

**THE REPUBLIC OF TURKEY
BAHÇEŞEHİR UNIVERSITY**

**PRIORITIZING INNOVATIVE SMARTPHONE
FEATURES BY USING ANALYTICAL HIERARCHY
PROCESS IN THE TELECOMMUNICATION SECTOR**

Master's Thesis

DAMLA VURANOK

ISTANBUL, 2019

**THE REPUBLIC OF TURKEY
BAHÇEŞEHİR UNIVERSITY**

**GRADUATE SCHOOL OF SOCIAL SCIENCES
MASTER OF BUSINESS ADMINISTRATION**

**PRIORITIZING INNOVATIVE SMARTPHONE
FEATURES BY USING ANALYTICAL
HIERARCHY PROCESS IN THE
TELECOMMUNICATION SECTOR**

Master's Thesis

DAMLA VURANOK

Supervisor: ASST. PROF. DR. FULYA TAŞEL

ISTANBUL, 2019

**THE REPUBLIC OF TURKEY
BAHCESEHIR UNIVERSITY**

**GRADUATE SCHOOL OF SOCIAL SCIENCES
MASTER OF BUSINESS ADMINISTRATION**

Name of the thesis: Prioritizing innovative smartphone features by using analytical hierarchy process in the telecommunication sector

Name/Last Name of the Student: Damla Vuranok

Date of the Defense of Thesis:

The thesis has been approved by the Graduate School of _____.

Title, Name and LAST NAME
Graduate School Director
Signature

I certify that this thesis meets all the requirements as a thesis for the degree of Master of Business Administration.

Title, Name and LAST NAME
Program Coordinator
Signature

This is to certify that we have read this thesis and we find it fully adequate in scope, quality and content, as a thesis for the degree of Master of Business Administration.

Examining Committee Members

Signature

Thesis Supervisor
Title, Name and SURNAME

Thesis Co-supervisor
Title Name and SURNAME

Member
Title Name and SURNAME

ACKNOWLEDGEMENT

I am grateful to my husband Korcan Vuranok who has always been with me with endless support, understanding and love.

I am also very grateful to my mother and father for their support for me, also I'd like to thanks my sister for support and help.

I sincerely would like to thank my supervisor Asst. Prof. Dr. Fulya Taşel for the guidance and support she provided from the very beginning.



Damla VURANOK

Istanbul, May 2019

ABSTRACT

PRIORITIZING INNOVATIVE SMARTPHONE FEATURES BY USING ANALYTICAL HIERARCHY PROCESS IN THE TELECOMMUNICATION SECTOR

Damla Vuranok

Master of Business Administration

Thesis Supervisor: Asst. Prof. Dr. Fulya Taşel

May 2019, 61 pages

Today, the telecommunication sector is a rapidly developing sector and a dynamic sector in which phone usage behavior changes rapidly. For this reason, the companies offer new and interesting services to their customers, such as the acquisition of new customers, reduction of abandoned customers, increasing customer satisfaction and ensuring customer loyalty. In the telecommunication sector, smartphones are equipped with innovative features every day. Thus, innovation, telecommunication and smart phones can be mentioned as three important concepts related to each other in today's world.

In this study, it is tried to measure the priority of seven innovative features in smart phones in the selection of smart phones. In order to contribute to this study, the concepts of innovation and telecommunication are also discussed in detail. These seven innovative features were determined by the studies and expert opinions. In the study, Analytical Hierarchy Process (AHP) method was used to prioritize innovative features.

Keywords: Analytical Hierarchy Process, Innovation, Telecommunication, Innovative Products, Smartphones

ÖZET

TELEKOMÜNİKASYON SEKTÖRÜNDE ANALİTİK HİYERARŞİ PROSESİNİ KULLANARAK YENİLİKÇİ AKILLI TELEFON ÖZELLİKLERİNİN ÖNCELİKLENDİRİLMESİ

Damla Vuranok

İşletme Yüksek Lisansı

Tez Danışmanı: Dr. Öğr. Üyesi Fulya Taşel

Mayıs 2019, 61 sayfa

Günümüzde telekomünikasyon sektörü hızla gelişen, telefon kullanım davranışlarının hızla değişiklik gösterdiği dinamik bir sektördür. Şirketler bu nedenle stratejilerinde yeni müşteri kazanımı, terk eden müşterilerin azaltılması, müşteri memnuniyetinin artırılması, müşteri sadakatinin sağlanması gibi bu amaçla da yeni ve ilgi çekici fark yaratacak hizmetler sunmaktadır. Telekomünikasyon sektöründe de akıllı telefonlarda her gün yenilikçi özelliklere yer verilmektedir. Böylece yenilik, telekomünikasyon ve akıllı telefonların günümüz dünyasında birbiriyle ilişkili önemli üç kavram olduğundan bahsedilebilir.

Bu çalışmada, akıllı telefonlarda bulunan yedi yenilikçi özelliğin akıllı telefon seçiminde önceliklendirilmesi ölçülmeye çalışılmıştır. Bu çalışmaya katkı sağlaması için inovasyon ve telekomünikasyon kavramlarından da detaylı bahsedilmiştir. Bu yedi yenilikçi özellik yapılan çalışmalardan ve uzman görüşlerden alınarak belirlenmiştir. Çalışmada yenilikçi özelliklerin önceliklendirilmesinde karar verme yöntemlerinden Analitik Hiyerarşi Proses (AHP) yönteminden yararlanılmıştır.

Key Words: Analitik Hiyerarşi Prosesi, İnovasyon, Telekomünikasyon, Yenilikçi Özellikler, Akıllı Telefonlar

CONTENTS

LIST OF TABLES	viii
LIST OF FIGURES	ix
LIST OF ABBREVIATIONS	x
1. INTRODUCTION	1
2. INNOVATION IN TELECOMMUNICATION INDUSTRY	4
2.1 THE CONCEPT OF INNOVATION	4
2.1.1 Innovation Related Concepts	6
2.1.1.1 Creativity	6
2.1.1.2 Research and development	7
2.1.1.3 Technology	8
2.1.1.4 Invention	8
2.1.2 Innovation Types	9
2.1.2.1 Product innovation	9
2.1.2.2 Process innovation	10
2.1.2.3 Marketing innovation	12
2.1.2.4 Organizational innovation	13
2.1.3 Innovation Strategies	14
2.2 THE CONCEPT OF TELECOMMUNICATION	16
2.2.1 Historical Development Of Telecommunication Sector	18
2.2.2 Telecommunication Process In Turkey	19
2.2.3 Telecom Operators In Turkey	20
2.2.4 The Importance Of Innovation In The Telecommunication Sector	21
2.2.5 Innovative Products In The Telecommunication Sector	23
2.2.5.1 Smartphones	23

2.2.5.2 Tablets	27
2.2.5.3 Smart home	28
2.2.5.4 IoT	30
3. METHODOLOGY OF THE RESEARCH	32
3.1 MULTICRITERIA DECISION MAKING METHODOLOGY	32
3.2 THE POSSIBILITY OF USERS TO CONSIDER THE INNOVATIVE FEATURES OF THE PRODUCT WHEN CHOOSING A SMARTPHONE.....	36
3.2.1 Survey Content.....	36
3.2.1.1 Demographic Results	36
4. RESULTS	38
4.1 OUTCOME OF THE RESEARCH.....	38
5. CONCLUSION AND DISCUSSION	41
REFERENCES	44
APPENDICES	59

LIST OF TABLES

Table 3.1: AHP severity scale.....	35
Table 3.2: Ramdonness index data	36
Table 4.1: Priorities of innovative smartphone features	38



LIST OF FIGURES

Figure 3.2: Percentage of gender.....	37
Figure 3.3: Percentage of age range.....	37
Figure 3.4: Percentage of education level.....	37
Figure 3.5: Percentage of marital status.....	37
Figure 4.1: Priority ratio of innovative smartphone features.....	39



LIST OF ABBREVIATIONS

- AHP : Analytical Hierarchy Process
- CI : Consistency Index
- CR : Consistency Ratio
- DNA : Deoxyribonucleic Acid
- GNP : Gross National Product
- GSM : Global System for Mobile Communications
- ICT : Information and Communication Technologies
- IoT : Internet of Things
- IDC : International Data Corporation
- OECD : The Organisation for Economic Co-operation and Development
- PTT : Postal Telegraph Telephone General Directorate
- R&D : Research and Development
- RI : Random Index
- SD : Secure Digital
- TDK : Turkish Dictionary
- TTAŞ : Türk Telekomünikasyon A.Ş.
- TV : Television
- USA : United States of America

1. INTRODUCTION

Telecommunication is one of the most important sectors developing very fast worldwide. The enterprises operating in this sector take on great tasks by meeting the basic needs of the people of today's information society such as communication.

In its simplest definition of innovation is to develop and implement new ideas. These ideas can be developed to solve previously unresolved issues or respond to previously unmet needs. Or it may aim to offer many more products and services that are already better and more useful. Innovation is carried out with the realization of these ideas and the emergence of products, services or methods of work, followed by the start of the sale of these products and services or the implementation of business methods. Innovation is an endless process which is caused by the search for a better human world.

Smartphones are mobile phones with high level of knowledge, capability and connectivity. In this way, they have become indispensable elements of daily life and business life. Smart phones are used for different purposes from the classic mobile phone features, thanks to the possibility to reach the internet at any time, social networks becoming indispensable of life, many more mobile applications such as games entertainment habits, shopping and banking.

Innovation, telecommunication and smart phones are among the issues that are important for today's world. In fact, these three concepts are very closely related. Innovative smartphones are available in the world of telecommunications.

The change in consumer habits, the development of mobile technologies, the increase in application usage, the expansion of smart phones that make it easy to do all kinds of transactions from shopping to video calls, reveals both the necessity of providing innovative features and the necessity of the telecommunication sector to be strong. For these reasons, innovation in the telecommunications sector is an important factor in keeping up with competition. Innovation is a word that we are used to hear frequently in recent years. However, considering its potential and underlying system, it is a case that needs to be carefully considered. Innovation is a new or significantly modified product or process; a new marketing method; or a new organizational method in business

practices, workplace organization or external relations. As can be seen, the most important feature emphasized in the definition is that the new or especially produced product has changed significantly.

Consumers' expectations and demands are increasing due to the increase in consumer awareness, expansion of consumer rights, the participation of new players in the production sector and the introduction of new products. In addition to guaranteeing product quality and reliability, businesses have to add new functional features or aesthetic views in order to compete in the sectors in which they are located. Even a step beyond the personalization of products has become a recent situation. When we look at the telecommunication sector, smart phones come up with new features every day and after a while, they become the indispensable need of the consumer. Therefore, the need for smart phones with innovative features arises.

The aim of the study is to find the priority of the seven innovative features determined by the literature while the users are choosing a smart phone. With this result, the idea of which innovative feature is having the most important priority. There are many factors that influence the decision of smartphone selection. In this thesis, seven features which are frequently mentioned in the literature have been selected.

This study consists of five chapters. After the introduction chapter, the second chapter continues. In the second chapter, the concept of innovation in the telecommunication sector is explained. The concepts of innovation, innovation types and innovation strategies are mentioned. Then the concept of telecommunications is explained. The history of the telecommunication sector, the process in Turkey and telecommunication operators, has addressed the importance of innovation in telecommunications. In addition, innovative products in the telecommunication sector are emphasized and smart phones, tablets, smart homes and IOTs are mentioned.

In the third chapter, Analytical Hierarchical Process is considered as decision making method. The stages of this process are examined. At the same time, the calculation stages are explained in detail. The questionnaire and the demographic characteristics of the participants were examined.

