AN INTERNET BASED SYSTEM FOR MONITORING PATIENTS AND RELATIVES' SATISFACTION RATES IN HEALTH SERVICES

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ABSTRACT

AN INTERNET BASED SYSTEM FOR MONITORING PATIENTS AND RELATIVES' SATISFACTION RATES IN HEALTH SERVICES

The aim of the study is to develop an internet based dashboard system for monitoring health key performance indicators (KPI) to improve medical services quality with a benchmarking framework. The study implements "patients and patient relatives' satisfaction rates" of the Ministry of Health of Turkey organizations and institutions as a sample KPI. Enterprise Digital Dashboard (EDD) is an effective tool for executives to get a top level view of their corporate. Decision makers need to have easy access to knowledge such as patient satisfaction rate, mean length of stay and other KPIs. Dashboard systems gather and display KPIs in a centralized system for supporting quality improvement processes. The Ministry of Health of Turkey collects and measures several KPI's in order to improve quality and performance in health-care services. 'Patients and patients relatives' satisfaction rate is one of these KPI's. In this study, we implemented an internet based system for replacing the currently applied paper-based patient satisfaction survey. The collected answers can be measured, benchmarked between hospitals or different departments of the same hospital, and monitored in various dimensions. Our solution has three sub-systems; first system collects survey answers through web forms, second system publishes the survey result as web services, and the last system displays the received KPI values from web services in a dashboard. The new system performs monitoring in various dimensions and benchmarking because the information is stored in a relational database. In current system, only the average satisfaction rate of a hospital is calculated and there is no benchmarking performed on the results. The benchmarking capability of the new solution provides the effective use of the KPI's in quality and performance improvement.

Keywords: key performance indicator (KPI), enterprise digital dashboard (EDD), benchmarking, knowledge management (KM), balanced scorecard (BSC).

ÖZET

WEB TABANLI SAĞLIK SEKTÖRÜNDE HASTA ve HASTA YAKINI MEMNUNİYET ORANI İZLEME SİSTEMİ

Bu çalışmanın amacı sağlık sektöründe kaliteyi geliştrmek için kilit sağlık kalite ve performans göstergelerinin görüntülenebildiği, kurum ve kuruluşlar arası kıyaslamaların yapılabildiği web tabanlı gösterge paneli sistemi oluşturmaktır. Bu kapsamda T.C. Sağlık Bakanlığının sağlık kurum ve kuruluşlarında uyguladığı hasta ve hasta yakını memnuniyet oranı kilit performans göstergesi örnek olarak sistemimizde geliştirilmiştir. Kurumsal gösterge paneli sistemleri yöneticiler ve karar vericilerin, kurum ve kuruluşlarının mevcut kalite ve performans durumlarını verimli bir şekilde görüntüleyebilmelerini sağlayan sistemlerdir. Gösterge paneli sistemleri bu amaçla kilit performans göstergelerini tek bir sistem altında toplar ve tek bir merkezden bu bilgilere kolay ve hızlı bir şekilde ulaşılmasını sağlarlar. T.C. Sağlık Bakanlığı da kalite ve performansı arttırmak amacıyla, çeşitli KPI'ların ölçümlenmesini ve değerlendirmesini yapmaktadır. "Hasta ve Hasta yakını memnuniyet oranı" bu KPI'lardan biridir. Çalışmamızda, mevcut durumda kağıt üzerinde yada telefon ile yapılan anket uygulaması, web tabanlı bir sisteme geçirilmiştir. Sistemde toplanan anket verileri ölçümlenir, hastane içinde yada hastaneler arasında karşılaştırılır ve değişik boyutlarda gösterilir. Sistemimiz üç katmanlı yapıdan oluşmaktadır; ilk kısımda anket verileri sisteme girilir, ikinci kısımda toplanan anket verileri web servisler aracılığıyla sunulur, son kısımdaysa yayımlanan veriler dashboard aracılığıyla gösterilir. Anket verileri ilişkisel veritabanında saklandığı için, her türlü görüntüleme ve mukayese işlemleri yapılabilmektedir. Mevcut uygulamada sadece sağlık kurumlarının ortalama memnuniyet oranı hesaplanmaktadır ve herhangi bir kıyaslama işlemi yapılmamaktadır. Yeni sistemin mukayese yeteneği sayesinde bu veriler kaliteyi arttırmaya yönelik olarak efektif bir şekilde kullanılabilmektedir.

Anahtar Sözcükler: kilit performans göstergeleri, kurumsal gösterge paneli, bilgi yönetimi, dengeli puan tablosu.

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LIST OF ABBREVIATIONS

KPI	Key Performance Indicator
EDD	Enterprise Digital Dashboard
ICT	Information and Communication Technologies
BPR	Business Process Reengineering
BSC	Balanced Scorecard
KM	Knowledge Management
DSS	Decision Support System
NIOPH	National Institute of Public Health

1. Introduction

Most common definition of knowledge management is as follows: Knowledge management is an organization or community's planned approach to collecting, evaluating, cataloging, integrating, sharing, improving, and generating value from its intellectual and information-based assets. The major goal of knowledge management is to provide a means to deliver the right information to the right person and place at the right time [1]. According to Neame and Boelen, "The health care environment is bursting with information, but the sector lacks the capacity to find, communicate or use it effectively" [2]. There are three core components of knowledge management; they are also called "building blocks" of knowledge management. The building blocks of knowledge management include data, information, and knowledge. Data are often defined as unprocessed representations of raw facts, concepts, or instructions that can be communicated, interpreted, or processed by humans or automatic means. Data become information when they are categorized, filtered, or indexed. Information becomes knowledge when critical thinking, evaluation, structure or organizations are applied to support decisions or understand concepts. The hierarchy of the data, information and knowledge can be seen on Figure 1.1.

A performance indicator defines the measurement of a piece of important and useful information about the performance of a program expressed as a percentage, index, rate or other comparison which is monitored at regular intervals and is compared to one or more criterion [3]. Using the KPI approach the implicit production objectives were translated into measurable values that can be extracted from existing production data. In today's challenging information era, planners and managers face deadlines and time constraints in their daily decision making [2]. Managing for competitive advantage in a global business environment means that managers should have easy access to information which would facilitate informed decision making. The technology adoption trend is shifting to a scenario where the decision makers should be able to access KPIs of the enterprise using various devices, accessing KPIs of busi-

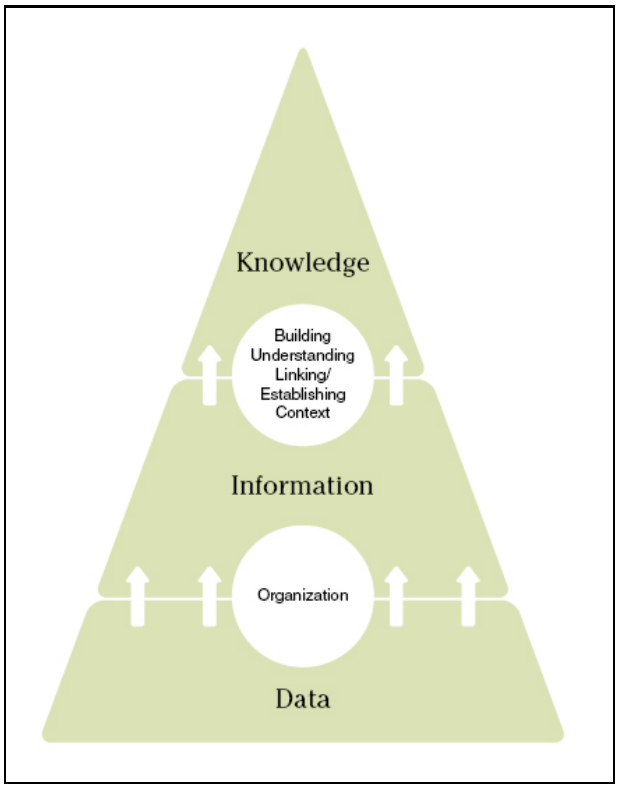

Figure 1.1 The hierarchy of Data, Information, and Knowledge

ness units distributed across the globe [5]. Decision makers need to have easy and fast access to knowledge such as patient satisfaction rate, mean length of stay and a number of other KPIs. So decision makers mostly focus on knowledge rather than data or information. The knowledge management tools provide organized, categorized and filtered knowledge to users. As discussed in Berler, Pavlopoulos and Koutsouris' study, although the medical community has embraced with satisfaction all major technological discoveries (i.e. magnetic resonance imaging, nuclear medicine, digital radiology etc.), allowing the improvement in patient care, this has not happened when talking about health-care informatics. There are several challenging points in implementing knowledge management tools:

- organizational and cultural matters related to health care
- technological gap between health-care professionals and information science experts
- legal requirements on the confidentiality of personal data, of patient related data,

and on data privacy

- industrial and market position of health-care informatics
- lack of vision and leadership of the health-care managers and health authorities, and the lack of willingness to reengineer the health-care processes
- less user acceptability and usability of the proposed information systems

Our study implements a knowledge management tool for monitoring key performance indicators of health care services by taking into consideration all of the above issues. The Ministry of Health of the Republic of Turkey develops "Transformation in Health Programme" for improving the quality of the health services in Turkey. The target of the reform need should not only be towards the increase of the satisfaction of the patients. Within the current understanding of a modern administration, the provision of a higher quality service with more reasonable cost or to purchase it should be one of the principal targets [4]. Although a definite standard structure in hospital information systems on finance, accountancy and invoicing exist, main standards for medical patient registration have not been developed and different implementations do not allow an integrated data analysis. To date, the use of information systems have completely stayed at the stage of registration, collecting and storing and for this reason, benefits such as transformation of data into information, making analysis of it, use of information and support of it to the management which are essential functions of information systems have not been provided. This situation turns information systems into a work burden. One of the major targets of the "Transformation in Health" programme is to improve hospital information systems and provide useful information to decision makers and other stakeholders. As a part of transformation, the programme puts in practice a performance monitoring and assessment solution in distributing the circulating capital of the health organizations and institutions. According to the regulations, the health care staffs are paid extra payments according to their performance. Their performance is measured by several factors such as operational tasks performed, number of examinations, number of operations, and organizational performance coefficients. Organizational performance coefficient is calculated by taking average of five

coefficients:

- Access to examine coefficient
- Patient and patient relatives' satisfaction rate
- Organizational infrastructure and process evaluation coefficient
- Organizational efficiency coefficient
- Organizational target coefficient

The details of the application and calculations will be explained in following sections.

In our study we implement a solution for collecting patient satisfaction survey answers, publishing survey answers, and organizing and monitoring those results in various dimensions. In existing application, the surveys are paper based. A single average satisfaction rate for the organization is calculated manually and consolidated into city level. So the results of the satisfaction survey answers remain as data, they are not converted to information and knowledge. The main advantage of our solution is to converting survey question answers into information and knowledge. Therefore the results can be categorized, filtered and organized easily to become knowledge. For example the survey results can be organized in order to benchmark one organizations value with another, and this leads to improve quality and performance, as another example the departments of an organization can be comparable with the new solution. As a conclusion the solution stores the satisfaction survey answers in the databases, and provides dashboard system which monitors satisfaction rate KPI in various dimensions to facilitate the decisions of the planners and the managers of the health care services.

2. Knowledge Management Tools In Health Sector

"Knowledge Management" is a process used by organizations and communities to improve how business is conducted by leveraging data and information that are gathered, organized, managed, and shared. Many have accumulated large collections of data and information that are often housed in separate files and databases and are not easily accessible for analysis and decision-making. The ability to use this information is often limited due to lack of understanding about context, purpose, or assurance about the quality of the information [1].

There are three core components of knowledge management; they are also called "building blocks" of knowledge management. The building blocks of knowledge management include data, information, and knowledge. Data are often defined as unprocessed representations of raw facts, concepts, or instructions that can be communicated, interpreted, or processed by humans or automatic means. Data can take many forms (e.g., textual, numeric, graphic, cartographic, narrative, or audiovisual). Data become information when they are categorized, filtered, or indexed. Information becomes knowledge when critical thinking, evaluation, structure or organizations are applied to support decisions or understand concepts. Knowledge differs from data or information in that new knowledge may be created from existing knowledge using logical inference. If information is data plus meaning then knowledge is information plus processing [1]. The hierarchical representation of building blocks of knowledge management is represented on Figure 1.1.

Although the medical community has embraced with satisfaction most of the technological discoveries (i.e., magnetic resonance imaging, nuclear medicine, digital radiology, etc), allowing the improvement in patient care, this has not happened when talking about health-care informatics. In order to persuade health-care decision-makers to assess the added value of KM tools, those should be used to propose new performance measurement and performance management techniques at all levels of a health-care

system [6].

As discussed in [6], new information and communication technologies (ICTs) are having integration problems in health care because of the way this sector is organized. Health care is a strongly people-centered sector where ICT was dealt more as an intruder, as a spy to the health-care professionals' way of doing things, and as a competitor to this people-centered model. Thus, if ICT intends to prove its advantages toward establishing an information society and a much more knowledge society, it has to focus on providing service-oriented solutions.

Knowledge management processes and tools can be of obvious benefit to public health organizations, but there are challenges that must be addressed to implement such an approach successfully. There are six main groups of issues have to be dealt with as cited below:

- The first issue is the organizational and cultural issues related to health care. This issue is rather important regardless of information systems since organization models and culture do not allow the continuity of care nor any type of structured data collection.
- The second issue is the technological gap between health-care professionals and information science experts. Doctors are often reluctant to use information systems that, as they say, are not designed for them.
- The third issue is the legal requirements on the confidentiality of personal data, of patient related data, and on data privacy. It is clear that if this issue is not addressed at a managerial and procedural level by imposing a policy for meeting those requirements, there is little chance that medical data will be digitally kept in a structured manner, thus moving from digital islands of clinical data toward a structured electronic health-care record.
- The fourth issue is the industrial and market position of health-care informatics. In general, the health-care market is seen by the industry as large in size but not highly profitable, mainly due to the lack of standards in implementing and

interoperating health-care informatics products. The results of those facts are that the industry has focused on creating mostly small-scale products (i.e., laboratory information systems, radiology information systems, clinical information systems, etc.) and not on designing information systems that are dealing with health care as a whole.

- The fifth issue is the lack of vision and leadership of the health-care managers and health authorities, and the lack of willingness to reengineer the health-care processes [business process reengineering (BPR)] for the benefits of efficiency and quality of care delivery. This issue should be dealt with by proposing strategies that focus on the process by establishing KPIs, balanced scorecard (BSC), or other metrics that are the upper level of a structured information-flow-based model.

- The sixth issue, and maybe the most important one, focuses of the terms of user acceptability and usability of the proposed information systems. This issue is the most related to the problem of dealing with the people-centered approach of the health-care sector. This issue deals with information-system user friendliness, with usability issues such as the time to reach a data entry point, the speed of information retrieval, the quality of information retrieval, the complex security procedures, etc [6].

Many of the tools and strategies associated with implementing KM are not new; what is new is a cohesive approach to KM design and implementation. Certainly there are pit-falls and limitations in using information technology for KM-trying to force fluid knowledge into rigid data structures, for example, or focusing too much on the tools and not enough on the content. But networks and computers, with their ability to connect people and store and retrieve virtually unlimited amounts of information, can dramatically improve departmental efficiencies.

Because of the hierarchical and relational format of the raw data, the program managers have to spend too much time preparing these data in a presentable format for analysis (aggregating, processing, copying to spreadsheet and graphics software,

etc.). Insufficient time is spent on the analysis itself, and on interpretation of the information for health services planning and management. Decision support systems in other words dashboard systems have thus been developed to enable decision makers to more rapidly prepare their data for analysis, so that more time can be spent actually analyzing the data and using the information for decision making. The decision support system (DSS) is a module added to an existing routine health information system that allows decision-makers to visualize health indicators and data elements collected by the system in graphical and geographical presentations [2].

2.1 Categories of Knowledge Management Systems

The general categorization of the knowledge management system can be done as follow:

- Knowledge storage tools. Knowledge storage tools, also known as content databases, allow a firm to electronically collect and store information. Examples of such storage tools include knowledge databases (Lotus Notes) as well as corporate intranets which serve as a repository of project files and other knowledge created by users. The latest knowledge storage tools differ from earlier database or file systems in that these newer tools have more sophisticated organizational structures which allow users to more easily identify and locate desired information. In addition, the internet has allowed for global access to such knowledge databases so that employees can store and retrieve information on a worldwide basis.

- Search and retrieval tools. The second category of tools is the search and retrieval tools. These tools allow the user to easily search for and locate information within a knowledge database or other knowledge repository. These tools also include tools which allow users to locate specific expertise within (or external to) a firm. For example, an employee may be working on a project which deals with a specific challenge. Using an expertise locator tool, the employee could query the expertise database and identify other employees (internal or external

to the firm) who may have experience or expertise in this particular field. These tools are particularly useful in helping employees locate others within a dispersed organization who may possess valuable knowledge relevant to their work.

- Collaboration tools. Collaboration tools allow employees to create a virtual, web-based workspace in which they can share files and interact in an electronic environment. Such tools can provide a "collaborative workplace which can enable distributed teams to work together to accelerate and improve development and delivery of products and services, optimize collaborative business processes, and improve innovation, problem-solving, and decisionmaking. These tools allow dispersed project teams to exchange electronic files, discuss topics on-line, as well as store, retrieve and organize project work in a centralized location.

- Communication tools. Various communication tools can also help firms address their knowledge management issues. These communication technologies can be classified into asynchronous and synchronous tools. Asynchronous tools include technologies which allow communication between two or more users on a sequential basis. Examples of such technologies include email, wikis and weblogs. Synchronous tools are those technologies which facilitate communication between users on a real-time basis. Discussion and chat technologies and videoconferencing are examples of synchronous communication tools. Both asynchronous and synchronous tools help to improve the knowledge sharing, interaction and transfer of information between employees in an organization [7].

