COMPETITIVE RIVALRY WITHOUT PROVOKING RETALIATION
A CASE ON TURKISH MEDICAL IMAGING MARKET

MBA THESIS

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COMPETITIVE RIVALRY WITHOUT PROVOKING RETALIATION: A CASE ON TURKISH MEDICAL IMAGING MARKET

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SEPTEMBER 1995

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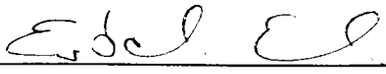

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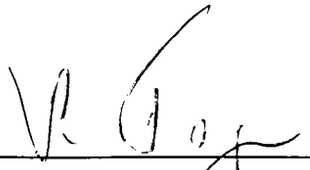

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ABSTRACT

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A CASE ON TURKISH MEDICAL IMAGING MARKET

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MASTER OF BUSINESS ADMINISTRATION

Supervisor: Assoc. Prof. Oğuz Babüroğlu

Competition is the core concept in non-monopolistic markets for a firm's survival. Competitive strategy is an area of primary concern to managers, depending critically on a subtle understanding of industries and competitors. Action and response characteristics of competitors have been an area of interest suggesting frameworks for further research. This study aims to implement the previous frameworks to the Turkish Medical Imaging Market, to verify the characteristics specific to this market. Basically it seeks to identify the attack behavior that elicits or averts retalitionary responses.

Keywords: competition, attack, retaliation, Medical Imaging

ÖZET

MİSİLLEMEYE YOL AÇMAKSIZIN REKABET KOŞULLARI: TÜRK TIBBİ GÖRÜNTÜLEME PAZARI ÜZERİNE BİR VAKA ÇALIŞMASI

KUNTER KUTLUAY

İŞLETME YÜKSEK LİSANS PROGRAMI

Danışman: Doç. Dr. Oğuz Babüroğlu

Rekabet, tekelci olmayan pazarlarda bir firmanın ayakta kalabilmesi için temel bir unsurdur. Rekabet stratejisi, endüstri ve rakiplerin detaylı anlaşılmasına dayanarak, yöneticileri öncelikle ilgilendirir. Rakiplerin etki ve yanıt özellikleri, ileriki çalışmalara yön verecek iskeletler oluşturan bir ilgi alanıdır. Bu çalışma, önceki iskeletleri Türk Tıbbi Görüntüleme Pazarı'na uyarlayarak bu pazara özgü özellikleri doğrulamayı amaçlamaktadır. Temel olarak misilleme yanıtları doğuracak veya engelleyecek etki tavırlarını tanımlamaya çalışmaktadır.

Anahtar Kelimeler: rekabet, etki, misilleme, Tıbbi Görüntüleme

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1. Introduction

1.1 The Purpose of the Study

Competition is the core concept in non-monopolistic markets for a firm's survival. Competitive strategy is an area of primary concern to managers, depending critically on a subtle understanding of industries and competitors (Porter, 1980). Business strategists are very much concerned with competitive rivalry, the jockeying and maneuvering among competitors that takes many forms (Chen and Miller, 1994). Porter summarizes the essence of this dynamics as follows:

> Rivalry occurs because one or more competitors either feels the pressure or sees the opportunities to improve position. In most industries, competitive moves by one firm have noticeable effects on its competitors and thus may incite retaliation or efforts to counter the move; that is firms are mutually dependent (1980: 17).

Action and response characteristics of competitors have been an area of interest suggesting frameworks for further research (Chen, Smith and Grimm, 1992; Chen and MacMillan, 1991; Kelly and Amburgey, 1991). Empirical studies on the interplay between the actions of a strategist, the responses they provoke and the ultimate performance implications of this interaction have barely begun (e.g., Chen and Miller, 1994; Chen, Smith and Grimm, 1992; MacMillan, MacCaffery and Van Vijk, 1985).

This study aims to implement the previous frameworks to the Turkish Medical Imaging Market, to verify the characteristics specific to this market. Basically it seeks to identify the attack behavior that elicits or averts retalitionary responses.

This study bears two important points to be recognized:

- Turkey is a country that has to purchase high-tech equipment from abroad. With so little number of producers in the medical field and so little investment in other fields of high-tech production, many markets have to share if not exactly the same but similar characteristics.

- Medical Imaging Equipment production is a "protected" field in terms of the aspects that will be stated below in the industry analysis. Therefor, each country definitely does not have the chance of production in the same sense. So, the horizons of this study should extend to other countries with no local production, only with the differences of the local culture and values.

1.2 Content of the Study

The study starts with a description and analysis of the Medical Imaging Industry, as effect of the industry structure to the action-response characteristics is believed to be vital. This section also includes determination of the important aspects of the market under question that may act in the strategy formulation process, as a result of customer value analysis.

Following section describes the framework used to determine and evaluate the action-response characteristics for the specificity of the Medical Imaging Market. Basic characteristics of actions and their response provoking possibilities are discussed.

The thesis ends with evaluation of possible ways of attack in the Medical Imaging Market in Turkey according to the framework introduced.

1.3 Frameworks Used

In order to determine the structure of the Turkish Medical Imaging Industry, the framework suggested by Porter (Porter, 1985) is used.

To determine the basic characteristics of the companies operating in the Medical Imaging Industry, the value-chain framework suggested by Porter (Porter, 1985) is used.

In order to determine the action-response characteristics, the Expectancy-Valence framework suggested by Chen and Miller (Chen and Miller, 1994) based on the motivational frameworks (Atkinson, 1964; Rotter, 1954; Wroom, 1964) is used.

1.4 Methodology

The methodology used to evaluate the proposals on the action-response characteristics and current market conditions of the Turkish Medical Imaging Industry are one-to-one interviews and group questionnaires with physicians, decision makers on the equipment purchasing process, and employees of equipment vendors, from every level. The interviews and questionnaires were conducted during two congresses (one Nuclear Medicine, Pamukkale - Denizli, April 1995, 150 attendants, Physicians in Nuclear Medicine and vendor employees, and a Multinational Radiology Congress, June 1995, 730 attendants, Radiologists and vendor employees), a symposium (Magnetic Resonance Imaging–MRI–, Afyon, May 1995, 120 attendants, Radiologists and Vendor employees), two user meetings (one Nuclear Medicine, Herzelia – Israel, January 1995, 60 attendants, Physicians in Nuclear Medicine and Elscint-vendor for Medical Imaging Equipment from Israel-employees, and an MRI meeting, Herzelia – Israel, June 1995, 40 attendants, Radiologists and Elscint employees) and occasional sales meetings.

2. Medical Imaging Industry in Turkey

2.1 General Description

Medical Imaging is viewing inner body structures without invasive operations. The equipment availing these procedures range from $15,000 to $2.5 million, depending on the technology used. The modalities include sound based systems like ultrasounds and color dopplers, X-ray utilizing systems like conventional x-ray, mammography, computerized tomography and angiography, and magnetization based systems, which are magnetic resonance imagers.

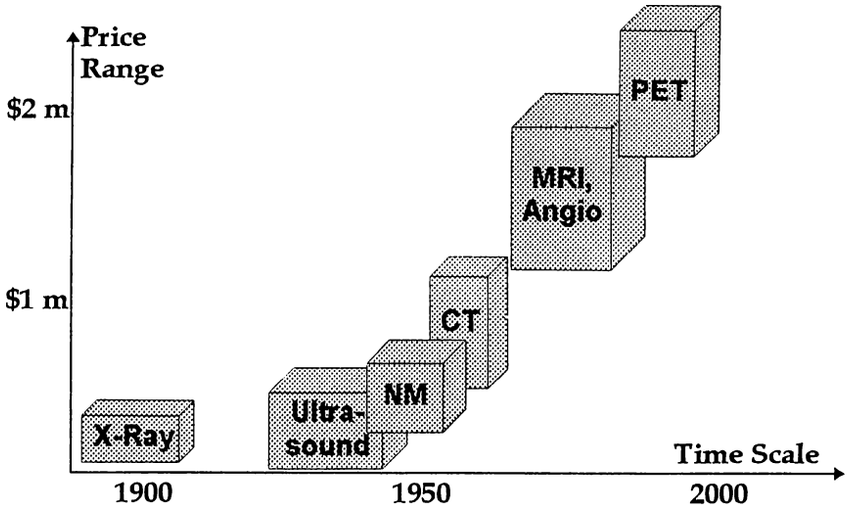


Figure 1 - Medical imaging equipment evolution

Starting from the first imaging technique x-ray, invented in 1895 by Roentgen, many different means of viewing inner body structures without invasive operations have evolved. With today's immense development in computer industry, this evolution has gained momentum in the last few decades. Industry giants, such as General Electrics (US), Siemens (Germany) and Philips (Netherlands) have invested great amounts starting from the fifties to this industry as separate divisions from their electronics

departments(Slater, 1993). Also mergers of small producers to these powers speeded up the evolution with considerable amount of funds available. Medicine, being an important social subject and a tool for the companies to improve their position in public opinion starting from the seventies, received even more care (Buğra, 1994:25).

Following the expansion in the market, Japanese and Italian companies also entered the race mainly with low pricing strategies. As computerized systems evolved through the end of sixties, companies from Israel and U.K. also emerged, basically using the technology they produced for other purposes, like weapon, aviation and space industries.

The world market is dominated with these few companies with some regional exceptions. Some of them share their technology and segment their markets accordingly (Phillips –Netherlands– sells Hitachi –Japan– CT scanners and ADAC –USA– Nuclear Medicine cameras in Europe, etc.) to gain regional power, and some extend their operations to new fields by horizontal or vertical integration.

Today, Turkish market is also covered by these companies with varying shares, with only one local producer of x-ray equipment; Truffy Roentgen, based in Bolu. When investigating the Turkish Market, it is necessary to keep in mind that the market is strongly open to the international arena, where these companies exist with their latest product introductions and innovations.

Some of these companies are represented by their own subsidiaries (e.g., GE –USA, Siemens –Germany) and others have a representative or exclusive dealer in Turkey (e.g., Philips –Netherlands, Elscint –Israel, Toshiba and Hitachi –Japan). In both cases, a stable organization to provide necessary services to the customers is essential.

2.2 Definition of the Industry

2.2.1 Supply

The supply side of the Medical Imaging Industry is formed by equipment vendors who are operating in Turkey to fulfill the local needs for these equipment. This section aims to provide information on the type of organizations in the industry and the services the companies provide.

2.2.1.1 Types of Organizations

As pointed out earlier, companies operating in the Medical Imaging Industry have different forms. These are:

- Brand-New Equipment Dealers
    - Local Producers
    - Fully or partially owned subsidiaries, or
    - Representatives or dealers of international producers
    - Hybrid organizations
- Others
    - Second hand equipment dealers
    - Service providers

2.2.1.1.1 Brand-New Equipment

2.2.1.1.1.1 Local Producers

The first case is the production performed by the companies in Turkey. When the Medical Imaging Industry is concerned, the only example of producer of such systems is Truffy Roentgen, based in Bolu.

Basically, the production includes conventional x-ray equipment and Mammography systems. These do not require high-technology know-how.

The production includes casing and integration, other than some small scale electronic parts production. The most important elements of production, like x-ray tube and power generator are imported from worldwide producers.

A few other investment has been made in the Medical Field in terms of production in recent years. Among them are Kardiosis Systems, based in KOSGEB - Ankara, producing equipment for cardiology purposes. Another example is the Research and Development efforts for an MRI system to be produced solely in Turkey going on in METU Biomedical Department. However, either the maturity of the products are very low or the current production holds a very small percentage of the total consumption of Turkey.

The basic operations of these companies are selecting and purchasing necessary materials and parts, production of some items, integration, testing and quality assurance, marketing activities, order processing and distribution of the finished goods, and after-sales service. A generic value chain for producers is provided.