In the fourth chapter, outcome of the research is explained in detail. According to the results of the questionnaire, the ranking of the innovative features is given and the properties are explained.

In the conclusion part of the study, why the study was conducted and how the results were obtained were explained and the differences of this study from other studies were mentioned. Administrative practices and limitations are explained in detail. The methods used are described. In addition, specific recommendations were made for inferences for the future.



2. INNOVATION IN TELECOMMUNICATION INDUSTRY

2.1 THE CONCEPT OF INNOVATION

Until the 1930s, the concept of innovation is not common. The significance of this concept was first mentioned by Austrian economist Joseph A. Schumpeter (Schumpeter 1934). According to Schumpeter; it is more important than the price competition between existing companies and products to take the place of old products and processes. For example; the impact of countries' new product developments on economic growth is greater than they would get with reductions in existing product prices (Akyos 2006). Schumpeter defines innovation as the realization of a new commodity or new quality goods, a new production method, a new market or supply source, a new commercial form, a new business or financial organizations (Kanber, 2010). The glossary meaning of innovation is defined as developing new approaches in design, production or product marketing to gain advantage over competitors or to be innovative (Dictionary of Business 2002, p. 266). Innovation describes both the process of renewal and a consequence of this process (Atik 2005, p. 5).

Defining innovation as only product improvement or renovation narrows the meaning of innovation. Schumpeter is one of the researchers who has made the most widely accepted definition of innovation theory in the literature. Innovation is; Introducing a new product to the market or developing an existing product, introduction of a new innovation process to an industry, the emergence of a new market, creation of new supply sources for raw materials or other inputs and indicates changes in the industrial structure (Erdem et al. 2011, p. 87). There are many definitions of innovations that similar to or different from Schumpeter until today. Schmookler (1966) also focused on a new product such as Schumpeter; an entity has made a technical change if it develops a new product or service for itself or uses a new method or input for itself. And the first thing that makes a certain technical change is that the enterprise makes innovation and it defines this action as innovation. Freeman (1982) stated that industrial innovation would arise if a new idea first commercialized. Porter (1990) stated that companies could be able to reverse competitive advantage through innovation, and that market seizure would be possible. According to Dodgson (1989); innovation is the sum of invention and use. The invention

expresses all efforts to create new ideas and to implement them. Usage process includes commercial development; implementation and transfer; focusing on ideas and inventions for specific purposes, evaluating these goals, transferring research and / or development results, and the use and dissemination of a wide variety of technological results.

According to Günay (2017), innovation is an endless process of innovation caused by the human quest for a better world. The competitiveness of the countries in which we live and called as the 4th Industrial Revolution; it is based on its capacity to produce science and technology, its ability to innovate, and its human development capacity.

In addition to these definitions, the definitions of Knight and Drucker are foreground in the study of Ersoy and Şengül (2008). Knight (1967) defines innovation as the realization of a new change for an organization and its environment, while Drucker (1987) defines innovation as a means by which entrepreneurs make changes to bring about a different business or service, and that it gives them the ability to create new capacity.

Innovation in the Oslo Manual (2005), published jointly by The Organisation for Economic Co-operation and Development (OECD) and Eurostat, which is at the top of internationally accepted sources of definition of innovation; "The application of a new or significantly improved product (goods or service) or process, new marketing method or new organizational method to in-house applications, workplace organization or external relations". In terms of this definition, the concept of innovation has become a general expression; it is understood that the product or process is linked to a new marketing method or organizational change. Therefore, contrary to popular belief, innovation can not be regarded as purely technology or related products, processes.

Innovation ensures that individual and social demands are met in the best possible way. Increasing competition and shortening the life of the service is forcing the companies to continuously innovate. Innovation has a strategic importance in the development of countries' economies, meeting new product and service demands, and increasing the competitiveness of companies. In addition, innovation provides benefits for the success of companies. Increasing the performance of the organization, improving the skills of the employees, decreasing the workload, increasing the motivation and excitement of the employees, providing freedom, exploration, learning and personal development opportunities to the employees are among the main benefits of innovation (Clair 2008).

2.1.1 Innovation Related Concepts

2.1.1.1 Creativity

Creativity; trying to establish similarities between elements of non-related fields; the ability to create new ideas and the ability to use our knowledge in new combinations (Barker 2001, pp. 16-23). Creativity means making, experimenting and adapting new combinations using existing objects in the nature. Innovation is a process. According to Torrance (1974), who has important studies on creativity, creativity is sensitive to problems and lack of knowledge; identifying challenges; searching for solutions, making predictions or hypotheses about deficiencies and testing them by modifying them and re-testing and finally delivering results. Guilford (1987) states that creativity, divergent thinking in general, is closely related to problem solving. However, he thinks that creative thinking skills can emerge in different fields such as art and science.

Creativity, on the other hand, is the ability to ensure the appropriate conditions for this process (Barker 2001, p. 23). According to Fisk (2011, p. 97), creativity is the initial phase of innovation, but at the same time it affects all other aspects of work. Günaydın (2011, p. 55) also emphasized that creativity enhances the rate of innovation development and innovation capacity, promotes new jobs and professions, promotes entrepreneurship, accelerates economic growth and development, in short, multiplier effect of creativity.

Although creativity has come into prominence in the fields of art, it has gained a special importance in science (Aral 2004). And creativity in science has been called scientific creativity by many researchers (Aktamış and Ergin 2006, İşler and Bilgin 2002).

Innovation is not just creativity, it is not just the creation of new ideas; Innovation starts with noticing these ideas, innovation is work, patience and commitment. New ideas are meaningless unless you put them into practice and test how they work (Gandotra 2010, p. 54).

Innovation and creative thinking in the workplace are increasingly important determinants of performance, success and long-term survival. It is clear that innovation is closely related to creativity and creative thought (Fialova and Hronova 2016, p. 32). Some authors have made a very close connection between innovation and creativity. Creativity and innovation are not the same thing. Creativity is the first step in innovation.

The result of creativity is an idea that can or can not be applied. But innovation is a process that starts at the first exit and results in creating value for the customer (McLean 2005, p. 227).

2.1.1.2 Research and development

Research and development (R&D) is often used side-by-side, but there are some differences. According to Deliotte (Gökçe and Telliöđlu 2013, p. 121), the research is an original and planned investigation aimed at acquiring a new scientific or technical knowledge or understanding; development is the application of newly developed materials, tools, materials, products, processes, systems, services, research results or other information to the production plan or design before the start of use of a product or service. According to Devrez (1970, p. 241), the greatest feature of R&D activities is the necessity of using scientific methods in these activities and the goal is to innovate as a result, that is innovation.

OECD Frascati Manual Research and experimental development (R&D); is expressed as a creative work carried out on a systematic basis for the use of information resources consisting of people, culture and society and to design new applications for this resource (OECD, Frascati Manual 2005, p. 30).

R&D is the work that is carried out in order to reveal the products and production processes in enterprises, to obtain systematic and regular information, to develop new products and existing products. R&D is the source of innovation (Zerenler et al. 2007, pp. 656-657).

R & D investments create many innovations. This encourages economic growth. In recent years, industrial innovation has played a major role in economic growth and regional development (Shefer and Frenkel 2005). From a micro point of view, performance and innovation are important for the company's success and competition. Inadequate innovation reduces the firm's performance and causes it to lose its competitiveness in the market (Auken et al. 2008, p. 51)

In general, the sectors with the most intensive R & D investments are those that produce advanced technology. These include defense and space technologies, pharmaceuticals, semiconductors and advanced metal alloys, and information and communication

technologies. Innovations in the field of advanced technology require the employment of highly qualified labor force compared to other sectors (Özer and Çiftçi 2009, p. 46)

2.1.1.3 Technology

The definitions of the technology word in the Turkish Dictionary (TDK [n.d.]) are listed as follows; "Information about construction methods, tools, equipment and tools used in an industrial field, application information covering their usage patterns, application knowledge", "All the information related to tools and materials developed to control and change the material environment of man".

From a classical point of view, technology comes from the Greek word "techno-logia" and is used in the sense of systematic work in the arts or crafts field. "Techne" in this word is an art or skill, and ability "logia" is theory, science or work (Lowe 1995). Thus the technology can be translated as "production-science". A broader narrative of technology is the application of knowledge to specific purposes (Dussauge et al. 1992).

Technology is the method, tools, equipment, machines and techniques used in production activities to make the environment that people live in more useful to them. People have invented tools using knowledge to meet their needs and have created technological innovations (Sarı 2013, p. 14).

Entrepreneurs make innovations by developing new technologies, discovering new products and creating new markets, thus becoming the pioneers of change (Link and Siegel 2007, pp. 20-22).

2.1.1.4 Invention

The invention is the creation of new technology (Betz 2010, p. 282). The invention is to make the path to the emergence of an innovation, a new technology idea; innovation is the commercialization of new high-tech products, processes and services (Betz 2010, p. 23). Barker (2001, p. 21) stated that invention could become an innovation only if the invention is marketed as a difference between invention and innovation, and not every invention can be innovation.

From a commercial point of view, innovation can be seen as an invention that has been successfully implemented and added value, profit, high revenue or superior quality. Innovation should have a positive impact on society, the economy and the political environment (Despa 2014, p. 39).

According to these definitions, invention and innovation are words with similar meanings. The word innovation may be much more comprehensive than the invention, and the invention may be a step in innovation.

2.1.2 Innovation Types

It appears that a large number of innovation types have been defined depending on the definition of innovation in the literature. One of the most comprehensive definitions for distinguishing the types of innovation belongs to Uz Kurt. According to Uz Kurt (2008, p. 32); Innovation can be classified in four different ways according to innovation areas (product, service, process, marketing and organizational innovation), degree (radical and incremental innovation), characteristics (technological and non-technological innovation) and its effects (destructive and supportive innovation).

In 2005, the OECD and the European Commission published the Oslo Manual, which divided the five areas of product, service, process, marketing and organizational by innovation areas. Besides, according to the degrees, it is divided into incremental (gradual) and radical. Radical innovation emerges with great breakthroughs and advances in which a product, a service style or methods have never been tried before. Incremental innovation is also a step-by-step progress. It includes a number of development and improvement activities. Both innovations can be explained via one example: The invention of mobile phones is considered to be radical innovation; the mp3 and camera features uploaded to the mobile phone are examples of incremental innovation (Elçi 2007, p. 17).

The main types of innovation that will be discussed in the literature will be examined.

2.1.2.1 Product innovation

In the Oslo Manual, product innovation is expressed as "the introduction of a new or significant improved product or service according to its present characteristics or foreseen use" (Oslo Manual 2005, p. 48).

Product innovation refers to the creation and presentation of new products that are technologically different from existing products developed at a new or significant level.

At the same time it provides tools for production, points out the development of new, improved products and services and enter to the market. Product innovation is the most obvious means to bring revenue to the market (Ojasala 2008, p. 53).

Elçi stated that, "The development of a new and different product; or change, difference and innovation in the existing product, and presentation of this product to the market" (Elçi 2007, p. 3).

Product innovation is launching a new product that aims to meet market needs. Product innovation is generally seen as the element of competitiveness of organizational structure, processes, products and activities in a company (Ilori et al. 2017, p. 104). Product innovation includes using new ideas and information successfully and to the fullest. Therefore, it brings with it the originality and usage elements (Alegre et al. 2006, p. 334).

The sales of product upgrades, seasonal changes, changes made for a single customer and not much different from the standard, and new products and services bought from other companies are not considered within the scope of product innovation (Oslo Manual 2005, pp. 149-150).

