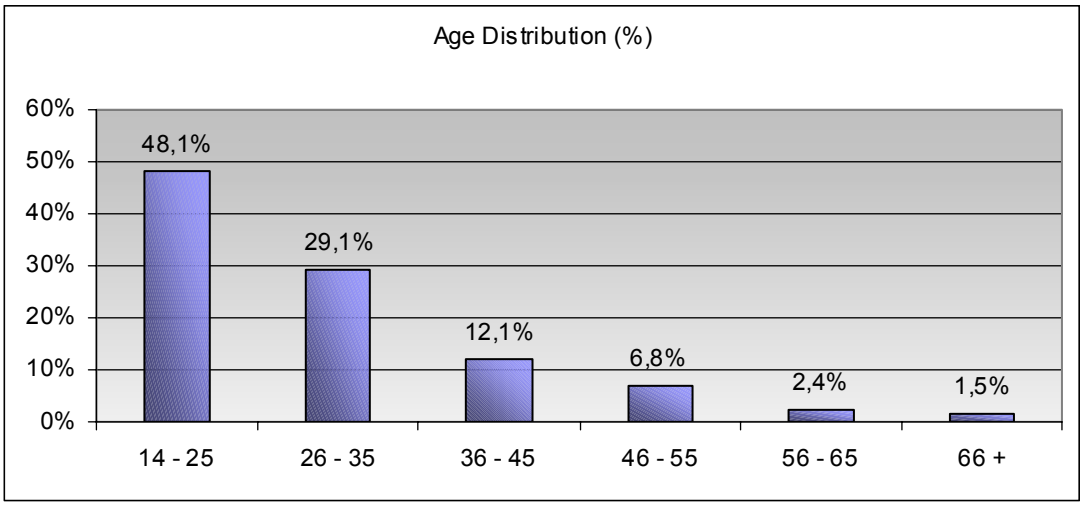

Figure 3.12 : Age distribution

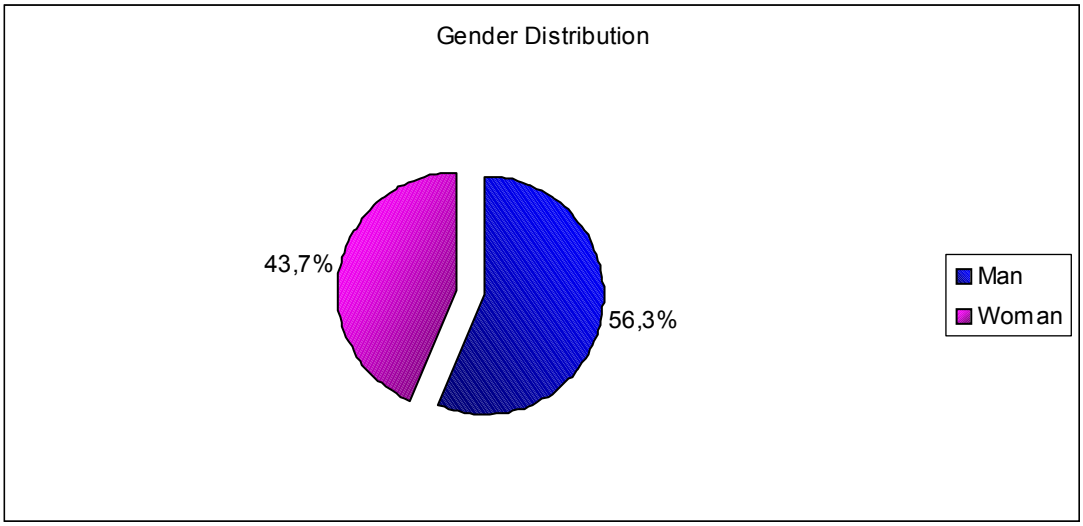

Figure 3.13 : Gender distribution

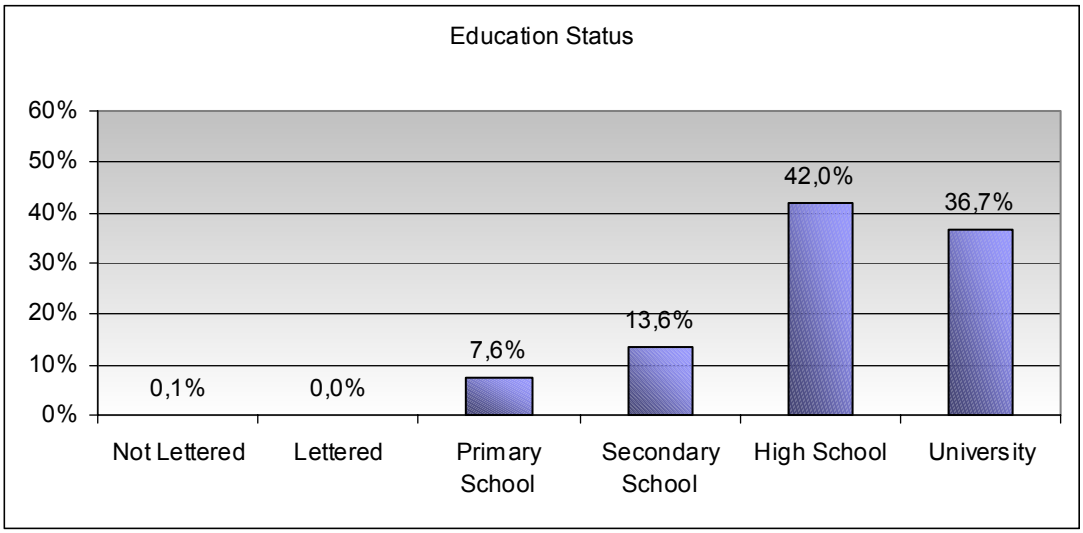

Figure 3.13 : Education status

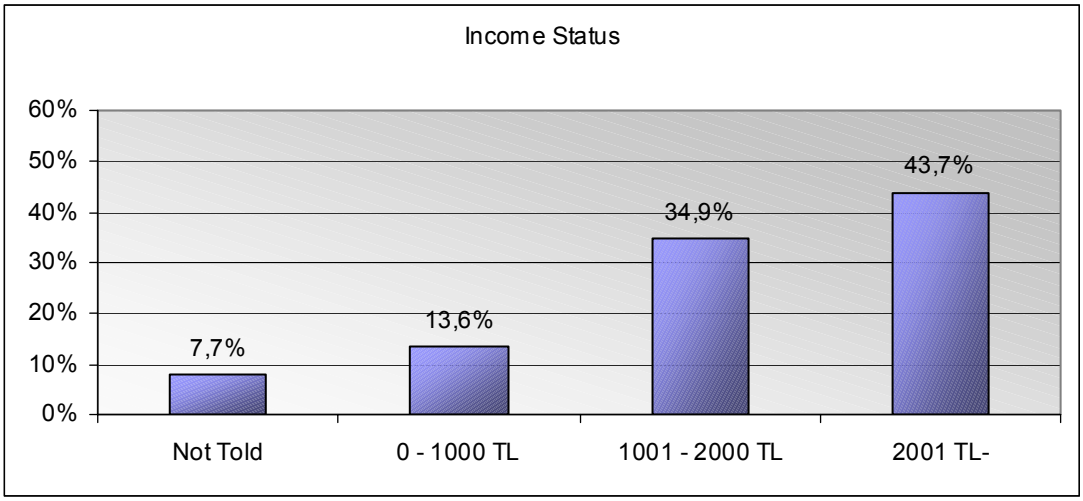

Figure 3.14 : Income status

Customers make their judgments of service quality on the basis of a series of criteria that are specific to the evaluated service (Caro and Garcia 2007). Hence selecting quality criteria is the most important issue when building satisfaction part. Reliability of satisfaction level result is dependent on well-done selecting quality criteria. For metro survey, the related researches are investigated in order to select the convenient criteria. For service industries, Schmidt and Strickland (1998, p.29) defined service dimensions and quality criteria, which are shown in Table 3.41. TCRP (1999, p.13) published a criteria list for public transport services. In the list there are 48 criteria, which are shown in Table 3.42. Jun (2007, p.3314), defined service dimensions and quality criteria for railway transport 24 criteria, shown in Table 3.43, are used in his study.