3. Definition of Key Performance Indicator

A performance indicator can be defined as "a variable that quantitatively expresses the effectiveness or efficiency, or both, of a part of or a whole process, or system, against a given norm or target". Another common definition of key performance indicator: A performance indicator defines the measurement of a piece of important and useful information about the performance of a program expressed as a percentage, index, rate or other comparison which is monitored at regular intervals and is compared to one or more criterion [3].

The key performance indicators for an organization can be identified by applying SMART approach, smart is an acronym for the features that a KPI must be:

- **S**pecific: KPI must define precisely what will be assessed.
- **M**easurable: KPI must be expressed quantitatively. The measured value can be used to determine if the performance toward a goal is getting better or worse.
- **A**chievable: The targeted KPI must be attainable. It must be in the capability of the organization.
- **R**esult-oriented or relevant: KPI must enable the business executives to understand the health of the organization by focusing on a few key indicators.
- **T**ime-bounded: KPI must relate to specific time periods and have deadlines.

Performance measurement is beyond the adoption of a set of objectives for a health-care system. Performance of health system does not limited to a set of key performance indicators; there are many sets of objectives proposed for the performance of health. As discussed in Berler, Pavlopoulos and Koutsouris' study, we referenced Donadebian approach to model the system and performance indicators.In Donadebian approach, a health-care organization is a system formed by the interaction of structures, processes, and outcomes. Structures are used to establish processes in order

to create health-care outcomes. The other important feature of health-care system is that intangible assets are more important than tangible assets, for example, health-care outcomes are more important than financial outcomes in a health-care system. In order to address this issue the Balanced Scorecard Framework (BSC) is the best way to identify and classify the necessary KPI's that mostly reflects the overall structure of a health-care organization. The details of the BSC framework will be provided in the next section.

4. Balanced Scorecard Systematic

Effective measurement must be an integral part of the management process. The balanced scorecard, first proposed in the January - February 1992 issue of Harvard Business Review (HBR). "The Balanced Scorecard- Measures that Drive Performance", provides executives with a comprehensive framework that translates a company's strategic objectives into a coherent set of performance measures. Much more than a measurement exercise, the balanced scorecard is a management system that can motivate breakthrough improvements in such critical areas as product, process, customer, and market development.

The scorecard presents managers with four different perspectives from which to choose measures. The rationale underlying the balanced scorecard is that business performance should not be assessed using a single financial indicator. It complements traditional financial indicators with measures of performance for customers, internal processes, and innovation and improvement activities (learning and growth). Clearly, many companies already have myriad operational and physical measures for local activities. But these local measures are bottom-up and derived from ad hoc processes. The scorecard's measures, on the other hand, are grounded in an organization's strategic objectives and competitive demands.

The BSC concept involves creating a set of measurements for four strategic perspectives:

- Financial: represents the long-term strategic objectives of the organization and thus it incorporates the tangible outcomes of the strategy in traditional financial terms. The three possible stages are rapid growth, sustain and harvest. Financial objectives and measures for the growth stage will stem from the development and growth of the organization which will lead to increased sales volumes, acquisition of new customers, growth in revenues etc.

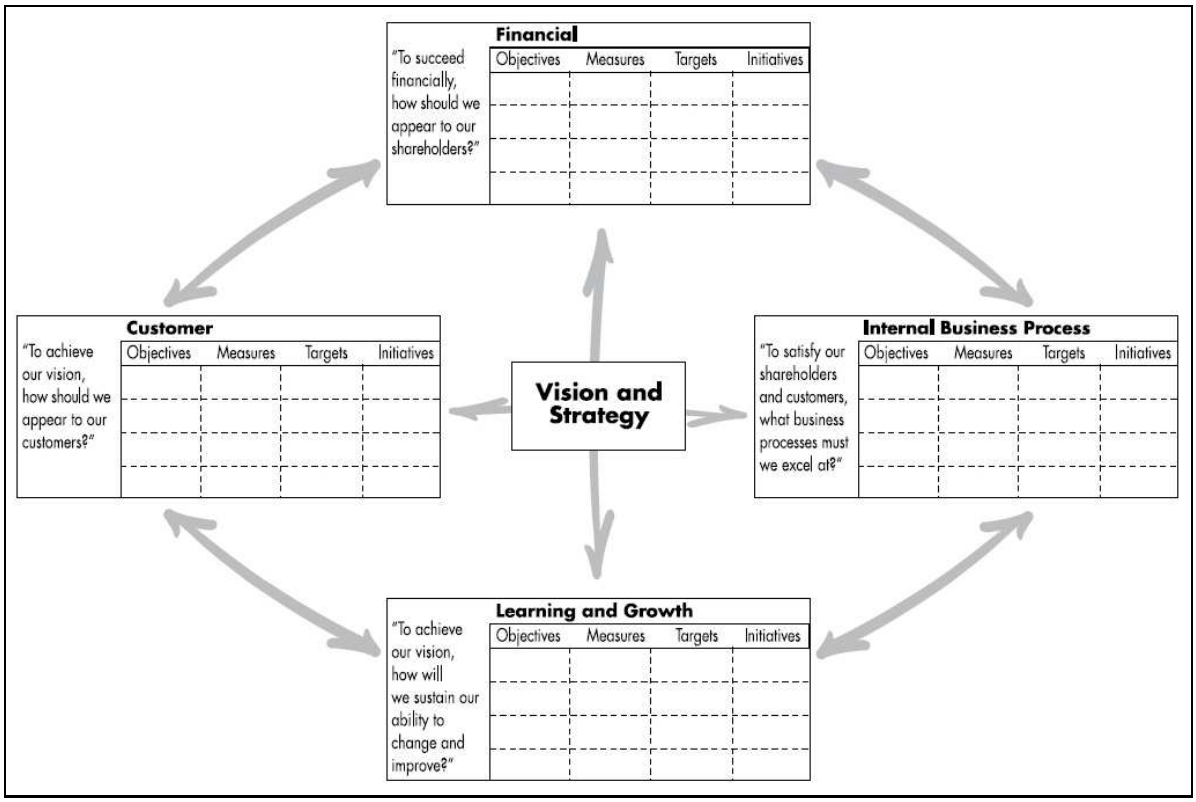

Figure 4.1 The four strategic perspectives of BSC

- Customer: defines the value proposition that the organization will apply in order to satisfy customers and thus generate more sales to the most desired (i.e. the most profitable) customer groups.

- Internal business process: focuses on all the activities and key processes required in order for the company to excel at providing the value expected by the customers both productively and efficiently. These can include both short-term and long-term objectives as well as incorporating innovative process development in order to stimulate improvement.

- Learning and growth: is the foundation of any strategy and focuses on the intangible assets of an organization, mainly on the internal skills and capabilities that are required to support the value-creating internal processes. The learning and growth perspective is concerned with the jobs (human capital), the systems (information capital), and the climate (organization capital) of the enterprise.

Unlike conventional metrics, the information from the four perspectives provides balance between external measures like operating income and internal measures like new product development. This balanced set of measures both reveals the trade-offs that managers have already made among performance measures and encourages them to achieve their goals in the future without making trade-offs among key success factors.

The balanced scorecard is not a template that can be applied to businesses in general or even industry-wide. Different market situations, product strategies, and competitive environments require different scorecards. Business units devise customized scorecards to fit their mission, strategy, technology, and culture. In fact, a critical test of a scorecard's success is its transparency: from the 15 to 20 scorecard measures, an observer should be able to see through to the business unit's competitive strategy [8].

As we discussed earlier, with the help of the four perspectives the BSC is the best way to identify and classify the necessary KPI's that mostly reflects the overall structure of a health-care organization in order to address intangible assets issue.

5. Description Of Health KPIs

The key performance indicators of health services are well-defined in the [6] according to principles of the BSC.

5.1 Financial KPIs

The financial performance indicators are listed in Table 5.1. Financial KPI's are the most important perspective of BSC since it is the measurement of all others.

Table 5.1
The financial performance indicators

KPI Description
Mean treatment cost per day
Mean cost of medical treatment per patient
Mean cost of drugs consumption
Mean cost of radiology testing
Mean cost of laboratory testing
Mean cost of medical material consumption
Mean cost of surgical procedure
Mean operational cot per department/clinic
Mean cost of vaccination procedures
Mean cost per medical examination
Return of capital employed
Net Cash flow
Income per employee
Payroll rate versus operational costs

5.2 Consumer KPIs

The Consumer (patient) performance indicators are listed in Table 5.2 and represent the image of the system to its customers, i.e., the patients and the citizens in general.

Table 5.2
The consumer performance indicators

KPI Description
Mortality Rate
Morbidity Rate
Number of medical staff per 1000 inhabitants
Number of beds per 1000 inhabitants
Accessibility of patients to medical units
Time in a waiting list
Appointments/day
Equity of delivered care
Number of readmission per patient
Mean length of stay
Patient Satisfaction Rate
Number of cases with EHR

5.3 Internal Business Process KPIs

The processes performance indicators are listed in Table 5.3 and represent how well the organization is structured to meet its predefined outcomes.

Table 5.3
The process performance indicators

KPI Description
Length of stay
Patient admission rate per medical unit
Percentage of bed coverage
Vaccination rate
Mean value of performed test per patient, per doctor
Number of inpatients
Number of outpatients
Number of drug prescription
Number of laboratory tests
Number of surgery procedures
Number of radiology tests
Number of visit in outpatient clinics
Number of visits in primary care institutions
Number of dental care processes
Number of processed emergency cases
Number of unprocessed order entries on the same day
Number of preventive care visits
Number of home care monitored patients
Number of inpatient from outpatient clinic
Number of medical procedures per day

5.4 Learning and Growth KPIs

The learning and growth performance indicators are depicted in Table 5.4.

Table 5.4
The learning and growth performance indicators

KPI Description
Medical device usage growth
Healthcare professionals training rate
Employee satisfaction rate
Number of doctors per bed
Number of nurses per bed
Number of existing healthcare professionals versus expected job positions
Personnel productivity rate
Number of medical interventions per doctor
Number of patient with reexaminations
Visits/ICD codes
Admissions per case type
Dismissals per case type

6. Enterprıse Digital Dashboards and KPI Frameworks

Performance management is a key issue in the continuous process of delivering high-quality health-care services. The use of KPIs has proved the design of a BSC that acts as the "cockpit" of a health-care authority where all metrics are the right instruments that enable the provision of health care based upon equity, financial control, continuous process, and structure refinement, and outcome measurements. As a result, data populating the performance indicators are acting as an important source of relevant and high-quality information at an administrative, operational, and clinical level [6].

Enterprise Digital Dashboard (EDD) is an effective tool for executives to get a top level view of their enterprise as well as closely linked partners. Decision makers need to have easy access to data such as total sales per month, inventory status and a number of other key performance indicators (KPI). An EDD would improve the lead-time and quality in decision making by extracting and generating KPIs from enterprise software systems. The EDD is in many ways similar to an automotive dashboard which provides the driver a single view of the state of the automobile. There are two primary areas that represent issues in the rollout of successful EDDs. These are in the areas of: retrieval of pertinent data from a multitude of data sources and interacting with business systems that may be developed using heterogeneous technologies [5].

The goal of an operational dashboard is to provide business users with relevant and actionable information that empowers them to make effective decisions in a more efficient manner than they could without a dashboard. In this context, "relevant" means information that is directly tied to the user's role and level within the organization. For instance, it would be inappropriate to provide the CFO with detailed metrics about Web site traffic but appropriate to present usage costs as they relate to bandwidth consumption. "Actionable" information refers to data that will alert the user as to when and what type of action needs to be taken in order to meet operational

or strategic targets. Effective dashboards require an extremely efficient design that takes into account the role a user plays within the organization and the specific tasks and responsibilities that user performs on a daily/weekly basis [10].

There are some useful tools used in dashboards to display impressive reports to the executive:

- Alert Icons: The simplest visualization is perhaps an alert icon, which can be a geometric shape that is either color-coded or shaded various patterns based on its state.
- Traffic Light Icons: The traffic light is a simple extension of the alert icon, and has little advantage over the alert icon in terms of data visualization.
- Trend Icons: A trend icon represents how a key performance indicator or metric is behaving over a period of time.
- Progress Bars: A progress bar represents more than one dimension of information about a KPI via its scale, color and limits.
- Gauges: Gauge is an excellent mechanism by which to quickly assess both positive and negative values along a relative scale. Gauges lend themselves to dynamic data that can change over time in relationship to underlying variables [10].

7. Existing Health Dashboard Projects

7.1 Greece Health Quality Improvement Project

In 2001, a reform of the Greek National Health-Care System was introduced in order to enhance the performance and control of health-care provision in Greece. One of the main changes was the division of the country into 17 autonomous health-care regions where the Regional Health-Care Authorities are responsible for the regional health-care strategy. This reform introduced the need to establish a three-level decision-making and performance-management mechanism.

The regional health-care system is comprised of a series of information systems (for example, a hospital is covered by a hospital information system, which is comprised of modules such as an ERP software, a patient administration module, and by clinical and other medical modules), covering all whole structures existing at any level the processes required to meet the administrative and medical needs (i.e., the electronic health-care record is the aggregation of all information related to a specific patient) and finally, the outcomes that must come out from the implementation of such a complex interpolation of informatics infrastructure. The information model was introduced to establish a community of networked health-care organizations (hospitals, primary care, etc.) that are interoperating in order to support and implement the new health-care strategy: to provide integrated and high-quality health-care services to the citizens based upon equal access to the resources. In order to achieve this goal, two main issues were raised: How and when will information systems interoperate? What is the minimum data set required to achieve the proposed strategy? The first issue is to be answered by using standards and protocols such as HL7 to meet with interoperability issues in health care. The second issue is addressed by the paper [6], the results of which are presented below. The proposed KPIs are forming a complete set of metrics that enable the performance management of a regional health-care system. In addition, the performance framework established is technically applied by the use of state-of-the-art

KM tools such as data warehouses and business intelligence information systems [6].

7.2 Health Information Network in Laos

The country is the least developed country in Asia with the GDP per capita is only 365 USD (2002). The area is 24,000 Sq Km, 70% of the land is mountainous and its population is about 5.5 million (2002). 86% of them are living in rural areas. The government is made up of 17 plus one local government.

Health care issues seem to be decentralized. Structure of hierarchy of health administration is that, under Ministry of Health, each province has its provincial health office, and under it, they have district health offices, and health care service is provided accordingly in the provincial hospital, district hospitals and then health centers in each province.

Amongst of all, medical recording system is not universal, nor instead of writing short notes for in-patients, they only keep several lines of records on a single same notebook for out-patients. For this reason and the low communication infrastructure distribution rate below, it is very difficult to grasp the national health status sustainable. Each time when a need arises, they need a vast amount of money to gather information on health care demand.

In order to gather information on health care from the whole country, and utilize them to make a nation-wide health policy, execute it even on the peripheral district and health center level, evaluate the plan afterwards, they are cooperating with National Institute of Public Health (NIOPH).

First, in each health center or hospital, simple medical records of patients are tabulated in a form of, for example, EXCEL, and then periodically through the above-explained connection, the center, which is to be settled in the NIOPH, gather information from them, validating it referring to other information from other organization

or institutes, and taking into the factors influence health status, such as environment, population, economics, and trends in policy change, it forecast health care demand [11].

7.3 Turkey Health Quality Improvement Project

The Ministry of Health of Turkey Republic develop a program called "Transformation of Health Program" in order to improve the performance and the quality of the health-care services. As stated in its original documentation the target of the program need should not only be towards the increase of the satisfaction of the patients. Within the current understanding of a modern administration, the provision of a higher quality service with more reasonable cost or to purchase it should be one of the principal targets. The details of this program and its applications will be provided in the next section [4].

8. Transformation Of Health Program

The Health Transformation Programme will design the health system that is planned to be implemented in the future and will facilitate the transition to the designed system by evaluating the inheritance of the experiences of the "reform studies" and "health project". Small but effective interventions made within the system will provide taking the preparation steps immediately. It is the only way that a continuous change and development can be obtained and the success can be provided [4].

The objectives and targets of the Health Transformation Programme are to organize, to provide financing and, to deliver the health services in an effective, productive and equal way.

Efficiency means the aim of improving the health level of our public through effective policies. The main target in the delivery of health service must be the prevention of people from the diseases instead of the treatment of the patient. Attaining this objective will be possible with the advances in the epidemiologic indicators. A decrease in the maternal and child mortality and morbidity ratios and an increase in the life expectancy at birth will be the most concrete proofs of the above-mentioned objectives.

Productivity is the proper use of the resources by reducing the cost and producing more services with the same resources. Distribution of the human resources, management of materials, rational drug use, health administration and preventive medicine practices should be evaluated under the framework of this goal. Involvement of all sectoral resources of the country in the system and achievement of integration will enhance productivity.

Equity is the achievement of the access of all citizens in Turkey to health services and their contribution to the finance of the services on the extent of their financial

power. The scope of equity includes decreasing the gaps concerning access to heath services, and health indicators among different social groups, between rural and urban areas and between east and west [4].

The principles of the Health Transformation Programme are as follows:

- Human centrism: This principle means that the individual citizen should get maximum benefit from the system and the individual's need, demand and hope should be central in the planning of the system and in the delivery of service. The individual should be addressed in the framework of 'family health' concept according to the fact that the health is produced in the atmosphere of family.
- Sustainability: It signifies the harmonization of the new system with the conditions and resources of our country and the continuity of the system by renewing itself.
- Continuous quality improvement: It signifies the formation of a feed back system in which the flaws or insufficiencies in the delivery of the services are detected and amended in the best way possible so that the system always reviews itself.
- Participation: Obtaining the opinions and recommendations of all stakeholders and the formation of platforms, which will enable a constructive discussion environment during the development, and implementation of the system means participation. Furthermore, this principle aims at involving all the components of the health sector into the scope of the system and the achievement of resource unity in practice.
- Reconcilement: Reconcilement is the lookout in reaching the common points by taking into consideration the interests of different units of the sector as a requirement of democratic governance. Instead of an implementation based on the conflict of the interest, the achievement of unity in methods, standards and control mechanisms and the commitment of the stakeholders to them are aimed.
- Volunteerism: It is the method that enables acting of all units in the system towards the planned objectives without making any distinction between service

suppliers and service demanders and between individuals and institution. It is essential that service supplier and service demander participate in the system voluntarily and not compulsorily in line with the encouraging measures.