It is possible to give many examples for innovation. For example, Sony is one of them which can be given as an example of innovation. It was founded in 1946 as a radio repair company, and four years later began to produce and sell unique products. In the following years, Sony has taken a leading role in television and color video recorders. In 1979, Sony developed one of the most important innovations and produced the Walkman. Many products, such as CD Walkman and DVD players, are Sony's innovations (Actor 2007, p. 18).

2.1.2.2 Process innovation

The process is expressed in terms of an event as a process that progresses to a certain conclusion and regularly progresses with successive changes. Process innovation can be regarded as a significant improvement, exchange of values, value participation, starting from the procurement of the product, from the production to the service delivery, of all the activities (business areas can be diversified according to business policies; the fields of activity can be diversified, including the feedback from the customer, as well as a wide range of fields such as workflows, transactions from production to delivery of the customer product) within the scope of the business activities. For example, purchasing

activities, accounting transactions, delivery operations, auxiliary support activities etc. are examples of process innovation. (Satı 2013, p. 73, Kılıç ve Bilginoğlu 2010, p. 219, Oslo Manual 2005, p. 53).

Process innovation is the implementation of a new or significantly improved production or distribution method. It also covers significant changes in the technical field of equipment and / or software (Ersan 2011).

The concept of a process can be defined as a set of business and activity groups that must be done in order to produce certain goods and services in enterprises, as well as the sum of the activities in which an output that creates value for the customer is created from different types of inputs (Carpenter 2012, p. 53). Process innovation aims to reduce production process costs and increase product volume (Birasnav et al. 2013, p. 66).

In Oslo Guide process innovation is defined as the creation of a new or significantly improved production or delivery method. This innovation has seen significant changes in techniques, equipment or software (Oslo Manual 2005, p. 49). Process innovation provides tools to protect and improve qualifications and reduce costs (Ojasala 2008, p. 53).

While innovation may seem like an intangible concept, it has great implications for commercial and social life. And the product and process innovations in everyday life indispensable to create the essence of all kinds of tools and materials, shows its concrete side (Ayhan 2002, p. 251).

The most classic example of technological process innovation is the just-in-time production system developed by Toyota in the 1950s. With this system, only the products needed are produced and these are produced on time. The system increases the productivity while keeping the stock amount at minimum and provides the flexibility to respond quickly to the changes (Keskin 2012, p. 19).

Another process innovation of Toyota is that 'jikota' quality. With this system, if a malfunction or an abnormal condition is encountered during production, the diagnostic system stops production automatically or manually. The system is tried to be remedied by reaching the worker. The Jikota system is also an indication of confidence in the worker, as it allows all workers to stop production in the unit where they work, if needed.

In this case, it increases workers' commitment and strengthens their sense of responsibility (Elçi 2007, p. 9).

2.1.2.3 Marketing innovation

Marketing innovation in the Oslo Guide is defined as "a new marketing method that involves significant changes in marketing innovation, product design or packaging, product positioning, product promotion, or pricing" (Oslo Manual 2005, p. 49).

Marketing innovation is a type of innovation that gives the product, which emerges as a technological innovation, an image and a reputation for competitiveness and a response to customer needs (Morgül 2014, p. 13).

A lot of the service sector must be able to attract a large number of customers for the further sale of products and services. Products and services are developed and produced for market launch. In order to attract customers, using different and new designs in products and services is defined as marketing innovation (BTSO 2007, p. 11).

Marketing innovation is concerned with the development of the mix of target markets and how best selected services will be served. The goal of market innovation is to identify new and best potential markets, new and best ways to serve target markets (Ojasala 2008, p. 53).

According to Penning and Kim (2009), marketing innovation points to significant changes in sales and marketing activities in order to increase sales volume of the product (Coşkun et al. 2013, p. 107). The basis of marketing innovation is to increase sales volume and attract customers attention. There is no change in the nature or content of the product (Satı 2013, pp. 79-82, Oslo Manual 2005, p. 53).

Marketing Innovation refers to the application of new or significantly modified marketing methods, strategies, design or packaging, placements, promotions or pricing content in a product, and involves opening or improving new market opportunities, positioning innovation (changing products' promotional content) marketing strategies (Edison et al. 2013, p. 1395).

An example of marketing innovation is the method used by amazon.com. Kırım (2006) describes the innovation of the famous site as follows: "Let me tell you a message I recently received from amazon.com. The message says: Rita McGratg's new book 'market busters' appeared, as a loyal customer of amazon.com You're more likely to get this book

than 5,732 other readers, if you want, click here and see how we do this. " How can you not wonder? How come this new book won't catch your attention?

As a result of appropriate changes and innovations in sales and marketing, marketing innovation can occur. This is the most important step that innovation has to manage. Nowadays, even before a new production is started, it is thought about where the product can be sold and where it can be marketed. New sectors and geographies, new target masses in the market, new channels to reach them, new applications for existing products can be made for marketing innovation (Fisk 2011, p. 112).

2.1.2.4 Organizational innovation

Organizational innovation is the innovation of organizational structure and administrative processes (Afuah 2003, p. 14). Fisk (2011) demonstrates the development of new processes and structures within the organization, finding new methods, tools and techniques to increase efficiency and effectiveness, cooperation with new partners and suppliers, and development of motivation skills as an example of administrative innovation.

Organizational innovation in the Oslo Guide defines "a new organizational method in business practices, business organizations, or external relationships". Organizational innovations can be achieved by reducing overall management costs, ensuring internal customer satisfaction, providing access to outsourced information, or improving the performance of the firm by reducing hardware costs. Differing from the competitors of the business, it is the creation of a resultant organizational method for strategic decisions taken by senior management that were not previously implemented within the enterprise (Oslo Manual 2005, p. 51).

Organizational innovation means more effective working methods at the firm level. It includes measurable changes such as increasing productivity and sales. As with other innovations, information needs to be produced and obtained (Terzioğlu 2008, p. 13).

Organizational innovation is the development, differentiation and renewal of an enterprise's business methods. In addition, this innovation enables the adaptation of existing methods to operating conditions. With organizational innovation, the goal is to reduce costs and increase productivity (Keskin 2012, p. 20). Organizational innovations are innovations that include changes in the routine of the enterprise, which aim to increase

efficiency, productivity profitability, flexibility and creativity (Tavassoli and Karlsson 2015, p. 1890).

In the OECD (2005) report, organizational innovation is expressed as changes in organizational structure and processes, such as new organizational structures, new customer relations, the establishment of new teams, and outsourcing (Burmaoğlu and Şeşen 2012, p. 4). It is noteworthy that a new behavior or idea for the organization is realized or significant improvements are made, and as a result, costs are reduced, productivity is increased, practice is increased, and specialization is increased. In this sense, organizational innovation will provide competitive advantage and will help businesses to take a step forward in terms of competition as they will support the execution of the business model on a solid ground.

An organizational innovation is the implementation of a brand new organizational method in the company's business practices, company organization or external relations. Organizational innovations are also aimed at improving the performance of the firm, reducing the costs of procurement, improving the satisfaction of the workplace, providing access to non-marketable values and reducing procurement costs by reducing administrative costs or transaction costs (Atalay et al. 2013, p. 228).

2.1.3 Innovation Strategies

The businesses need to be innovative in order to gain competitive advantage in the face of environmental changes, competitors' attacks and technological developments. There are various strategies for businesses that decide to be innovative. Create different combinations of business resources and skills. The business can conduct innovations, produce new products or develop existing products by conducting research and development studies in-house. When determining innovation strategies, businesses should balance the necessary (Ahmed and Shepherd, 2010).

The innovation strategy consists of financial objectives and growth areas related to a new product or service. The strategic roles that define the strategic mission of new products or services are the set of criteria that provide filters for new product or service ideas. Although the roadmap provides broad guidance for mobilizing innovation, the strategy provides more detailed information about the effort made for innovation (Satı and Işık, 2011, p. 546).

The success of innovation activities in a business is intertwined with the general strategy of the enterprise. (Coşkun et al. 2013, p. 109). Innovation strategies are defined as the plans that lead to the development of the enterprise and the ability to use technology (Deniz 2008, p. 152).

In order to develop innovation strategies; Knowing the needs and expectations of the employees, recognition of the market, combining the needs of the markets and employees, the adoption of the existing vision by everyone, the company's goals and strategic plans must be prepared in advance (Murat and Kulualp 2008, p. 4).

According to Günaydın (2011, p. 62), innovation strategies are divided into defensive strategy, imitation strategy, dependent strategy, innovation capture strategy, opportunity chasing strategy, aggressive strategy and traditional strategy. In defensive strategy, small incremental innovations try to preserve the position. Innovation leaders in imitation strategy are being monitored and imitated. It can be said that the dependent strategy is similar to the counterfeit strategy. In innovation capture strategy, R&D results of other organizations are reached for innovation. Opportunity chasing strategy is more than imitative strategy. In the first stage, incomplete aspects of innovations such as trial, observation, researching customer expectations are determined. In the second stage, according to these deficiencies, innovation is imitated by changing. The aggressive strategy is a strategy implemented by technology leaders and organizations with high-budget R&D departments. The traditional strategy is the strategy followed when innovation is not needed.

There is a need for innovation management and innovation governance in order to create, implement and benefit the innovation strategy in the best possible way. Elci defines innovation management and governance as follows; Innovation management defines the entire range of innovation (product, service, organizational, marketing) and management of scientific, technological and administrative processes of enterprises. Innovation governance refers to activities and activities related to the involvement of stakeholders (suppliers, public authorities, researchers, consumers, competitors) in the design, implementation and evaluation phases of the innovation policy (Elci 2007, p. 181).

Innovation strategies are prepared for the effective use of innovations. In this context, innovation strategies of enterprises are not only considered as competitive strategies, but

they are evaluated in accordance with business strategies. Many factors, such as business culture, capital, managers' point of view, employees' educational status, technological infrastructure, play a role in determining the innovation strategy as well as determining the market share and growth strategies of innovation strategies (Satı 2013, pp. 316-317).

Innovation strategies indicate at what level the operator is interested in innovation. It is the sub-strategy of the basic strategy. According to Baykal (2007), innovation strategy is a strategic role that draws on the strategic mission of new products. According to Kuzu (2008), innovation strategy can be successful depending on the fact that the general strategy and the innovation strategy are complementary. It can be said that a positive relationship between the innovation strategy and the competition strategy provides a competitive advantage (Çoşkun et al. 2013, p. 109).

Although the importance of innovation is frequently emphasized, it is not emphasized how effective and efficient it can be realized. There are two main problems related to innovation in terms of enterprises. The first one is the problem of managing innovation, which includes the creation process of innovation, and the other is the marketing problem that will enable the innovations to be effectively commercialized and launch to the market. Innovative activities need to be transformed into an economic and social value. This may be possible through effective marketing. If a new product, service or business model cannot be effectively marketed, it will not be considered as an innovation. Therefore, businesses need to implement a successful innovation strategy in both the process of innovation and commercialization (Uzkurt 2010, pp. 41-42).

2.2 THE CONCEPT OF TELECOMMUNICATION

The origin of the telecommunication word is derived from the telegram, which means 'far' in ancient Greek, and the communicar words, meaning 'to share' in Latin. In Turkish, the term "communication" is used to mean the transmission of information / data between people, places or devices. In this process, there is a sender, a receiver and a medium to which the data is transferred (İçöz 2003, p. 20).

According to Turkish dictionary (TDK [n.d.]) telecommunication is a type of information, such as news, text, pictures, symbols or any kind of information, transmission or reception through electromagnetic systems. ¹

¹ Türk Dil Kurumu 2018

Information and telecommunication technologies can be briefly defined as; an integrated system that includes the necessary economic infrastructure to regulate the access and use of these technologies, together with the technological infrastructure necessary for the storage, processing and dissemination of information. (Türedi 2013, p. 299).