2.2.1.1.1.2 Subsidiaries

Some multinational companies form fully or partially owned subsidiaries in Turkey. The subsidiaries use the name of the main producer—like General Electric Medikal Sistemler Türkiye of GE Medical Systems, USA.

These companies have to market and service only the equipment produced by the main company. They form a central organization, generally based in Istanbul, and provide services to other parts of Turkey either from this center or through subsections formed in important areas.

The services provided include sales and marketing activities, order processing, delivery and after-sales services. A generic value chain is provided.

2.2.1.1.1.3 Representatives

These are local independent companies owned by local investors. These companies represent the operations of foreign producers in Turkey.

The agreement of representation, once established, is renewed every year by the local firm and the producer.

The operation rights of the representative, although listed in detailed within the agreement of representation, include importing, marketing, selling and servicing the equipment produced by the main company.

The representative is free to market any other good and services it wishes, only with the condition that the services provided will not be contradicting each other. For example, Nükleer A.Ş., representative of Elscint Medical Systems, Israel for Medical Imaging Equipment, also represents Amersham, U.K., for Nuclear Medicine supplies and accessories. There are even examples like Meditel, based in İstanbul , which represents Shimadzu Medical Imaging Systems and Diasonics Medical Imaging Systems together, as the equipment these companies provide do not overlap although having similar types of operation.

Representing more than one company and/or product avails diversification of operations. This helps financial ease in terms of cash flow determination. Disposables representation provides continuous cash flow, helping the financing and increasing the flexibility for rare and high value one-shot sales of the Medical Imaging Equipment.

A generic value chain for representative companies is provided.

2.2.1.1.1.4 Hybrid Organizations

There are also examples of hybrid organizations in the industry, in which the sales and service organizations of the same foreign producer are owned by different parties.

This also takes different forms as can be seen from the following examples:

Philips Medical Systems, Netherlands, is represented by MESİ A.Ş. based in İstanbul. In the beginning of 1995, Philips took away the service operations from MESİ and formed a subsidiary to deal with after sales service, leaving the sales operations to MESİ A.Ş., still a representative.

Kurt&Kurt A.Ş., based in Ankara, represents many foreign companies, operations concentrating on Hitachi Medical Systems –Japan. However, Kurt&Kurt has separated sales and service operations forming a company under the same organization, Elser A.Ş. Both companies are connected to the same group, but the operations are completely different.

This type of operation has the advantage of the vendor side as they are separating two conflicting operations (Shapiro) and concentrating on the service provided—either sales or technical service and assistance.

From the customer point of view, this separate organization creates conflict most of the time since the customer has more than one party during the sales and after-sales discussions. The customer has to make a compromise either to be serviced by a company specialized on technical service or to deal with one single party during the usage of the system.

2.2.1.1.2 Others

Two other type of organizations are functioning in the market which bear importance especially in the low-end price sensitive segment.

2.2.1.1.2.1 Second Hand Equipment Dealers

These are dealers of used, second or third end equipment dealers. The operation is similar to the representatives described above. However, these are not authorized by the producer companies. They buy the equipment from either abroad, where the replacement market for the Medical Imaging Products is much rapid, or from internal market, mainly form big cities which would like to renew their equipment to have a better position in the market, and sell these equipment to less developed areas of Turkey, which cannot be sensitive to the quality of the equipment because of economic conditions, to low prices.

The basic operation is as follows:

They hear that a certain clinic is going to sell its equipment. Then, before buying the equipment from them, they start looking for customers for that specific system. When the sales deal is finished, they de-install and carry the equipment to the new place and do the installation there. The profit is the commission from the transaction.

The advantage of the buyer from this type of operation is that they have a system to very low prices–for a tomography system, used price is almost 1/5 of the brand new price of the system. However, there are many disadvantages. These include no warranty for the product and not developed technical service organization. Legal representatives of these equipment either refuse or quote high prices servicing the replaced second-hand equipment. The buyer either accept these high prices or contact with independent service providers described below.

2.2.1.1.2.2 Independent Service Companies

These are independent firms that provide technical service to certain brands of Medical Equipment. Mainly the ex-service personnel of the

representatives or subsidiaries, these are experienced technical people on the equipment.

They provide the spare-parts necessary for the service necessary from abroad, where piracy and imitation of the original spare parts are available, and charge lower prices for service than the authorized companies.

The buyers of both second-hand and brand-new equipment, taking any risk it may convey, apply to these services for low charges.

For an equipment once serviced by an unauthorized organization, the dealer either refuses to service or quotes high prices. This risk is undertaken by the equipment owner against the low pricing of the regular service.

2.2.1.2 Services Provided

A Medical Imaging Company has to provide the following services in order to continue operations:

1. Sales
2. Technical service
3. Medical application services
4. Financial services
5. Other services

2.2.1.2.1 Sales Organization

This is the organization that controls and carries through marketing and sales activities.

Marketing activities include contributions to shows, technical seminars and congresses, promotional activities and one-to-one relations with customers.

Sales activities include sales contracts and agreements, purchasing orders, warranty contracts, importing and other legal formalities and distribution.

Although sales activities can be controlled locally, marketing activities has to be distributed. One to one sales relations with customers are very important before and during the sales process.

In some companies, there are sales organizations in the major cities like Ankara, İstanbul or İzmir. The sales people working for these offices segment Turkey according to geographical or personal reasons—personal relations with certain customers—and deal with the customers accordingly.

There are also companies which shrink their marketing activities to one or two cities for the whole Turkey, and try to response the customers from these centers. The more concentrated the marketing organization, the more it takes to reach the customers. This causes deficiencies in customer relations, which is a disadvantage for the purchasing decision.

Large scale advertising activities require close follow-up on the magazines and papers for relevant advertisement. There are also examples of technical seminars and workshops organized by vendor companies to promote their products while displaying their devotion to the development of the knowledge-base of the Turkish Medical Imaging Industry. Also contributions to organized seminars and congresses enables the companies to display their latest developments in the field to the potential customers.

The advertisements on the medical periodicals include not only the product improvements, but also the devotion to the field.

2.2.1.2.2 Technical Service Organization

Technical service forms the backbone of the overall operations for the Medical Image Industry.

The interference of the technical service with the project starts during the quotation phase. This includes feasibility studies and cost determination for the location where the prospect desires the equipment to be installed to, which is named "the site". The technical requirements for most of the medical imaging equipment in terms of site specifications are strict. For the x-ray generating systems, the walls of the walls of the site adjacent to any other residential area should be covered with lead of enough thickness in order to prevent the adverse affects of high dose x-ray. Magnetization utilizing systems interfere with the surrounding electronic equipment if not taken under control properly. High magnetic field can be fatal for people using "pacers" or carrying metal objects.

The additional work required for the installation is planned and the expected cost is determined during this period, before price negotiations of the sales department.

Following the sale, the technical personnel starts preparing the site according to the predefined plans and specifications until the transportation of the equipment has been completed. This requires electrical, mechanical and construction expertise.

Until the acceptance of the system by the customer, the installation activity takes place. Mechanical and electrical construction, performance and quality checks and verification are all parts of the installation phase.

Following the installation and the acceptance of the equipment by the customer, the warranty period starts. During this period, which is generally one year, the equipment is under technical control of the vendor. Routine preventive maintenance is performed, and if there is a need for repair, it is completed by the vendor without any charge for replaced spare parts or workmanship. This warranty is not unconditional, which leaves out user mistakes and other conditions not related to the design, production and workmanship of the equipment. Although conditionality may cause some

doubt for the customers (Berry, Zeithaml, & Parasuraman, 1985; Karabatı, 1994), in practice the warranty covers most malfunctions, including many of the user mistakes, in order to have a better image in the industry for high quality equipment.

Following this warranty period, technical service organization starts charging the customer for the services it is providing. This can be in either call basis, or in terms of a service contract.

For call basis agreements, the customer, if has a malfunction in the equipment, calls the technical service, and the technical service charges for the time spent and the spare parts used during the repair. The prices charged are generally high and the customer does not have the priority for the service, so there ma be delays of response time.

For service contracts, the customer and the technical service signs a service contract based on conditions similar to the warranty period. Spare parts to be used can either be included or excluded. The contract is valid for one year period. The priority of the customer is now increased and preventive maintenance, which lowers the possibility of a malfunction is performed on a routine basis.

The service charges vary, after negotiations, from customer to customer. The geographical area, importance of the customer for the vendor, future purchasing plans and bargaining power of the buyer arousing from these are the determinants for the charges.

During the warranty period and beyond, that is through the economic life of the equipment, following points have to be recognized by the vendors in terms of technical service:

1. *Prompt service:*

The technical service should be prompt in responding the service calls. Once the equipment is down, the customers of the user, the patients, look for an immediate alternative. The return rate of the patients is quite low. The loss for the user gets higher as the equipment is left unserviced for a long time.

2. *Problem solving in limited time:*

Being quick in problem solving following the first response is an indication of technical expertise and well-formed spare parts inventory. Most delays during the repairs occur because of missing spare parts in the local inventories. The customs procedures act further in receiving the necessary parts when required.

Quick problem solving is important in the same sense with "promptness". The earlier the equipment is up and working, the more the earnings for the customer. Also the image of quality enters into the picture, both for the vendor and the customer.

3. Quality and Image:

The quality image of the technical service department is also very important. Personal relations with customers count during the service and maintenance periods. Including the tools used by the personnel, together with their self confidence and behavior towards the customer are important aspects of delivering high quality service to the customer.

2.2.1.2.3 Medical Application Service

Medical application service is the transfer of the knowledge of how to use that equipment effectively. Although each vendor has similar types of equipment —like GE and Siemens produce MRI systems, both serving the same purpose with similar procedures— many aspects, ranging from the user interface to parameter settings differ. The equipment are mostly

computer controlled; however, user expertise and interaction is highly necessary for the fine tuning of results of the exams.

Medical Application comes into the picture during the preparation of the bid to the potential customer. The ease of operation and possibilities available should be demonstrated by an "application specialist" to the prospect in coordination with the efforts of the sales personnel.

Following the sales, before and/or after the installation, training of the customer should be carried over. Application training is generally a part of the sales agreement, which lasts between 2 to 15 days depending on the complexity of the equipment.

During the usage period of the equipment, the user is always in contact with the application specialist to learn more about the equipment and any further developments in the field.

In some companies, because of the similarity of the roles, application service is carried out by the service personnel. This degregates the complexity of operations increasing the responsibilities of the personnel. The number of the service and application staff should be arranged relative to the installed base of the company.

2.2.1.2.4 Financial Services

Medical Imaging Equipment are expensive systems, especially for the private investors. Cash payment for most of the cases is not possible.

The vendor should also be providing financial services to its customers during their purchasing decision. These services include contracts and special agreements with the leasing companies, parent company credits and other financial relations with banks.

Leasing companies work also with the investors directly. However, relations with the leasing companies like foreign crediting and financial pooling, considerably lowers the interest rates and reduces the formalities for these transactions.

Vendor company credit for long term payments is also provided to the customer. This has some disadvantages against leasing procedure, like the amount of Value Added Tax to be paid, however, also has the flexibility of dealing directly with the vendor. The transaction requires securities like bank guarantees. These formalities can also be simplified by established relations with banks and other institutions.

2.2.1.2.5 Other Services

The vendor companies should follow the legal environment as well as the current state of the economy to continue their operations.

The high inflationary economic situation, abrupt and unexpected changes in foreign currency exchange rates affect the Medical Imaging Industry to a great extent. The charges for the studies performed by the equipment are determined twice every year by the government, with private charges aligned accordingly, and the prices are constant in Turkish Lira for long periods of time, while the cost of the equipment bought and most disposables used with these equipment are priced under foreign currencies, mainly US Dollar. This lowers the predictability and increases the risk involved for investment to the Medical Imaging Environment.

The vendor companies should be providing assistance to the customer in determining their costs in order to be able to survive.