- Division of Power: It means the division of powers providing the finance of health services, making plans, undertaking control and producing service. In this way, there won't be any conflicts of interest and more productive and more qualified services will be delivered.

- Decentralization: The institutions should be recovered from the clumsy structure. Parallel to the changing conditions and contemporary vision, self-management is planned. Therefore, autonomous companies in terms of administration and financing will have rapid decision mechanisms and will use the resources productively.

- Competition in service: It signifies the transfer of the delivery of health service from the monopoly to the competitive different service deliveries appropriate for certain standards. Thus, an environment, which encourages towards continuous quality development and decreasing the cost, will be established.

Ministry of Health produces statistics within its own institutions, instead of providing information to the whole sector. Different units collect different data in line with its own needs, and this data is conveyed to the Ministry of Health through Provincial Health Directorate. Data has been collected by the related unit; compiled and published as an Annual Statistics by the Council of Research, Planning and Coordination Board. However, this data has not been converted to the information and could not be used for the purpose of management. Statistical outcomes have been examined in terms of reliability since adequate control could not be provided in collection and flow of the data. This examination and raised distrust prevent the data to be used in the decision mechanisms.

Health registrations of individuals remain at the level of outpatient clinic card in most places and unsystematically registered files in the hospitals have sometimes been

lost in the archives. In fact, it is impossible to understand the content of the found files. There is not an integrated system in which health registrations of individuals are recorded and a disease registration and notification structure that analyzes the epidemiological data completely.

Electronic hospital information systems, established in line with the technological developments emerged, have a structure in which accountancy registration is made mostly. In most of these programs, an automation approach does not exist which provides the stock follow-up, material management and financial analysis. Hospital information systems, in which patients are registered, almost do not exist. Behavioral change of hospital staff regarding data keeping in the programs having this property has not also been provided. In addition to these, owing to the centralist attitude of Ministry, in some of hospitals, electronic register systems have not been established.

Although a definite standard structure in hospital information systems on finance, accountancy and invoicing exist, main standards for medical patient registration have not been developed and different implementations do not allow an integrated data analysis. To date, the use of information systems have completely stayed at the stage of registration, collecting and storing and for this reason, benefits such as transformation of data into information, making analysis of it, use of information and support of it to the management which are essential functions of information systems have not been provided. This situation turns information systems into a work burden.

The most important problems in health information systems are the difficulty in analysis of needs and change of needs in time. Thus, information system can turn into an old-technology in a short time even before the completion of the project. Establishment of the information systems are not enough by its own but it is also necessary to maintain them in a working manner. For this reason, trained health staff and technical staff are required. However, rapid change in staff and the, inability to train the new staff create serious problems.

Quality and Accreditation for Qualified and Effective Health Services; Acceptability and standard of service in health sector is as important as the medical consumption equipment used and the quality of the diagnosis and treatment devices. Suitability of health units to certain standards is not enough. Setting up a mechanism in which the service delivery process and obtained outputs are evaluated is necessary. Although the subject of quality has been ignored before, both service providers and financial resource providers have begun to pay attention to this subject.

Furthermore, the protection of ethical values is the fundamental principle in the delivery of health services. This can be achieved through the establishment of an ethic board,which has a strong power of sanction. This board should be formed with the contribution of various representatives and comprehensive authority should be given.

In conclusion, Health Transformation Programme will deliver the health services in a qualified, effective, sustainable and equal way and will be a system that will assume an increase in income level based on the performance of health professionals. Ministry wants public to receive the service it deserves [4].

9. Circulating Capital Additional Payment Regulation

The Ministry of Health of Republic of Turkey developed a program called "Transformation in Health" in order to improve the quality and performance of the health-care services in Turkey. In this scope, the ministry published regulations for the distributing the organizations' circulating capital to staff according to performance of the staff and the staff's organization [14]. The aim of these regulations is to identify the rules and the procedures that are used in calculating the circulating capital payments to the personnel. The payment amount is calculated by taking into consideration several factors; the title of the staff, working conditions and times, contribution to services, performance, self-employment or not, number of examinations, operations and the organizational performance coefficient. There is a two level classification of hospitals in Turkey, institutions are the smaller size hospitals, and organizations are more complex hospitals and have more capacity. The circulating capital of organizations and institutions are recorded every month, the governmental cutoffs applied on those values, 50% in organizations and 65% in institutions of remaining amount is multiplied by the organizational performance coefficient and then distributed to the personnel according to their performance. The performance of each personnel's calculated individually, and then individual performances are summed. The rate of each personnel's payment is calculated by the proportion of their own performance to the organizations/institutions total performance.

9.1 The Net Payment Amount to Health-Care Staff

$$TDCCA = TCCA * DC * OPC \tag{9.1}$$

where TDCCA refers to the total distributed circulating capital amount, TCCA refers to total circulating capital amount. DC is the distribution coefficient, it is 0.65 for

institutions and 0.5 for organizations and OPC is the organizational performance coefficient.

The net performance point of the personnel can be calculated by the rules in document [14]. Basically, the performance point is calculated according to the title of the staff, working conditions and times, contribution to services, performance, self-employment or not, number of examinations, operations. The total distributed circulating capital amount is calculated by the Eq. 9.1. The total performance point of the organization/institution is the sum of all personnel's performance points.

$$PCCA = NPPP * (TDCCA/TPP) \tag{9.2}$$

where PCCA is the amount of payment paid to each personnel, NPPP is the net performance point of the personnel. TDCCA refers to the total distributed circulating capital amount, and TPP refers to total performance point of the organization/institution.

10. Quality Improvement And Performance Assessment Instructions

The quality improvement and performance assessment instruction is published by the Ministry of Health of Turkey Republic in order to identify the criterias in calculating the organizational performance coefficient. The purpose of the instruction is to define and organize the metrics that are used to improve health-care services and measure organizational performance of health-care organizations and institutions. The performance, quality and other metrics can be measurable and comparable. The performance metrics evaluate the conditions of health-care services; reflect the ideas of public to the services and courage staff that work for the organizational performance [12].

This quality improvement and performance assessment instruction includes first level health care institutions (excluding the health care institutions in the cities where family health care application started), and second and third level health care organizations of Ministry of Health.

The Ministry of Health of Turkey Republic constructs a performance and quality coordination hierarchy infrastructure to ensure the quality and correctness of the evaluation of performance and quality management applications of organizations and institutions. The graphical representation of this hierarchy is represented in Figure 10.1.

10.1 City Performance and Quality Coordination Office

City performance and quality coordination office is established to coordinate, observe and evaluate performance and quality management applications of organizations and institutions in the city. To be able to perform its duties, directorship will

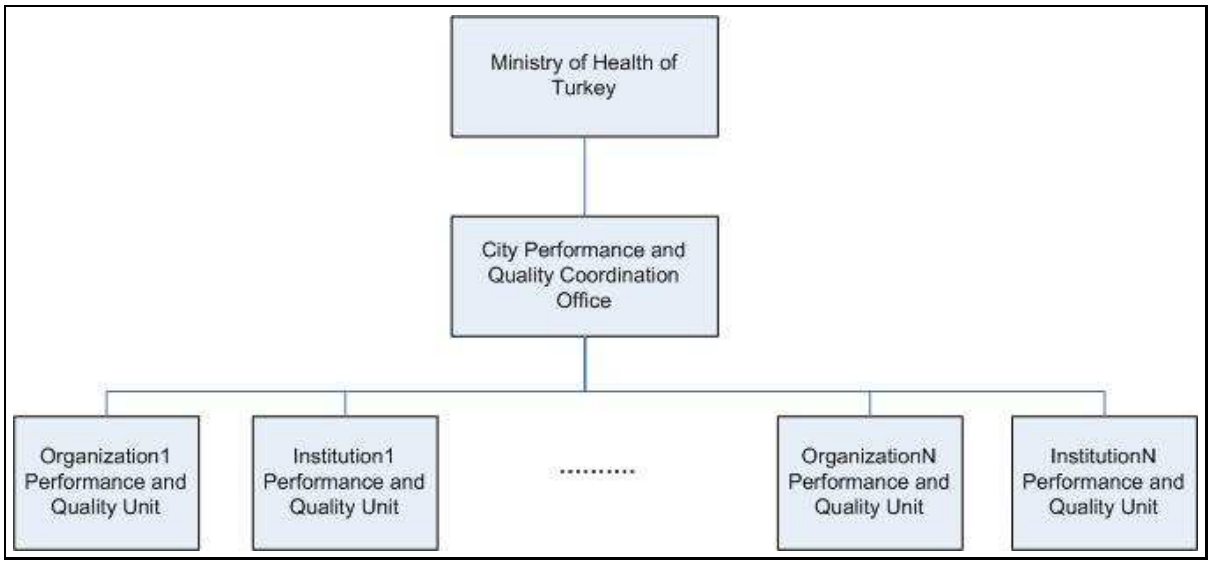

Figure 10.1 The performance and quality coordination hierarchy infrastructure

provide appropriate physical place, instrument, devices and technical equipment and will assign sufficient number of staff for the coordination office. Health care director will charge one of the health care co-directors as the city performance and quality coordinator.

The duties of city performance and quality coordination office are as follows:

- Monitor the additional payment process based on organizations and institutions performance in the city and if necessary communicate the statistics with the ministry.
- Coordinate the process of the patient and patient relatives' satisfaction survey studies performed in the city, if necessary prepare the surveys and make them applied; if needed establish a "survey evaluation committee" to make and finalize survey observation and evaluation processes.
- Provide organization infrastructure and process evaluation forms of the organizations in the city to be filled.
- Monitor, evaluate and coordinate the quality management processes of organiza-

tions and institutions on the behalf of city health care director.

- Perform studies for the support and development of the quality management processes of organizations and institutions, and provide the processes to be applied widespread.
- Examine and evaluate the forms coming from the organizations and institutions and send them to the ministry.
- Organize meetings for knowledge and information sharing about the improvements of the quality management processes in the organizations and institutions in the city and provide meeting minutes to be prepared.
- Attend to activities like seminars and conferences about their duties, follow up-to-date and professional articles and announce them to the related parties.
- Archive in the city coordination office of performance and quality.
- Provide necessary support for the evaluators assigned by the directorship and attend these studies.

10.2 Organization Performance and Quality Unit

Unit is composed of four people whom are in charge of head doctor or the assistant head doctor assigned by the head doctor. These four people are; hospital director and co-director, head nurse, and performance and quality representative. Head doctor assigns one staff, who is experienced in quality and performance application in health care industry as the performance and quality representative. Performance and quality unit determines the roles and responsibilities to perform the tasks defined in the instruction.

The unit works as a decision and execution authority for the performance and quality activities. Unit defines procedures and methods according to the needs of organization. Also unit can establish teams, groups, committees, quality cycle study groups

for the performance and quality improvement studies according to the organizational requirements.

Duties of the organization performance and quality unit are as follows:

- Define politics and strategies for the organizational performance and quality management processes.
- Define scorecard for the performance and quality, plan activities to perform these goals, organize, monitor and evaluate these goals.
- Plan, organize, procure and manage resources needed to improve patient care quality and organizational performance.
- Define organizational processes, determine process owners and people who are responsible from the processes, and establish groups to improve theses processes.
- Determine current problems in the organization, prioritize these problems and in order to overcome them, perform process improvement activities or make them to be performed.
- Plan necessary trainings for the staff included in the quality teams and make them to get the trainings.
- Support and evaluate the activities and studies performed by the quality improvement teams.
- Define metrics in order to evaluate the quality level of the organization and manage the activities according to the earned values, results.
- Provide to perform organization staffs' performance evaluation and perform appropriate activities like training according to the evaluation results.
- Establish courage mechanisms for the staff to attend these activities.
- Apply the standard survey set in the scope of the survey application principles defined in survey application principles section. Define organizational performance coefficient defined in organizational performance coefficient section.

- Control and publish documents prepared by the quality teams and units.
- Communicate and be in cooperation with the city coordination office of performance and quality, and other hospital governmental institutes about the performance and quality management studies.
- Communicate data about the additional payment based on performance with the ministry or make them to be communicated [12].

10.3 Storage of the Records

The operations, decisions, minutes and reports that are performed based on this instruction should be recorded in a notebook that is approved by the organization or institution director.

In the organizations, organizational performance coefficient that is calculated in the second week of the next period by head doctor, head doctor assistant, hospital director, head nurse and representative of performance and quality management should be recorded with a minute. By this way, organizational performance coefficient becomes definite. A copy of the minute is sent to city coordination office of performance and quality.

In the institutions, institutional performance coefficient that is calculated in the first (20) days of the next period by health care director, coordinator of performance and quality, two office directors and one staff of coordination office should be recorded with a minute. By this way, organizational performance coefficient becomes definite.

Directorships fill the form defined in Appendix in excel format and send them as an email to "performanskalite@saglik.gov.tr" and "analiz@saglik.gov.tr" addresses in the first month of the next period.

11. Organizational Performance Coefficient And Assessment Criterias

In the organization, organizational performance coefficient is become definite in the second week of the next period. These coefficients form the basis of additional payments in the related period which are performed according to the regulations.

In the organizations, organizational performance coefficient is calculated as follows:

$$OPC = (AEC + SSC + IPEC + OEC + OTC)/5 \tag{11.1}$$

where OPC refers to organizational performance coefficient. AEC is the access to examination coefficient, SSC is the patient and patient relatives' satisfaction survey coefficient, IPEC is the organization infrastructure and process evaluation coefficient, OEC is the organization efficiency coefficient and OTC is the organization target coefficient.

If the calculated coefficient value is greater than 1, then it is accepted as 1. For the organizations that newly start to serve health care services, the organizational performance coefficient is accepted as 1 for the current period.

The details of the above criterias will be provided in the following sections.

11.1 Organization Access to Examination Coefficient

Organization access to examination coefficient is sum of room count that is actively used and allocated for each doctor, and count of active dental units, divided to the count of doctors. Room and doctor counts which are used to calculate the organization access to examination coefficient are taken from the last week of the

period. If the organization access to examination coefficient is greater than 1, then it is accepted as 1 [12].

11.2 Organization Infrastructure and Process Assessment Coefficient

City coordination office of performance and quality fills Organization Infrastructure and Process Evaluation Form provided by the ministry for all of the organizations in the city(integrated province hospitals are excluded) for each period. With the evaluation of the form, score of each organization in the city is calculated.

Coordination office sends the organization infrastructure and process evaluation coefficient values to the organizations with an official paper at the latest first week of the next period. If for any reason, coordination office cannot send the values to the organizations (coordination office defines the reason in a minute and submit to the heath care directorship for approval), the coefficient value is accepted as 1 by the organizations.

Coordination office sends the organization infrastructure and process evaluation coefficient values to the organizations with an official paper at the latest first week of the next period. If for any reason, coordination office cannot send the values to the organizations (coordination office defines the reason in a minute and submit to the heath care directorship for approval), the coefficient value is accepted as 1 by the organizations.

Organization infrastructure and process evaluation coefficient calculation form should be filled and calculated by the presidency [12]. In the same period, if the presidency calculates a value for the coefficient, then it should be used for other calculations. If the value is determined like that, then evaluators and coordinator records this with a minute. Coordination office sends this value to the organizations with an official paper

at the latest first week of the next period [12].

11.3 Patient and Patient Relatives Satisfaction Survey Coefficient

Organizations apply the standard survey set defined in Appendix in the scope of the survey application principles defined in survey application principles section in each period. If needed, services can be taken for this purpose. The surveys defined in Appendix applied to the number of people defined in survey application principles section. Survey results of two surveys are calculated separately and their average is computed by dividing them to the number of survey participants. The total value of the survey is calculated by addition of the selected answers points of questions.

Patient and patient relatives' satisfaction surveys are applied during period and at the last week of the period it is stopped and the value is calculated as follows:

$$SSC = ((APSS + ABSS)/2)/100 \tag{11.2}$$

where SSC is the patient and patient relatives' satisfaction survey coefficient, APSS is the average of policlinic services survey and ABSS is the average of services for departments with beds survey.

In an organization, if the number of patients that the survey can be applied is lower than 50, then only the survey for the policlinic services is applied. For this case, patient and patient relatives' satisfaction survey coefficient calculation is as follows:

$$SSC = APSS/100 \tag{11.3}$$

where SSC is the patient and patient relatives' satisfaction survey coefficient, and APSS is the average of policlinic services survey.

Patient and patient relatives' satisfaction survey should be done or make to be

done by the presidency. Patient and patient relatives' satisfaction survey coefficient is determined between 0 and 1 using the results of surveys in the organizations that are selected by the presidency or coordination office. If the presidency or coordination office performs a survey in the same period, then its results are taken as the coefficient value.

The coefficient values calculated by the organizations are invalid for the periods that the presidency or the coordination office calculates it. For the periods, that the presidency or coordination office does not calculate coefficient value, then the organizations can use their own survey results to calculate the coefficient value and use it to compute organizational performance coefficient [12].

11.4 Organization Efficiency Coefficient

The organization efficiency coefficient can be calculated for organizations as taking average of the following criterias:

- Staff Expense Support Rate
- Staff Expense Rate
- Bed Occupancy Rate
- Mean Length of Stay
- Inpatient Rate
- Data Entry to New Performance Monitoring Tool

The details of calculation of the above criterias can be found in [12].

11.5 Organization Target Coefficient

The organization target coefficient can be calculated for organizations as taking average of the following criterias:

- Ceaserian Section Rate
- Average Operations Points per Surgeon
- Average Operations Points per Operation Bed
- Data Entry to New Performance Monitoring Tool The details of calculation of the above criterias can be found in [12].

12. Institution Assessment Criterias And Coefficient

In the institutions, organizational performance coefficient is become definite in the first 20 days of the next period. These coefficients form the basis of additional payments in the related period which are performed according to the regulations.