Telecommunication is defined as visual and audio elements via electronic components. In the simple sense, the services provided in the sector where communication services are provided between two points; directly connected with technology. It contains services with high capital, has very different products, is a natural monopoly. It requires high wreck costs, the product is not stocked, has network externality, is an important input for many sectors (Aktan 2001).

Information and telecommunications technologies; are able to transfer information across the globe with relatively low operating costs and the ability to easily reach long distances. In addition, information and telecommunication technologies can easily eliminate the problems caused by geographical distances. Due to the decrease in geographical problems, international buyers and sellers can share the information in a larger way, reduce uncertainty and transaction costs and increase their competitiveness beyond national borders (Güvel and Aytun 2013, p. 2).

The telecommunications sector can be considered as the sub-segment of the Information and Communication Technologies (ICT) sector. Components can be expressed as hardware (fixed and mobile infrastructure, terminal devices, user stations) and services (fixed and mobile phone, leased line, cable TV) (Ariöz 2005, pp. 9-10).

Nowadays, the telecommunication sector has become a strategic sector with a commercial and economic value which constitutes the basic infrastructure of the information society and is far beyond the provision of individual and mass communication (Kurt, ty: 2).

The range of services offered by companies with many areas of change is quite wide in the telecommunication sector. Internet service, landline, mobile services and television services are just a few of them. A variety of services and goods, consisting of more than one element, can be offered to the customer as a whole in the sector or sold separately. In particular, the incentives provided to the customers, the confusion of the services provided and the rapid change make it difficult to determine the revenue separately for each service (KPMG 2010, p. 9).

As can be seen in various definitions, the concept of telecommunication has changed over time and has been shaped by expanding to suit the conditions of time.

2.2.1 Historical Development Of Telecommunication Sector

When the development process of telecommunication technologies in the world is examined, it is seen that the telegraph invented in 1837 was accepted as the beginning of telecommunication (Ekergil 2006). The Morse code used in telegraph communication was developed by Samuel Morse, an American painter in 1843, and still remains valid today. The telephone, which was the basis of today's telecommunication technology, was invented by Bell in 1876 and in this direction, telephone exchanges were established in 1880s. The phone was used extensively in Europe, primarily in the United States. In the 1920s, communication technology has been widely used all over the world with the establishment of radios and submarine cables in intercontinental communication (Ileri 2009, p. 42).

In the following years, the first broadcast of the television, which was one of the means of communication, was made in the United States of America (USA) in 1927 and the regular broadcasts were started in 1936 in England and in the USA in 1939 (Ministry of Education 2008, p. 28).

In the telecommunications sector, mobile communication systems were set up in the end of 1900s to enable the use of mobile phones. Although mobile communication services started technically in 1946, the use of these services by the community was in 1995. In the telecommunications sector, mobile communication systems were set up in the end of 1900s to enable the use of mobile phones. Mobile communication is now provided by GSM (Global System for Mobile Communications) technologies. The first commercial GSM network was established on 1 June 1991 in Finland and was put into service (Böbrek 2011, pp. 7-8). The most important mobile communication tool has been the mobile phone over time (Karaaslan and Budak 2012, p. 4549).

The Internet, which is a worldwide and widespread communication network, increased the number of internet users in the 1980s with the production of personal computers. In the 1990s, mobile technologies were used predominantly in the telecom sector, and initiatives for the information society became more important in the 2000s and broadband technologies gained importance (Tezgiden 2008, pp. 15-16).

There has been a significant period of reform in the telecommunications market throughout the world over the last two decades. This reform process has had a direct relationship with the development of world trade, increased competition and liberalization in the same period. The privatization of the telecommunications companies, which were generally monopoly of the state, and the opening of the sector to competition through liberalization, were also in this period (Kuş 2011, p. 44).

2.2.2 Telecommunication Process In Turkey

The foundations of the Turkish telecommunication sector were laid by the establishment of the Postahane-i Amire in 1840. The Telegraph and Telephone Law No. 406, which is still valid today and contains the basic regulations, was adopted in 1924 and the telephone and administrative task in the country was assigned to the Postal Telegraph Telephone General Directorate (PTT) (Arıöz 2005). Especially in the 1980s, large infrastructure investments were made to expand and complete the basic infrastructure network. In these years, the telecommunication sector of our country has been heavily influenced by the liberalization process in the world, and the discussions and approaches have been started to be implemented in our country, and the telecommunication devices have been opened to market (Tezgiden 2008).

Telecommunication companies were companies that offer traditional fixed telecommunication services owned by the public since the founding of the Republic of Turkey. However, these companies, mobile, internet, cable, television (TV), electronic commerce, etc. have turned into a structure that operates in many areas of the new economy. In this process, the monopolistic structure of the sector has been replaced by consolidation by privatization, liberalization and mergers (Yıldız 2014, p. 312).

In 1994, together with Law No. 4000, postal and telecommunication services were separated, and Türk Telekomünikasyon A.Ş. (TTAŞ) has been established and the way for licensing of value-added telecommunication services has been opened. Thus, the first important steps were taken towards liberalization of the sector (Arıöz 2005).

Although Turkey's economy shrink by 6% in 1999, the telecommunications sector has achieved growth of 15%. Looking at the year 2000, this rate was 24% and reached a size of 13 billion dollars. These figures show how important Transport and Communication are in the Gross National Product (GNP) (Afşar 2017, p. 40).

With the enactment of Law No. 4502 in 2000 and Law No. 4673 in 2001, regulatory authorities and licensing authorities, previously held by the Ministry of Transport, were transferred to the Telecommunications Authority, the sectoral regulatory authority established. From these years, Ministry of Transport has made numerous arrangements to ensure sustainable competition in the sector, to protect consumer rights, to improve service quality and to provide numerous services in various service areas such as internet service provider, mobile phone service, satellite telecommunication service and long distance telephone service. In 2004, the monopoly rights of TTAŞ were abolished and the sector became structurally free trade. In 2005, block sales of TTAŞ's 55% stake were completed and TTAŞ was privatized (Tezgiden 2008, pp. 49-61). There are sixteen companies providing voice services in the telecommunication sector and seven companies providing internet services (Afşar 2017, p. 41).

95% of the world's population benefits from mobile voice services and 84% of the customers benefit from 3G services. The number of customers benefiting from the Long Term Evolution service, which provides faster access to the internet than 3G, is 53% of the world's population and there is an increasing customer trend on the basis of internet users. (ITU 2016).

Turkey has to adapt to global developments and increased market share. In this context, Turkey with 442-minute average monthly mobile usage time has taken first place among European countries (BTK 2017). At the same time, there has been a continuous increase in the number of broadband internet customers compared to years (BTK 2017).

2.2.3 Telecom Operators In Turkey

The GSM sector is one of the sectors with the fastest technological development. In March 1994 Turkcell started to operate in Turkey. In May, Telsim started to operate. The GSM sector reached 80,000 in the same year and 75,061,699 at the end of 2016.²

In 2000, Aria (İş-Tim) and Aycell entered the market and the number of operators was four. On February 19, 2004, Aycell and Aria merged under the Avea brand under the TT & TIM framework. Thus, the number of operators in the GSM sector has fallen to three.³

2 Btk [Online] www.btk.gov.tr [Accessed 20 April 2017]

3 Ubak [Online] www.ubak.gov.tr [Accessed 20 April 2017]

On May 24, 2006, Telsim announced that Vodafone Telecommunication Inc. has been incorporated into the Vodafone Group with its commercial title. Vodafone is a British telecom company that purchases a Turkish telecommunication company called Telsim. As of the end of 2006, the company name was changed to Telsim-Vodafone. As of March 31, 2007, Telsim was abolished and changed its name to Vodafone.⁴

TT & TİM İletişim Hizmetleri A.Ş., was officially established on 19 February 2004 as the result of the merger of Türk Telekom's GSM Operator Aycell, İş Bankası Group and İş-TİM, which was established with TİM partnership. After merging, there was a brief process in which Aria and Aycell brands continued under the TT & TIM framework. As of June 23, 2004, "Avea" brand has started to be used. As of October 15, 2004, "TT & TİM İletişim Hizmetleri A.Ş." commercial title "Avea İletişim Hizmetleri A.Ş."⁵

According to the number of subscribers, Turkcell has a share of 43.7%, Vodafone 30.8% and Türk Telekom Mobil 25.5% in the second quarter of 2018. As of the second quarter of 2018, 56.9% of Türk Telekom Mobile subscribers, 55.9% of Vodafone subscribers and 54.1% of Turkcell subscribers consist of postpaid subscribers. Approximately 88.3% of the total mobile subscribers are individual and 11.7% are corporate subscribers. As of the second quarter of 2018, the market share of Turkcell is 44.7% and the market shares of Vodafone and Türk Telekom Mobil are 30.8% and 24.5%, respectively.⁶

2.2.4 The Importance Of Innovation In The Telecommunication Sector

Organizations create innovations due to pressures from external environment such as competition, resource scarcity and customer needs. Or it can create innovations from an internal organization such as gaining different competencies, achieving a higher level of aspiration, increasing the scope and quality of services. In either case, the adoption of innovation is to change adaptive behavior to maintain or improve the organization's performance (Damanpour et al., 2009, p. 635).

Innovation, as a concept, describes both a process and a result. Innovation refers to the process as "transforming an idea into a marketable product or service, transforming a new or improved manufacturing or distribution method, or transforming a new method of

⁴ Vodafone [Online] www.vodafone.com.tr [Accessed 20 April 2017]

⁵ Avea [Online] www.avea.com.tr [Accessed 20 April 2017]

⁶ Btk. [Online] <https://www.btk.gov.tr/uploads/pages/pazar-verileri/2018-2ceyrekraporu.pdf> [Accessed 5 July 2018]

social service”. Today, the company is shown as the source of innovation and economic growth. Determining the needs of the market and meeting them with new or innovative products has become the reason for the existence of today's firms. Increasing the ability of knowledge to generate added value as a production input, the convergence and multilateralism of innovation processes to the market increase the importance of knowledge management in production and service processes (Akyos 2006).

In this age, the telecommunication sector, which has gained importance with the increase of knowledge in the economic life, has become one of the sectors with the greatest impact on the economy. The sector offers services to the individual user and business world in various technologies and content (voice, data, images). Another important feature of the telecommunications sector is that, unlike many other sectors, a sectoral development affects all other sectors positively (Eke 2010, p. 85).

On the other hand, a country with strong production and IT industries will innovate value-added technological products that have best in class features and quality. This in return will create a strong social and economical well-being for the country industries (Topçuoğlu 2004, p. 46).

Technological developments lead to significant innovations and changes in telecommunications and other fields. Innovations and developments in telecommunications services have led to a number of factors that enable market-based regulations in the telecommunications sector. New data communication technologies have significantly reduced production, connection and operating costs in the telecommunications sector (Dodd, 2012).

The old infrastructure in the telecommunications sector has not been able to keep up with the increase in mobile internet and online video streaming demands. Although the sector has come a long way since dial-up internet and wired telephone lines, it has been struggling to keep up with the demand. The telecom industry is now focusing on the next generation mobile communications 5G connection. 5G is the 5th generation wireless broadband service that should be faster than the current 4G standard worldwide. In addition, better security is required. Due to the necessity of making phone calls secure from end to end, almost all companies in this sector are forced to invest in security as the

threat increases (İsmaail 2017). These trends and new technologies advance the telecommunications sector and reveal the importance of innovation.