Table 3.41 : Service dimensions and quality criteria defined by Canadian Center for Management Development

Dimensions	Variables
Responsiveness	❖ Timely delivery of service ❖ Number of contacts to receive ❖ Waiting time ❖ Timely reaction to expressed concerns Service Staff are: ❖ Empathic ❖ Courteous ❖ Helpful ❖ Skilful and competent ❖ Equipped with up-to-date information ❖ Respectful ❖ Flexible
Reliability	❖ Provided needed service ❖ Provided what was promised ❖ Adhered policy and standards ❖ Minimal error rate
Access & Facilities	❖ Convenient location ❖ Physical Access to building ❖ Comfort of offices and waiting areas ❖ Adequate parking ❖ Hours of service ❖ Appearance, clarity and location of signs ❖ Ease of obtaining appointments ❖ Telephone Access ❖ Use of technology ❖ Variety of Access modes
Communication	❖ Questions were answered ❖ Availability of information ❖ Plain language ❖ Consistency of information/advice ❖ Services delivered in official, documents ❖ Ease of understanding procedures
Cost	❖ Ease of billing/payment ❖ Reasonable cost

Source: F. Schmidt & Strickland T., 1998, Client satisfaction survey common measurement tool, Canada: Citizen-Centered Service Network Canadian Centered Service Network Canadian Centre for Maanagement Development

Table 3.42 : Example list of public transport service quality measures defined by TCRP

1Absence of graffiti
2 Absence of offensive odors
3 Accessibility of trains/buses to handicapped
4 Availability of handrails or grab bars on trains/buses
5 Availability of monthly discount passes
6 Availability of schedule information by phone/mail
7 Availability of schedules/maps at stations/stops
8 Availability of seats on train/bus
9 Availability of shelter and benches at stations/stops
10 Cleanliness of interior, seats, Windows
11 Cleanliness of stations/stops
12 Cleanliness of train/bus exterior
13 Clear and timely announcements of stops
14 Comfort of seats on train/bus
15 Connecting bus service to stations/main bus stops
16 Cost effectiveness, affordability, and value
17 Cost of making transfers
18 Displaying of customer service/complaint number
19 Ease of opening doors when getting on/off train/bus
20 Ease of paying fare, purchasing tokens
21 Explanations and announcement of delays
22 Fairness/consistency of fare structure
23 Freedom from nuisance behaviors of other riders
24 Frequency of delays for repairs/emergencies
25 Frequency of service on Saturdays and Sundays
26 Frequent service so that wait times are short

Table 3.42: Example list of public transport service quality measures defined by TCRP (continued)

27 Friendly, courteous, quick service from personnel
28 Having station/stop near destination
29 Having station/stop near my home
30 Hours of service during weekdays
31 Number of transfer points outside downtown
32 Physical condition of stations/stops
33 Physical condition of vehicles and infrastructure
34 Posted minutes to next train/bus at stations/stops
35 Quietness of the vehicles and system
36 Reliable trains/buses that come on Schedule
37 Route/direction information visible on trains/buses
38 Safe and competent drivers/conductors
39 Safety from crime at stations/stops
40 Safety from crime on trains/buses
41 Short wait time for transfers
42 Signs/information in Spanish as well as English
43 Smoothness of ride and stops
44 Station/stop names visible from train/bus
45 Temperature on train/bus — not hot/cold
46 The train/bus traveling at a safe speed
47 Trains/buses that are not overcrowded
48 Transit personnel who know system

Source: TCRP, 1999. A handbook for measuring customer satisfaction and service quality. Washington: Transit Research Program

Table 3.43 : Example list of service quality criteria for railway transport defined by Lui Jun

Dimension	Description of Indicators
Tangibility	1. Modern equipments and technology required on trains and at stations
	2. Clean and comfortable train and stations
	3. Clean staff clothing and appearance, wearing work permits
	4. Matching service with train and station facilities
Reliability	5. Things can be completed in time
	6. Timely and accurate Advisory services and information
	7. Making every effort to help tourists in trouble
	8. Railway enterprises are trustful
	9. Railway enterprises are able to provide timely services
	10. Railway enterprises are able to resolve passengers' complaints quickly and effectively
Responsiveness	11. Railway enterprises are able to offer detailed services information
	12. Railway staff is able to provide timely services
	13. Railway staff is willing to serve and help
	14.Railway staff gives effectives problems
	15. Railway staff can promptly correct the error
	16. Ticket Windows are able to meet the passenger's demand timely
Assurance	17. Visitors are assured while purchasing
	18. Railway staff is available
	19. Railway staff is polite
	20. Railway staff is supported to service by enterprises
Empathy	21. Staff concerned passengers and give personalized attention to them
	22. Railway enterprises put passenger's interest as the thermal
	23. Railway enterprises record complains and make improvement
	24. Booking time and timetable of trains are convenient for most passengers

Source: J. Jun, G. He, 2007. Study on railway transport service quality evaluation

In Metro survey, the criteria is placed in the questionnaire is nearly common with TCRP's list; some of them are not convenient. In the light of researches mentioned

above and service delivery standard that established in this study, the quality criteria are selected. The criteria are shown as question in Table 3.44.

Table 3.44 : Survey questions according to service criteria and determinants

Determinants	Criteria Defined in Service Commitments	Questions
Accessibility	Availability of ticket machines	Availability of akbil/token machines
Accessibility	Availability of validation devices	Availability of validation devices
Information	Permanent information in stations	Permanent information in stations
Information	Permanent information in trains	Information on board (announcements, warnings and route maps)
Time	Waiting for trains	Waiting times for trains
		Punctuality
Customer Care	Reception and information in station on the offer of services	Attitudes and behaviors of security staff
		Attitudes and behaviors of sale agents
		Sale office services in stations
Comfort	Availability of escalators, lifts and moving walkways (travelators)	Availability of escalator and lift
	Cleanliness and neatness of metro stations	Cleanliness of stations
		Lighting at the stations
	Cleanliness and neatness of trains	Cleanliness of trains
	Passengers comfort in trains/ Passengers comfort in trains during the off-peak hours	Passenger density in trains
Customer Care	Call Center	The service delivered by Call Center
	Web site	The information service provided from the websites of Istanbul Ulasim
Information	Client information in case of planned traffic disturbance/ Client information in case of unexpected traffic disturbance	Information at the stations in case of traffic disturbance
		Information onboard in case of traffic disturbances
Accessibility	-	Accessibility of stations
Security	-	Security level at the stations
Security	-	Security levels on trains
Fare	-	Fare amount of journey
Time	-	The duration of journey
Comfort	-	Noise and vibration levels on trains
	-	Air condition on trains (temperature, dampness)

In the questionnaire form, passengers are asked about their satisfaction levels for the 25 service criteria.