In the institutions, organization efficiency coefficient is calculated as follows:

$$OPC = (AEC + IEC)/2 \tag{12.1}$$

where OPC is the organizational performance coefficient, AEC is the access to examination coefficient, and IEC is the institution efficiency coefficient.

If the calculated coefficient value is greater than 1, then it is accepted as 1. For the organizations that newly start to serve health care services, the organizational performance coefficient is accepted as 1 for the current period [12].

The details of the above criterias will be provided in the following sections.

12.1 Institution Access to Examination Coefficient

Institution access to examination coefficient is sum of room count that is actively used for policlinic services and allocated for each doctor in the institutions in the city, and count of active dental unites, divided to the count of doctors. Room and doctor counts which are used to calculate the institution access to examination coefficient are taken from the last week of the period. If the institution access to examination coefficient is greater than 1, then it is accepted as 1 [12].

12.2 Institution Efficiency Coefficient

The institution efficiency coefficient can be calculated for organizations as taking average of the following criterias:

- Average observation number per pregnant
- Average observation number per lochia
- Average observation number per baby
- Average observation number per child
- 0 Age group DBT-3 vaccination rate
- 0 Age group DBT-1 vaccination rate
- 1 Age group KKK vaccination rate
- 0 Age group BCG vaccination rate
- 0 Age group Hepatit-3 vaccination rate
- Data Entry to 1. Level Additional Payment Monitoring Tool Point

The details of calculation of the above criterias can be found in [12].

13. Survey Application Principles

Quality in medical care and treatment processes in health sector has two dimensions. First is staff and technical standards. Second is service quality of patient and its relatives' views. To collect data about patient experience and improve standards according to this information can only be achieved by asking questions to patients. The application principles of the question set that is prepared to emerge this dimension to improve the quality in health sector are as follows;

- The survey application is a research about satisfaction rate.
- Universe: Objects or people that are in an observation area.
- Sampling: For the research, a piece is selected which is representing the units in the universe.
- The citizens (for younger than 18, their relatives) getting service from the hospital form the research universe. The number of patients that are used for sampling should be the same for policlinics and departments with bed. But for the departments with bed, the number of patients should be determined according to the ratio of inpatients and patients.
- The way how the people are selected for the survey application should be documented in detail in survey report.
- Sampling units that the question set applied will be selected among the applied patients in the same period. The distribution of patients that the survey will be applied should be equal for each month in the selected period [13].

Application methods of question sets can be: by human resources department of the hospital or interviewers (outsource), by mail, by telephone.

Number of people that survey will be applied is determined according to the size of the hospital, hospital class and service status. Each of policlinic services satisfaction survey and services in bed satisfaction survey will be applied at least number of people that is equal to the number of beds in the hospital. In each period, number of people that each survey is applied cannot be smaller than 50. In these periods, only survey about policlinic services can be applied [13].

There are some concerns about survey application:

- Interviewer should explain parts that the applicant does not understand.
- The importance of the survey should be explained and surveyor should assure about the privacy.
- Time spent to answer the question should be under control of the surveyor.
- Surveyor should control if any not answered question is left.
- If hospital staff is assigned for the survey application, it will increase biased results. Take attention about this concern.
- Assigned person should introduce him/her self before the survey starts, and should stay away from the behaviors that will affect patient.
- If the survey is performed to surveyors or hospital staff, then short term trainings should be given.
- Survey application should be applied on the discharged date of the patient.
- An appropriate room should be reserved for the survey application, so that the person filling the survey can feel comfortable.
- These processes should be valid for inpatients and patients.
- The number of valid survey results (all questions are answered) that are performed face to face should be at least minimum number of people that the survey should be applied. For example, if the number of surveys that will be applied is 100 for a hospital, then valid survey results that should be get is at least 100 [13].

The personal information who answers questions in the survey should be kept in secret. This privacy is assessed according to the patient rights. Accessing this information is not free unless an exception of investigation of survey and its results [13].

14. Implemented Solution Architecture and Details

The proposed solution is implemented with the C# 2.0 and ASP.NET 2.0 programming languages. The Microsoft SQL Server 2005 is used as the database. The following tools are used for the implementation of the solution:

- Microsoft Visual Studio 2005
- Microsoft SQL Server 2005 Management Studio Express
- Microsoft Visio 2003 Enterprise Edition
- Infragistics Net 7.3 Advantage for ASP.NET
- Photoshop 7.0

The solution contains 2 ASP.NET projects for the web interfaces of the system, 1 ASP.NET web service project for the web services and 4 C# projects for the business layer classes and common files. The Figure 14.1 represents the architecture of the solution in Visual Studio 2005. "IBSMQ.Survey.BusinessLayer" and "IBSMQ.Survey.Web.UI" projects form the first system of the solution that the users can enter, update, delete survey answers. The "IBSMQ.Survey.BusinessLayer" project contains the business objects implementation, and necessary classes to perform functionality. Also, it has classes to access to the database system. "IBSMQ.Survey.Web.UI" project contains web pages which are used for entering, modifying and monitoring of the survey instances. The class diagrams, the screenshots of the projects and some other details will be provided in the Appendix section.

"IBSMQ.Survey.ServiceLayer" project implements the web services and the web methods. The web services publish the survey results via web methods, there are 9 web methods implemented in the web service. There are separate web methods for each of the reports. Web methods can be called from all kinds of environments, they

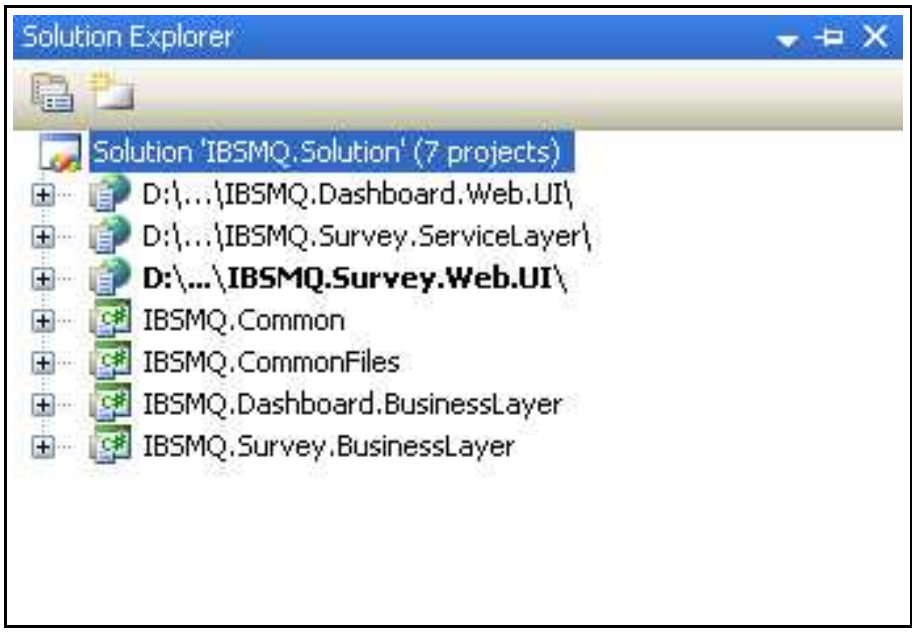

Figure 14.1 The architectural view of the solution

are independent from environment. In other words, with the help of this web service system, the results of the satisfaction rate survey application can be accessible from .NET environment or Java environment, which are the two most popular environments of nowadays.

"IBSMQ.Dashboard.BusinessLayer" and "IBSMQ.Dashboard.Web.UI" projects form the dashboard system of the solution. This dashboard system calls the web services' web methods, and displays the results as reports in various dimensions. "IBSMQ.Dashboard.BusinessLayer" project contains the business objects implementation, and necessary classes to perform functionality. It has classes to access to database.

"IBSMQ.Dashboard.Web.UI" project contains reports web pages which are used for monitoring the KPI reports in various dimensions. The class diagrams, the screenshots of the projects and some other details will be provided in the Appendix section.

The relational database management system, Microsoft SQL Server 2005 is used as the database system. There are 22 tables, 2 views and 79 stored procedures in the database. The relations between the tables are represented in Appendix section.

15. Conclusion

Performance management is a key issue in the continuous improvement process of delivering high-quality health-care services. Enterprise Digital Dashboard (EDD) is an effective tool for executives to get a top level view of their corporate. Decision makers need to have easy access to knowledge such as patient satisfaction rate, mean length of stay and a number of other key performance indicators (KPI). The proposed solution provides a single view of the metrics being monitored in a user friendly manner. The ministry of health of Republic of Turkey developed a new program called "Transformation in Health" in order to improve the quality and performance of the health-care services in Turkey. In this scope, the ministry published regulations for the distributing the organizations' circulating capital to staff according to performance of the staff and the staff's organization. The aim of these regulations is to improve the quality of the health-care services and improve the health-care personnel's performance, patient and patient relatives' satisfaction rate is one of the KPI's that is used for this purpose. The proposed solution collects survey question answers into databases, so the relevant KPI analysis can be performed easily. The decision makers can monitor "patient and patient relatives' satisfaction rate" KPI in various dimensions through the system.