Laws and regulations related to the Medical Industry have to be followed by both the customers and the vendors. Subsidies by the government are provided to investments in several fields, including the Medical Field. The

conditions on the subsidy provided is revised and announced as new situations arise together with the current government policy (Başbakanlık Hazine Müsteşarlığı, 1995). The subsidy can be in forms of postponing the Value Added Tax arousing from the purchase, reduction in income taxes and customs duties, etc. which may add up to more than 10% reduction and 15% delay of the total investment.

The terms and conditions for these subsidies should be followed by the vendor and necessary consultancy should be provided to the customers to ease the operations and formalities included.

2.2.1.3 Service Variations in Different Type of Organizations

The services provided by the vendors to the customers differ related to the organization type the vendor is employing.

Sales, technical and medical application services should be provided by all organizations of brand new suppliers. The local producers have to supply these services domestically, however, subsidiaries and representatives can support their forces via international resources the parent companies provide.

For the hybrid organizations, these services are provided with special agreements among the sales and service companies. The dynamics may differ from company to company, however, the result should be uninterrupted service to the customer.

Second-hand dealers provide mostly the sales service only, lacking in the technical and medical application services. They may solve this problem by agreements with independent service companies. However the customer willing to buy a second hand inexpensive equipment takes the risk of not being serviced, or generally makes agreements with the service companies himself.

Financial services are also provided mainly by the brand new equipment dealers in terms of long term payments and better relations with leasing companies and banks. Subsidiaries and representatives of transnational producers have more financial power and opportunities than local small scale producers. The financial service is the weakest for the second-hand dealers and the service companies, where the need for better financing is not necessary because of the low-pricing of the systems.

2.2.2 Demand

The demand side of the Medical Imaging Industry can be investigated in two main subjects: the patient channels, meaning the source, the amount and the financial power of patients which need medical exams performed by the Medical Imaging Equipment, and the organizations which are eager to provide these services by purchasing the Medical Imaging Equipment.

2.2.2.1 Patient Channels

The patients for the Medical Imaging Equipment vary by source, which is important during the purchasing decision of the company. The number of patient generated and the amount of earnings differ and this is a main concern while determining the target market for the customer.

2.2.2.1.1 Private

This is the segment of patients which are not generally connected to a social security, fund or any other organization, or the ones that do not want to delay the appointment dates set by their organizations.

For the time being, the supply of the Medical Imaging service is lower than the demand of the exams, especially for the social security and the government side. So, long range appointments and delayed exams take place.

Some patients chose to pay more and have a quick exam. These, combined to regular private patients, form a good source of patients with higher charges.

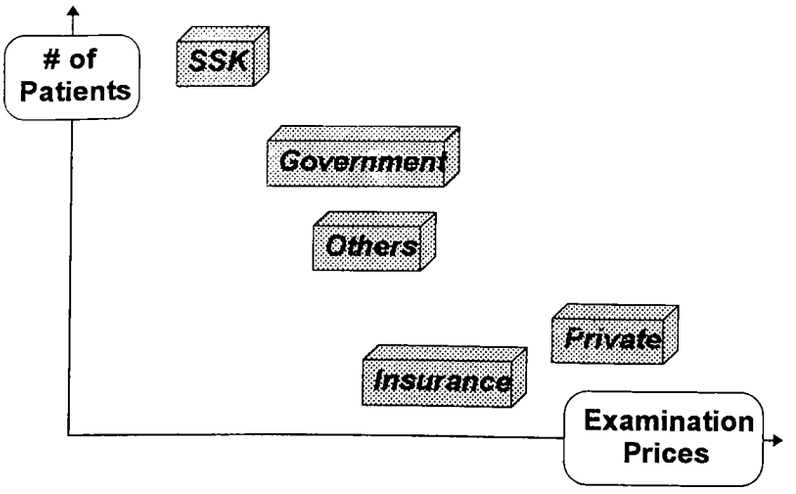


Figure 2 - Volumes and prices for different patient channels

2.2.2.1.2 SSK

SSK –Sosyal Sigortalar Kurumu– is the largest social securities agency in Turkey. Every worker working under Turkish laws as to belong to SSK and the employee, together with the employer, has to pay certain amount of fee to SSK, relative to the wage. In turn, SSK provides free health care service to their members.

This is the largest base of patients in the Medical Imaging Industry. Although SSK owns hospitals and imaging centers itself to service to its own potential, the supply is far beyond the demand. Therefor, SSK makes agreements with private business owners to look after its members. The fixed prices for each medical exam is announced every six months on a routine basis, and the Imaging Centers accepting SSK members should apply these prices.

The prices announced by SSK is low, just overcoming the cost of the exams. However, most of the owners of private business want to make agreements

with SSK because of its large volume. An indicative list of number of patients to a clinic is presented in Appendix A.

When a service is provided to a member of SSK, the clinic receives legal papers from the patient, without asking for any payment. Then, on certain periods, the papers are sent to SSK to receive the charges of the services provided.

To be able to continue to provide service to SSK members, the clinic should not turn down any requests, although the prices are low relative to other patients, especially the private.

SSK announces minimum specifications for equipment used in clinics in order to send patients. These specifications are also trend setters of the industry. Since most centers need the patients coming from SSK, they try to upgrade and renew their equipment to fulfill the required specifications. These specifications are also references for decision makers, either from the private or the government side, to forecast the near future in terms of the quality necessity of the Imaging Industry. The evaluations involved also help provide improvements in the market towards better quality.

2.2.2.1.3 Government

Pension Fund –Emekli Sandığı– is the general life insurance organization valid for government workers. It is the second large source of patients for the Medical Imaging Centers.

Hospitals connected to the Ministry of Health, and the Medical Faculties of the Universities are the organizations that are entitled to look after the patients connected to the Fund. If there are long delays to have an exam in these organizations, the patient can go to private clinics with legal permission and receive the payment of the scan from his association (Maliye Bakanlığı, 1995).

The prices for the exams are determined periodically by the Government and announced accordingly (Maliye Bakanlığı, 1995).

An indicative price list is provided in Appendix A.

2.2.2.1.4 Insurance Companies

Insurance companies providing individual health insurance is another source of patients. The insurance companies make agreements with the Medical Imaging Centers and the prices are set accordingly. Although the prices that are set differ among centers, they are generally higher than both SSK and the Fund. Some indicators are provided in Appendix A.

The payment schedule to the clinic differ from company to company. Some request the member of the insurance to pay to the clinic and pay the patient afterwards. Another practice is that the patient signs a paper proving that he had an exam and the clinic request the payment from the insurance company directly.

The insurance companies can only make agreements with private clinics and centers, therefore the service received for the patient is relatively high. The differences of services among service providers are presented in the following section.

2.2.2.1.5 Other Organizations

Other sources of patients mainly include banks, police and army forces. These operate similar to independent insurance companies, making agreements with individual centers.

The volume is generally high and the prices set are similar to the Ministry of Health.

2.2.2.2 Types of Customer Organizations

Customers of the Medical Imaging Equipment are presented in the following section. These include mainly the government and the private sector. The varying characteristics depending on the culture of organization are provided.

2.2.2.2.1 SSK

SSK, being a source of patients, is also a good customer for the Medical Imaging Equipment.

SSK provides health care services to its members at hospitals and clinics of its own. SSK Dışkapı Hospital in Ankara and SSK Okmeydanı Hospital in İstanbul are examples of the fully equipped hospitals that provide health care service to SSK members.

SSK also owns a technical center in Etlik, Ankara, where it employs engineers for technical service. Technical service operations for the equipment of SSK hospitals are carried on from this office, including relations with suppliers, repairs and maintenance.

The purchases of equipment to be used in SSK hospitals are performed by the center office based in Ankara, in the form of "tenders". The technical specifications and requirements of the equipment are prepared by the doctors of SSK hospitals and SSK Engineers. Administrative specifications such as delivery dates and types, warranty period requirements are prepared by the central office. The expected value —ceiling for the purchase— is also determined from this center. Among the firms that submit a bid to the tender, the one that can fulfill the requirements and that can quote the lowest price becomes the winner and supplies the equipment to SSK.

The tenders are performed in different types. The law (numbered 2886) regulates the tender practice in general, however, there can be exceptions for individual purchases.

The tenders are announced within the legal newspaper, "Resmi Gazete", and other media related to the medical field.

The general practice for the tenders are in different types:

1. Direct purchase:

This type of purchase is done directly from the producer, whether local or international. The bids are prepared by the producer itself or by the local representative. If the winner of the tender is a foreign company, all the formalities regarding the importing of the equipment is performed by the buyer, and the transfer of the money is directly to the producer in a foreign currency, generally US dollar.

2. Indirect purchase:

For this type of tender, the bid should be presented by a local company in Turkish liras. This local company should have an authorization letter indicating that it is entitled to represent the producer of the equipment for that tender.

All the importing duties and taxes belong to the winner of the tender. The service warranties are also provided by the local firm under approval of the producer.

3. Bargaining:

For both of the previous types, the tender can be performed either with or without bargaining.

If the tender is done without bargaining, the bids are provided to the buyer, and the final prices are accepted. The competition is not aware of each others price until the tender is finalized.

If the tender is performed with bargaining, the firms fulfilling the specifications are invited to a bargaining session. The final purchase is done from the bidder with lowest price. Each competitor is informed by the others price and their power of bargaining.

Following the tender, the vendor of the medical equipment should perform the installation in order to charge the price of the system.

SSK hospitals are good references to the Medical Imaging Industry with the equipment they are using and the number of patients being scanned every day. The equipment used by these hospitals are known to the industry and are under continuous inspection of the competition. The performance of these systems are highly visible to the industry.

2.2.2.2.2 Ministry of Health

Ministry of Health is also a high-volume purchaser and reference for the Medical Imaging Field. Only the government hospitals together with Medicine Faculties of Universities are entitled to give Legal Health Report, which increases the importance of these hospitals. A complete listing of Government Hospitals entitled to give Legal Health Report are provided in Appendix B.

Ministry of health purchasing practice is similar to that of SSK. The purchases are done either centrally and then distributed to government hospitals, or by the individual hospitals which need the equipment.

A legal "tender" should take place before the purchase. The specifications for the tenders are prepared by the doctors of the hospitals and approved by

the Ministry. The payment of the price of the equipment is done following the installation.

2.2.2.2.3 Universities

University Faculty of Medicine Hospitals are the most important reference sites for the Medical Imaging Industry. In addition to daily practice similar to the SSK and Ministry of Health Hospitals, University Hospitals perform research studies using the available equipment. Most studies that are announced during workshops and conferences are performed in University hospitals.

Another important point is that every year, many students of Medical Imaging are graduated from the Medicine departments of these universities, who are potential customers for the equipment they have used during their education.

Universities are more flexible for their purchases of equipment. They can follow the "tender" rules of the government, or can directly purchase from one vendor by choosing the quality of the equipment or the service.

2.2.2.2.4 Private investors

Private investors are the most flexible customers in terms of Medical Imaging Equipment purchases.

The equipment to be bought is decided by the decision makers of the investment as a result of investigation and bargaining with the vendors. The former practice of the physicians involved, the state of the art and the personal relations with the vendors play important roles during the decision process.

The visibility of the equipment used in private clinics are also quite high. The cost of the equipment has the greatest portion of the investment to the

medical imaging clinic and in order to pay back the investment, the equipment has to be up and running most of the time. The investors to these equipment closely follow these operations since private clinics are companies trying to earn money other than just providing health care service.

The private organizations that reside in the industry are as follows

2.2.2.2.4.1 Hospitals

Private hospitals are the largest means of investment in the medical industry. Medical Imaging Equipment are used in different departments of these clinics, generally radiology, nuclear medicine and cardiology. These departments provide service both to other departments of the hospital and to patients coming from different channels discussed in previous section.