Table 3.45 : The scale of satisfaction levels

No	Service satisfaction level
6-Very satisfied	Satisfied
5-Satisfied	
4-Slightly satisfied	Dissatisfied
3-Slightly dissatisfied	
2-Dissatisfied	
1-Very dissatisfied	

The satisfaction scale rates according to this formula are shown as **(3.8)**

$$S = Sp*100/6 \qquad \textbf{(3.8)}$$

S=Satisfaction level
Sa: Satisfaction average

The importance satisfaction (IS) analysis is a method used in searching out the service criteria, which require amendment primarily. The analysis evaluates the satisfaction level of passengers from service criteria and the importance level of service criteria together. In order to compute the satisfaction level, the ratio of satisfied passengers over all passengers is calculated.

The formulation to calculate the satisfaction level is shown in the following:

$$S = \frac{My}{Tp} x\ 100 \qquad \textbf{(3.9)}$$

S: Satisfaction level
My: Number of satisfied passengers
Tp: Total number of passengers
Ms: Satisfaction level

Passengers are asked to select most important ones from the 25 service criteria.
The following formulation shown as 3.10 is used to evaluate the importance satisfaction analysis value:

$$IS: [\ I(1-S)] / P \qquad \textbf{(3.10)}$$

IS: Importance Satisfaction Analysis Value
I: Importance Level
S: Satisfaction Level
P: Total number of passengers

In importance satisfaction analysis, the service criteria occur in three priority areas. The distribution of service criteria into priority areas is determined according to the importance satisfaction analysis value. In the following, there is some information about in which area the criteria occur according to the importance satisfaction analysis value.

I. Priority Area: IS >= 0.15
II. Priority Area : 0.08 <= IS < 0.15
III. Priority Area : IS <0.08

4. RESULTS

Within the frame of establishing SQMS, service delivery standard and performance measurement methods are developed. The quality criteria are determined and their reference services, requirement levels and unacceptable situations are defined. At the end of June, the adoption workings have ended successfully. Between July and November, the results of quality criteria, which are shown in Table 4.1, are reached the requirement level. The criterion, which has the lowest level, is replaying written complaints. The highest criteria, which level is 100, are availability of turnstiles, permanent information in trains, web site, passenger comforts in train and passenger comforts in train during of-peak hours. Client information in case of planned traffic disturbance isn't measured since it didn't occur.

Table 4.1 : Service level of metro line

Criteria No.	Quality Criteria	Service Level
C1	Availability of ticket machines	98,8
C2	Availability of turnstiles	100,0
C3	Reception and information in station on the offer of services	97,4
C4	Availability of escalators, lifts and moving walkways (travelators)	98,4
C5	Permanent information in stations	100,0
C6	Cleanliness and neatness of metro stations	94,6
C7	Cleanliness and neatness of trains	99,8
C8	Permanent information in trains	97,6
C9	Contact Centre	98,6
C10	Web site	100,0
C11	Passenger	86,4
C12	Fight Against Fare-Dodging	93,6
C13	Waiting Times	99,9
C14	Passenger Comfort in trains	100,0
C15	Passenger Comfort in trains during the off-peak hours	100,0
C16	Client information in case of planned traffic disturbance	--

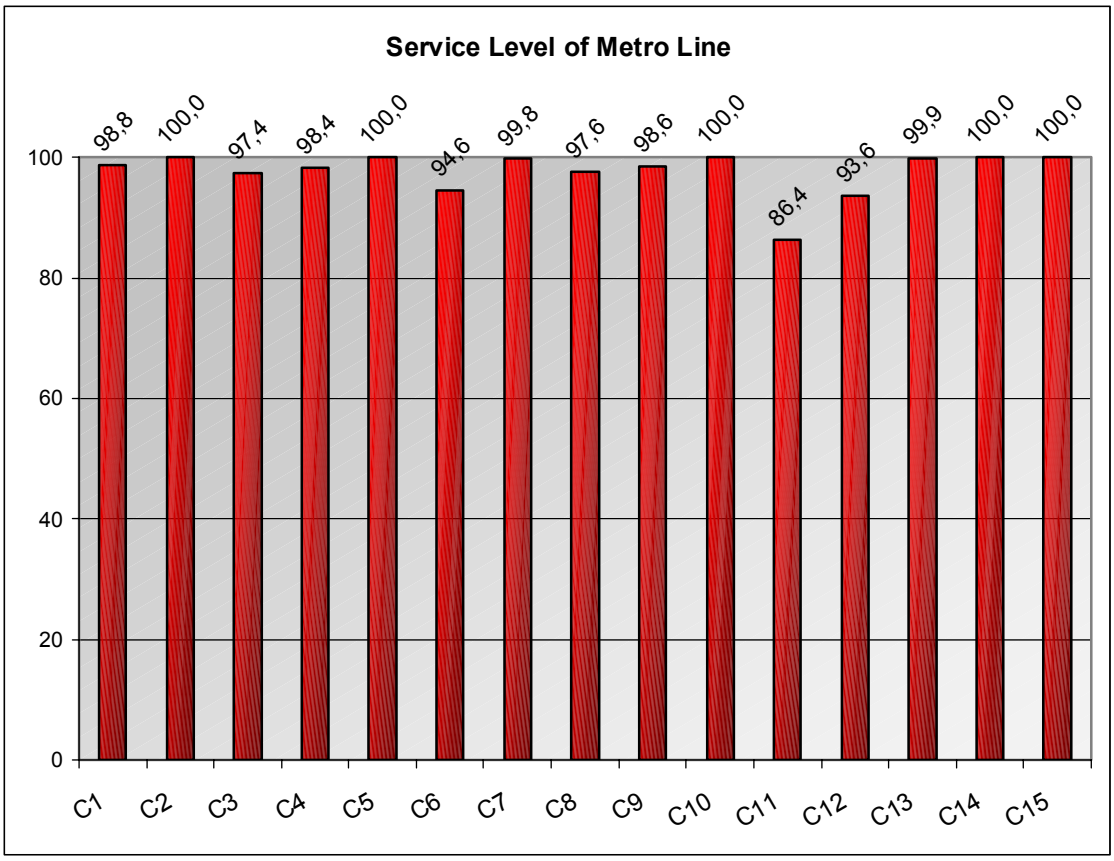

Figure 4.1 : Service level of metro line

In addition to mystery shopper survey and direct measurement method, customer satisfaction survey is conducted in order to understand customer perception and expectations. The survey is done with passengers who ride metro. In the questionnaire 25 criteria are determined in order to collect customer idea about the service level. Customers tell the satisfaction level and the most important criteria according to them. In table 4.2 shows the results of the survey.

Table 4.2 : Satisfaction levels

Criteria No	Satisfaction Criteria	Level (%)
S1	The duration of journey	85.64
S2	Lighting at the stations	83.66
S3	Availability of validation devices	82.77
S4	Punctuality	82.14
S5	Sale office services in stations	82.00
S6	Cleanliness of stations	81.81
S7	Availability of akbil/token machines	81.47
S8	Waiting times for trains	81.43
S9	Attitudes and behaviors of sale agents	81.23
S10	Permanent information in stations	81.21
S11	Attitudes and behaviors of security staff	81.21
S12	Cleanliness of trains	81.03
S13	Information on board (announcements, warnings and route maps)	80.74
S14	Accessibility of stations	80.03
S15	Availability of escalator and lift	79.63
S16	Information at the stations in case of traffic disturbance	79.27
S17	Information onboard in case of traffic disturbances	78.96
S18	Security levels on trains	78.87
S19	Security level at the stations	78.00
S20	Noise and vibration levels on trains	76.37
S21	Fare amount of journey	72.52
S22	The information service provided from the websites of Istanbul Ulasim	71.64
S23	Air condition on trains (temperature, dampness)	70.38
S24	Passenger density in trains	62.73
S25	The service delivered by Call Center	57.45