According to Deloitte, while the telecommunications sector continues to accelerate with the power of innovation in 2017, a new mobile era will emerge with the introduction of the fifth-generation wireless network technology (5G) into its first commercial use. One of the most anticipated mobile technology platforms, 5G is the connective tissue that blends the new uses of mobile technology such as the Internet of Things (IoT), autonomous vehicles and mobile media. Second hand smartphones also represent the potential growth area in the telecommunications sector. As the value of smartphones continues to increase, there is a corresponding increase in the remaining value of smartphones and the desired lifetime of these devices. Here there are opportunities for operators and other businesses to take advantage of the increased value of second-hand smartphones and the increased volume that will enter this channel.⁷

2.2.5 Innovative Products In The Telecommunication Sector

2.2.5.1 Smartphones

As a product of developing technology, mobile phones have entered our lives as an important part of everyday life. Mobile phones were at the forefront of communication features, being mobile and being able to communicate at any time. Nowadays, with the development of information technologies, it has evolved to smart phones that have many different features (Karaarslan and Budak 2012, p. 4549).

The rapid progress of information technology and the rapid use of technology has brought about important improvements in daily life and leads to new developments in our social life. Especially smartphones are becoming more preferred than laptops and tablets in information and communication technologies (Özbek et al. 2014).

It is claimed that they become an extension of body and identity (Özkoçak 2016) and it can have a stronger impact on our lives.

Smartphones, which have a higher level of computing capability than ordinary mobile phones, allow users to do almost anything they can do with a variety of applications (send and receive email, access and organize office documents, play games, watch video etc.)

⁷ Deloitte [Online] <https://www2.deloitte.com/us/en/pages/technology-media-and-telecommunications/articles/telecommunications-industry-outlook.html> [accessed 10 July 2018]

Smartphones respond to almost every need of today's users with features such as the ability to run multiple applications simultaneously with touch interfaces, image and / or sound recording with internal or attachable memory (Ada and Tatli 2012, p. 3).

Smartphone use is generally evaluated within the use of mobile phones, but it is beneficial to separate the mobile phone and the smartphone. While simple mobile phones enable the use of voice communication and text message services, smartphones provide benefits such as accessing, locating, sharing and socializing by working with different operating systems such as Windows Phone, iOS, Symbian OS, Android and Linux (Çakır and Demir 2014, p. 215).

There are many features on smart devices. Among these features, 7 criteria were selected in the literature. They are water resistance (Flockett 2017), fingerprint recognition (Das 2015, Gonzalo 2018, Corcoran and Costache 2016), iris recognition (Das 2015, Elrefaei et al. 2018, Trokielewicz et al. 2015), quick charge, dual camera (Sharma 2017, Ahmad et al. 2018), long battery life (Araujo et al., Kekolahti et al. 2016) and large internal storage (Ware).

Water damage is one of the most common causes of device damage. Therefore, there is a need to protect the phones. In addition, research from International Data Corporation (IDC) shows that the number of devices with water resistance increased by 76% year-on-year in the first nine months of 2016 compared to the previous year. This figure is likely to increase over the next few years (Flockett 2017). According to Coulson, among the unforgettable milestones, Motorola has emphasized its water resistance from 2011 onwards with the Droid Razr model, and then spread to other manufacturers. When Apple and Samsung's tastes launched a high-level water-resistant product range, interest began to rise across the industry. At a stage where smartphones were no longer aesthetically diverse, so features became an increasingly important differentiator for those times. Water resistance should be an important part of the deoxyribonucleic acid (DNA) of a smartphone (Coulson 2018, pp. 38-39).

There are also features that we call biometric properties. Biometrics is defined as the use of computer science technology to extract an individual's unique features so that they can have access to certain resources to authenticate and / or identify an individual. One of them is iris recognition and the other is fingerprint recognition (Das 2015, p. 6). Fingerprint technology is also available on other consumer devices, including

smartphones. The fingerprint sensor uses capacitive touch to detect the user's fingerprint and has a resolution of 500 pixels per inch. The fingerprint can be read in any direction. This system, which can be integrated into operating systems on smartphones, can unlock any device with the user's fingerprint and verify digital media purchases. Because an increasing number of consumers begin to use technology more closely, fingerprint technology will become more widespread over time (Corcoran and Costache 2016, p. 71). Biometric identification has become a widespread technology in our daily lives. It is used to unlock our phones, to enter the gym or to enter the office due to its convenience and to avoid remembering passwords (Gonzalo 2018). As a result, this feature makes life easier for users and provides security.

According to literature, Iris recognition system achieves very high accuracy. An iris recognition system generally has two main functions: registration and verification. There are four stages: first, by capturing the eye with the smartphone camera and then by localizing the iris borders, this stage is known as the stage of partitioning. The second stage is normalization, which converts the iris image into a fixed-size pattern. Then, unique features are demoulded, and finally, the system compares these features to another template previously stored in a database, and makes a decision (acceptance/rejection) based on the matching result. Using the built-in camera on smartphones requires some preprocessing steps to be performed prior to iris partitioning due to difficulties with the images taken by the visible wavelength, which has a lot of noise, such as reflections, lightings and less iris texture details (Elrefaei et al. 2018, pp. 14579–14603). The application of biometric techniques on smartphones provides more reliable identification methods based on the unique characteristics of people. The possible effects of unauthorized access can be devastating for personal data. Therefore, there is a tendency to add a new authorization application based on the iris layout to determine the smartphone user. Iris recognition is considered the most reliable biometric technique to protect the device, its applications and sensitive data (Trokielewicz et al. 2015).

Another feature is the Quick Charge feature. Many features are considered when selecting a telephone. In recent years, the fast charging feature has begun to emerge slowly. Who doesn't want a smartphone that can charge in minutes instead of hours (Hill 2018). Quick Charge is a Qualcomm technology designed to attract more power on most Android devices than the previous standard protocols, and does not compromise your battery life.

Compatible devices are charged from 0 to 80% in 35 minutes with a Quick Charge charger. Considering that smart phones are used continuously, this feature is very prominent⁸. Quick charging is currently used on many mobile devices. Quick charging of mobile devices reduces users' worry about limited device uptime by filling devices with faster energy. This has been the focus of the industry and has developed and implemented various quick charging technologies such as Quick Charge 3.0 by Qualcomm⁹, TurboPower by Motorola¹⁰, VOOC Flash Charge 10 by OPPO¹¹.

According to Sharma, most manufacturers now have dual camera variants with different pixel counts on their cameras. Some have brought these dual cameras from the rear and promises a new revolution in selfie images. However, others have become more aggressive in providing dual cameras with the same pixels, thus promising even better images. With the use of dual cameras, you can blur the background of subjects and achieve a better field effect in photos. This describes the dual camera feature as it is achieved by digitally combining the images captured by the two cameras (Sharma 2017). Producers need to focus on good-quality image cameras to enable consumers to buy their products. In addition, it has been argued that manufacturers should use dual cameras on their phones to meet consumers' demand (Ahmad et al. 2018).

Since batteries have a maximum lifetime, the premature discharge of each cycle not only affects the short-term availability of the mobile device, but also affects the ability to operate over a long period of time (Araujo et al. 2017). According to a study in the literature, price, brand, design (including elements such as size and weight) camera, screen size and battery life were the most frequently mentioned features in the surveys conducted in the years of 2002-2012 (Kekolahti et al. 2016).

When choosing a new phone, the amount of internal storage is usually one of the few basic factors that influence the decision to purchase a phone with another. Given the

⁸ Qualcomm [Online] <https://www.qualcomm.com/solutions/mobile-computing/features/quick-charge> [accessed 11 December 2018]

⁹ Qualcomm [Online] <https://www.qualcomm.com/solutions/mobile-computing/features/quick-charge> [accessed 11 December 2018]

¹⁰ Motorola [Online] <https://www.motorola.com/us/TurboPower/turbopower.html> [accessed 11 December 2018]

¹¹ Oppo [Online] <http://www.oppo.com/en/technology/vooc/html> [accessed 11 December 2018]

memory features of any phone, it is important to understand the difference between internal and external memory. The internal memory is the manufacturer's installed storage space, usually 16, 32 or 64GB, with the operating system, preinstalled applications, and other system software installed. External or expandable memory means a removable Micro Secure Digital (SD) card or the like. Many devices with a micro SD card slot are sold with a card already installed. However, not all phones will have this extra storage space, and not all phones have the possibility to add external memory (Ware 2018).

According to IDC research conducted by an international research company worldwide, sales figures for smartphones reached a historic record for the first time, reaching over 1 billion by the end of 2013. Total device sales increased by about 4 percent compared to previous years, reaching 1.8 billion (IDC 2014). Smartphone use tends to increase over the years. The increase in these sales figures may be a sign that the importance of smartphones in everyday life and business life will increase.

According to Gartner, Inc., global sales of smartphones to end-users grew by 1.3 percent in the first quarter of 2018 compared to 2017. Around 384 million smart phones were sold in the first quarter of 2018, representing 84 percent of total mobile phones. While Samsung ranked first with a market share of 21%, Apple ranked second with a market share of 14% and Huawei ranked third with a share of 11%.¹²

2.2.5.2 Tablets

Tablet PCs are mobile technologies that are smaller and lighter than the desktop and laptop computers, with touchscreen features and some types of special pens. Tablets are smaller and lighter than desktop and laptop computers. There is no mouse or keyboard, it has a touchscreen. It is a new computer alternative that enables users to connect to the Internet, watch videos, use various software and programs, read e-books, etc (Bulun et al. 2004).

Tablet technology, contrary to popular belief, appeared in the late 1980s. GRiDPad and Fujitsu PoqetPad, which Samsung launched in 1989, are known as the first tablets with stylus touch screens (Bonnington 2015). In 1993, when Steve Jobs left Apple, Apple continued to sell tablets that could be controlled with a special pen under the name

¹² Gartner [Online] <https://www.gartner.com/newsroom/id/3876865> [accessed 11 December 2018]

Newton MessagePad, but did not get very good sales and ended production of devices with the return of Steve Jobs to the company (Original Tablet 2010).

None of the tablets produced over the last twenty years have shown the expected success. However, it can be said that this process is positive for Apple to analyze the user needs of the tablet. Apple's idea of driving tablets to the market again surfaced in the 2000s. Moreover, this time, the tablet is designed to interact with the finger touch.

However, the company decided that a smartphone with the same features would be a priority, and in 2007, the smartphone drove the iPhone to the market (Bonnington 2015). The sales are very good and the iPhone continues to be renewed with a top model every year. Not long after the success of the iPhone, in 2010 the Apple company rolled out the first model of the iPad. In addition to being able to interact with the finger, the iPad is much sharper than pre-manufactured tablets, has ergonomics that can be carried easily, and lasts longer (Bonnington 2015).

It is known that the companies have made touch screen tablet designs since the 80's and that the models produced since the 90's have not been adopted much by the users. According to Daşkıran (2012): "In order to bring out the ideal tablet structure in the technological development paradigm, we have to wait until 2010 to bring the components needed together". These components can be summarized as mobile processors with high performance, battery life that allows long usage time, and combining these features without compromising portability (Daşkıran 2012). There are now a large number of products with different characteristics produced by various manufacturers in this class.

In 2000, many manufacturers in the sector dealing with computer technology designed small computers in R&D units to monitor touch screen, video and picture images. The general name of computers designed in R&D units is accepted as a tablet computer. Tablet PCs used touch screen technology and some companies added special pen technology. After 2010, tablet computers began to become widespread. The reason for this is; It has been shown that the products produced by many companies to the market are made to be done well, their promotions and advertisements are made well, the prices are cheaper and the software and processors are produced according to the users (Perenson 2012).