The quality of the imaging departments also reflect to the overall quality of the hospital. This fact keeps the imaging equipment even under more observation.

Private hospitals, especially specialized on specific fields of medicine, like cardiology, brain surgery, receive more publicity. The diagnosis and cure rate of these hospitals are counted as the success of the imaging equipment used in these hospitals.

A private hospital's purchasing and employing medical imaging equipment can be regarded as vertical forward integration towards imaging centers. There are examples of hospitals which do not provide imaging services because of the high cost and speciality required. These are very good sources of patient to independent imaging centers.

2.2.2.2.4.2 Imaging Centers

Imaging centers employ two or more Medical Imaging Equipment to provide diagnostic services to the surrounding sources. These sources are private physicians —mainly neurology, cardiology, oncology and orthopeady—, private hospitals and other official sources like SSK, universities and government.

The scans can be performed by skilled technicians and can generally be controlled by one physician utilizing qualified human resources. These centers are owned mostly by radiologists or Nuclear Medicine physicians, compared to private hospitals which are owned by either physicians from other branches or non-medicine investors. The services provided in these centers are therefore better in terms of images and procedures.

2.2.2.2.4.3 Independent Physicians

These are radiologists or nuclear medicine physicians which own one modality.

According to the load of patients and the surrounding, the modality is chosen by the physician. The mostly preferred modalities are ultrasounds, conventional X-ray and computerized tomography. The pricing, pay-back period, ease of maintenance are factors affecting the choice and the brand of the system.

2.3 Structural Analysis of the Industry

For the industry analysis, the framework developed by Porter (1985) is used. Following the analysis of the structure for the medical Imaging Industry, one should keep in mind that although the industry structure is relatively stable, it can change over time as an industry evolves. A firm is usually not a prisoner of the industry's structure. Firms, through their strategies, can influence the

five forces. If a firm can shape the structure, it can fundamentally change an industry's attractiveness for better or worse (Porter, 1985:7).

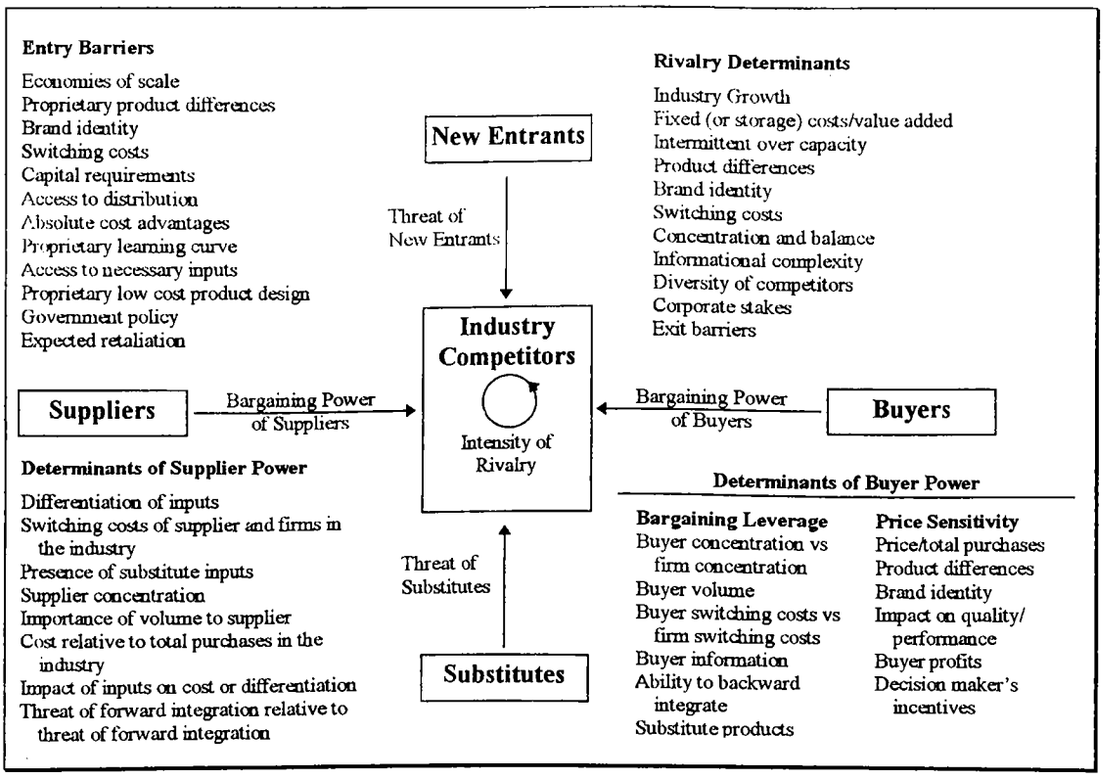


Figure 3 - Elements of Industry Structure

2.3.1 Entry Barriers

2.3.1.1 Economies of scale

The centers requiring the imaging equipment are distributed all around the large geographic area. If the vendor company is not concentrated on a certain area —which has to be the case is the company is willing to do business with government—, the services provided have to reach most of these centers. The most important is the technical service, for which promptness and quality are vital.

For one system belonging to a modality, one specialized service person is essential. However, this service person can control more than one

equipment, up to tens of systems. As the number of equipment installed increases, the necessity of personnel per equipment decreases thereby reducing the costs considerably.

With the increased installed base and increased number of specialized personnel, the chances of backing up also increases, increasing the flexibility of the organization.

The economies of scale is valid for the technical equipment as well as the personnel requirements. The rarely used expensive technical equipment are better utilized in more than one sites, reducing the need for investment of fixtures and equipment property.

Designing the organization, the localization of the skilled work force is also essential, lowering the traveling costs. Although a growing organization with the growing needs is always possible, the economies of scale will further increase as the installed base increases.

2.3.1.2 Proprietary product differences

The equipment being produced bear advanced technology. Although the basic principles of the systems produced by different producers are similar to each other, there exist variations in the final products.

Superiority of design, low cost operation, ease of use and maintenance are all important in the industry to have a competitive position.

2.3.1.3 Switching Costs

For the Medical Imaging Equipment, the installation area reflects the characteristics of the brand used. Also, peripherals used to complete the service provided, in most cases, are chosen to work together with the existing systems.

In centers utilizing more than one system, either different or same modality, have communication systems in the form of a Local Area Network. This communication enables the images scanned by the related department to be transferred to a single reporting area where the specialized physicians diagnose the outputs of more than one modality.

Recently, the developments in the medical imaging field is generating a common platform called DICOM, where equipment of different vendors will be able to communicate with each other (Elscint, 1995). However, the differences in the basics of the systems generate difficulties of adaptation. This for the time being will continue to be basic concern of the clinics during their purchasing decisions.

Another problem while switching vendors rise from the technical service costs. The vendors, during the purchasing phase, include the service and maintenance costs of the existing systems to the deal, which has an important part of the running costs of especially old systems.

Training of personnel to the new equipment, redefining sources of disposables and relations with new and unknown service organizations increase the switching cost from one vendor to the other for the customer.

2.3.1.4 Access to Distribution

The distribution is the sales and service organization for a Medical Imaging Company. Forming an organization in a new area involves the investment and opportunity costs and risks of successful competition.

Access to local distribution is easier for a foreign producer of Medical Imaging Equipment that forms an agreement with a local dealer, rather than forming a subsidiary in the first place. A good example is Philips Medical Systems, which had a representative for its operations in Turkey for a long time, MESİ A.Ş. Now, starting form the technical service organization;

Phillips is forming a subsidiary to further gain control over the market. The introduction phase is passed with minimum investment and risk, using a local established organization.

2.3.1.5 Government Policies

Government regulations and policies affect the Medical Imaging Industry in many aspects.

The Medical Imaging Equipment to be used are under close investigation in most countries. The government requires clearance of the used systems by associations like Food and Drug Administrations in USA. Sale and usage of systems without the permission of these associations are not possible.

In some other countries like Turkey, there does not exist a strict organization like FDA. However the government aims to control the quality of the systems being used through the agreements it does with private clinics. The government requires some minimum specifications in order to let its members to be examined in a specific system.

This control on the equipment continues in purchases made by the government. International references play important roles during the tenders performed by the government.

However, the absence of laws and regulations on the private field, the overall quality cannot be controlled.

2.3.2 Threat of Substitutes

All firms in an industry are competing, in broad sense, with industries producing substitute products (Porter, 1980:23). However, this is not true for the Medical Imaging Field.

"Before an invasive operation, for example brain or heart surgery, it is essential to have the complete information of what will be done during the operation" says one surgeon.

Different modalities can be substitutes for each other, but this may not be true for most of the cases. Each modality provides different information on the same part of the body, which are structure, functionality, blood flow and dynamics, and the complete picture is the collection of all the parameters. The latest trend in Medical Imaging is called "multi-modality registration", which is the overposing the information of different modalities coming from the same area of the body.

The substitute of the Medical Imaging Equipment for the hospitals may be "not to purchase" the systems and receive this service from surrounding centers. However for the government and SSK, integration of this service to their operations is essential considering the volume involved.

2.3.3 Bargaining Power of Suppliers

Bargaining power of suppliers for the international producers are quite low. Most producers have chosen to integrate backwards because of the unique design of the equipment. The purchased parts are generally industry standard components like computer assemblies and electronics components, and the suppliers of these parts are mostly numerous, which lowers the chances of bargaining from the supplier side.

The bargaining power of the parent company to the local operation is an other area of interest to be determined. The parent company facilities should be available to the local dealer, including long term financing, technical support and other services. The bargaining power of the supplier is lower as the local business expand in volume. There may also be subsidies and aids to the newly started business in a given country.

2.3.4 Bargaining Power of Buyers

The determinants of the bargaining power of the buyer are relative to its strength in the industry.

Well known physicians, established centers and reference hospitals have the advantage of bargaining. The bargaining is in terms of pricing, services provided and long term payments. These aspects are most important when the vendor is a new entrant to the market and when the system in question is an expensive and rare modality for which every reference counts.

Another important aspect to be considered is the fact that the imaging equipment is a significant fraction of the buyer's costs and purchases. For the businesses depending on one or two equipment, the other expenses like administrative expenses and consumable costs are negligible. Here the buyers are prone to expend the resources necessary to shop for a favorable price and purchase selectively (Porter, 1980:25)

2.3.5 Intensity of Rivalry

Rivalry occurs because one or more competitors either feels the pressure or sees the opportunity to improve position. In most industries, competitive moves by one firm have noticeable effects on its competitors and thus may incite retaliation or efforts to counter the move; that is firms are mutually dependent.

This pattern of action and reaction may or may not leave the initiating firm and the industry as a whole better off. If moves and countermoves escalate, then all firms in the industry may suffer and be worse off than before (Porter, 1980).

The Medical Imaging Industry is dominated by a few firms. When the argument is concerning the high priced items, there are very few brand

choices for the buyer. This is expected to carry out a relatively stable competition structure, however, the companies heading for the leadership are of very equal power. They prone to fight each other and they have the resources for sustained and rigorous retaliation.

The costs of the representatives and subsidiaries operating in Turkey are not very high. There are not much *storage costs* as all sales and servicing may be performed at customers' premises. The equipment sold goes directly to the installation site following the clearance from the customs. The storage costs are only valid for the production companies. The storage of the spare parts inventory can be considered for the retailers.

When it comes to *the lack of differentiation*, the difference between the subsidiaries and representatives are very important to note. A subsidiary can only sell and service the equipment the parent company produces. They are supported by the parent company and have to live on the equipment they are selling. Any temporary situation which stops investments (like an economical crisis) will have great effects on the operations.