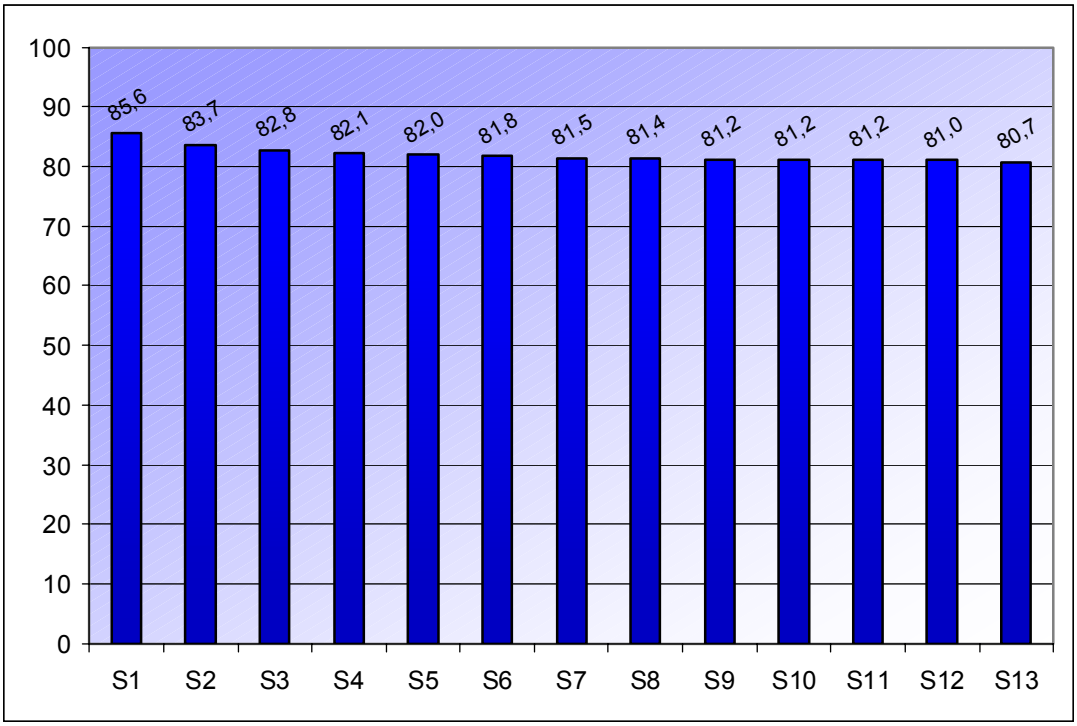

Figure 4.2 : Satisfaction levels-1

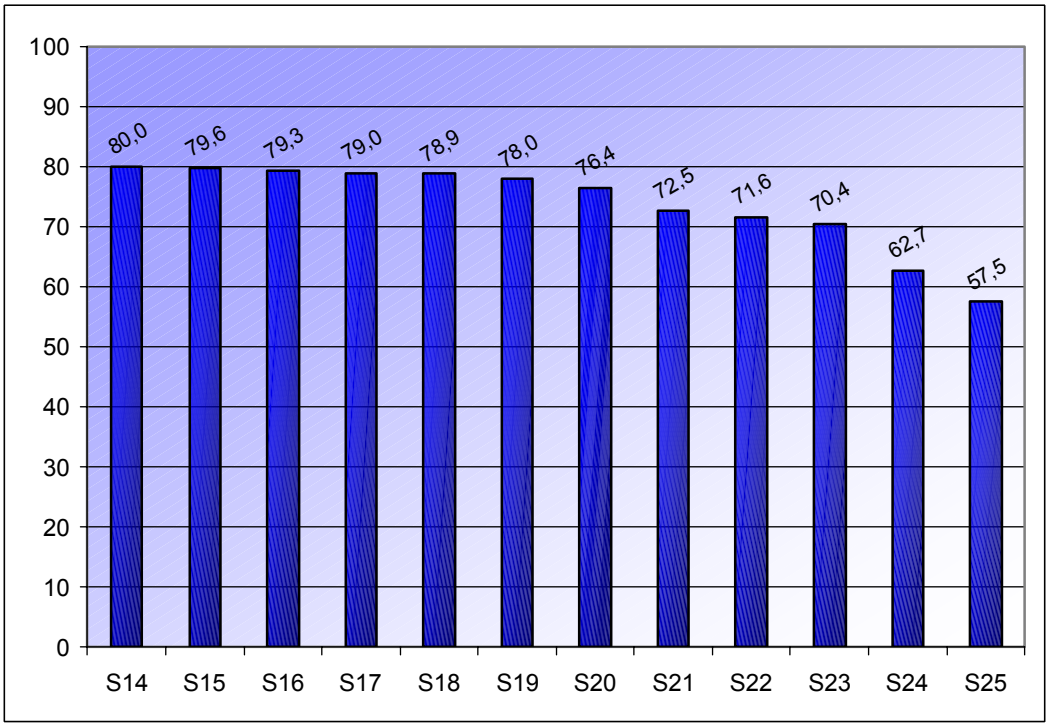

Figure 4.3 : Satisfaction levels-2

The highest level of the satisfaction is the duration of journey which value is 85,6. percentage. The lowest level of satisfaction is the service delivered by Call Center which value is 57.45.

The importance of criteria is considered in importance satisfaction analyses. In the result of analyses, the criea classified in three groups which are first priority area, second priority area, third priority area. Table 4.3 shows the results of IS analysis. According to the results, passenger density in trains is in the first priority area. In the other words, Istanbul Ulasim should focus on increasing the service quality of passenger density in trains. In the second priority area involves waiting times for trains, security level at the stations, fare amount of journey, air condition on trains, security level on trains. The rest of the criteria locate in the third priority area. Improving the service level of criteria, placed first and second priority area, contributes increasing the satisfaction level.

Table 4.3 : The results of IS analysis

Criteria	Frequency	Percentage	Satisfaction	IS	Priority Area
Passenger density in trains	200	26,7%	0,41	0,16	**1**
Waiting times for trains	368	49,1%	0,8	0,10	**2**
Security level at the stations	260	34,7%	0,72	0,10	**2**
Fare amount of journey	172	22,9%	0,59	0,09	**2**
Air condition on trains (temperature, dampness)	144	19,2%	0,55	0,09	**2**
Security level on trains	227	30,3%	0,74	0,08	**2**
Attitudes and behaviours of security staff	234	31,2%	0,77	0,07	**3**
Accessibility of stations	195	26,0%	0,74	0,07	**3**
Cleanliness of trains	188	25,1%	0,75	0,06	**3**
Cleanliness of stations	187	24,9%	0,77	0,06	**3**
The duration of journey	249	33,2%	0,83	0,06	**3**
Information at the stations in case of traffic disturbance	137	18,3%	0,7	0,05	**3**
Noise and vibration levels on trains	109	14,5%	0,64	0,05	**3**
Availibility of escalator and lift	121	16,1%	0,7	0,05	**3**
Permanent information in stations	143	19,1%	0,76	0,05	**3**
Punctuality	169	22,5%	0,8	0,05	**3**
Sale office services in stations	114	15,2%	0,72	0,04	**3**
Attitudes and behaviours of sale agents	104	13,9%	0,75	0,03	**3**
Availibility of akbil/token machines	107	14,3%	0,76	0,03	**3**
Information onboard in case of traffic disturbances	70	9,3%	0,7	0,03	**3**
Information on board	87	11,6%	0,76	0,03	**3**
Availability of validation devices	89	11,9%	0,78	0,03	**3**
Lighting at the station	76	10,1%	0,8	0,02	**3**

5. CONCLUSION

Service quality is the decisive factor that service companies can use to differance and obtain competitive advantage. Defining service quality is more harder than quality of tangible products. Thus, it is more complicated to supply services, which customers desired. Since quality management is essential for service industries in order to sustain high quality service and follow customer expectations and requirements, which can be changed.