APPENDIX A. The Diagrams and Screenshots

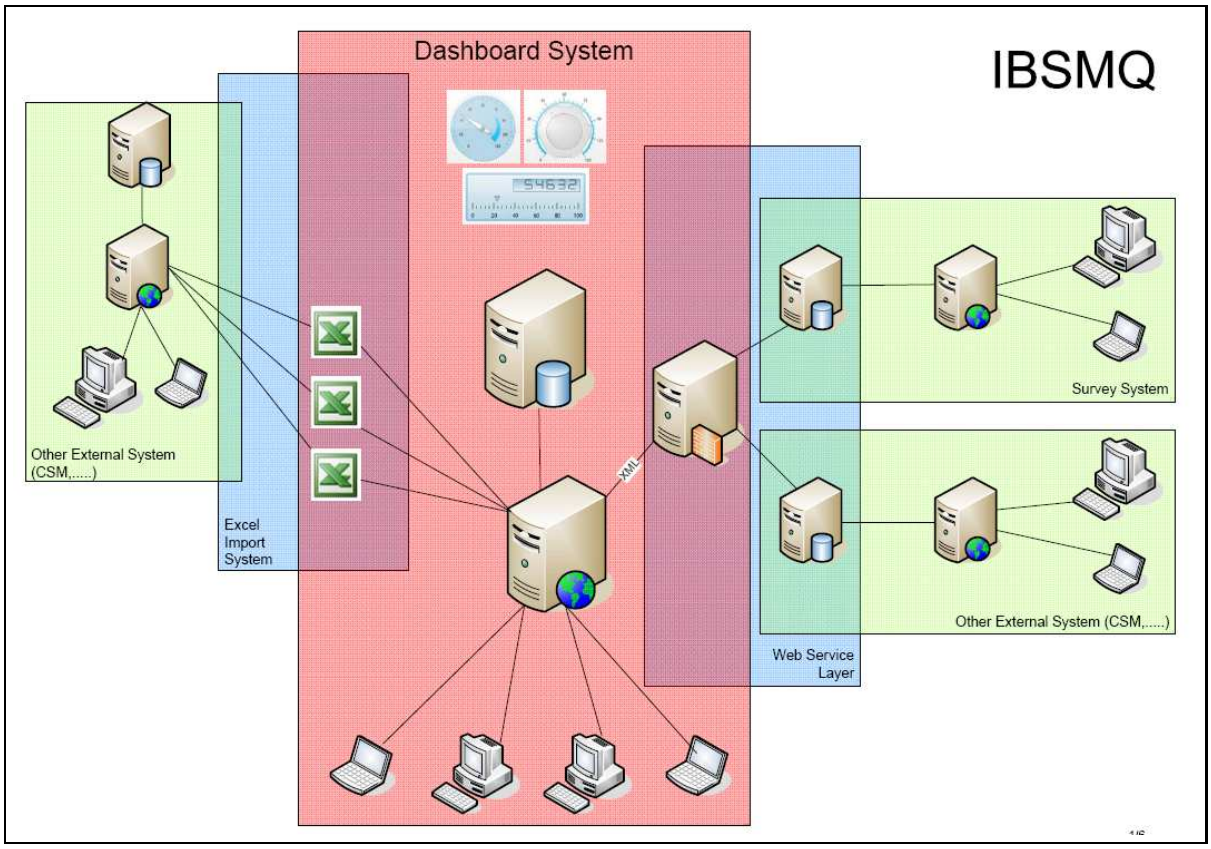

Figure A.1 Overall Architecture

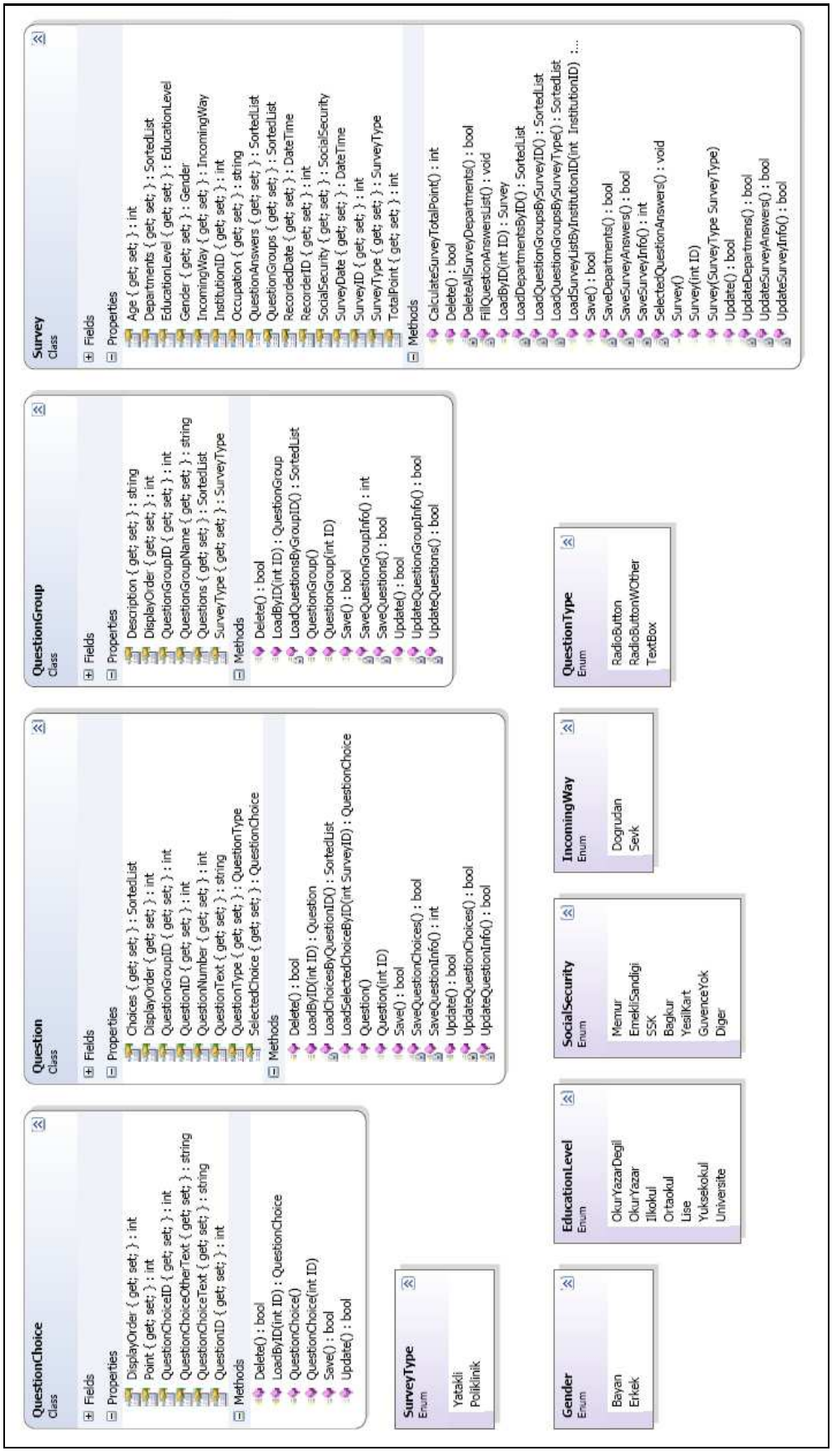

Figure A.2 Class Diagrams for Survey System

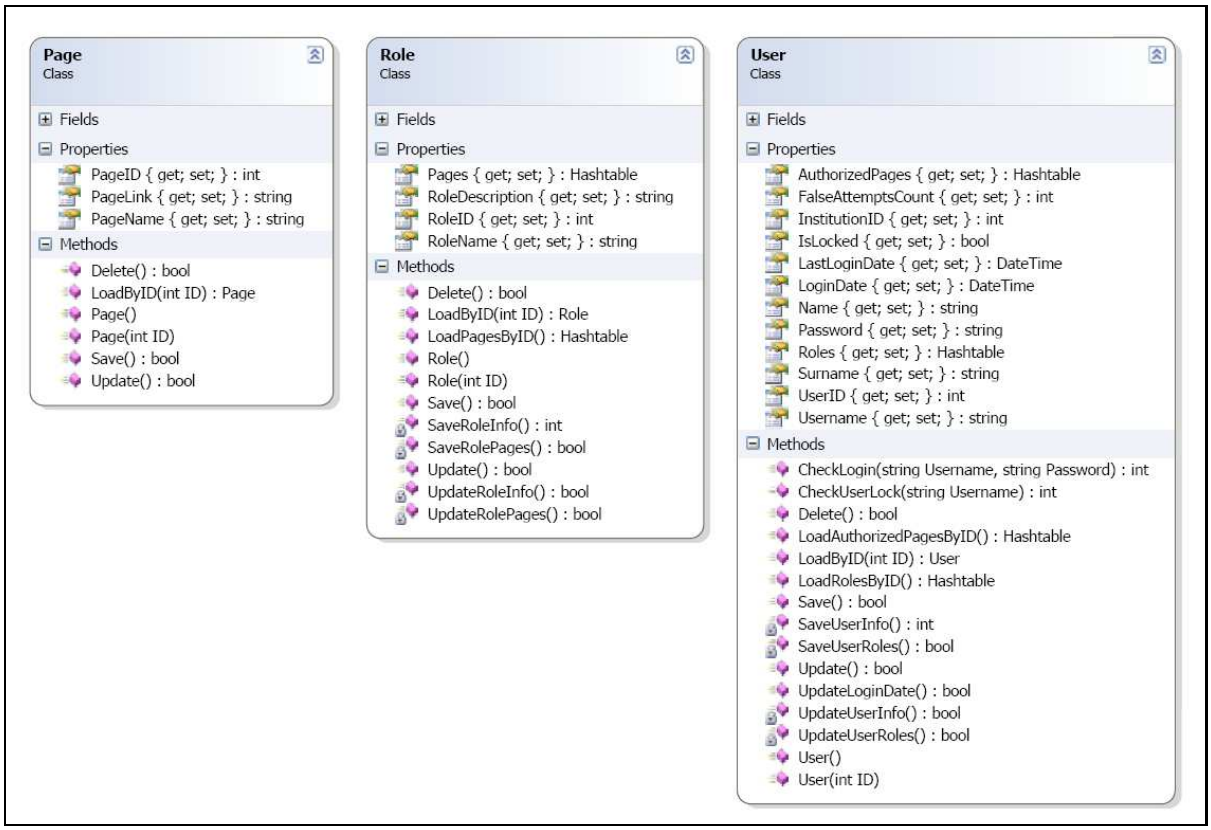

Figure A.3 Class Diagram for Authorization Classes

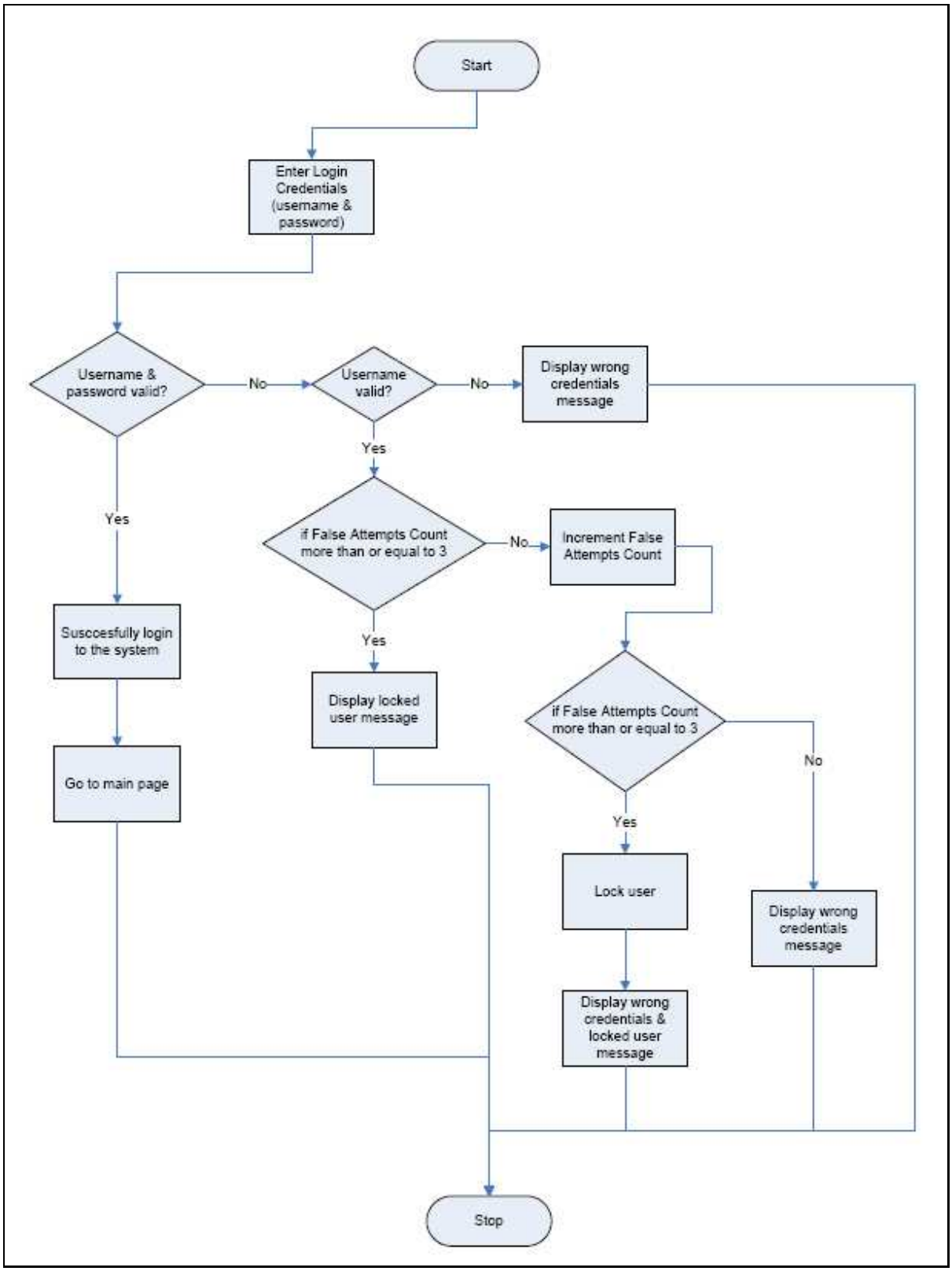

Figure A.4 Authorization Process Flow

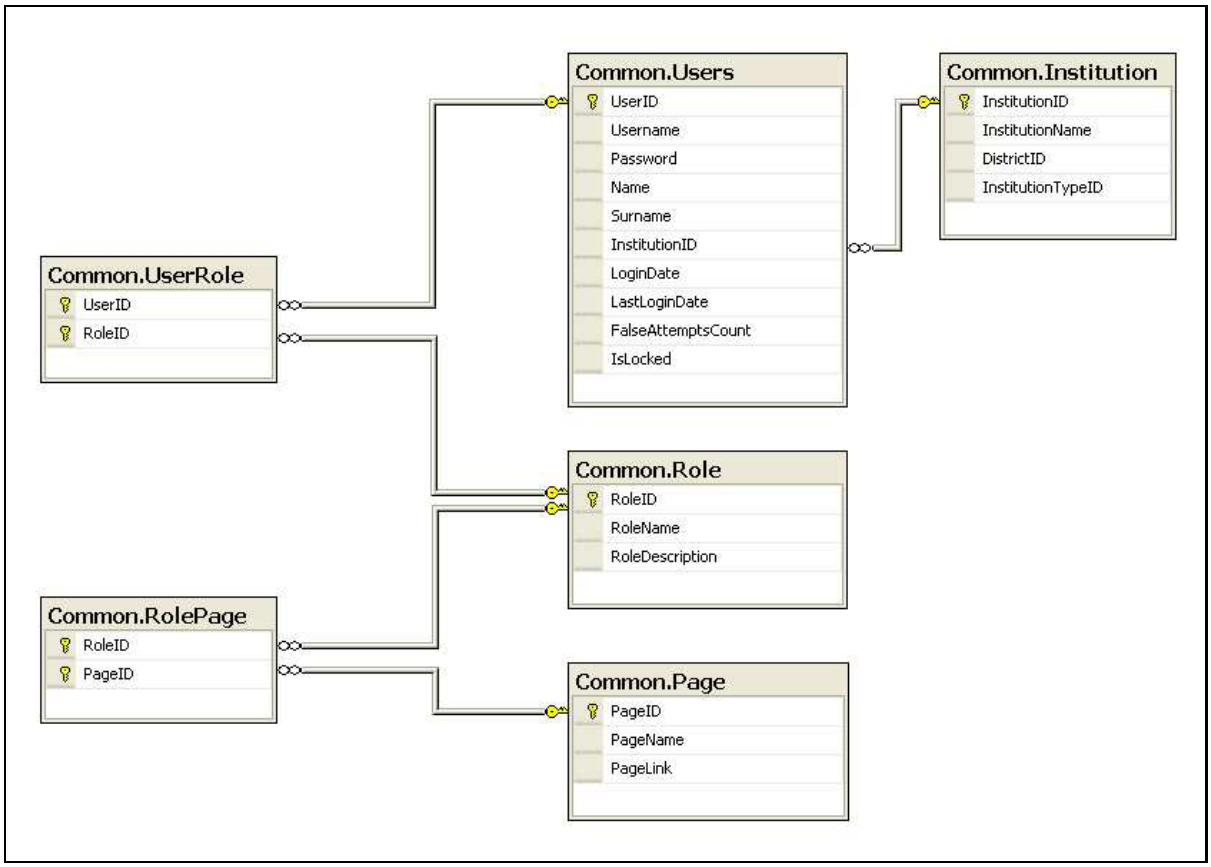

Figure A.5 Tables and Relations for Authorization

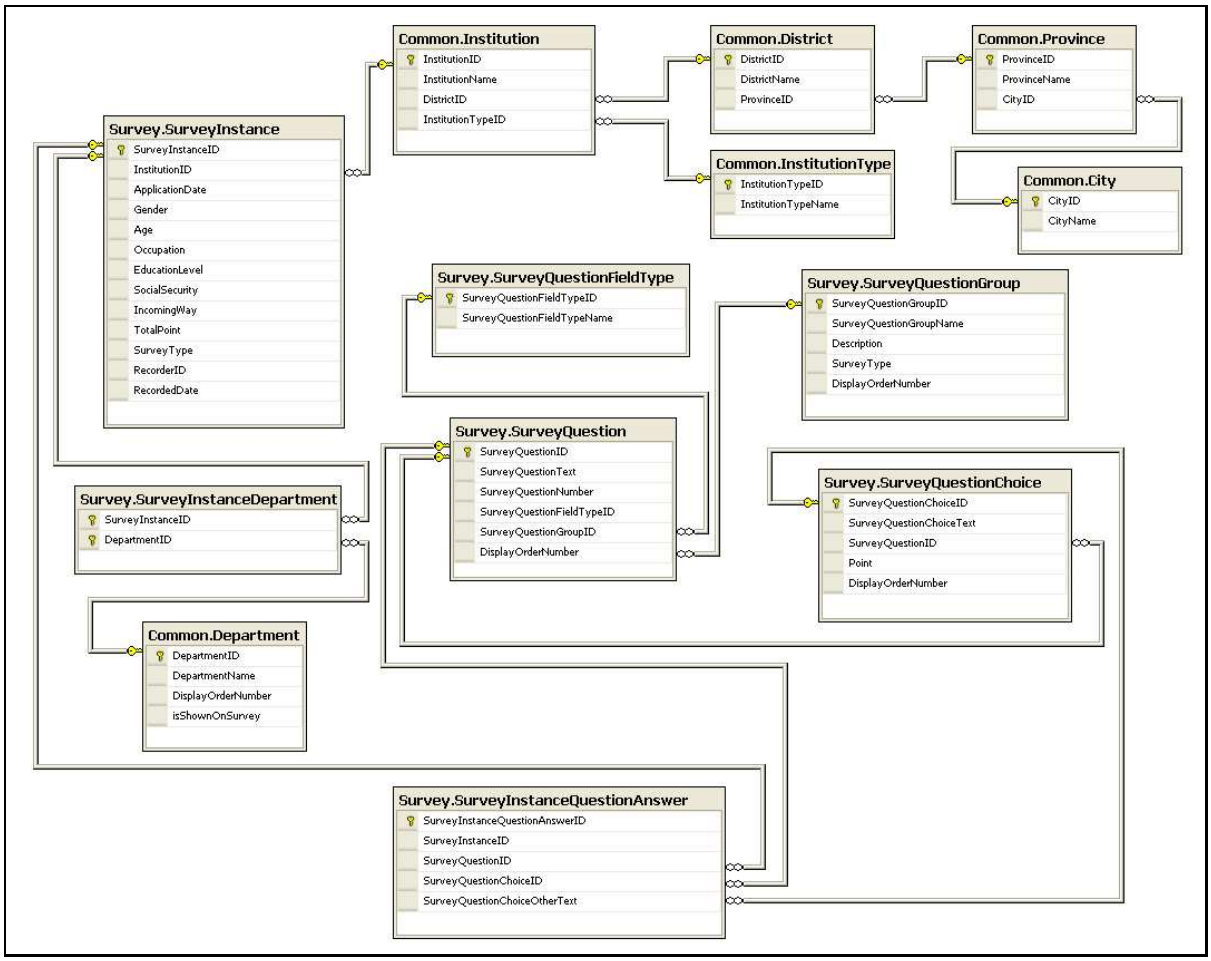

Figure A.6 Tables and Relations for Dashboard

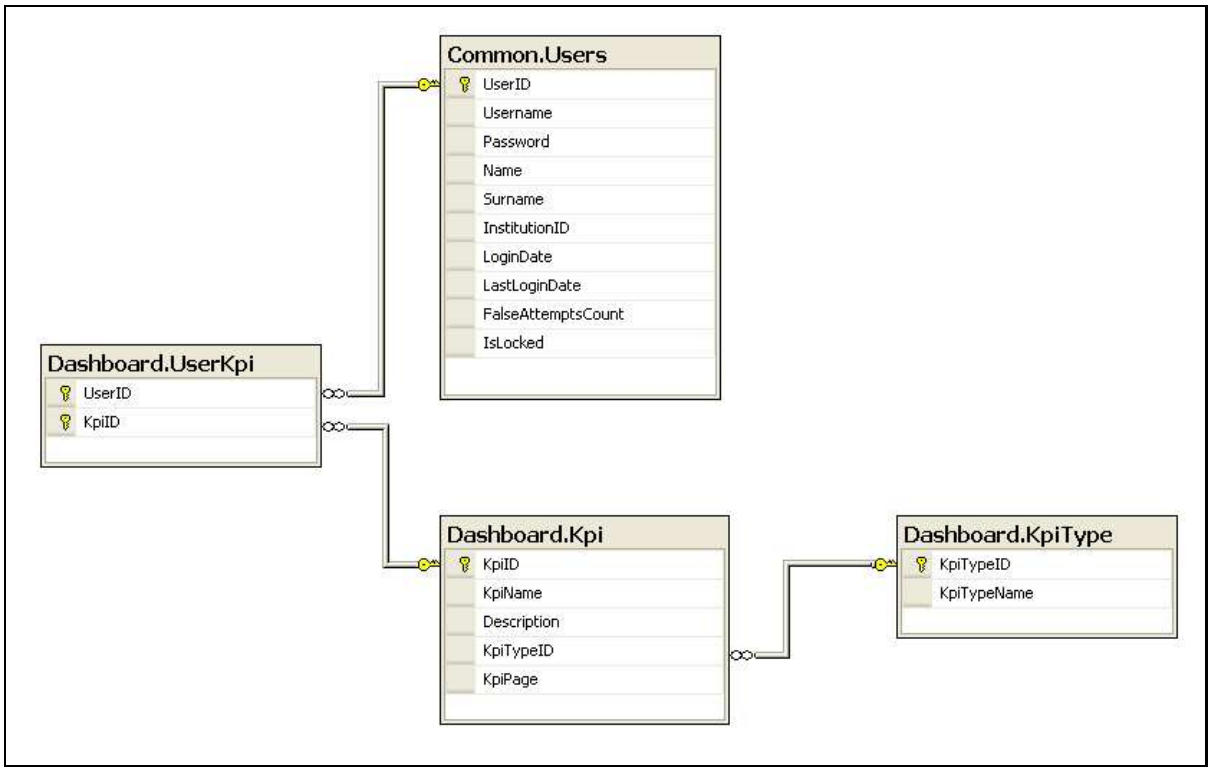

Figure A.7 Tables and Relations for Survey

Figure A.8 Screenshot of MainPage

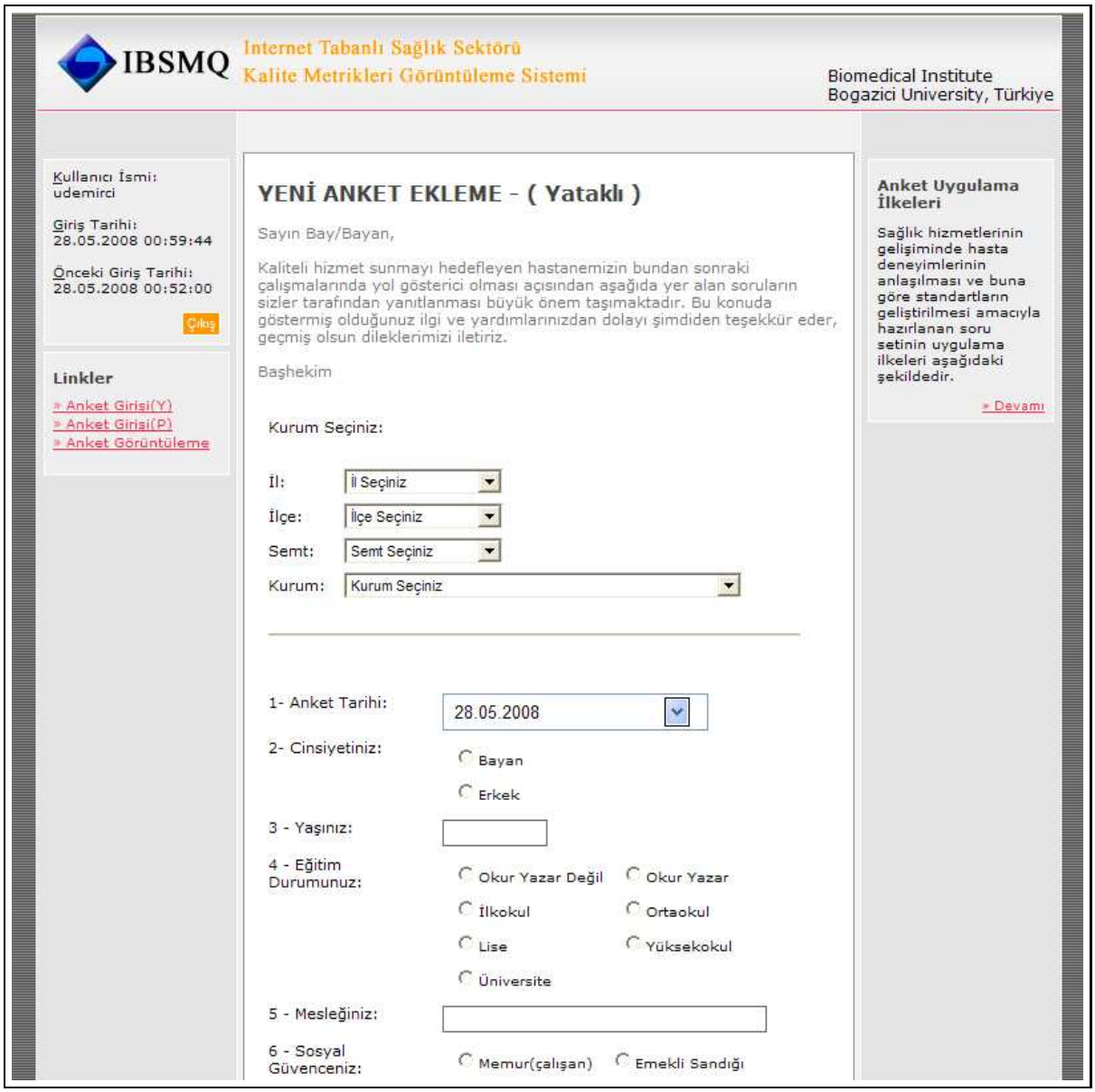

Figure A.9 Screenshot of Survey Entry Page