However, representatives are entitled to sell any other equipment or disposables in any other field and are therefor more confident in terms of differentiation. Nükleer A.Ş., representative of Elscint Medical Systems — Israel—, is a good example of such practice. " we also represent disposables companies. In 1994, following the economical decisions of the government in April, although the sales of the imaging equipment stopped, our sales of disposables carried us through the economical crisis" says Mr. Ali Adil Ökmen, General Manager of Nuclear Inc. "This also affects our operations in terms of cash flows. You can be more flexible when you have a constant cash flow from the medical disposables, which is a must-buy item for hospitals and clinics."

These facts also bring in uncertainty because of *diverse competitors*. For every country, the strategies and the rules of the game conducts differences

even for the same parent company. This creates ambiguity to develop counter strategies or take defensive positions.

Exit barriers are economic, strategic and emotional factors that keep companies competing in the business even though they may be earning low or even negative returns on investment (Porter, 1980:20).

For the case of the Medical Imaging Market, the emotional factors in terms of image, marketing abilities, etc., come into the front line especially for the local markets. Buğra (1994) discusses the effects of public pressure on business strategies. The firms, other than just earning money, get involved in public activities to improve position.

To keep the image of the parent company in front of the public, like GE's example of household consumption production in 1950's (Slater, 1993), firms are still involved in public activities and production even though the situation is temporarily unfavorable.

3. Attack and Retaliation

This section aims to introduce a framework developed for the understanding of the competitive attack and retaliation. Action and response characteristics of competitors in the Medical Imaging Market is investigated, and constituents of effective attack strategies which may elicit or at least impair the possibility of retaliation is presented.

3.1 Modes of Attack

The central thesis in this context suggests that, attacking firms can best constrain their rivals and thereby achieve their own objectives by making nuanced and discrete moves that fail to elicit retaliation (Deutsch, 1969).

For competitive contexts in which no rival clearly dominates, which may include the Turkish Medical Imaging Market with its many aspects, a subtle attack strategy is expected on the average to be far more effective than a brute force strategy (Fisher, 1964; Porter, 1980). Attack such as the latter is likely to prompt retaliatory responses that negate the potential advantage of the attacker (Deutsch, 1969). According to Porter, as cited previously:

> This pattern of action and reaction may not leave the initiating firm and the industry as a whole better off. If moves and countermoves escalate, than all firms in the industry may be worse off than before (1980:17).

Competitive moves that are covert, hard to respond to, and targeted peripheral areas of the market will be much more likely to create 'asymmetries' and thereby yield enduring rewards (Levitt, 1969; Shamsie, 1990).

This concept is also included in the frame of the Chinese strategist Sun Tzu: "the expert approaches his object indirectly. By selection of a devious and distinct route he may march a thousand li (kilometers) without opposition and take his enemy unaware" (Griffith, 1963:41).

Thus, competitive moves that go unchallenged can be significant weapons in a strategist's arsenal (Chen and MacMillan, 1992).

3.2 The Model

The superiority of subtle over brute attack as a means of limiting retaliation can be derived from the well known expectancy-valence framework of motivation. It has the advantage identifying and systematically interrelating the various attributes of an attack to the proclivities of rivals to respond to it (Chen and Miller, 1994).

The model states that there are two basic prerequisites that underlie the proclivity to respond to any threat: the subjective reward value or the 'valence' of responding effectively, and the expectation or perceived probability that one is actually capable of performing in a way that will earn the reward (Atkinson, 1964; House, 1971; Vroom, 1964). The subtle attack will limit both these factors, thereby reducing the motivation to respond.

The motivation to retaliate will be greatest where the threat is significant. If potential responders feel that something important is at stake—that is, if they view the attack is potentially costly to them—they will have an incentive to counter it. However, even if an attack puts much at stake, retaliation would still be unlikely unless potential responders are confident in their ability to mount an effective response. This effort-reward expectancy is central to expectancy valence theory (Atkinson, 1964; House, 1964; Vroom, 1964).

Because a significant reward and the confidence that one's behavior will earn it are both prerequisites of response, most psychologists believe that

these terms combine multiplicatively to determine the motivation to respond (House, 1971; Lawler, 1973; Vroom, 1964).

There is, however, another potential determinant of the proclivity to respond to an attack, and that is its visibility. Most models of human motivation seem to assume that in order to respond to a threat, one must first notice it. Thus in a corporate setting, the more obvious an attack, the greater the likelihood that it will be countered (Chen and Miller, 1994).

This study focuses on the three factors that are expected to influence retaliation: attack visibility, response difficulty, and attack centrality (Figure 4). Here, response difficulty stands for the Effort-Outcome Expectancy and attack centrality stands for the Outcome Valence of successful retaliation of the motivational model that is put forward.

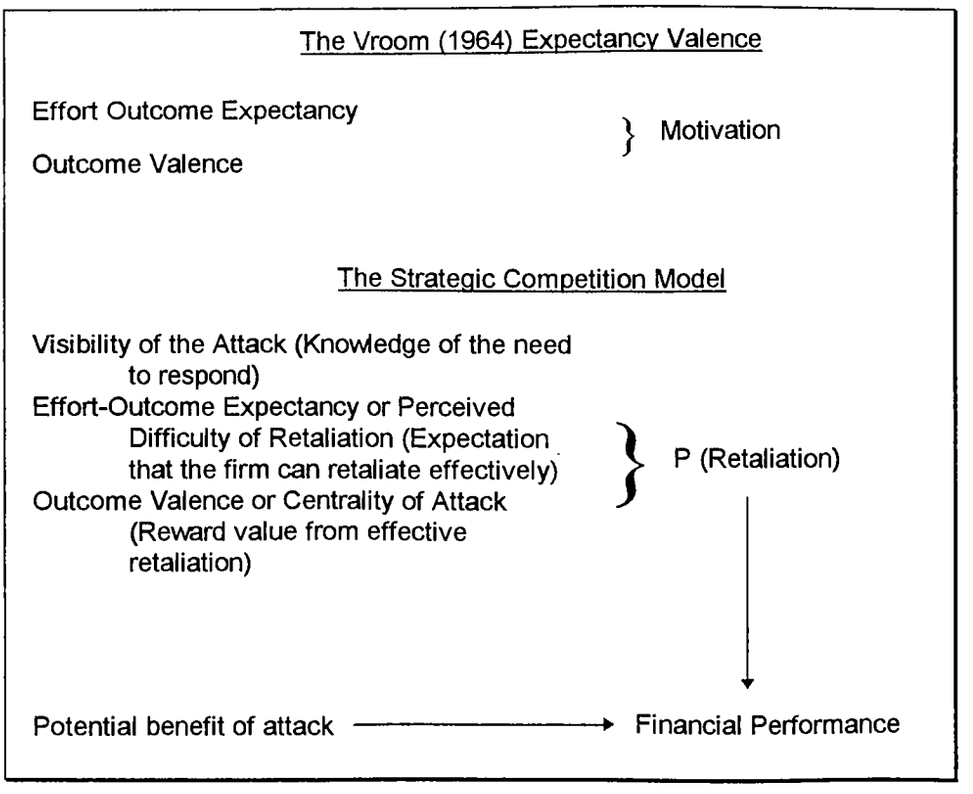


Figure 4 - The general model for attack and retaliation

3.3 Corporate Actions and Responses

3.3.1 Visibility of Attack

It is stated by many studies that the more visible a threat, the more likely that it will be detected and responded to (Deutsch, 1969; Deutsch and Krauss, 1960, Kiesler and Sproull, 1982). This idea also extends to the war strategies. According to Sun Tzu, one must conceal one's shape from the enemy: 'Subtle and insubstantial, the expert (general) leaves no trace; divinely mysterious, he is inaudible. Thus he is master of his enemy's fate' (Griffith, 1963).

The type of action that is bound to receive retaliation is very dependent on the type of the industry. Some actions—such as price cuts in a price sensitive market—may be so overt and visible as to invite an immediate response (Chen and Miller, 1994). As Porter (1980:96) argues, 'effective retaliation may be impeded when strategic moves are kept secret or introduced quietly away from competitors' centers of attention'.

Another idea is that actions that are rather vague and do not apply obviously to one particular business or target market may also go unnoticed by the competitors and thus reduce the probability of response (Chen and Miller, 1994).

To recap, if an action is visible in the market place, it will elicit responses from many of the competitors who are effected.

3.3.2 Response Difficulty

The more difficult is to respond to an attack, the smaller the number of retaliatory responses.

In a competitive situation, effort-performance expectancy will be reflected by the perceived ease of mounting appropriate retaliation (Chen and Miller, 1994). An action is more likely to evoke a response if it is easy to imitate, that is, if it can be countered easily, economically and without much organizational disruption (MacMillan, 1983; MacMillan et al., 1985). This idea is further supported by Porter: Price changes can readily be matched by competitors because they require little in the way of special expertise, complex coordination, unsettling disruption, or major resources (1980).

In contrast, attacks that develop new products or processes may be much harder to implement. According to Scherer (1980), 'Any fool can match a price cut, but counteracting a clever advertising gambit is far from easy.'

3.3.3 Centrality of Attack

The greater the centrality of markets attacked, the greater the number of retalitionary responses.

The valence or expected pay-off associated effective retaliation will be very much function of the centrality of the attack—that is, the extend to which it pertains to markets that are especially large, valued by or vital to potential responders. Where a firm attempts to capture a rival's major market, it is more likely to trigger a response; the competitor might experience significant losses (negative pay-offs) if it failed to do so (Chen and Miller, 1994).

A firm may not retaliate if its commitment is directed to other industries (Porter, 1985:532), or for that matter other target markets within the same industry. By launching attacks that are not highly valued by competitors, the firm may avoid, or at least delay retaliation as the rewards by retaliating will be low even if the attack is visible and the expectancy of successful retaliation is high.

This is the strategy favored by some Japanese companies for their entry periods to European and United states markets. They first launched low end products such as cars and motorcycles before they moved into the mainstream (Hamel and Prahalad, 1990).

3.3.4 The Multiplicative Relationship

The first order and second order products of response ease (the inverse response difficulty), attack visibility and attack centrality are positively correlated with response intensity.

There are many ways of interpreting and examining the relations between these expectancy-valence hypothesis. As suggested earlier, expectancy valence theory predicts a multiplicative relationship between expectancy and valence—in this case, perceived response difficulty and attack centrality (Pinder, 1984; Vroom, 1964). It is also suggested that the visibility of the attack multiplicatively enters the scene.

In psychological models, this relationship between the motivation and expectancy-valence is described by only the product of the constituents (Georgopoulos et al., 1957; House, 1971; Vroom, 1964). One missing item will therefor reduce the motivation to zero level, eliminating any results because of one single element. However, in the corporate competition context, there is always a valence of any successful retaliation. Therefor, this relation can only be explained as a positive correlation.

Other interpretation models include the gate model and the chain model.

The strictest version of the expectancy-valence model can be likened to a series of *gates* each of which must be open in order for retaliation to occur. The gates in this case may be labeled "visibility of attack", "difficulty of response", *and* "centrality of attack". The expectancy-valence reasoning suggests that unless all the gates are open and the attack is visible, easy to

respond and central, there will be no response. Thus attackers need only to shut one gate to avoid retaliation and increase profitability.

In contrast, the chain model proposes that an attacker will be as vulnerable as the weakest link in the chain of his attack: be it high visibility, high centrality, *or* low difficulty. Here, one weakness alone will be enough to elicit retaliation (Chen and Miller, 1994).

3.3.5 The Relation Between Attack, Retaliation and Performance

The extent to which a firm's actions will provoke retaliation will be negatively related to performance.

The purpose of an attack is to pass to a higher level of performance among the competition. The consequences of a competitive action for an attacker depends at least on the number of responses that an action provokes. The initiating firm's profits may be adversely affected if it encounters intense retaliation. Conversely as long as the number of responses to an action remains small, the initiating firm will continue to enjoy its quasi-monopolistic status (MacMillan et al., 1985; Mansfield, 1968; Porter, 1980).