In this title, the SQMS is analysed for UPT system. The definiton of service quality, measurement of quality and determining customer requiments and expectations are accepted main factors. As definition of service quality, service delivery standard is set for metro line. 16 criteria, which explain how, the services are suppossed to be supplied to customers is determined. In order to control how company and staff obey the Standard, the performance measurement system is developed. Mystery shopping survey and Direct Performance Measurement is two methods that used in the implementation phases. In order to determine customer requirement and expectation Customer Satisfaction Survey is fulfilled in metro line. The survey gives information us about the peception of customers. The most satisfied criteria are the duration of journey, lighting at the stations, availability of validation devices according to the results of survey. The Least satisfied criteria are air condition on trains, passenger density in trains and the service delivered by call center. Owing to expectation question, the priorities for developing services are determined. Passenger density in trains is the unique criterion that locates in the first priority area. The reasons should be defined and the service level of passenger density in trains should be improved.

In future studies, a detail research can be done as well as customer satisfaction survey. In this research, the reasons of dissatisfaction can be investigated and the solutions should be developed. In this study, customers tell their ideas about the service crtieria whether they staisfy or dissatify. In the future studies, the local problems can be defined and eliminated in order to improve service quality.

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APPENDICES

APPENDICE-A.1 Customer Satisfaction Survey Questionnare

Time started : ___ /___ Time ended : ___ /___

Hello. My name is …….. . I work for …. . My company is now carriying out a survey for customer satisfaction research in metro service. Your opinions about this issue are very important for us, if you accept the questionnaire it will take about 15 minutes. Would you help us by participating in our research? …… Thanks for your help.

Order of the person accepting the questionnaire: SIGN (-) for the people who dıd not accept the questınnaıre and show whıch person accepted by cırcle!!

Order of person									
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**

SECTION OF STATION AND TICKET

K.1 The station questionnaire filled in:
(ATTENTION!FILL IN WITHOUT ASKING!!)

Taksim	1
Osmanbey	2
Şişli	3
Gayrettepe	4
Levent	5
4. Levent	6

K.2 Time questionnaire filled in:
(ATTENTION!FILL IN WITHOUT ASKING!!)

Morninng-Peak hours (08:00-09:59)	1
Morning- Non-peak hours (10:00-11:59)	2
Afternoon (12:00-16:59)	3
Evening-Peak hours (17:00-20:29)	4
Evening-Non-peak hours (20:30-00:00)	5

K.3 What kind of ticket did you use for this trip? **(ATTENTION!READ THE CHOICES AND TAKE ONLY ONE ANSWER)**

QUOTA CONTROL	TICKET TYPES		
1. Discounted	Daily unlimited	1	**Continue**
	Weekly unlimited	2	
	15-days unlimited	3	
	Monthly unlimited	4	
	Discounted (not unlimited) akbil (student, teacher, etc.)	5	**Pass on K.5**
	Free passcard (pressmen, disableds, police, etc.)	6	
2. Standart	Standart (not unlimited) akbil	7	
3. Token	Token	8	

K.4 How long have you being used unlimited passcards?

ATTENTION: <u>ASK JUST TO UNLIMITED PASSCARD USERS</u>

✍ _____ **day(s)**
✍ _____ **month(s)**

✍ _____ **year(s)**

K.5 In which station are you going to get off?

Taksim	1
Osmanbey	2
Şişli	3
Gayrettepe	4
Levent	5
4. Levent	6

SECTION OF METRO USAGE

S1. How often do you use metro? **(TAKE ONLY ONE ANSWER)**

ATTENTION: TAKE THE ANSWER IN TERMS OF PER DAY ,PER WEEK, PER MONTH, ETC. EXAMINE MORE IF YOU GET ANSWERS LIKE "SELDOM, RARE" .

Per day	✍….. time(s)
Per week	✍….. time(s)
Per month	✍….. time(s)
other	✍……

S2. **You might have come to metro with a different transport vehicle or this might be your first transport vehicle for this trip. Bearing this in your mind, could you specify the district and neighborhood as the start point of your trip?**

(ATTENTION! BE SURE THAT, IT IS THE START POINT IF THE SPECIFIED DISTRICT AND NEIGHBORHOOD IS NEAR THE DEPARTURE STATION)

S3. Where is your final point of this trip? Could you please specify the district and neighborhood? **TAKE ONLY ONE ANSWER**

(ATTENTION! BE SURE THAT, IT IS THE FINAL POINT IF THE SPECIFIED DISTRICT AND NEIGHBORHOOD IS NEAR THE DESTINATION STATION)

Town	S2	S3
Adalar	0	0
Avcılar	1	1
Bağcılar	2	2
Bahçelievler	3	3
Bakırköy	4	4
Bayrampaşa	5	5
Beşiktaş	6	6
Beykoz	7	7
Beyoğlu	8	8
Eminönü	10	10
Esenler	11	11
Eyüp	12	12
Fatih	13	13
Gaziosmanpaşa	14	14
Güngören	15	15
Kadıköy	16	16
Kağıthane	17	17
Kartal	18	18
Küçükçekmece	19	19
Maltepe	20	20
Pendik	21	21
Sarıyer	22	22
Şişli	23	23
Ümraniye	25	25
Üsküdar	26	26
Zeytinburnu	27	27
Büyükçekmece	28	28
Sultanbeyli	30	30
Çatalca	47	47
Diğer ✍_____		

S4. How did you come to this metro station? ***(YOU MAY GET MORE THAN ONE ANSWERS)***

By walking	1
By füniküler	2
By tramway	3
By public bus	4
By taxi	5
By service bus	6
By private car	7
By minibus/shuttle or dolmus(shared taxi)	6
By sea transports	8
Other (please specify) ✍ _____	

S5. How long did it take to come to this metro station IN TOTAL?

ATTENTION! TAKE THE ANSWER BEARING IN MIND THE WAY SPECIFIED IN S4.

✍ _____ **hour(s)**

✍ _____ **minute(s)**

S6. How long do you think it will take IN TOTAL from the starting point to the final point of this trip?

ATTENTION! TAKE THE ANSWER BEARING IN MIND THE TOTAL TIME OF THE TPIP.

✍ _____ **hour(s**

✍ _____ **minute(s)**

S7. In which days do you use metro more often? **READ THE CHOICES. ATTENTION!YOU MAY TAKE MORE THAN ONE ANSWER IF HE/SHE USES METRO IN THE SAME FREQUENCY.**

S8.

Weekdays	1
Saturday	2
Sunday	3

S9. What is the general purpose of your trips by metro? **READ THE CHOICES AND TAKE ONE ANSWER.**

Home to work/ work to home	1
Home to school/ school to home	2
To/from shopping	3
To/from personal business	4
To/ from recreation	5
To/from a doctor's, medical or dentist appointment	6
To/from a friend or relatives home	7
Other (please specify) ✍ _____	

SECTION OF SATISFACTION

S10. Could you please evaluate your satisfaction degree about the factors in your trips by metro that I will mention? Could you rate each factors by the help of the card? From 6 very satisfied to 1 very dissatisfied.

SHOW THE CARD1. ASK THE STATEMENTS WITH ROTATION.