2.2.5.3 Smart home

A smart home can be defined as homes that can be controlled from a center, communicate with each other, build relationships, and provide life that makes people safer, more

comfortable, responds to needs and makes life easier by means of all these technologies (Yılmaz 2004).

According to Gül (2010), smart homes are defined as a complex system that allows control of multiple subsystems operating in an integrated fashion via a common controller. Balta-Ozkan et al. (2013) has described it as a system that can control intelligent homes through intelligent technological devices and networks that are used to enhance the comfort and efficiency of a variety of everyday home activities ranging from ambient heat to lighting and water temperature adjustment.

While the adaptation of control systems used in many fields of industry to daily necessities is provided by home technologies, home automation is also used to apply these technologies to individual needs and requests. Smart homes use sophisticated technologies to create homes that respond to the needs of the residents, make their lives easier, provide a safer, more comfortable and safer life (Kurbetçi et al. 2003).

Numerous smart home appliances have been developed around the world.

Each of these applications varies according to cost and user needs. Although not yet widespread in Turkey, intelligent home applications in the world are spreading especially in energy saving and security areas (Schulzrinne et al. 2003, pp. 128-135).

When we look at the examples of the smart house, we see that the first developments in this sector were realized by big technology companies. About the subject, Technology firms created Home Application (Application Programming Interface) such as Honeywell, Intel, Compaq, Microsoft, Mitsubishi and Philips. This common standard interface is designed to manage existing lighting, heating, security systems and other automatic devices. By using programs in this design, the plug and play logic intended for easy use of computers and peripherals has been considered in household appliances. Every electronic device in the house has been provided to operate in the integrity of the interface as a part of this system (Aslan 2014).

The concept of smart home and the emergence of technology in parallel with the development of home appliances, began to become more useful to facilitate our lives. For example; TV sets, music sets, remote controls for garage doors, coffee machines timers, washing machines, refrigerator. Nowadays, all of these devices are communicated to each other so that they can be managed from a single main center (Güçül 2008).

2.2.5.4 IoT

In 1991, a group of academics were using a coffee machine at Cambridge University, where they worked in the UK. There is a coffee machine on the upper floor of the place where they work. And because they are tired of finding this coffee machine empty each time, they have designed a system that takes three times a minute of the coffee machine and transmits these images to their computers. This coffee machine is the first example of “Internet of Objects” concept (Kutup 2011).

The Internet of objects (IoT) concept was first expressed by Ashton during a presentation to a private company in 1999 (Ashton 2009). Ashton stated that internet is dependent on data entry to computers. However, people's time, knowledge and accuracy of data entry are limited. The Internet recognizes ideas from people. The Internet has little knowledge about the physical objects (things) that exist in the world. It is emphasized that the information of the internet needs to be gathered not only from people but also from objects. Thus, human error, damage and cost will be reduced. In addition, thanks to information gathered from internet objects, information will be provided in a timely manner, such as when objects are changed, maintained, recalled.

The Internet of Things gives them the opportunity to see, hear, think, come together and talk to each other so that physical objects can share information and decide together. IoT is the transformation of basic technologies such as embedded devices, communication protocols, sensor networks, internet protocols and applications from the traditional to the smart one (Al-Fuqaha et al. 2015, pp. 2347-2376.)

The Internet of objects tells us that it is possible to bring many different advantages such as the ability to hold individual and environmental data that can support the daily activities of individuals in various forms, as well as to benefit from e-health services and to provide an enhanced learning experience. In this structure, too much data is stored, processed or presented. The vast majority of these computing processes are realized through intelligent devices, with the development of technology. In order for a device to be smart, it must have a sensor, or sensors, to connect to it wirelessly. The future conditions in which the objects of the objects are presented can be called intelligent environments (Gubbi et al. 2013).

Although IoT is not a compromise in the sense of a single definition, IoT can be defined as the connection of everything and everyone on an integrated network. A communication network in which objects with a physical identity are linked to other objects and other data networks. Any live or inanimate objects can be connected to the IoT network via software programs and sensors. Some large companies monitor their customers consumption habits in this way and manage the marketing of products that are relatively more likely to buy. The management processes of the companies can be connected to the IoT network and the logistics of the resources required for the production and the continuous production of the production can be ensured. It is possible to use IoT at every stage of economic and social life. This data network is filled with technological devices that transform billions of data into meaningful information at every moment in your life. The targeted benefit in the world of objects is to increase the quality of human life with this meaningful data, to use time effectively and to provide security. (Yüksek 2015). Together with IoT, the representative cities of civilization are transformed into smart cities that keep pace with a more brisk and planned life. This transformation brings together many opportunities to make life easier for people and companies (Zanella and Vangelista 2014).

3. METHODOLOGY OF THE RESEARCH

3.1 MULTICRITERIA DECISION MAKING METHODOLOGY

Multi Criteria Decision Making Methods were developed when a number of tools were needed to assist decision-making in the 1960s. The aim of using Multi-Criteria Decision Making Methods is to control the decision-making mechanism in cases where the number of alternatives and criteria are high. And the decision is to get the result as easily and quickly as possible (Heriřçakar 1999, p. 245).

The Multi-Criteria Decision Making problem relates to the listing of a number of decision alternatives, each defined in terms of different decision criteria, which must be considered at the same time (Zavadskas and Turskis 2010, pp. 159-172.).

Decision-making methods differ depending on the methods used and the solutions to be found. The decision taken in the case of many contradictory criteria is known as a multi-criteria decision. Multi-criteria decision-making is the process of determining the most appropriate solution according to the specified criteria (Bazzazi et al. 2011, p. 2550).

Because the criteria often conflict with each other, there is no solution that meets all criteria at the same time. In this case, the solution is determined according to the decision maker's preferences (Sayadi et al. 2009, p. 2257). A typical multicriteria decision making methodology problem usually includes three basic components; alternatives, criteria and weights for each criterion. The advantage of multiple decision-making methods is the combination of many criteria and alternatives (Chatterjee 2010, p. 484).

In cases where there are multiple and often incompatible criteria, multi-criteria decision making method is used to solve a problem (Korkmaz and Uygurtürk 2012, pp. 95-115). The multi-criteria decision-making method classifies and grades events at the decision-making stage according to the importance or requirements of events affected by multiple factors in the decision-making and implementation process (Güler 2016).

Multi-criteria decision-making methods are widely used in solving decision-making problems based on multiple criteria. The most commonly used of these methods are

Analytic Hierarchy Process (AHP), others such as topsis, moora, electre, vikor, anp, promethee etc. can be listed as (Eleren 2007).

Topsis was developed by Hwang and Yoon as a multi criteria decision making technique in 1981 (Shyjith et al. 2008, p. 376). Hwang and Yoon formed the topsis method according to the solution of the solution as the shortest distance to the positive-ideal solution and the farthest distance to the negative-ideal solution (Monjezi et al. 2010, p. 2).

The Moora method was first developed by Brauers and Zavadskas. Moora is a multi-purpose optimization method. And, it has been used in different fields in recent years. It is one of the methods used to develop different applications to support decision-making problems (Brauers and Zavadskas 2006, p. 445-469).

The Analytic Hierarchy Process is a non-linear framework for realizing deductive and inductive thinking, without considering the use of derivative science, taking into account several factors simultaneously and allowing for feedback, and by making numerical balances to reach a synthesis or conclusion. Thomas L. Saaty developed AHP in Wharton School between 1971-1975 (Saaty 1987). Thomas Saaty's AHP is an effective tool for complex decision-making and can help decision-makers decide on their priorities and make the best decision. It helps to capture the subjective and objective aspects of the decision by reducing the complex decisions into a series of pairs and synthesizing the results. In addition, the AHP includes a useful technique to check the consistency of the decision-maker's assessments, thereby reducing the bias in the decision-making process (Saaty 1980).

The AHP method is based on a hierarchical system of many objectives, criteria and alternatives. This hierarchical system is based on expert judgment with double comparisons of different criteria (Hillerman et al. 2017, p. 99).

AHP is a mathematical method which can evaluate both qualitative and quantitative parameters in decision making. It also considers the priorities of the group or individual. Knowledge and knowledge of decision-makers can take part in decision-making process with AHP method (Aydın et al. 2009, p. 72).

The implementation steps of the AHP method are as follows:

Step 1: Defining the problem, aims, criteria and alternatives are given. A decision hierarchy is established starting from the goal with the aim of decision. The goal is placed at the top. The intermediate level, criteria and sub-criteria are placed. The lowest level is placed in alternatives (Saaty 2008, p. 85).

Step 2: After the creation of the hierarchical structure, a dual comparison matrix is created to determine the importance of the criteria and sub-criteria among themselves. The decision maker compares the criteria or alternatives in binary. For the n criterion to be evaluated, matrix A is created to determine the importance of the i criterion according to the criterion j. The components on the diagonal of the comparison matrix (i = j) take 1. The binary comparison matrix (A_{ij}) is given in (3.1) equation (Saaty 1990, p.12).

$$A_{ij} = \begin{bmatrix} 1 & a_{21} & a_{31} & \dots & a_{n1} \\ 1/a_{21} & 1 & a_{32} & \dots & a_{n2} \\ 1/a_{31} & 1/a_{32} & 1 & \dots & a_{n3} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ 1/a_{n1} & 1/a_{n2} & 1/a_{n3} & \dots & 1 \end{bmatrix} \quad (3.1)$$

When the binary comparison matrix is generated, the significance scale developed by Saaty (1990) is used to determine the relative superiorities. The scale is shown in Table 3.1 and takes values between 1-9. It is sufficient for binary benchmark comparisons to be made for values above the diagonal of all the values of the comparison matrix. For those under the diagonal, $a_{ji} = 1 / a_{ij}$ is used.

Table 3.1: AHP severity scale

Value	Definition
1	Equal importance
3	Moderate importance
5	Strong importance
7	Very strong or demonstrated importance
9	Extreme importance
2, 4, 6, 8	Intermediate values

Source: Saaty, T. L., 1990. How to Make A Decision: The Analytic Hierarchy Process. *European Journal of Operational Research*. **48**, p.15.

Step 3: Calculate the significance vector using binary comparative matrices. The significance vector showing the importance of each component relative to the other component is calculated using the formula (3.2). The importance vector (W) refers to the importance weights of the criteria.

$$W_i = \frac{\sum_{j=1}^n a_{ij} w_{ij}}{n} \quad (3.2)$$

Step 4: In the comparisons made by the decision-maker where consistency is measured. Consistency ratio (CR), less than 0,10 value is an indicator of consistency. When the CR value is greater than 0.10, comparisons are called inconsistent and comparisons are reviewed. The CR value is calculated using the formula (3.3). The CR value is obtained by dividing the consistency index (CI) by the random index (RI). Roughness index data are given in Table 3.2. The biggest eigenvalue seen in equality; n refers to the number of criteria. The largest eigenvalue is the largest of the vector values resulting from the multiplication of the vector A with the vector W and dividing the resulting vector by the w values (Cheng and Li 2001, p. 34).

$$CR = \frac{CI}{RI} ; CI = \frac{\lambda_{max} - n}{n-1} ; CR = \frac{\lambda_{max} - n}{(n-1)*RI} \quad (3.3)$$

Table 3.2: Ramdonness index data

n	1	2	3	4	5	6	7	8	9	10
RI	0	0	0,58	0,9	1,12	1,24	1,32	1,41	1,45	1,49

Source: Saaty, T.L., 1980. *The Analytic Hierarchy Process*. McGraw-Hill, New York.