Responses may not only neutralize an action's benefits, they may also create the need for further actions. Costs go up and profitability shrinks; or alternatively, sales do not increase enough to compensate for the rise in expenses (Porter, 1980, 1985; Scherer, 1980; Shamsie, 1990).

4. Aspects of competition in Turkish Medical Imaging Market

The most important competitive aspects of competition valid for the Turkish Medical Imaging Market are determined from the results of interviews with the decision makers and the questionnaires that were issued during the scientific meetings mentioned in the introduction. The questionnaires are presented in Appendix H.

Before discussing the aspects of the market, it is necessary to note a point regarding the buyer side, which is an outcome of the interviews and meetings with the decision makers of the purchase.

The types of customer organizations were discussed in section 2.2.2.2. However, there exists a superior distinction among the customers which are the following:

4.1 Major Customer Groups: State and Private investors

"State" type includes decision makers (either physicians of the related specialty or hospital directors which may or may not be physicians) at state or state like organizations, including headquarters or hospitals of SSK, Ministry of Health, hospitals of university medicine faculties, and even private hospitals embodying many different sections besides the imaging departments. These are decision makers which do not participate in the investment process, but most of the time are responsible from the economic and image outcome of the imaging equipment to be purchased. The order of importance of the attributes of medical imaging equipment are similar for this type, whatever the origin of the decision maker is.

"Private" is the type where the decision maker is the investor himself. Both the present efficiency and the future economy of the equipment, together with the image in the society is directly related to the choice at the beginning.

The private type differs from the "state" type by the order of importance of the attributes of the medical imaging equipment an companies.

The answers of the questionnaire in Appendix H delineate this distinction:

4.2 Results of the questionnaire

The questionnaire was conducted during a Radiology congress where the participants were asked to respond to three pages of questions. The possibility of a free tour to a foreign country was used to attract participation, and a total of 244 responses were received to a collection booth at the end of 4 days' effort.

Out of the total 244 answers, all provided address and telephone number, however, 190 were found to answer all of the questions, providing a base for the investigation of this project.

The quantitative results can be found in appendix H.

The major observation out of the quantitative results is that the way of thinking about the medical imaging equipment and the companies are very well grouped into the presuggested types of customers. Private investors are much more interested in the pricing and financing of the equipment than the "state" decision makers, which are interested in the prestige of the equipment they are using. Again, as a further support to the idea, private investors deal with the future costs of the equipment, which are technical service quality, service price and promptness of the service. The expectations from both the suppliers of the existing equipment and the prospect suppliers of the equipment in the decision phase state that the service promptness and service quality. The longer and the less problematic the equipment will be working, higher the rate of return the investor will get out of his investment (section 2.2.1.2). The quality of the equipment looses the order of importance against these issues.

This observation can be related to the patient channels of the private investors.

As discussed before, the majority of the number of patients are coming from state organizations having fixed charges which are much lower than that of the private patients (section 2.2.2.1). There exists a minimum quality requirement for the equipment to be used, however, these requirements can not force the investor to go for the higher end. These requirements can be met by average equipment of major suppliers in the industry, which are in the middle of the price and quality range of the available equipment (private discussions with investors). As the charges of studies do not differ according to the quality of the equipment used, the marginal return of the additional investment for better equipment falls dramatically. When only the economical aspect is considered, this return on further investment is minimum.

This fact leaves the equipment quality aspect further behind during the purchasing decision. What prevents the importance of equipment quality from being absolute zero is the attractiveness in the market and competitive image of the clinic/hospital. Usage of better equipment may increase the number of patients that come from private channels, but this increase does not generally pay for the extra cost. With today's charges for the studies, the investment breaks even in three to four years, which means that an increase in the cost of initial investment for 25% will extend the pay-back period for 1 more year. This resource can be used to renew the equipment, as the evolution of the industry obsoletes the existing equipment in this period of three to four years (private discussions with investors).

On the other end, state decision makers escalate the importance of the equipment quality above other aspects. An important reason underlying this preference is the fact that the state or state-like organizations do not generally take into consideration the utilization or the pay-back of the equipment used. The financial resource belongs to someone other than the

decision maker and he or she generally does not have to explain the reasons underlying the purchasing decision.

Sometimes, the specifications of the state tenders are prepared in such a way that only a few firms, known with their high pricing can submit a quotation. The brand and the model of the equipment is a way of exchanging prestige among the state organizations. Extra prices paid to the company name or the brand may exceed the utilization and this is reflected in the studies coming out of the clinics.

For the state decision makers, the importance of neither the service quality nor promptness is that high. The reason to this can be the following:

The state decision makers, especially the hands-on physicians work at another place other than the state-like organization. More the equipment in the former clinic malfunctions, more they will find time to work for the latter, which in most cases is their own place. Even though this is not the case, they still do not want to work long and hard hours since they are being paid on a regular basis whether they work or not. So the motivation for more working hours is close to zero.

4.3 Competitive attack and response characteristics

Having discussed the importance of above points for the Medical Market, it is necessary to discuss the ingredients that determine the response characteristics to competitive moves.

The most important aspects considered during the decision process and which may be used as means of competitive retaliation are as follows:

1. Quality image of the medical imaging company

2. Quality image of the equipment

3. Quality image of the technical service

4. Pricing and financing of the equipment

4.3.1 Quality image of the Medical Imaging Company

This aspect is generally linked to the image of the parent company in the international arena. It is reinforced with advertising campaigns, organization of or participation to local or international technical meetings and technical support projects.

This type of attack, that is the desire to increase the image of the company, although having high visibility and can even be considered high in terms of centrality, is difficult to respond to.

The image of the companies are determined by their long term operations. Both in the international arena and in the local market, the performance of the company in all aspects, including technical service, financial power and possibilities, offer an overall quality image.

The attempt of increasing the quality image of the company is generally done via advertisement campaigns and appearances at industry-wide shows. Whatever the efforts are, the end product, that is the services provided by the company is known to the end user in the long term (private discussions with decision makers).

An attempt to improve the image of the company effects both the private and the state markets, which increases the centrality. However as discussed above, the response difficulty is bound to leave the number and intensity of effective retaliation at minimum level.

With the analogy of the "gate" model of retaliation, the gate for the response ease is only slightly open or closed for many cases, and for the chain model, the link for the response ease in quite weak.

Any firm which is in a position to respond to an advertisement attack, can only use the resources in their hands. This type of attack has acted to increase the overall performance in the industry, forcing the firms to improve their operations, in terms of both product and service (see appendix G for the advertisements in the media).

4.3.2 Quality image of the equipment

The equipment produced by the Medical Imaging Companies follow a trend together with the evolution of the supporting industries like electronics and computers as discussed above. Therefor, although having minor variations, the functionality of the equipment is quite similar for many competitors. What counts is the ease of operation, patient comfort and the reliability of the equipment to contribute to the overall quality.

An attack to increase the quality image of an equipment, similar to that of a company, is performed via advertisements and demonstrations. Therefor the visibility of the attack is quite high for the competitors. Also, an important aspect is the show performed at an important reference site, that is at a clinic of high patient volume and quality (see Appendix B and C for a list of reference hospitals). This creates further visibility to both competitors and potential customers.

The centrality for any single competitor is also quite high, affecting the future sales and operations to a great extent, as discussed above. This is also supported by the fact that the condition and the quality of existing installed equipment is a very important attribute during the decision process.

The response difficulty to a standing attack for equipment quality is also high, as it depends on the current state of the art production of the company. The evolution of a new design or even a slight improvement on an existing equipment may take several months (Product manager from a leading

international company). This delay in design means, a delay in the response to this type of attack.

There are also examples of responses to the attack of the quality of the equipment before a matching product is produced. Companies, in many situations, announce their future equipment which are still work in progress, either to attack or to retaliate against an existing attack in the industry. This fact also improves the overall quality of the industry by forcing the producers to speed up the design and production phase of new equipment bearing high technology (RSNA, 1994).

We can see that the possibility of effective retaliation, both in intensity and timing, is quite low for increased quality image of equipment. This is because the gate is not wide open or the link is not very strong for the response ease.

4.3.3 Quality image of the technical service

The role of technical service was discussed above. Technical service is the most important aspect during the purchasing decision for the private investors, which is a very important market for the medical imaging companies.

The visibility of the improved service quality is high to the competitors in the industry. This is reflected by the current performance of the company in the field and the no-charge warranty period for the new installations, which is also an important cost to be considered by the private investors.

The response difficulty is high to improved service quality, since it requires a major organizational change an a lot of investment both in personnel and equipment (Scherer, 1980)

Centrality of this type of attack is also very high. It effects the present and future operations of the companies in question, at least in the private market.

Again, using the gate and chain model, the possibility of intensity of effective retaliation is quite low because of the increased difficulty in the response.

4.3.4 Pricing and financing of the equipment

Pricing and financing as a means of competitive attack is commonly used in the Medical Imaging Market, depending on the customer. As discussed previously, a strong means of advertising is the equipment used by well known doctors or hospitals. The references of the systems in quesiton are of extreme importance, especially dealing with the state type of customers.

The visibility of the attack, although the prices of the systems should be kept confidential for many businesses, is quite high. Especially during sales to state-like organizations, the bargainning method displays the prices of each vendor to the others. So the vendors determine their prices according to competitors which are also eager to sell their equipment to that specific site.

The systems in question vary in terms of prices depending on the configuration and the conditions of the final agreement. So comparison of system prices are very difficult. This prevents, up to a certain point, the marketing discussions that are valid for standardized items. Therefore, with the condition that the fluctuations are reasonable, the low prices quoted to important sites do not effect other future sales up to a certain point.

The centrality of this type of attack is again high since the number of total Imaging Equipment sold every year is not many. Most customers go to all the leading companies in the field and try to make a decision among the available systems. One single sale, because of the low overall volume, effects the present and future operations of the companies involved.

Expectation of effective retaliation is also very high for this case. The prices quoted are determined by the main companies and are reflected to the

customer. Companies may even chose to declare loss for important customers and important markets.

In the light of the above discussion, possibility of provoking retaliation for a price and financial attack is high.

5. Conclusion

From the above analysis and discussion, it is observed that The Turkish Medical Imaging Market corresponds with the framework introduced. The characteristics of the attack and possibility of response can be determined using the motivational frameworks.

The "gate" and "chain" models of effective retaliation as a follower of the expectancy-valence framework can also be used as a means of decision making to guide the strategist acting in the local market.