6 - Very satisfied
5 - Satisfied
4 - Slightly satisfied
3 – Slightly dissatisfied
2 - Dissatisfied
1 – Very dissatisfied

R		
1	Availibility of akbil/token machines	✍ ____
2	Availability of validation devices	✍ ____
3	Permanent information in stations	✍ ____
4	Information on board (announcements, warnings and route maps)	✍ ____
5	Waiting times for trains	✍ ____
6	Punctuality	✍ ____
7	Attitudes and behaviours of security staff	✍ ____
8	Attitudes and behaviours of sale agents	✍ ____
9	Sale office services in stations	✍ ____
10	Availibility of escalator and lift	✍ ____
11	Cleanliness of stations	✍ ____
12	Lighting at the stations	✍ ____
13	Cleanliness of trains	✍ ____
14	Passenger density in trains	✍ ____
15	Information at the stations in case of traffic disturbance	✍ ____
16	Information onboard in case of traffic disturbances	✍ ____
17	Accessibility of stations	✍ ____
18	Security level at the stations	✍ ____
19	Security levels on trains	✍ ____
20	Fare amount of journey	✍ ____
21	The duration of journey	✍ ____
22	Noise and vibration levels on trains	✍ ____
23	Air condition on trains (temperature, dampness)	✍ ____

S11. Have you ever used the websites of İstanbul Ulaşım **"www.istanbul-ulasım.com.tr OR www.istanbululasım.com?**

YES	1	PASS THROUGH S.12
NO	2	CONTINUE

S12. Could you please specify your satisfaction degree from the information service provided from the websites of İstanbul Ulaşım? **SHOW THE CARD1.**

Very satisfied	6
Satisfied	5
Slightly satisfied	4
Slightly dissatisfied	3
Dissatisfied	2
Very dissatisfied	1

S13. Have you ever called İstanbul Ulaşım Passenger Service-444 00 88?

YES	1	PASS THROUGH S.14
NO	2	CONTINUE

S14. Could you please specify your satisfaction degree from the information service provided from İstanbul Ulaşım Passenger Service?

Very satisfied	6
Satisfied	5
Slightly satisfied	4
Slightly dissatisfied	3
Dissatisfied	2
Very dissatisfied	1

S15. a. Is there anything disturbing you in your metro trips?

YES	1	PASS THROUGH S.15
NO	2	CONTINUE

S14.b. What are they? **DO NOT READ THE CHOİCES! YOU MAY GET MANY ANSWERS!**

Attitudes and behaviours of other passengers	1
Being expensive	2
Difficulty of accessibility of stations	3
Have no information about timetables	4
Difficulty of going down/up stairs	5
Incompetence of escalators	6
Lack of security toward theft, purse-snatching etc.	7
Dirtiness of stations	8
Vibration of trains	9
High density on trains	10
Long running time	11
Long wait times for next train	12
Discomfort of trains	13
Attitudes and behaviuors of personnels	14
Incompetence of air conditioning	15
Noise from trains	16
Other ✍ _____	

S16. Could you please select the most important 5 ones between the following criteria for your metro trips and arrange them in your priorty order?

R		
1	The cleanliness of trains	✍
2	Wait times for the next train	✍
3	Punctuality	✍
4	Lighting at stations	✍
5	Level of density on trains	✍
6	Cleanliness of stations	✍
7	Running time	✍
8	Security level at stations	✍
9	Security level on trains	✍
10	Noise end vibration level on trains	✍
11	Information services at stations(direction and route maps, timetables)	✍ ____
12	Air conditioning on trains (temperature, dampness)	✍ ____
13	Accessibility of stations	✍

		____
14	Ability to purchase tokens at stations	____
15	Fare amount of journey	____
16	Attitudes and behaviors of frontline personnel	____
17	Running of escalators and elevators	____
18	From akbil/token machines	____
19	From the toll gates	____
20	Information services on trains(announcements, warnings and route maps))	____
21	From the attitudes and behaviours of sale ofice	____
22	Informing at stations about disturbance	____
23	Informing on trains about disturbance	____
24	Information services provided from the websites of İstanbul Ulaşım	____
25	Information sevices provided from İst Ulaşım Passenger Service-444 00 88	____

S17. Do you or your family have any private cars?

YES	1	PASS THROUGH DEMOGRAPY
NO	2	CONTINUE

S18. Did you have opportunity to make this trip by your private car?

YES	1
NO	2

DEMOGRAPHİC QUESTIONS

D.1. Age?

____

D.2. Gender?*(ATTENTION!FILL IN WITHOUT ASKING!!)*

MALE	1
FEMALE	2

D.3. Education?

Not literate	1
Literate	2
Primary school	3
Secondary school	4
High school	5
University and +...	6

D.4. Current job?

ATTENTION! GET THE DETAİLED ANSWER

Current job: .....

Position at current job:

Employee	1
Employer	2
Partner	3
Manager	4
Self-employer	5

D.5. Marital status??

Married	1
Single	2
Widowed	3
Divorced	4

D.6. **MONTHLY TOTAL INCOME of your family?(SHOW THE CARD4)**

Below 250 YTL	1
251-500 YTL	2
501-750 YTL	3
751-1000 YTL	4
1001-1250 YTL	5
1251-1500 YTL	6
1501 – 1750 YTL	7
1751 – 2000 YTL	8
2001 – 2250 YTL	9
2251 – 2500 YTL	10
2501 – 3500 YTL	11
3501 YTL and above	12

D.7. **(ATTENTION! FILL WITHOUT ASKING!!)** Do you have any disablements?

YES	1
NO	2

D.8. Do you have any other opinions for Istanbul Ulasim A.Ş. about services given in Metro?

✍_____
_____
_____
_____
_____
_____
_____

D.9. We are carring out this search for İstanbul Ulaşım A.Ş. Do you want your informations to be shared with İstanbul Ulaşım A.Ş.?

YES	1
NO	2

ADRESS DETAIL

RESPONDENTS INFOS	
Name	
Adress	
City	
Town	
District	
Neighborhood	
Street	
Street	
Building No/Name	
Apartment No	
Home Phone	(_____)
Work Phone	(_____)
GSM Phone	(_____)
E-mail	@
Date	**___/___/200_**

APPENDICE- A.2 M2 Taksim – 4 Levent Mystery Shopper Checklist

Station		**Code**		**Checklist No**		
Station Boarded		**Code**		**Measurement Date**	/ /	
Mystery Shopper		**Code**		**The Train No**		
Days(1-7)		**Making Complaints**			Y	N
Time o the geting on train	: dk	**Entrance**				

Ticket Scenario	Akbil	1	Jetonmatik	2	Sale Office	3

Pay attention! Evaulate the subcriteria with respect to ticket scenario		
K:1 AVAILABILITY OF TICKET MACHINES	**YES**	**NO**
1.1.1 Akbil is uploaded succesfully from ticket machine (Akbil24 or ticket machine)	1	2
1.1.2 Get confirmation of the upload	1	2
1.1.3 The token is gotton succesfully	1	2
1.1.4 Recovers change and get information on the monitor	1	2
Notes:		
1.2 Is there any unacceptiable situation?	**1**	**2**
1.2.1 The traveller can't upload his Akbil in the station	1	2
1.2.2 The traveller can't buy token in the station	1	2
1.2.3 The change is not given (except warning message).	1	2
1.2.4 The traveller, who paid the price of the ticket, didn't get it	1	2
Notes:		
K:2 AVAILABILITY OF VALIDATION DEVICES	**YES**	**NO**
2.1.1 Validate ticket and pass turnstile free of problem.	1	2
2.1.2 A turnstile is accessiable to all categories of users (PRM included).	1	2
Notes:		
2.2 Is There Any Unacceptale Situation?	**1**	**2**
2.2.1 The ticket isn't validated because of the failure of machines	1	2
2.2.2 The ticket isn't held back in the validation device and don't give the permission to pass the validation devices.	1	2

Notes:

K:3 RECEPTION AND INFORMATION ON THE OFFER OF SERVICE				
3.1 Sale Agents			**YES**	**NO**
PAY ATTENTION IF YOU USE TICKET MACHINE DON'T EVALUATE SALE OFFICE				
3.1.1 Sale Agent wears Corporate Identification			1	2
3.1.2 Sale Agent is corteous and welcoming	Not Seen	9	1	2
3.1.3 Sale agent answers the question kindly and	Not Asked	9	1	2
3.1.4 The answer is understandable,enough and true.	Not Asked	9	1	2
3.1.5 Sale agent has a good	Not Seen	9	1	2
3.1.6 Sales agent wears corporate uniform.	Not Seen	9	1	2
Notes:				
3.2 Sale Ofice			**YES**	**NO**
3.2.1 Sale office is easily noticable			1	2
3.2.2 On the sale office there isn't any information which is not corporate.			1	2
3.2.3 There is available network map.	Not Asked	9	1	2
3.2.4 On the sale office there is ticket tariff.			1	2
Notes:				
3.3 Security Staff	**Not Seen**	**9**	**YES**	**NO**
3.3.1 In Turnstile area there is security staff.			1	2
3.3.2 Security staff pay attention at the passengers.			1	2
3.3.3 Security staff wear corporate identification and his/her name can be seen.	**Not Seen**	9	1	2
3.3.4 Security staff is courteous.	Not Seen	9	1	2
3.3.5 Security staff answers the question kindly and helpfully	**Not Asked**	9	1	2
3.3.6 The answer is understandable,enough and true.	**Not Asked**	9	1	2
3.3.7 Security staff is respect to self care rules (hair, beird, make up)	Not Seen	9	1	2
3.3.8 Sales agent wears corporate uniform.	Not Seen	9	1	2
3.3.9 Security staff is respect to standing position defined by company			1	2
Notes:				

3.4 Is There Any Unacceptale Situation?	**1**	**2**
Mislead due to wrong information.	1	2
3.4.2 The staff ignores on purpose the client.	1	2
3.4.3 The staff presentation is obviously incorrect.	1	2
3.4.4 The staff is rude to the traveller.	1	2
3.4.5The agent refuses a sale because of a lack of change	1	2
3.4.6 The agent is not able to deliver a map and/or information about the fares.	1	2
Notes:		

K:4 AVAIIABILITY ESCALATOR,LIFT,MOVİNG WALKWAY				
4.1 ESCALATOR	**No Escalator**	9	**YES**	**NO**
4.1.1 Escalators work			1	2
4.1.2 The number of escalator which doesn't work				
4.1.3 (If escalator doesn't work) On the escalator there is Information about ESCALATOR stopped/ maintenance.			1	2
Notes:				
4.2 LIFT	Asansör yoktu	9	**YES**	**NO**
4.2.1 Lift works			1	2
4.2.2 (If Ifft doesn't work) On the escalator there is Information about lift stopped/ maintenance.			1	2
Notes:				
4.3 MOVING WALKWAYS (It is measured only in Taksim station)			**YES**	**NO**
4.3.1 Moving Walkway works			1	2
4.3.2 (if travelotor doesn't work)On the travelator there is information about travelator stopped/ maintenance			1	2
Notes:				
K:5 CLEANLİNESS AND NEATNESS OF STATIONS			**YES**	**NO**
5.1 There is no disturbing smell in the stations.			1	2
5.2 ENTRANCE			**YES**	**NO**

5.2.1 There is no graffiti on the entrance area.			1	2
5.2.2 The bins are empty.			1	2
5.2.3 Stairs are clean	Weather Condition	9	1	2
5.2.4 Floors are clean	Weather Condition	9	1	2
5.2.5 Lighting is enough	Weather Condition		1	2
5.2.6 The walls are clean				2
5.2.7 The ceilings are clean and neat				2
5.2.8 Windows are clean and neat.	There isn't any window	9	1	2
Advertisement Boards are clean	Not Seen	9	1	2
5.2.10 Vending machines are clean (ATMs, Pepsi, Ülker)	Not Seen	9	1	2
Notes:				
5.3 MEZANİN(Turnikelerle platform arası bölüm)			**YES**	**NO**
5.3.1 There is no graffiti on the mezanin area.			1	2
5.3.2 The bins are empty.			1	2
5.3.3 Stairs are clean			1	2
5.3.4 Floors are clean			1	2
5.3.5 Lighting is enough			1	2
5.3.6 The walls are clean			1	2
5.3.7 The ceilings are clean and neat			1	2
5.3.8 Turnstiles are clean			1	2
5.3.9 Windows are clean and neat.	There isn't any window	9	1	2
5.3.10 Advertisement Boards are clean	Not Seen	9	1	2
5.3.11 Vending machines are	Not Seen	9	1	2

clean (ATMs, Pepsi, Ülker)				
Notes:				
5.4 PLATFORM			**YES**	**NO**
5.4.1 There is no graffiti			1	2
5.4.2 The bins are empty.			1	2
5.4.3 Floors are clean			1	2
5.4.4 Lighting is enough			1	2
5.4.5 The walls are clean			1	2
5.4.6 Seatings are clean and neat			1	2
5.4.7 Advertisement Boards are clean	Not Seen	9	1	2
5.4.8 Vending machines are clean (ATMs, Pepsi, Ülker)	Not Seen	9	1	2
Notes:				
5.5 Is there any extraordinary dirtiness At the entrance/Mezzanine/ platform ?			1	2
Notes:				
5.6 Is There Any Unacceptale Situation?			**1**	**2**
5.6.1 Injured or the clothes are damaged because of the degradations or the bad maintenance of the installations.			1	2
Notes:				

K:6 PERMANENT INFORMATION IN TRAINS	YES	NO
6.1.1 The name of the station visible from the whole length of the train	1	2
6.1.2 Different directions, exits and possible connections;	1	2
6.1.3 Useful information about where he can get a ticket;	1	2
6.1.4 Time table	1	2
6.1.5 The right time of the first and the last passage(mentioned on the timetable is enough)	1	2
6.1.6 Accessible maps of the rail system network	1	2
6.1.7 Accessible district map with indication of accesses for the PRM	1	2
6.1.8 The phone number of the Contact Center	1	2
6.1.9 The website adress	1	2
6.1.10 The travelling rules applicable in the station	1	2
6.1.11 Security rules applicable in the station	1	2
6.1.12 The principal current fares	1	2
Notes:		
6.2 Is There Any Unacceptale Situation?	**1**	**2**
6.2.1 District map or current fares not up-dated	1	2
6.2.2 A traveller is mislead due to missing or wrong or ineligible information.	1	2
Notes:		
K:7 CLEANLINESS AND NEATNESS OF TRAINS	1	2
7.1.1 The outer surface is clean	1	2
7.1.2 There is no grafiti on the outer surface	1	2
7.1.3 Floor is clean | Not Seen | 9	1	2
7.1.4 The windows (outer surface) are clean	1	2
7.1.5 There is no grafiti in the train.	1	2
7.1.6 There is no disturbing smell in the train.	1	2
7.1.7 In the train lighting is enough	1	2
7.1.8 The handles are clean and non damaged	1	2
7.1.9 The seatings are clean and non damaged | Not Seen | 9	1	2
7.1.10 Signs are clean and non damaged	1	2
Notes:		
7.2 Is There Any Unacceptale Situation?	**1**	**2**
7.2.1 The traveller is injured or his clothes are damaged because of the bad maintenance of the equipment.	1	2
Notes:		
K:8 PERMANENT INFORMATION IN TRAINS	1	2
8.1.1 There is a Map of line below the doors	1	2