Step 5: The first four steps are calculated for the whole hierarchical structure. Weighted points of alternatives are calculated. The scores of the decision alternatives are compared and sorted. The alternative with the highest score is determined as the most suitable alternative.

3.2 THE POSSIBILITY OF USERS TO CONSIDER THE INNOVATIVE FEATURES OF THE PRODUCT WHEN CHOOSING A SMARTPHONE

It is aimed to prioritize innovative features in the selection of smart phones. For this reason, the survey was conducted by using AHP method.

3.2.1 Survey Content

The seven smart phones mentioned in the literature above have been identified as innovative features. These properties include water resistance (Flockett 2017), fingerprint recognition (Das 2015, Gonzalo 2018, Corcoran and Costache 2016), iris recognition (Das 2015, Elrefaei et al. 2018, Trokielewicz et al. 2015), Quick charge, dual camera (Sharma 2017, Ahmad et al. 2018) long battery life (Araujo et al. 2017, Kekolahti et al. 2016) and large internal storage (Ware 2018).

A comparative AHP questionnaire was prepared using these features. 150 surveys sent and 112 turned back and turn back ratio was approximately 0.75.

3.2.1.1 Demographic Results

A comparative AHP questionnaire was prepared using these features. 150 surveys sent and 112 turned back and turn back ratio was approximately 0.75.

When we examined the respondents, it was seen that 56 percent were male and 44 percent were female., this is shown in Figure 3.1.

When we analyse the age range of the respondents 10 percent is between 18-25, 53 percent is between 26-35 years old, 28 percent is between 36-44 years old and 9 percent is over 45 years old which is shown in Figure 3.2. The age range was 26-35 years old with the highest participation rate.

Figure 3.1: Percentage of gender

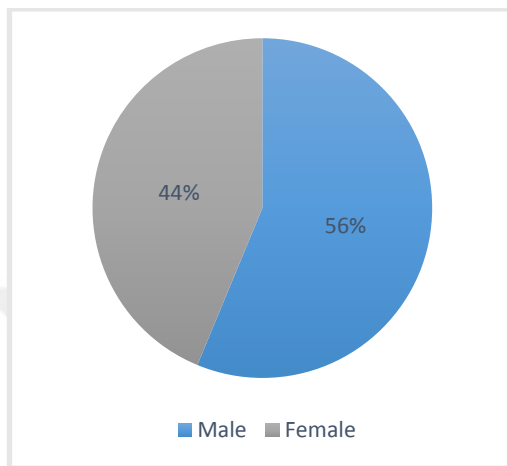
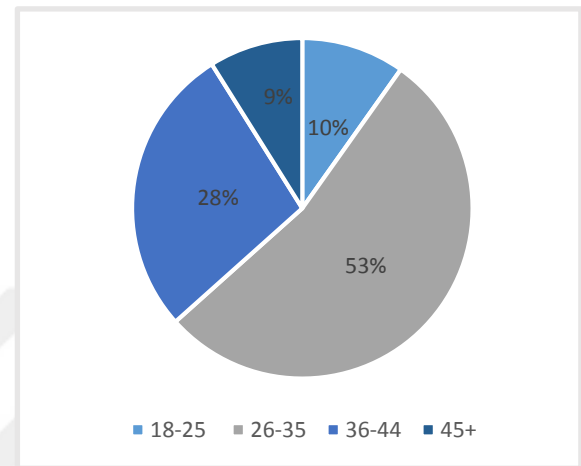


Figure 3.2: Percentage of age range



If the marital status is examined, 65 percent of the respondents are married and 35 percent of them are single, this is shown in Figure 3.3.

As shown in Figure 3.4, the education level of the respondents are as follows: 65 percent of bachelor degree, 24 percent of master degree, 5 percent of doctorate degree, 5 percent of high school degree and 1 percent of associate degree.

Figure 3.3: Percentage of marital status

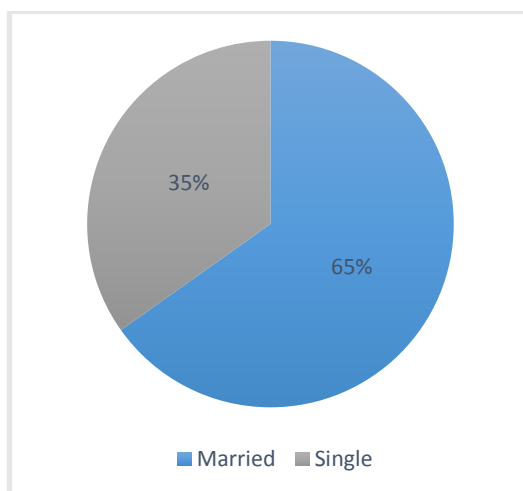
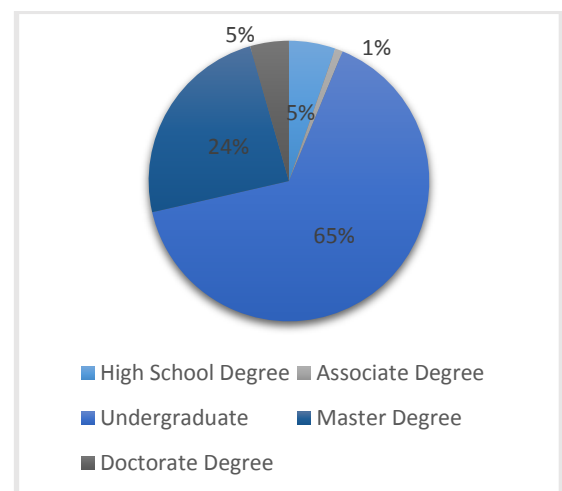


Figure 3.4: Percentage of education level



4. RESULTS

4.1 OUTCOME OF THE RESEARCH

The purpose of the study is to determine which innovative features are prioritized by users when choosing a smartphone. The study was carried out on the seven innovative features mentioned previously.

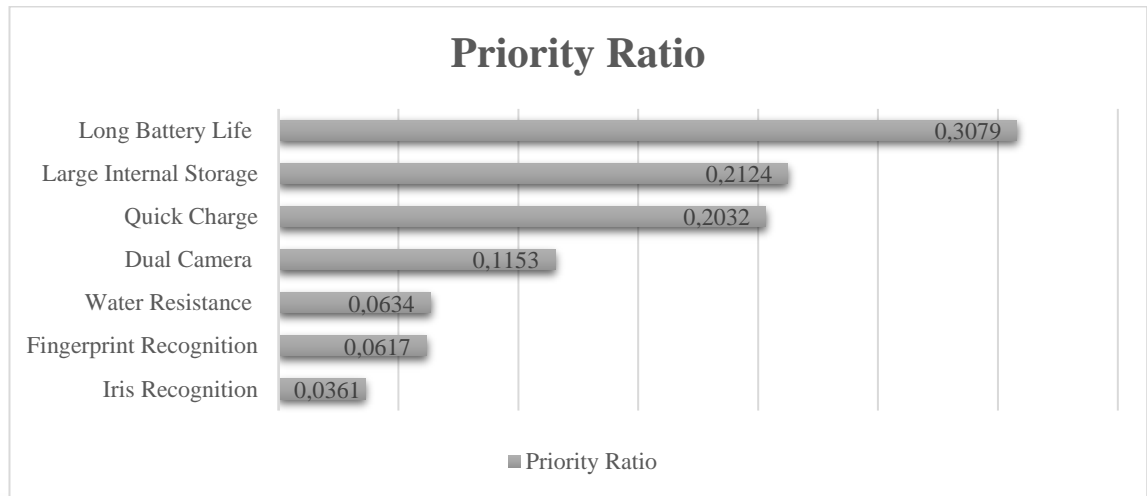
In the study, priority ratios of innovative smart phone features were determined by using AHP method. Consistency calculation was performed for 112 surveys. According to the consistency calculation, it was decided to evaluate 50 questionnaires. Priority table was created by using AHP method for these 50 questionnaires. The priority order of these ratios is given in Table 4.1.

Table 4.1: Priorities of innovative smartphone features

	1	2	3	4	5	6	7	Priorities
1	0,05742	0,08054	0,0890	0,0515	0,05479	0,06371	0,04699	0,0634
2	0,04503	0,06316	0,0756	0,0584	0,05374	0,07823	0,05754	0,0617
3	0,02488	0,03223	0,0386	0,0352	0,03509	0,05121	0,03584	0,0361
4	0,21735	0,21065	0,2133	0,1949	0,22165	0,19076	0,17378	0,2032
5	0,11712	0,13073	0,1228	0,1026	0,11174	0,11961	0,10236	0,1153
6	0,29464	0,26391	0,2462	0,3339	0,30541	0,32689	0,38418	0,3079
7	0,24357	0,21878	0,2145	0,2235	0,21758	0,16959	0,19931	0,2124

The following chart has been created on the basis of properties according to this priority order:

Figure 4.1: Priority ratio of innovative smartphone features



According to AHP method, among the 112 surveyed participants, the highest priority was the Long Battery Life which was the sixth criterion with “0.30788” value. In fact, this result coincides with the opinion of Kekolahti. According to Kekolahti, the most important criteria, the Long Battery Life, has been one of the most frequently mentioned characteristics (Kekolahti et al. 2016). Technology and smartphones take a lot of time in these days, one of the biggest problems is the quick end of charging. And according to the result of this survey, the most needed feature of the users is the Long Battery Life.

The second priority was the Large Internal Storage, which is the seventh criterion with a value of “0.2124”. According to Ware, the amount of internal storage is usually one of the few key factors that influence the decision to purchase one phone with another (Ware 2018).

The lowest priority ratio is “0.03615”, which is the third criterion of Iris Recognition technology. In fact, when we examine the literature, it was stated that biometric features were used to make life easier for the users and to ensure safety (Das 2015, p. 6). One of the low priority rates is fingerprint technology with a ratio of "0.0617". However, according to Gonzalo, fingerprint technology finds solutions to the problem of security and password (Gonzalo 2018). When an increasing number of consumers start using technology more closely, fingerprint technology and eye recognition technology will

become more common over time (Corcoran and Costache 2016, p. 71). In addition, there may be no awareness of these technologies.



5. CONCLUSION AND DISCUSSION

Innovation is introducing a new product to the market or developing an existing product. Innovation usually means renovating, changing or creating more efficient processes, products or ways. For businesses, applying new ideas, creating dynamic products or improving existing services.

Creativity is the same as looking at other people, but seeing what is different. Just as creativity is about the process of creating new ideas, innovation is the process of transforming these new ideas into goods and services. Innovation originates from creativity. Creativity and innovation are not the same thing. Creativity is the first step in innovation. The result of creativity is an idea that can or can not be applied. But innovation is a process that starts at the first exit and results in creating value for the customer. From past to present, innovations have been made in every field with innovative ideas. Innovation is finding something new and making it more useful and usable with something new.

There is a strong link between science and technology. Scientific knowledge leads to the production of new technologies. In contrast, science uses technologies to produce new information. There is a similar relationship between innovation and technology. Innovative developments take the role of locomotive in the development of technology. Companies that can meet the needs, demands and expectations of their customers and keep up with the developing innovations of the day are much more successful than those who are not active in this field.

Smartphone companies, which are among the most popular devices of our time, have to give importance to innovation and technology. Some of the telecom companies that do not give importance to this are almost disappearing as they cannot foresee the trend in our age. In order to exist in this competition, they must follow the innovation on their smartphones. In addition to the option of expanding the pricing strategies of mobile phone manufacturers, it can be said that the most sensible option to convince consumers to renew their phones is to make new products attractive with innovations.