Suggestions for further research include the determination of the similarities of the other industries with the Medical Imaging Industry. Also interactions with international markets and the feasibility of local production can also be examined

6. Appendix

Appendix A

Prices of Scans performed on Medical Imaging Equipment
Determined by the government to be used in University Hospitals, and Hospitals connected to Ministry of Health.
The following is an indicative list in Turkish Liras provided to public through *Resmi Gazete* (Maliye Bakanlığı , 1995).
(1$=~47,000 TL)

NÜKLEER TIP	
Organ Sintigrafileri	
Akciğer	
Nükleer Akciğer sc. 133 xe ile perfüzyon+ventilasyon	2.500.000
Nükleer akciğer sc. inhalasyon	900.000
Nükleer akciğer sc. perfüzyon	1.000.000
Akciğer aerosol ventilasyon sintigrafisi	750.000
Akciğer perfüzyon sintigrafisi MAA ile	750.000
Akciğer perfüzyon sintigrafisi mikrosifer ile	1.500.000
Akciğer perfüzyon sintigrafisi + venografi	1.500.000
Akciğer perfüzyon spect çalışması	1.500.000
Beyin	
beyin nükleer hmpao ile beyin perfüzyon tomografisi	10.000.000
Beyin nükleer kinetik	1.500.000
Beyin nükleer kinetik + statik	3.000.000
Beyin nükleer shunt analizi	2.000.000
Beyin nükleer sisternografi	3.000.000
Beyin nükleer sistogram	800.000
Beyin nükleer spleno-porta kan akımı tetkiki	800.000
Beyin nükleer statik	800.000
Sisternografi	750.000
Böbrek	
Nükleer böbrek dinamik-statik sintigrafisi	2.000.000
Nükleer böbrek diürik renogram	2.500.000
Nükleer böbrek kinetik+statik	3.000.000
Nükleer böbrek mesanede residual idrar mik. sap.	1.500.000
Nükleer böbrek renin angiotensin	750.000
Nükleer böbrek renografi	1.500.000
Nükleer böbrek statik	1.500.000
Nükleer böbrek statik DMSA	900.000
Kalp	
Nükleer kalp kan volümü tayini	1.500.000
Nükleer kalp lokal arterial kan akımı incelemeleri.	1.250.000
Nükleer kalplokal venoz kan akımı incelemeleri	1.250.000
Nükleer kalp myokard perfüzyon	7.500.000
Nükleer kalp MUGA	2.000.000
Shunt analizi	750.000
MIBI SPECT	4.000.000
Kemik	
Nükleer bölgesel kemik incelemeleri	1.000.000
Nükleer kemik 131-I tarama	1.000.000
Nükleer kemik tüm vücut statik+kinetik	1.500.000
Nükleer kemik spect	3.750.000
Kemik iliği sintigrafisi	1.000.000
Tiroid	

Nükleer tiroid ağırlık hesaplı sintigrafi	600.000
Nükleer tiroid dumping testi	450.000
Tiroid ultrasonografisi	800.000
RADYOLOJİ	
Direkt grafiler	
El-bilek grafisi	250,000
Kemik survey	2.500.000
Mammografi	1.000.000
Mandibula	300.000
Servikal vertebra grafileri	300.000
Skalyoz tetkiki	1.000.000
Kontrastlı tetkikler	
Aortografi	2.500.000
Çift kontrastlı kolon	2.500.000
Çift kontrastlı mide	1.700..000
Drip kolonografi	1.500.000
Myelografi	3.500.000
Sestograf	300.000
Ventikulography	3.500.000
Angiografik tetkikler	
Aorto-femolo-popliteal arteriografi	5.500.000
Coliak angiografi ve arteriel portografi	5.500.000
İnferior mesenterik angiografi	5.000.000
Pelvik arteriografi	5.000.000
Bilgisayarlı Tomografiler	
Bilgisayarlı alt abdomen tomografisi	4.000.000
Bilgisayarlı beyin tomografisi	4.000.000
Bilgisayarlı orbita tomografisi	4.000.000
Bilgisayarlı vertebra tomografisi	4.000.000
Yüksek rezolüsyonlu akciğer b.t.	4.000.000
Ultrasoundlar	
Ultrasoundlar abdomen	600.000
Ultrasoundlar doppler	600.000
Ultrasoundlar obstetrik	600.000
Ultrasoundlar pelvik	600.000

These prices are effective since April, 1995. The increase in prices relative to the previous period was 50-70%.

The prices for SSK patients are generally 40 to 60% of the prices set by the Ministry of Health. Most of the studies cost more than the prices paid by SSK, when both the variable and the rundown of fixed costs is concerned. However, clinics chose to continue SSK operation to fill the idle time availabel on the equipment they own.

The prices for the private patients, although varying from clinic to clinic, runs about 50 to 60% higher than the prices set by the Ministry of Health. However, in most cases, the physicians sending the patient to the imaging center takes a commission out of the total charge. The real income is much less than the indicated amounts. For a typical private clinic, following is the number of patients from different channels per day for different modalities:

Increases in the number of patients in 6 month periods

	Months			
	1-6	7-12	13-18	19-
TOMOGRAPHY				
SSK	0	2	4	8
PRIVATE	3	3	4	5
GOVERNMENT	0	4	5	6
ULTRASOUND				
SSK	0	2	3	4
PRIVATE	4	4	4	4
GOVERNMENT	1	2	3	3
MAMMOGRAPHY				
SSK	0	1	2	2
PRIVATE	1	2	2	2
GOVERNMENT	2	3	4	4
GAMMA CAMERA				
SSK	0	2	4	4
PRIVATE	4	5	6	8
GOVERNMENT	1	1	2	2
X-RAY				
SSK	0	2	4	4
PRIVATE	7	7	8	9
GOVERNMENT	0	0	2	2
BMD				
SSK	0	2	4	4
PRIVATE	4	5	6	8
GOVERNMENT	1	1	2	2

As observed from the typical patient channel analysis, an average clinic expects to receive most of its patients from governmental sources, including Ministry of Health and SSK. The prices for these patients, as discussed above, are determined by central authorities and the clinic itself has no way of interfering.
Recently, associations including Society of Radiology and Society of Nuclear Medicine are starting to be effective in the decision process and the effects of the efforts are visible for the last two years.

Appendix B

The complete listing of Hospitals that are entitled to give *Legal Health Report.*

1. Ankara Dr. Zekai Tahir Burak Kadın Hastalıkları Hastanesi
2. Ankara Numune Hastanesi
3. Ankara Yüksek İhtisas Hastanesi
4. Ankara Onkoloji Hastanesi
5. Ankara Hastanesi
6. Ankara Atatürk Göğüs Hastalıkları ve Göğüs Cerrahi Merkezi
7. Adana Numune Hastanesi
8. Antalya Devlet Hastanesi
9. Bursa Devlet Hastanesi
10. Diyarbakır Devlet Hastanesi
11. Erzurum Numune Hastanesi
12. Gaziantep Devlet Hastanesi
13. İstanbul Haydarpaşa Numune Hastanesi
14. İstanbul Göğüs Cerrehi Merkezi
15. İstanbul Haseki Hastanesi
16. İzmir Atatürk Sağlık Sitesi Devlet Hastanesi
17. Konya Devlet Hastanesi
18. Samsun Devlet Hastanesi
19. Sivas Numune Hastanesi
20. Trabzon Numune Hastanesi
21. Üniversite Tıp Fakültesi Hastanelerinin Tümü

Appendix C

Universities that has a Faculty of Medicine
(Türk Tabipler Birliği, 1995)

City	*University*
Adana	Çukurova Üniversitesi
Ankara	Ankara Üniversitesi
Ankara	Gazi Üniversitesi
Ankara	Hacettepe Üniversitesi
Antalya	Akdeniz Üniversitesi
Aydın	Adnan Menderes Üniversitesi
Bolu	Abant İzzet Baysal Üniversitesi
Bursa	Uludağ Üniversitesi
Denizli	Pamukkale Üniversitesi
Diyarbakır	Dicle Üniversitesi
Edirne	Trakya Üniversitesi
Elazığ	Fırat Üniversitesi
Erzurum	Atatürk Üniversitesi
Eskişehir	Osmangazi Üniversitesi
Gaziantep	Gaziantep Üniversitesi
Isparta	Süleyman Demirel Üniversitesi
İstanbul	İstanbul Üniversitesi
	İstanbul Tıp Fakültesi
	Cerrahpaşa Tıp Fakültesi
İstanbul	Marmara Üniversitesi
İzmir	Dokuz Eylül Üniversitesi
İzmir	Ege Üniversitesi
Kayseri	Erciyes Üniversitesi
Kocaeli	Kocaeli Üniversitesi
Konya	Selçuk Üniversitesi
Malatya	İnönü Üniversitesi
Manisa	Celal Bayar Üniversitesi
Mersin	Mersin Üniversitesi
Samsun	Ondokuz Mayıs Üniversitesi
Sivas	Cumhuriyet Üniversitesi
Şanlıurfa	Harran Üniversitesi
Trabzon	Karadeniz Teknik Üniversitesi
Van	Yüzüncü Yıl Üniversitesi
Zonguldak	Karaelmas Üniversitesi

Appendix D

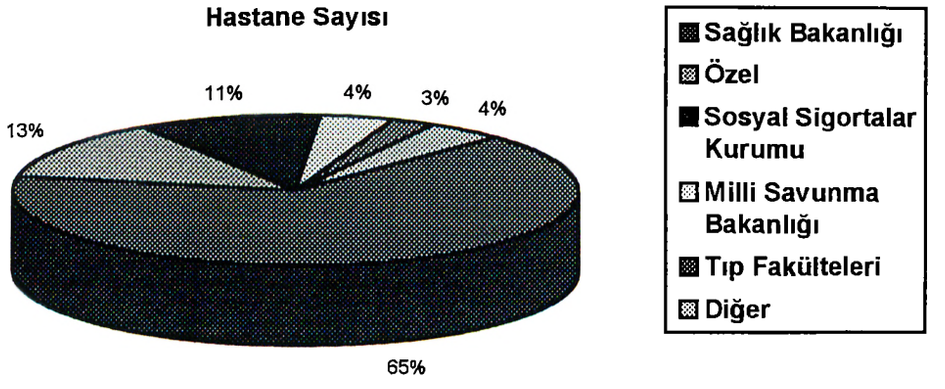
Data for Healthcare Personnel in Turkey (1992)
(Türk Tabipler Birliği, 1995)

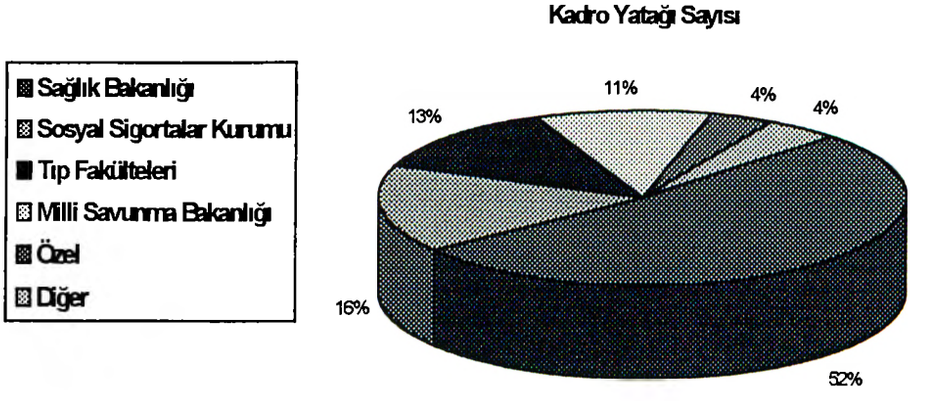
Personelin Ünvanı	Toplam	Sağlık Bakanlığı	SSK	Üniversite	Diğer Kamu	Özel
Hekim	56,975	29,223	6,656	9,032	3,577	8,487
Uzman	25,587	8,978	3,702	4,532	1,317	7,058
Pratisyen	31,398	20,255	2,954	4,500	2,260	1,429
Diş Hekimi	10,703	5,474	1,844	415	497	1429
Eczacı	19,837	3,531	1,041	868	287	14,110
Sağlık Memuru	24,395	2,430	18,480	1,032	1,513	940
Hemşire	44,525	1,161	32,631	5,804	3,864	1,065
Ebe	44,525	1,161	32,631	5,804	3,864	1,065
Toplam	256,901	72,213	99,939	31,987	17,179	35,583

Appendix E

Listing of Hospitals According to Association
(Sağlık Bakanlığı)

Kuruluşun Adı	Hastane Sayısı	Kadro Yatağı Sayısı
Sağlık Bakanlığı	653	75,638
Milli Savunma Bakanlığı	42	15,900
Sosyal Sigortalar Kurumu	105	23,186
İktisadi Devlet Kuruluşları	13	2,197
Diğer Bakanlıklar	2	680
Tıp Fakülteleri	26	18,498
Belediyeler	5	1,160
Dernekler	11	771
Yabancılar	6	560
Azınlıklar	5	934
Özel	126	5,392