8.1.2 There is The line number-M2- in front and behind train.	1	2
8.1.3 There is The vehicle destination in front of the train	1	2
8.1.4 Audible anouncement of the stops	1	2
8.1.5 There is a Network map on platform	1	2
8.1.6 In the train there are rules and advices about the use of the train	1	2
Notes:		
8.2 Is There Any Unacceptale Situation?	**1**	**2**
A traveller is mislead due to missing or wrong or unlegible information.	1	2

APPENDICE- A.3 Contact Center Mystery Shopper Checklist

Mystery Shopper		**Code**		**Measurement Date**	/ /
Scenario Name/Code		**Code**		**Days(1-7)**	
Left name			**Left Phone**		
Measurement Time	:				

1. PASSENGER ASİSTANT	**YES**	**NO**
1.1 Passenger assistant reply the call in less than one minute.	1	2
1.2 Passenger Asistant welcoming defined by company	1	2
1.3 Passenger Asistant say goodbye defined by company	1	2
1.4 Passenger asistant is courteous and helpful while answering the question	1	2
1.5 The answer given by passenger asistant is understandable and enough (passenger asistant help passengers about suggestions and complaints, lost properties, current fares and journey alternatives)	1	2
2. AUTOMATED AUDIBLE ANNOUNCE SYSTEM		
2.1 Automated audible announce system works.	1	2
Notes:		
3. Is there any Unacceptable Situation?	1	2
3.1. Passenger Asistants give the reply in less than 3 minutes	1	2
3.2. Passenger assistant gives right information about the services given	1	2
3.3. The information given by automated audible anonunce is up date.	1	2
3.4. The information given by automated audible anonunce is up date.	1	2
3.5. The information given by automated audible anonunce is wrong (Passenger can get information about timetable, ticket fares, lines)	1	2
Notes:		

APPENDICE- A.4 Complaint Management System Mystery Shopper Checklist

	COMPLAINTS BOX	CONTACT CENTER	MAIL
Mystery Shopper			
GM Code			
Measurement Date	/ /		
The station which is made complaints in.			
Complaint Detail			
Left Name			
Reply Date	/ /		
Contact Detail (Phone, mail)			
Measurement No			

1. Complaints	**YES**	**NO**
1.1 Reply is given in seven working days	1	2
1.2 The information given is true.	1	2
1.3 The information given is understandable and clear.	1	2
2. Is there any unacceptable situations?	**1**	**2**
2.1 Client doesn't receibe a standard reply	1	2
2.2 Client doesn't receive reply included tecnical terms.	1	2
2.3 Reply is given in 14 working days.	1	2
Notes:		

APPENDICE-A.5 Web Site Mystery Shopper Checklist

Measurement Date	/ /	**Time**	:	**Days (1-7)**	

1. CRITERIA	**YES**	**NO**
1.1 Time Table	1	2
1.2 Ticket Type and Current Fares	1	2
1.3 Network map	1	2
1.4 Information how to make a complaint and lost property	1	2
1.5 Contact Center Number-4440088-	1	2
1.6 Passenger rules and safety rules	1	2
1.7 Information about planned traffic disturbance	1	2
2. Is there a unacceptable situation?	**1**	**2**
2.1 There isn't any nonupdate information	1	2
Notes:		

APPENDICE- A.6 Service Standards Guideline For Mystery Shoppers

Availability of ticket machines

- Akbil machine loads akbil without problem.
- Genuine loading information is given on the monitor screen after operation is done.

Akbil machine should be in a working condition before it is approached and loading operations should be successful.

After loading operations, akbil machine should show authentic loading informations on screen.

- Token should be collected from token machine with difficulty.
- Charge and receipts should be received after operation.

Token machine should be in a working state before been approached. Collection of toekn should be succesful.

After token is collected charge should be given when required and the necessary informations should be given by the machine after operations.

Avalibility of turnstiles

The validation ticket should be able to be used successfully.

If the validation machines is faulty or closed notice sign/information should be placed outside the validation machine..

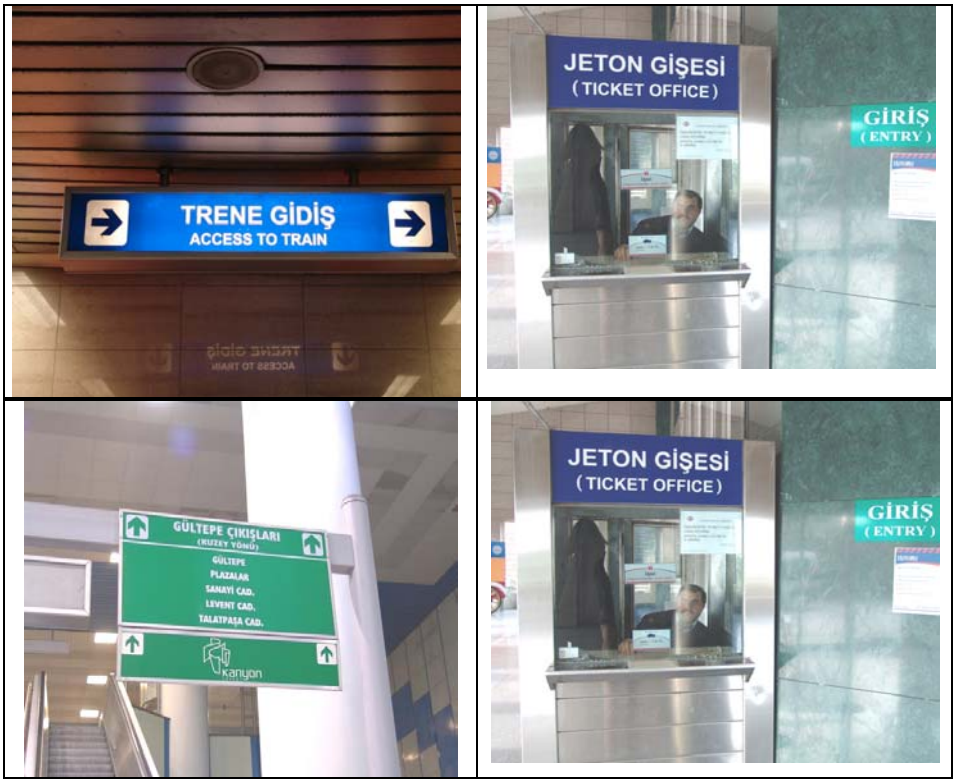
- Disadvantaged (blocked, baby cart, old vb.) traveller entrance is made.

Example of how a disadvantaged traveller can go through the validation machine.

Permanent information at stations

The name of the station should be visible from inside the train.

Station's name should be visible from inside the train


TRENE GİDİŞ
ACCESS TO TRAIN
JETON GİŞESİ
(TICKET OFFICE)
GİRİŞ
(ENTRY)
GÜLTEPE ÇIKIŞLARI
(KUZEY YÖNÜ)
GÜLTEPE
PLAZALAR
SANAYİ CAD.
LEVENT CAD.
TALATPAŞA CAD.
Kanyon
JETON GİŞESİ
(TICKET OFFICE)
GİRİŞ
(ENTRY)

CURRICULUM VITAE

Name Last Name : İsmail Durman

Address : Fevzi Çakmak Mahallesi 1121. Sk. 81/5 Esenler - İstanbul

Place and Date of Birth : Ankara, 1982

Foreign Language : English

Primary School : Tahsin Şahinkaya Primary School, 1993

High School : Süleyman Demirel Anatolion High School, 2000

Degree : Gazi University, 2005

Institute: Science

Name of the Programme : Industrial Engineering

Experiences : İstanbul Transportation Co., 2005-2009