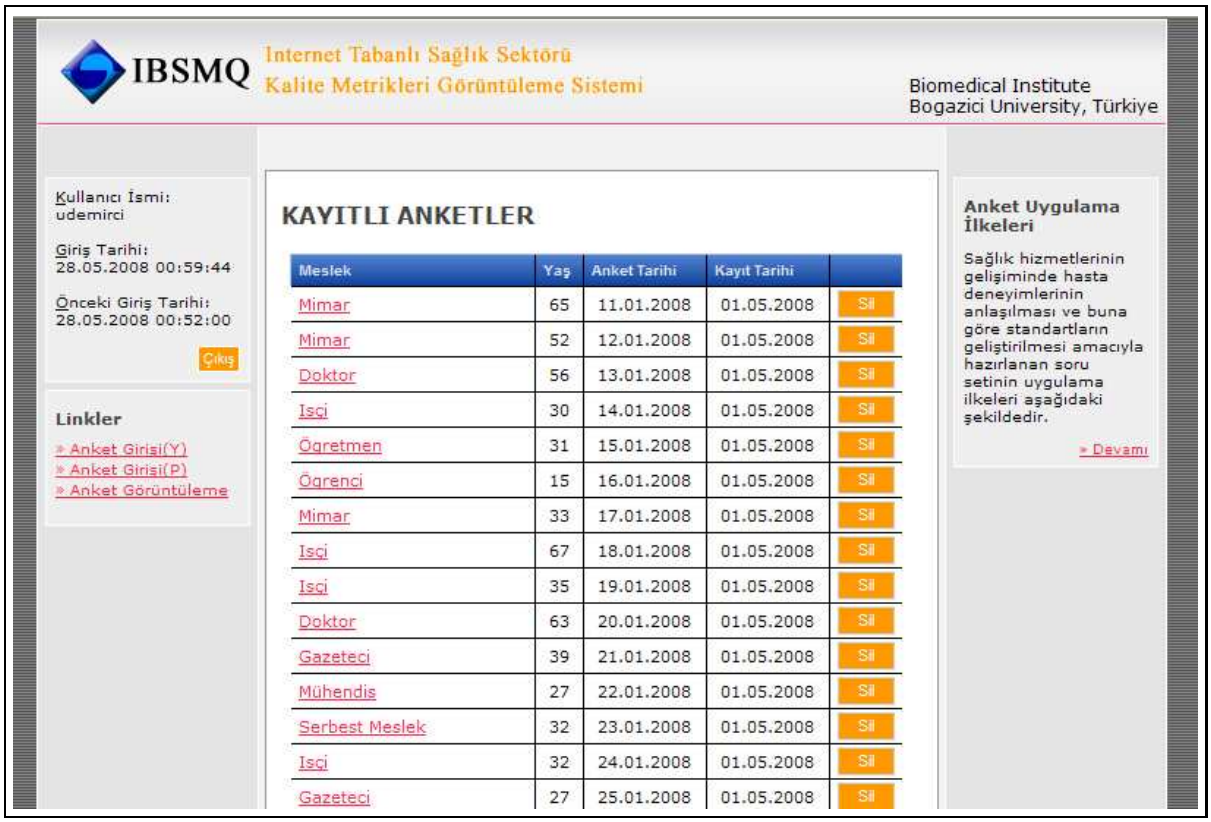

Figure A.10 Screenshot of Survey List

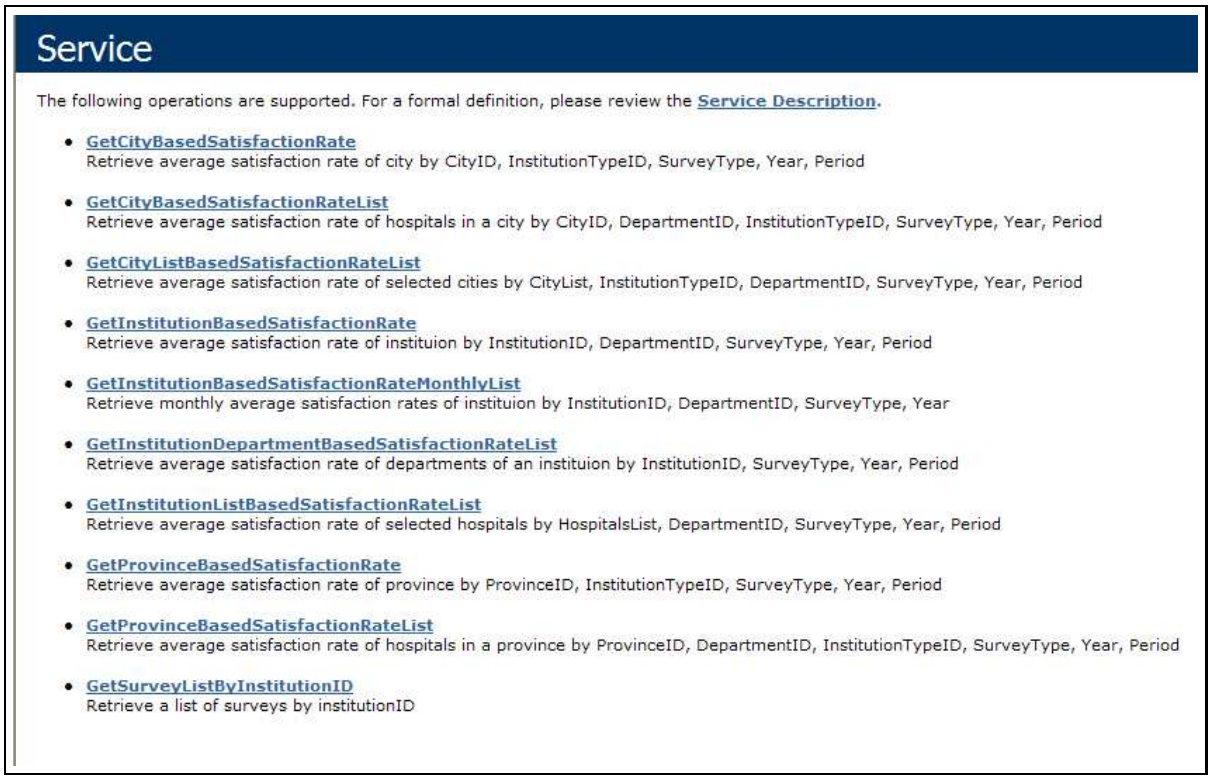

Figure A.11 Screenshot of Web Services List

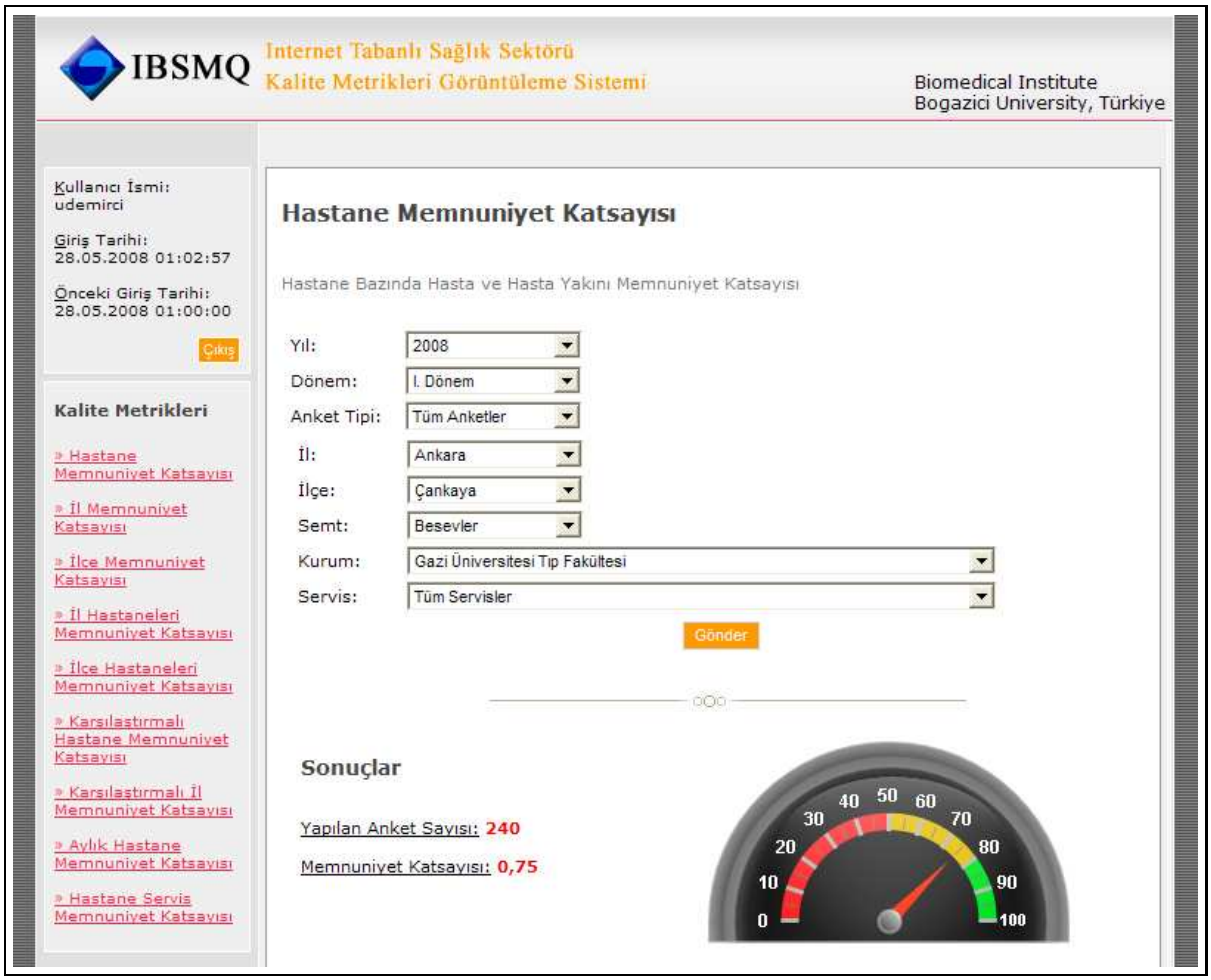

Figure A.12 Screenshot of Report 1

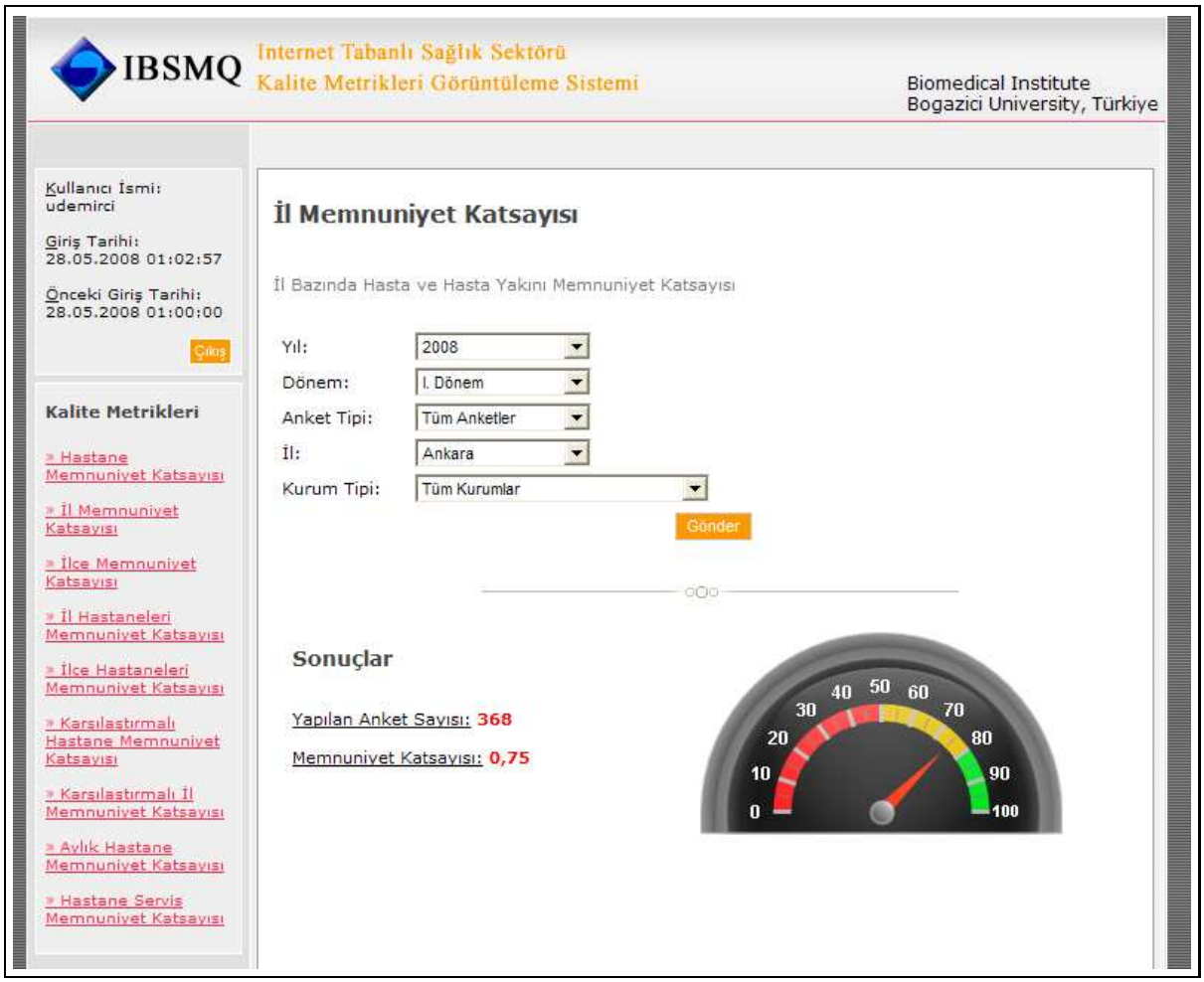

Figure A.13 Screenshot of Report 2

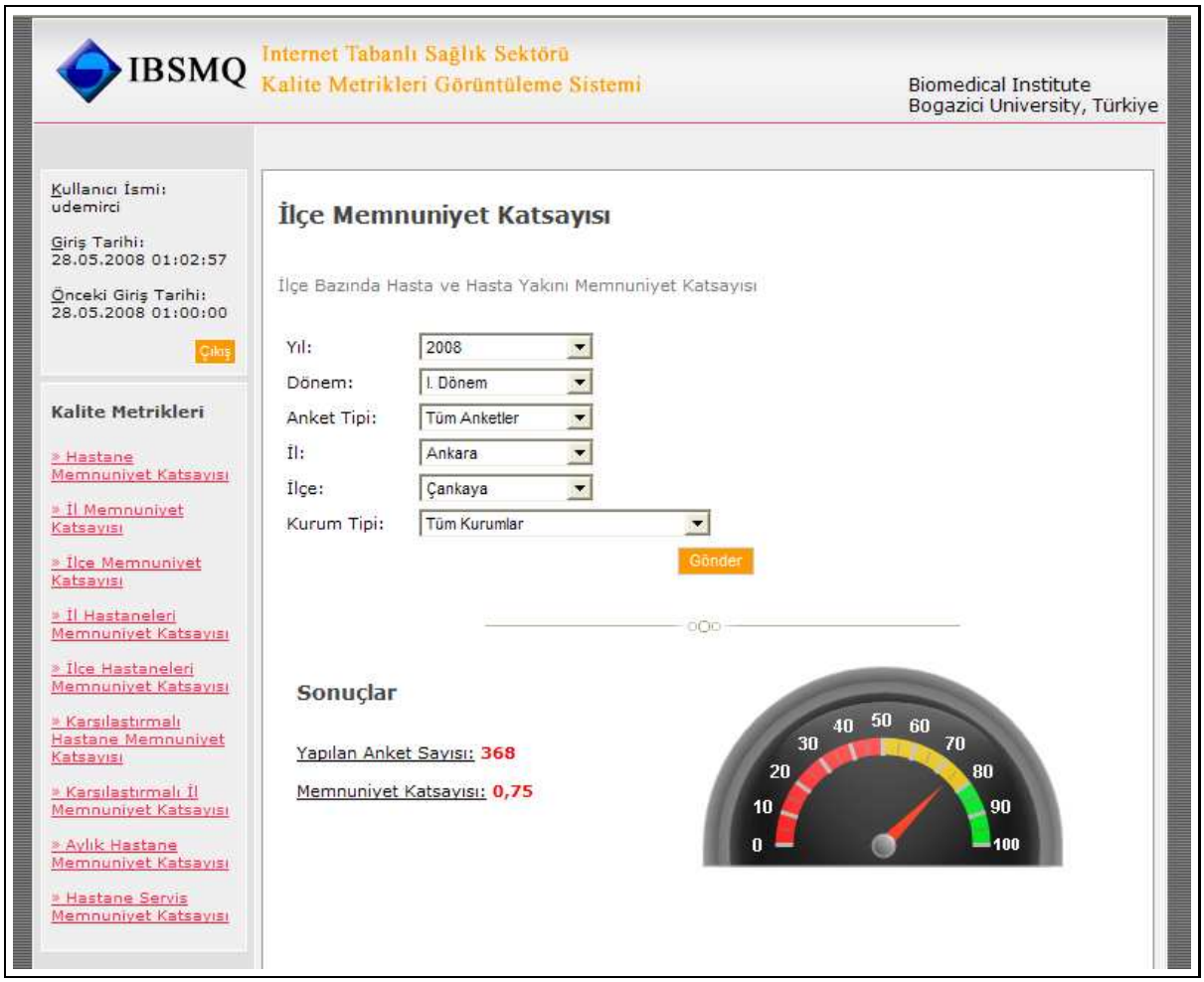

Figure A.14 Screenshot of Report 3

Figure A.15 Screenshot of Report 4

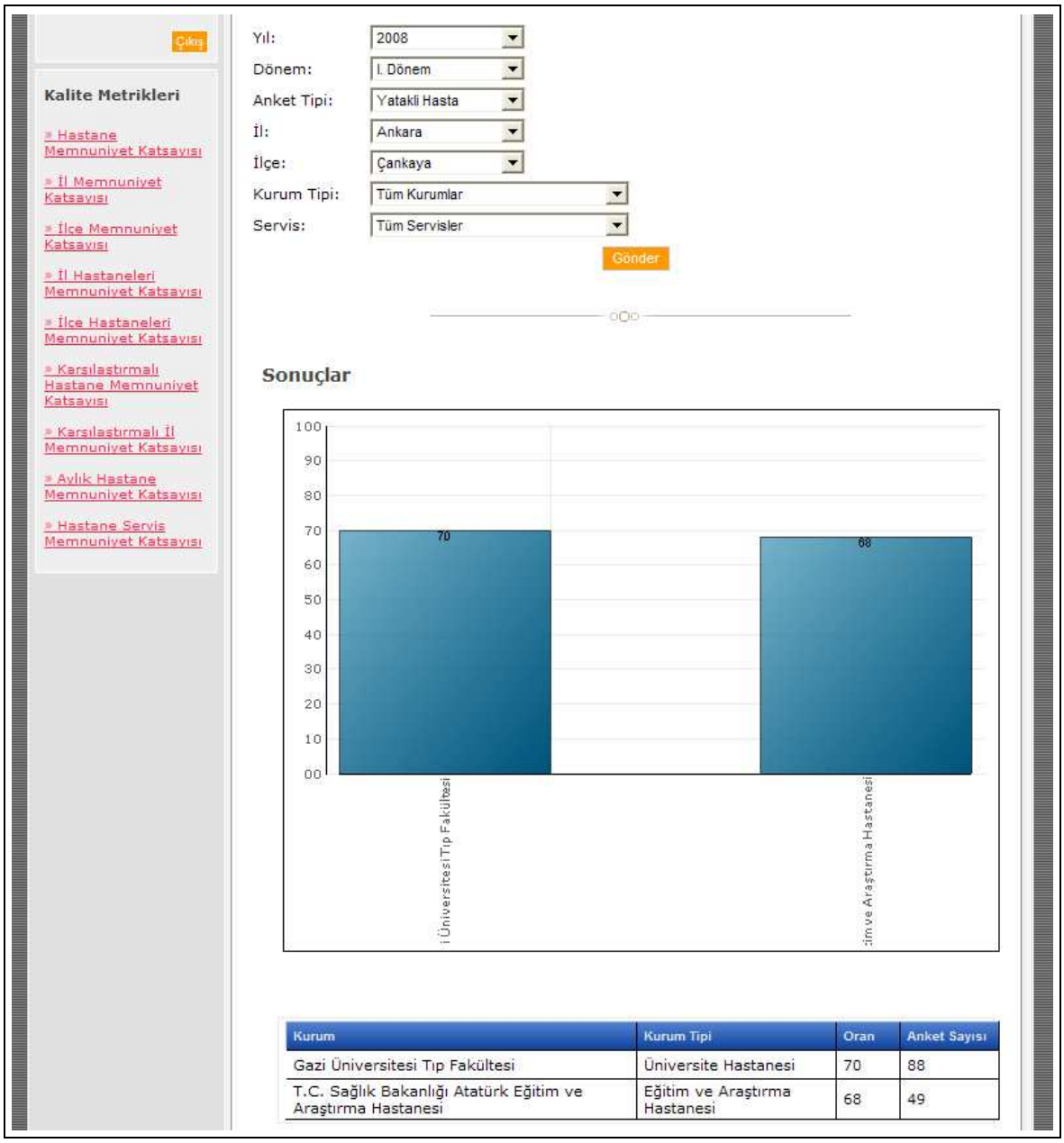

Figure A.16 Screenshot of Report 5

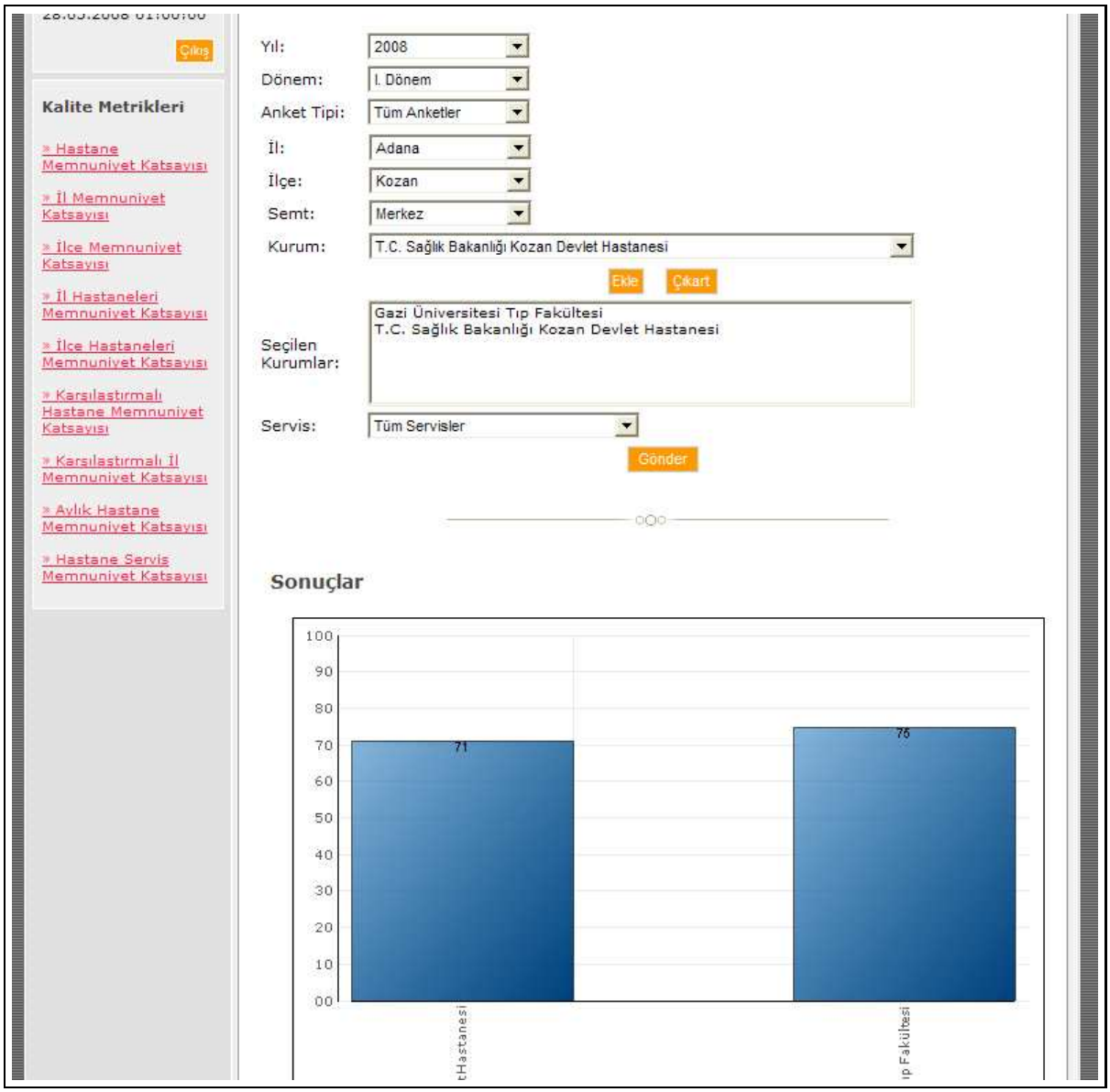

Figure A.17 Screenshot of Report 6

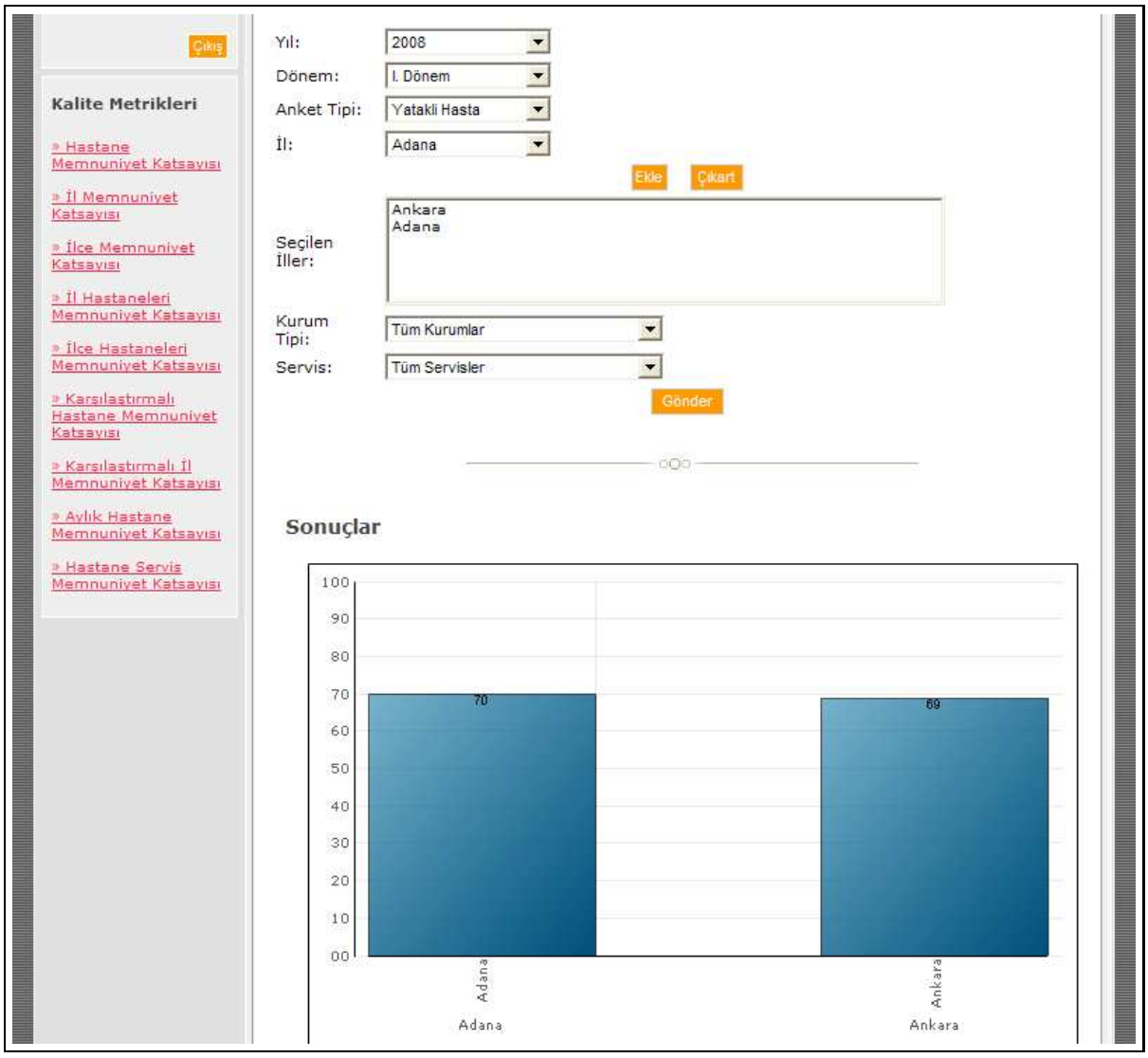

Figure A.18 Screenshot of Report 7

Figure A.19 Screenshot of Report 8

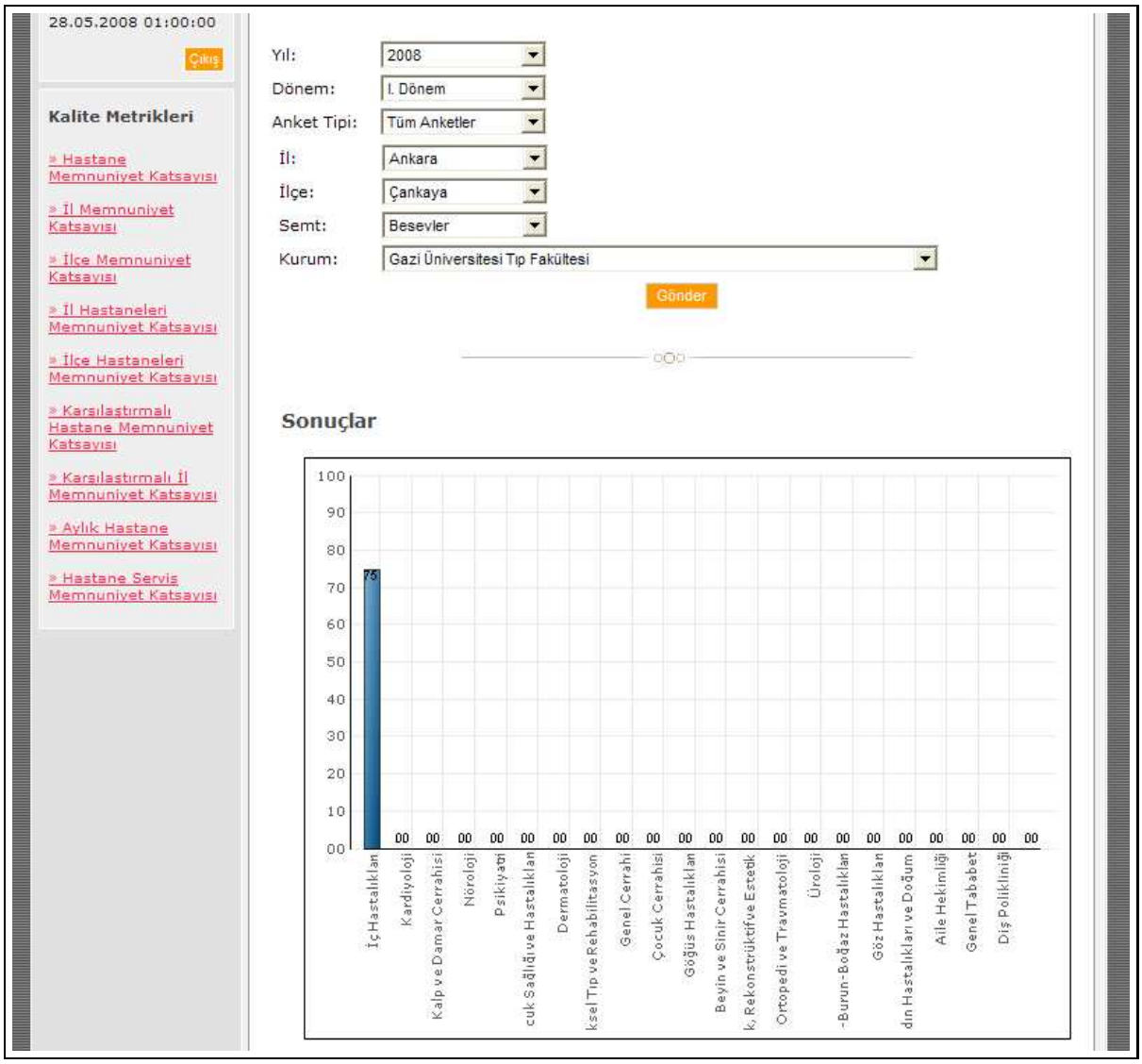

Figure A.20 Screenshot of Report 9

APPENDIX B. The Satisfaction Surveys

STANDART ANKET SETİ

YATAKLI SERVİS HİZMETLERİNİ DEĞERLENDİRME ANKETİ

Sayın Bay/Bayan,

Kaliteli hizmet sunmayı hedefleyen hastanemizin bundan sonraki çalışmalarında yol gösterici olması açısından aşağıda yer alan soruların sizler tarafından yanıtlanması büyük önem taşımaktadır. Bu konuda göstermiş olduğunuz ilgi ve yardımlarınızdan dolayı şimdiden teşekkür eder, geçmiş olsun dileklerimizi iletiriz.

Başhekim ……..

1- Anketin Doldurulduğu Tarih: …./…../…..

2- Cinsiyetiniz

1- Kadın ☐
2- Erkek ☐

3-Yaşınız ……..

4- Eğitim Durumunuz

1- Okur Yazar Değil ☐
2- Okur Yazar ☐
3- İlkokul ☐
4- Ortaokul ☐
5- Lise ☐
6- Yüksekokul ☐
7- Üniversite ☐

5- Mesleğiniz ……..