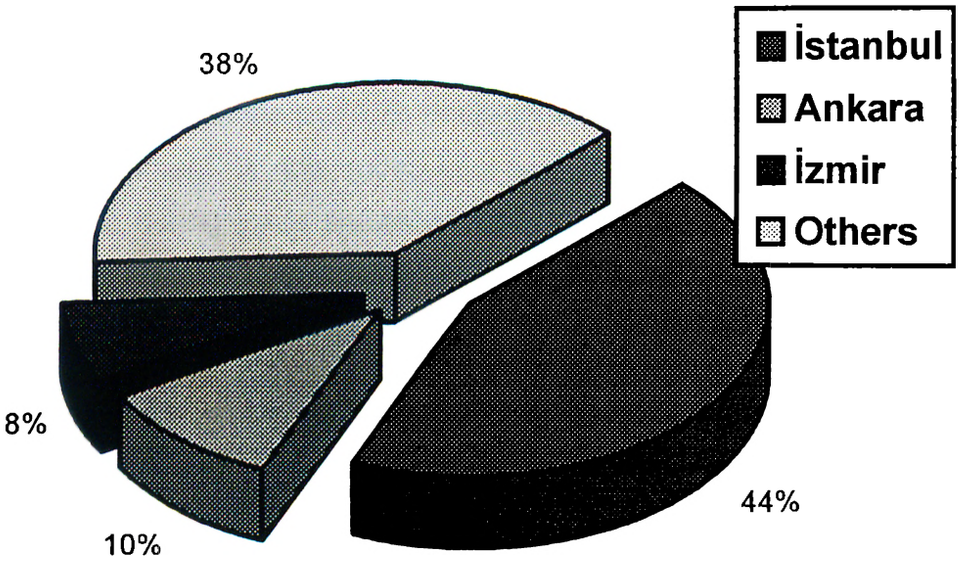




Appendix F

Private Clinics on Radiology until 1993
(Source: Ministry of Health)

City	*Number of Clinics*
Ankara	135
İstanbul	584
İzmir	101
Others	507



Appendix G

Advertisements in the Media

The following pages include examples of advertisements of Medical Imaging Companies in the media.

The media used include scientific and informative periodicals on radiology and nuclear medicine. The audience is the physicians of radiology and nuclear medicine.

An important point to note about the advertisement is that not all of them are promoting their product quality. Rather, the services including finance and reliability are stressed, which are most of te times more important for the decision maker.

Thes ads are directly aimed at the possible decision makers at occasions where the search for new equipment is the most intense. These come mostly out of magazines distributed during trade shows or congresses. On the other hand, the advertisements taken from perodicals that are either sent to or directly purchased by the Radiologists/Nuclear Medicine Physicians, stress more on the quality of the equipment involved. A few examples of these ads are also provided.

DIAGNOSIS: HEALTHY BOTTOM LINES FROM KODAK.

Kodak recognizes that a better bottom line means more than the highest quality diagnostic solutions. It means a high quality commitment.

Kodak's commitment is to far-reaching economic health strategies that help improve your bottom line. So you don't have to compromise quality and value. Examine some specific benefits:

Improved Outcomes: *With over 1,000 institutions now using our award-winning Kodak/InSight thoracic imaging system, radiologists report improved patient diagnosis, a reduced necessity to request follow-up imaging studies, and the reduction of film repeats by as much as 86%*

Increased Operational Efficiency: *Our wide-ranging Continuous Quality Improvement (CQI) services uncovered patient transport inefficiencies in one radiology department, reversing losses of $800,000 in revenues*

Maximized Productivity: *The Kodak Ektascan 2180 laser printer docked with the Kodak X-Omat 180 LP processor made CT images available up to 20 minutes sooner in one facility, enabling over 7% more patients a day to be moved through the CT department*

Kodak can help you see healthy bottom lines, through cutting edge technology, service, and support. Call 1-800-354-1106, ext. 119 for information on any of these areas.

More than quality imaging

Kodak

REMEMBER,

NO MATTER HOW TIGHT

THINGS GET WITH HEALTHCARE REFORM,

WE HAVE MORE THAN ONE WAY

TO HELP YOU OUT.

Healthcare reform is putting the squeeze on everybody. To be more accurate. More efficient. And to improve patient care and quality of outcomes.

That's why DuPont is working hard to create solutions that help radiology, the lab, the pharmacy and other areas of your network work as an integrated system.

We've been investing more than $100 million a year in technology like our Ultra-Vision™ high-resolution film/screen system. With 40% greater resolution than conventional systems, Ultra-Vision gives you significantly more clarity, which reduces repeats. And costs.

We're also making the transition from film-based radiology to digital-based radiology easier. By helping radiology establish a flexible foundation in digital technology that grows with the department.

We have multiple digital imaging solutions, too. Solutions that integrate images and information, and speed diagnosis to remote sites through high-speed digital image transmission.

Finally, our laser printer systems integrate networks and digital image management to send images to workstations throughout the hospital, for at-home teleradiology, or to print films at remote sites.

To talk to a DuPont representative about all of our imaging solutions, call 1-800-252-9099. No matter how tight things get, we've got more than one way to help you out. DuPont...powerful solutions for changing needs.

DUPONT

Join us at RSNA, Booth 2549.

He Doesn't Know Your Budget's Been Slashed, He Only Knows Where It Hurts.

This is a time of great challenge. Harsh economic realities threaten to put quality care at risk.

Like you, we at Philips Medical Systems are doing everything possible to meet this challenge. In particular, we're leveraging the power of advanced technologies to squeeze maximum productivity from every square inch of your facility.

Our new GYROSCAN NT series MRI systems, for example, are the first high field magnets that are as easy to site as a CT or x-ray system. They weigh just 8,000 pounds, including their liquid helium cryogens, need only 380 square feet and are so patient-friendly, you can increase referrals of large or claustrophobic patients.

Philips also offers one of the world's most flexible C-arms—a full-featured angiographic suite and R/F room in a single system. Multi DIAGNOST 3, with its unique tilt/roll capability, is a powerful multi-purpose system that reduces unit procedure cost.

To learn more about how Philips can help you meet the challenges ahead, call 1-800-999-5883, ext. 100. For if the challenge is to be met, we must meet it together.

Sharing Your Vision.

Philips
Medical
Systems

PHILIPS

Appendix H

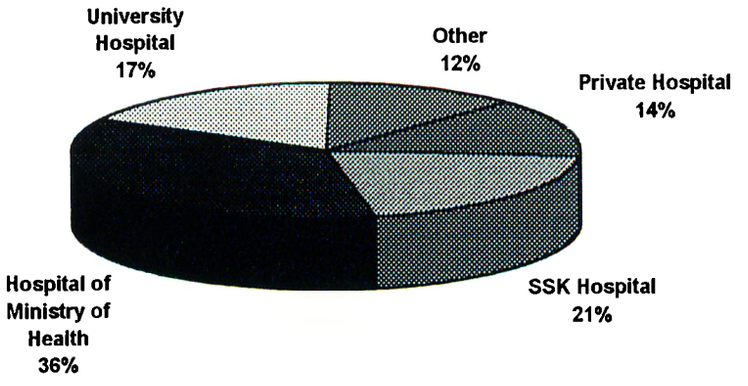
The next pages include questionnaires performed during congresses and meetings to evaluate the understandings of the decision makers on the Medical Imaging Industry.

Quantitative results of the questionnaire:

Number of responses:	*244*
Address providers:	*244*
Number of complete responses:	*190*

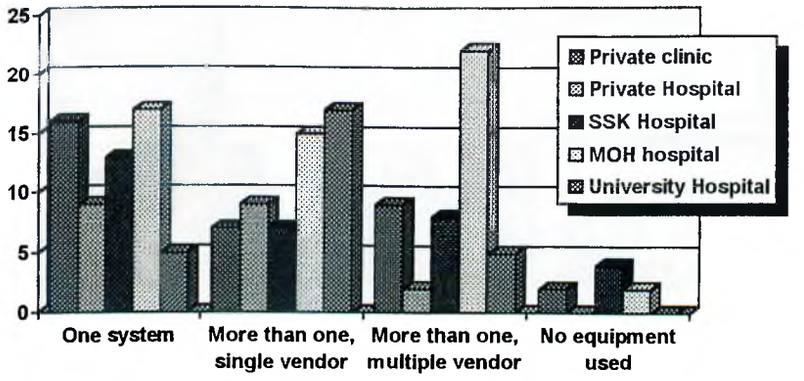
Question 1: Current Association

Private Clinic	34
Private Hospital	22
SSK Hospital	32
Hospital of Ministry of Health	56
University Hospital	27
Other	19



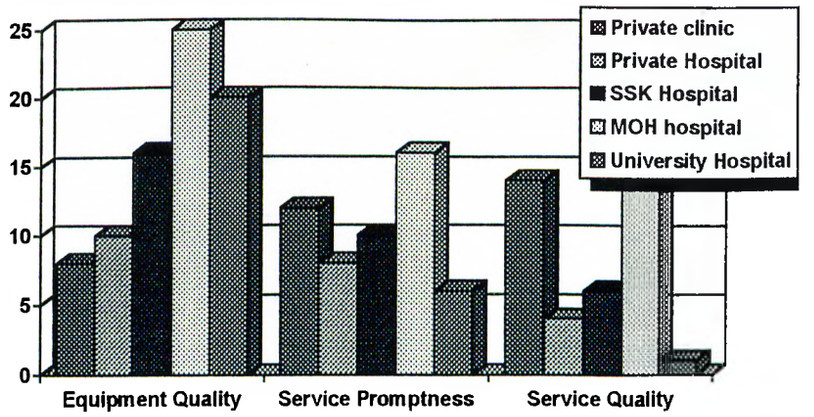
Question 2: Number of equipment used

BY	*One system*	*More than one, single vendor*	*More than one, multiple vendor*	*No equipment used*
Private clinic	16	7	9	2
Private Hospital	9	9	2	0
SSK Hospital	13	7	8	4
MOH hospital	17	15	22	2
University Hospital	5	17	5	0



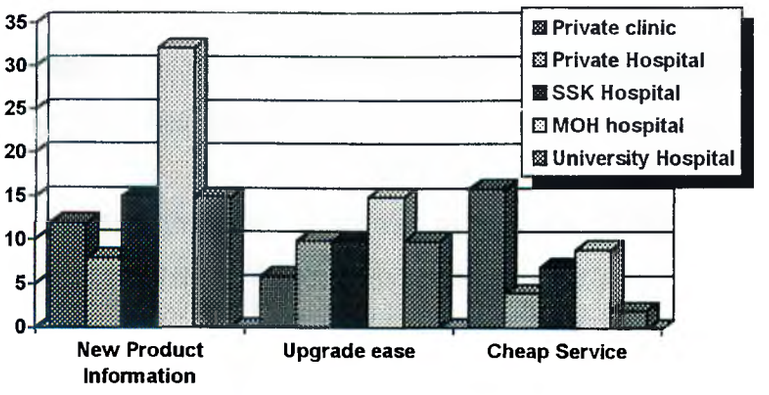
Question 4: Expectations from utilised equipment

BY	*Equipment Quality*	*Service Promptness*	*Service Quality*
Private clinic	8	12	14
Private Hospital	10	8	4
SSK Hospital	16	10	6
MOH hospital	25	16	15
University Hospital	20	6	1



Question 5: Expectations from companies

BY	*New Product Information*	*Upgrade ease*	*Cheap Service*
Private clinic	12	6	16
Private Hospital	8	10	4
SSK Hospital	15	10	7
MOH Hospital	32	15	9
University Hospital	15	10	2



Question 7: Important aspects of the equipment during purchase decision:
Mostly received answers:

BY	*1st order*	*2nd order*	*3rd order*
Private clinic	9	3	8
Private Hospital	5	1	6
SSK Hospital	1	2	7
MOH hospital	1	2	7
University Hospital	1	6	4

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