6- Sosyal Güvenceniz

1- Memur(çalışan) ☐
2- Emekli Sandığı ☐
3- SSK ☐ } Genel Sağlık Sigortası ☐
4- Bağ-Kur ☐
5- Yeşil Kart ☐

6- Güvencem Yok ☐
7- Diğer ☐

7- Hastaneye geliş şekliniz

1- Doğrudan hastaneye başvurdum ☐
2- Başka kurum tarafından sevk edildim ☐

8- Hizmet Aldığınız Servis(ler)

1 İç Hastalıkları ◯
2 Kardiyoloji ◯
3 Kalp ve Damar Cerrahisi ◯
4 Nöroloji ◯
5 Psikiyatri ◯
6 Çocuk Sağlığı ve Hastalıkları ◯
7 Dermatoloji ◯
8 Fiziksel Tıp ve Rehabilitasyon ◯
9 Genel Cerrahi ◯
10 Çocuk Cerrahisi ◯
11 Göğüs Hastalıkları ◯
12 Beyin ve Sinir Cerrahisi ◯
13 Plastik, Rekonstrüktif ve Estetik Cerrahi ◯
14 Ortopedi ve Travmatoloji ◯
15 Üroloji ◯
16 Kulak-Burun-Boğaz Hastalıkları ◯
17 Göz Hastalıkları ◯
18 Kadın Hastalıkları ve Doğum ◯
19 Aile Hekimliği ◯
20 Genel Tababet ◯
21 Diğer ◯

HASTA KABUL

Yatış sırasındaki işlemlerle ilgili olarak aşağıdaki soruları cevaplayınız.

9- Servise yatış işlemlerini yapan görevli bana karşı ilgili ve nazikti.

1- Evet, tamamen **(3)**
2- Evet, kısmen **(2)**
3- Hayır **(0)**

10- Yatış işlemi yapılmadan önce, hastane kuralları (ziyaret saatleri, sigara yasağı vb.) hakkında yeterli bilgi verildi mi?

1- Evet, tamamen **(2)**
2- Evet, kısmen **(1)**
3- Hayır **(0)**

11- Yatış işlemlerinin tamamlanması için ne kadar beklediniz?

1- Beklemedim **(3)**
2- 1 saatten az **(2)**
3- 1 ile 4 saat arası **(1)**
4- 4 saatten fazla **(0)**

SERVİSLER

Yattığınız serviste aldığınız hizmetlerle ilgili olarak aşağıdaki soruları cevaplayınız.

12- Yattığınız odada gürültüye maruz kalıyor muydunuz?

1- Evet **(0)**
2- Kısmen **(1)**
3- Hayır **(2)**

13- Size göre, kaldığınız servis ve odanın temizliği nasıldı?

1- Çok temiz **(4)**
2- Temiz **(3)**
1- Vasat(idare eder) **(2)**
3- Pek temiz sayılmazdı **(1)**
4- Hiç temiz değildi **(0)**

14- Odanın ısı ve havalandırma sistemini yeterli buldunuz mu?

2- Evet **(3)**
3- Kısmen **(2)**
4- Hayır **(0)**

15- Kullandığınız tuvaletler ve banyo temiz miydi?

1- Çok temiz **(4)**
2- Temiz **(3)**
3- Vasat (idare eder) **(2)**
4- Pek temiz sayılmazdı **(1)**
5- Hiç temiz değildi **(0)**

16- Hastane yemeklerini nasıl buldunuz?

1- Çok iyi **(3)**
2- İyi **(2)**
3- Vasat (idare eder) **(1)**
4- Kötü **(0)**

HEKİMLER

Hekimlerin size karşı davranışlarıyla ilgili olarak aşağıdaki soruları cevaplayınız.

17- Sizin için önemli olduğunu düşündüğünüz sorulara hekimler tarafından anlayacağınız şekilde yanıt verildi mi?

1- Evet, her zaman **(3)**
2- Evet, bazen **(2)**
3- Hayır **(0)**

18- Sizi tedavi eden hekimlere güven duydunuz mu?

1- Evet, her zaman **(3)**
2- Evet, bazen **(2)**
3- Hayır **(0)**

19- Hekimler size karşı yeterince ilgili ve nezaketli miydi?

1- Evet **(2)**
2- Kısmen **(1)**
3- Hayır **(0)**

HEMŞİRELER

Hemşirelerin size karşı davranışlarıyla ilgili olarak aşağıdaki soruları cevaplayınız.

20- Size, hemşireler tarafından yeterince ve zamanında hizmet verildi mi?

1- Evet, her zaman **(3)**
2- Kısmen **(2)**
3- Hayır **(0)**

21- Sizin önemli olduğunu düşündüğünüz sorulara hemşireler tarafından anlayacağınız şekilde yanıt verildi mi?

1- Evet, her zaman **(3)**
2- Evet, bazen **(2)**
3- Hayır **(0)**

22- Sizin tedavinizde yer alan hemşirelere güven duydunuz mu?

1- Evet, her zaman **(3)**
2- Evet, bazen **(2)**
3- Hayır **(0)**

23- Hemşireler size karşı yeterince ilgili ve nezaketli miydi?

1- Evet **(2)**
2- Kısmen **(1)**
3- Hayır **(0)**

TEDAVİ ve BAKIM

Tedavi sürecinde aldığınız hizmetlerle ilgili soruları cevaplayınız.

24- Tedaviniz süresince hekimler tarafından sizin için verilen kararlara katıldınız mı?

1- Evet, her zaman **(3)**
2- Evet, bazen **(2)**
3- Hayır **(0)**

25- Tedaviniz süresince hemşireler tarafından sizin için verilen kararlara katıldınız mı?

1-Evet **(3)**
2-Kısmen **(1)**
3-Hayır **(0)**

26- Durumunuz ve size uygulanan tedavi hakkında ne kadar bilgi verildi?

1- Hayır, bilgi verilmedi **(0)**
2- Yeterli bilgi verilmedi **(2)**
3- Yeteri kadar bilgi verildi **(4)**

27- Sizin yakınlarınızdan veya arkadaşlarınızdan biri hekimle konuşmak istediği zaman fırsat veriliyor muydu?

1- Evet, her zaman **(3)**
2- Evet, bazı durumlarda **(2)**
3- Hayır **(0)**

28- Muayene edildiğiniz zaman yeterli ölçüde mahremiyet sağlandı mı?

1- Evet, her zaman **(4)**
2- Evet, bazen **(3)**
3- Hayır **(0)**

29- İhtiyacınız olduğunda, hemşireyi veya hekimi çağırdığınız zaman çağrıya yanıt veriliyor muydu?

1- Evet, hemen (5-10 dakika içinde) **(4)**
2- Evet, az sonra (15-20 dakika içinde) **(3)**
3- Evet, geç yanıt veriliyordu (20-30 dakika içinde) **(2)**
4- 30 dakikadan fazla **(1)**
5- Hayır **(0)**

HASTANEDEN AYRILMA

30- Hekim veya hemşirelerden, eve gittiğinizde karşılaşabileceğiniz sorunları size izah eden oldu mu?

1- Evet, tamamıyla **(3)**
2- Evet, kısmen **(2)**
3- Hayır **(0)**

31- Tedavi olduğunuz servisten, ihtiyacınız olduğunda iletişim kurulabilecek bir telefon numarası verildi mi?

1- Evet **(3)**
2- Hayır **(0)**

GENEL DEĞERLENDİRME

32- Hastanede kaldığınız süre içinde saygı ve hürmet içinde tedavi edildiğinizi düşündünüz mü?

1- Evet, her zaman **(6)**
2- Evet, bazen **(4)**
3- Hayır **(0)**

33- Tedavi gördüğünüz servisteki hekimlerin ve hemşirelerin ekip çalışmasını nasıl değerlendiriyorsunuz?

1- Mükemmel **(4)**
2- Çok iyi **(3)**
3- İyi **(2)**

4- Vasat(idare eder) **(1)**
5- Kötü **(0)**

34- Genel olarak, aldığınız tedavi ve bakımı nasıl değerlendiriyorsunuz?

1- Mükemmel **(5)**
2- Çok iyi **(4)**
3- İyi **(2)**
4- Vasat (idare eder) **(1)**
5- Kötü **(0)**

35- Hekimlerin ve hemşirelerin sizin için elinden geleni yaptığını düşünüyor musunuz?

1- Evet her zaman **(3)**
2- Evet, kısmen **(2)**
3- Hayır **(0)**

DİĞER HUSUSLAR

36- Hasta hakları birimi hakkında bilgilendirildiniz mi?

1- Evet **(2)**
2- Hayır **(0)**

37- Hastanenin genel temizlik ve düzenini nasıl değerlendiriyorsunuz?

1- Mükemmel **(4)**
2- Çok iyi **(3)**
3- İyi **(2)**
4- Vasat (idare eder) **(1)**
5- Kötü **(0)**

38- Hastanenin genel kalitesi hakkında ne düşünüyorsunuz?

1- Mükemmel **(4)**
2- Çok iyi **(3)**
3- İyi **(2)**
4- Vasat (idare eder) **(1)**
5- Kötü **(0)**

39- Eğer ihtiyaç duyarsanız tekrar bu hastaneyi tercih eder misiniz?

1- Evet **(2)**
2- Hayır **(0)**

ÖNERİLERİNİZ

……
……
……
……

POLİKLİNİK HİZMETLERİ DEĞERLENDİRME ANKETİ

Sayın Bay/Bayan,

Kaliteli hizmet sunmayı hedefleyen hastanemizin bundan sonraki çalışmalarında yol gösterici olması açısından aşağıda yer alan soruların sizler tarafından yanıtlanması büyük önem taşımaktadır. Bu konuda göstermiş olduğunuz ilgi ve yardımlarınızdan dolayı şimdiden teşekkür eder, geçmiş olsun dileklerimizi iletiriz.

Başhekim ……..

1- Anketin Doldurulduğu Tarih: …./…../…..

2- Cinsiyetiniz

1- Kadın ☐
2- Erkek ☐

3-Yaşınız ……..

4- Eğitim Durumunuz

1- Okur Yazar Değil ☐
2- Okur Yazar ☐
3- İlkokul ☐
4- Ortaokul ☐
5- Lise ☐
6- Yüksekokul ☐
7- Üniversite ☐

5- Mesleğiniz ……..

6- Sosyal Güvenceniz

8- Memur(çalışan) ☐
9- Emekli Sandığı ☐
10- SSK ☐
11- Bağ-Kur ☐
12- Yeşil Kart ☐

} Genel Sağlık Sigortası ☐

13- Güvencem Yok ☐
14- Diğer ☐

7- Hastaneye geliş şekliniz

1- Doğrudan hastaneye başvurdum ☐
2- Başka kurum tarafından sevk edildim ☐

8- Hizmet Aldığınız Bölüm(ler)

1	İç Hastalıkları	◯
2	Kardiyoloji	◯
3	Kalp ve Damar Cerrahisi	◯
4	Nöroloji	◯
5	Psikiyatri	◯
6	Çocuk Sağlığı ve Hastalıkları	◯
7	Dermatoloji	◯
8	Fiziksel Tıp ve Rehabilitasyon	◯
9	Genel Cerrahi	◯
10	Çocuk Cerrahisi	◯
11	Göğüs Hastalıkları	◯
12	Beyin ve Sinir Cerrahisi	◯
13	Plastik, Rekonstrüktif ve Estetik Cerrahi	◯
14	Ortopedi ve Travmatoloji	◯
15	Üroloji	◯
16	Kulak-Burun-Boğaz Hastalıkları	◯
17	Göz Hastalıkları	◯
18	Kadın Hastalıkları ve Doğum	◯
19	Aile Hekimliği	◯
20	Genel Tababet	◯
21	Diş Polikliniği	◯
22	Diğer	◯

FİZİKİ ORTAM ve BİRİMLER

9- Polikliniklerin bulunduğu yere ve muayene odalarına kolay ulaşılabiliyor mu(işaret levhaları var mı)?

1- Evet, kolay ulaşılıyor **(4)**
2- Yönlendirme eksik **(2)**
3- Hayır, zor oldu **(0)**

10- Size göre, polikliniklerin temizliği nasıldı?

1- Çok temiz **(4)**
2- Temiz **(3)**
3- Fena değil **(2)**
4- Kirli **(0)**

11- Polikliniklerde bulunan tuvaletlerin (lavaboların vb.) temizliği nasıldı?

1- Çok temiz **(4)**
2- Temiz **(3)**
3- Fena değil **(2)**
4- Kirli **(0)**

HEKİM MUAYENESİ

Aldığınız hizmetlerle ilgili olarak aşağıdaki soruları cevaplayınız.

12- Hastaneye geldikten sonra muayene olmak için bürokratik işlemlere (hasta kabul, kayıt vb.) harcadığınız toplam süre ne kadardı?

1- 0- 20 dakika **(6)**
2- 21-40 dakika **(4)**
3- 41-60 dakika **(2)**
4- 1 saat ve üzeri **(0)**

13- Hekimin sizi muayene etmesi ne kadar sürdü?

1- 5 dakika kadar **(0)**
2- 6-10 dakika **(2)**
3- 11-15 dakika **(4)**
4- 16- 20 dakika **(6)**

14- Hekim tarafından, size verilen tedavi veya yapacağınız egzersizler için anlayacağınız şekilde açıklama yapıldı mı?

1- Evet, tamamıyla **(4)**
2- Evet, kısmen **(2)**
3- Hayır **(0)**

15- Hekim şikâyetlerinizi dinleyip, hastalığınızla ilgili sorularınıza anlayacağınız şekilde yanıt verdi mi?

1- Evet, tamamıyla **(4)**
2- Evet, kısmen **(2)**
3- Hayır **(0)**

16- Sizi muayene eden hekime güven duydunuz mu?

1- Evet, elbette **(4)**
2- Evet, kısmen **(2)**
3- Hayır **(0)**

17- Hekimler size karşı yeterince ilgili ve nezaketli miydi?

1- Evet **(2)**
2- Kısmen **(1)**
3- Hayır **(0)**

DİĞER MESLEK GRUPLARI

18- Sizinle ilgilenen personel aşağıdakilerden hangisiydi?

1- Hemşire
1- Fizyoterapist
2- Röntgen teknisyeni
3- Psikolog
4- Sosyal Hizmet Uzmanı
5- Diğer: Lütfen belirtiniz……

19- Sizinle ilgilenen personel, önemli olduğunu düşündüğünüz bir soruya anlayacağınız şekilde yanıt verdi mi?

1- Evet, tamamıyla **(4)**
2- Evet, kısmen **(2)**
3- Hayır **(0)**

20- Sizinle ilgilenen bu sağlık görevlisine güven duydunuz mu?

1- Evet, elbette **(4)**
2- Evet, kısmen **(2)**
3- Hayır **(0)**

21- Sizinle ilgilenen personel yeterince ilgili ve nezaketli miydi?

1- Evet **(2)**
2- Kısmen **(1)**
3- Hayır **(0)**

POLİKLİNİK DEĞERLENDİRME

Poliklinikte aldığınız hizmetlerle ilgili aşağıdaki soruları cevaplayınız.

22- Poliklinikte durumunuz ve tedaviniz hakkında yeterli bilgi verildi mi?

1- Yeterli bilgi verilmedi **(2)**
2- Yeterli bilgi verildi **(4)**
3- Hayır, bilgi verilmedi **(0)**

23- Hastalığınızla ilgili sizinle yapılan görüşmelerde mahremiyete dikkat edildi mi?

1- Evet, kesinlikle **(4)**
2- Evet, kısmen **(2)**
3- Hayır **(0)**

24- Size önerilen tedavi ve diğer uygulamalar hakkında fikriniz soruldu mu?

1- Evet, tamamen **(4)**
2- Evet, kısmen **(2)**
3- Hayır **(0)**

25- Hekim, ilaçları neden yazdığı ve nasıl kullanacağınız konusunda, anlayacağınız şekilde bilgi verdi mi?

1- Evet, tamamıyla **(4)**
2- Evet, kısmen **(2)**
3- Hayır **(0)**

26- Muayeneniz sırasında sizinle ilgilenen görevlilerin kendilerini tanıtan yaka kartı var mıydı?

1- Evet, hepsinin vardı **(4)**
2- Bir kısmının vardı. **(2)**
3- Hiçbirinin yoktu. **(0)**

27- Hekiminizi kendiniz seçebildiniz mi?

1- Evet **(4)**
2- Hayır **(0)**

BİLGİLENDİRME

28-Hekiminizi seçebilmeniz için bilgilendirildiniz mi?

1- Evet **(3)**
2- Hayır **(0)**

29- Hekiminiz tarafından, eve gittiğinizde (hastaneden ayrıldıktan sonra) hastalığınızın tedavisi boyunca yaşanabilecek durumlar için bilgi verildi mi?

1- Evet, tamamıyla **(4)**
2- Evet, Kısmen **(2)**
3- Hayır **(0)**

30- Durumunuzun kötüleşmesi halinde veya endişeye kapıldığınız anda hastaneden iletişime geçebileceğiniz bir telefon-iletişim adresi verildi mi?

1- Evet **(4)**
2- Hayır **(0)**

GENEL DEĞERLENDİRME

31- Hastaneye başvurduğunuz probleminizle ilgili olarak size verilen hizmetten memnun kaldınız mı?

1- Evet, tamamıyla **(4)**
2- Evet, kısmen **(2)**
3- Hayır **(0)**

32- Polikliniklerde verilen hizmetler düzenli işliyor muydu?

1- Düzenli değildi. **(0)**
2- Oldukça düzenliydi. **(2)**
3- Çok iyi düzenlenmişti. **(4)**

33- Genel olarak ifade edecek olursanız, polikliniklerde aldığınız hizmetlerde size karşı saygılı davranıldı mı?

1- Evet, her zaman **(4)**
2- Evet, bazen **(2)**
3- Hayır **(0)**

34- Polikliniklerde aldığınız hizmeti genel olarak nasıl değerlendirirsiniz?

1- Mükemmel **(5)**
2- Çok iyi **(4)**
3- İyi **(3)**
4- Orta **(2)**
5- Kötü **(0)**

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