In view of these reasons, in this study, the prioritization of innovative features in smart phones was conducted. A questionnaire was applied to 112 people who agreed to participate in the research. Analytical hierarchy process was applied as a method. The survey questions consisted of demographic questions and participants' encountering innovative features in smartphones.

A total of 112 people answered the questionnaire and 63 were male and 49 were female. 11 of the participants were between 18-25 years old, 60 were between 26-35, 31 were 36-44 and 10 were over 45 years old. If the marital status is examined, 73 of them are married and 39 of them are single. The educational level of the participants were 6 high school degree, 1 associate degree, 73 bachelor degree, 27 master degree and 5 doctorate degrees.

According to the results obtained from the research, the highest priority was identified as Long Battery Life. In fact, there has not been a lot of surprise. When the literature and the trends of the individuals are examined, it is estimated that this feature will emerge at the top. According to Kekolahti (2016), price, brand, design (including elements such as size and weight), camera, screen size and battery life were the most frequently mentioned features in the surveys conducted in the years of 2002-2012. Because the charge of smartphones that we use today, ends very quickly. This can be explained by the fact that the most preferred feature is the Long Battery Life.

Long battery life is followed by large internal storage. A phone, especially if there is no increase in memory support, can be insufficient according to usage habits. This increases the need for large internal storage. In the literature, the amount of internal storage is often mentioned as one of the few important factors that influence the decision to buy one phone from another.

In addition, according to the results obtained from the case study, the Iris Recognition feature turned to be the least important for the consumers. Despite of this feature being among the most innovative ones, it hasn't been identified as the most desirable by the participants, which is an interesting fact. In the same way, Fingerprint Technology is also in the last place. Both features are evaluated in terms of biometric features. As mentioned in the literature, these features, which are important for users both in terms of convenience and security, are not known by users and are not adopted. But they will be used much more in the future.

In terms of managerial implications, smartphones and telecom companies are looking for a variety of ways to sell smartphones. While doing that, they should diversify their innovative characteristics, as demonstrated by this study. According to the findings of this study, important innovations, especially regarding the battery, will affect the purchasing decision of the customers positively. In addition, the lowest priority eye recognition and fingerprint technology can be explained to the customers. It can be mentioned about the features that increase security and eliminate the problem of password recall. For this reason, biometric features can be ranked first in the priority ranking when customers' awareness is increased.

In the light of this study, when other studies in the literature are examined, it is seen that many studies have been done to determine the criteria of smartphone selection. In these studies, it was seen that there is no focus on innovative smart phone features directly. In this respect, this study differs according to other studies on this subject in literature.

To mention the limitations in this study, the survey was conducted in Turkey and respondents are Turkish citizens. If the study is conducted with participants from other countries, different results may be achieved due to cultural differences. Another limitation is that detailed information should be given to respondents to the questionnaire to understand the content of the questionnaire. Since the Analytical Hierarchy Process was applied in this study, the scope of the sample was kept a little narrower. To avoid the misunderstanding about the questionnaire structure the required information is given to the each respondent.

As a suggestion for future studies, the sample of people to be surveyed can be increased. Seven features can be reproduced by adding more features. Another decision-making method can be applied instead of the AHP method.

REFERENCES

Books

- Ahmed, P. K. and Shepherd C. D., 2010. *Innovation Management Context, Strategies, Systems And Processes*. Great Britain: Pearson Education Limited.
- Afuah, A., 2003. *Innovation Management*. 2nd edn. New York: Oxford University Press.
- Aktan, C.C., 2001. *Kamu Ekonomisi ve Kamu Maliyesi*. İzmir: Anadolu Matbaacılık.
- Arıöz, A., 2005. *Telekomünikasyon Sektöründe Serbestleşme Süreci*. Ankara: Rekabet Kurumu.
- Atik, H., 2005. *Yenilik ve ulusal rekabet gücü*. Ankara: Detay Yayıncılık.
- Ayhan, A., 2002. *Dünden Bugüne Türkiye'de Bilim-Teknoloji ve Geleceğin Teknolojileri*. İstanbul: Beta Yayınları.
- Barker, A., 2002. Yenilikçiliğin simyası. A. Kardam, (Trans.), İstanbul: Mess Yayın. (Original work published 2001).
- Betz, F., 2010. *Teknolojik yenilik yöntemi: Değişimle gelen rekabet avantajı*. P. Güran, (Trans.), Ankara: TÜBİTAK Popüler Bilim Kitapları. (Original work published 2003).
- Das, R., 2015. *Biometric Technology: Authentication, biocryptography, and cloud-based architecture*. New York: Taylor & Francis Group, LLC.
- Dictionary of Business, 2002. . 3rd edn, New York: Oxford University Pres.
- Dodd, A. Z., 2012. *The essential guide to telecommunications*. 5th edn. New Jersey: Prentice Hall.
- Dussauge, P., Hart, S. & Ramanantsoa, B., 1992. *Strategic Technology Management*., Chichester: John Wiley & Sons, p. 6.
- Ekerkil, V., 2006. *Telekomünikasyon sektöründe maliyetleme ve maliyete dayalı fiyatlandırma yaklaşımları: Türk Telekomünikasyon A. Ş. için bir model önerisi*. Eskişehir: Anadolu Üniversitesi Yayınları.

- Elçi, Ş., 2007. *İnovasyon Kalkınmanın ve Rekabetin Anahtarı*. 2nd edn. İstanbul: Tecnopolisgrup
- Fisk, P., 2011. *Yaratıcı Deha*. N. Özata, (Trans.), İstanbul: Kapital Medya Hizmetleri (Original work published 2010).
- Freeman, C., 1982. *The Economics of Industrial Innovation*. 2nd edn. Cambridge: MIT Press.
- Guilford, J. P., 1987. *Creativity research: Past, present and future*. In S. G. Isaksen (Ed.), *Frontiers of creativity research: Beyond the basics* Buffalo, NY: Bearly, pp. 33-65.
- Günaydın, H., 2011. *Yaratıcı Yönetim*. İstanbul: IQ Kültür Sanat Yayıncılık.
- İçöz, Ö., 2003. *Telekomünikasyon sektöründe regülasyon ve rekabet*. Ankara: Rekabet Kurumu Yayınları.
- Keskin, S., 2012. *İnovasyon Nasıl Yapılır?*. İstanbul: Mavi Yayınları.
- Kılıç, M. and Bilginoğlu, B., 2010. *İhracatçı Türk firmalarında personel sağlama ve seçme yöntemleri ve inovasyon performansı ilişkisi: Orta anadolu ihracatçı birlikleri örneği*. Ankara: Sosyoekonomi.
- Kırım, A., 2006. *Karlı Büyümenin Reçetesi İnovasyon*. 1st edn. Ankara:Sistem Yayıncılık.
- Link, A. N., and Siegel, D. S., 2007. *Innovation, Entrepreneurship and Technological Change*. New York: Oxford University Press Inc.
- Lowe, P., 1995. *The management of technology : Perception and opportunitics*. London: Chapman & Hall, p. 6.
- Marangoz, M., 2012. *Girişimcilik*. İstanbul: Beta Yayınları.
- Saaty, T.L., 1980. *The Analytic Hierarchy Process*. McGraw-Hill, New York.
- Satı, Z. E., 2013. *İnovasyonu yönetmede kesitler – Bilgi yönetimi, AR – GE, marka yönetimi, stratejik yönetim*, Ankara: Nobel Akamedik Yayıncılık Eğitim Danışmanlık Tic. Ltd. Şti.
- Schumpeter, J. A., 1934. *The Theory of Economic Development*, Harvard University Press, Cambridge: Mass.

Torrance, E. P., 1974. *Torrance tests of creative thinking: Norms and technical manual*, Scholastic Testing Press, Bensenville, IL.

Uzkurt, C., 2008. *Pazarlamada deęer yaratma aracı olarak yenilik yönetimi ve yenilikçi örgüt kültürü*. İstanbul: Beta Yayınları.



Periodicals

- Aktamış, H., & Ergin, Ö., 2006. Fen eğitim ve yaratıcılık. *Dokuz Eylül Üniversitesi Buca Eğitim Fakültesi Dergisi*. **20**, pp. 77–83
- Alegre, J., Lapiedra, R. and Chiva, R., 2006. A measurement scale for product innovation performance. *European Journal of Innovation Management*, **9** (4), pp. 333–346.
- Al-Fuqaha, A., Guizani, M., Mohammadi, M., Aledhari, M., and Ayyash M., 2015. *IEEE Communication Surveys & Tutorials*. **17** (4), pp. 2347-2376.
- Aral, N., 2004. Çocukta yaratıcılığın gelişimi. *Çoluk Çocuk Dergisi*. **36**, pp. 23-24
- Atalay, M., Anafarta, N. and Sarvan, F., 2013. The relationship between innovation and firm performance: An empirical evidence from Turkish automotive supplier industry. *Procedia-Social and Behavioral Sciences*. **75**, pp. 226-235.
- Auken V. H., Madrid-Guijarro, A. and Garcia-Perez-de-Lema G., 2008. Innovation and Performance in Spanish Manufacturing SMEs. *International Journal of Entrepreneurship and Innovation Management*. **8** (1), pp. 36-56.
- Aydın, Ö., Öznehir, S., Akcalı, E., 2009. Ankara İçin Optimal Hastane Yeri Seçiminin Analitik Hiyerarşi Süreci ile Modellenmesi. *Süleyman Demirel Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*. **14** (2), pp. 69-86.
- Balta-Ozkan, N., Davidson, R., Bicket, M. and Whitmarsh, L., 2013. The development of smart homes market in the UK. *Energy*. **60**, pp. 361-372.
- Bazzazi, A., Osanloo, M., and Karimi, B. 2011. Deriving Preference Order of Open Pit Mines Equipment Through MADM Methods: Application of Modified VIKOR Method. *Expert Systems with Applications*. **38** (3), pp. 2550-2556.
- Birasnav, M. & Albufsala, M. & Bader, Y., 2013. The role of transformational leadership and knowledge management processes on predicting product and process innovation: An empirical study developed in Kingdom of Bahrain. *Review of Applied Management Studies*. **11**, p. 64-75.

- Brauers, W. K. M. and Zavadskas, E. K., 2006. The MOORA Method and its Application to Privatization in a Transition Economy. *Control and Cybernetics, Systems Research Institute of the Polish Academy of Sciences*. **35** (2), p. 445–469.
- Bulun, M., Gülnar, B., & Güran, M. S., 2004. Eğitimde mobil teknolojiler. *Turkish Online Journal of Educational Technology*. **3** (2), pp. 165-169.
- Burmaoğlu, S. and Şeşen, H., 2012. Türk Firmalarının organizasyonel inovasyon yeteneğini etkileyen faktörler. *Ankara Üniversitesi SBF Dergisi*. **26** (2).
- Bursa Ticaret ve Sanayi Odası (BTSO), 2007. İnovasyon Nedir ve Şirketlere Ne Getirir. *BTSO Etüd ve Ar-Ge*.
- Chatterjee, P., Athawale, V. M., and Chakraborty, S., 2010. Selection of Industrial Robots Using Compromise Ranking and Outranking Methods. *Robotics and Computer-Integrated Manufacturing*. **26** (5), pp. 483-489.
- Cheng, E.W.L. and Li, H., 2001. Analytic Hierarchy Process An Approach to Determine Measures For Business Performance. *Measuring Business Excellence*. **5**, pp. 30-36.
- Coşkun, S., Kılınç, İ. and Mesci M., 2013. Stratejik rekabet üstünlüğü sağlama aracı olarak inovasyon stratejileri: Kocaeli otel işletmeleri üzerine bir araştırma. *Abant İzzet Baysal Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*. **13** (2), pp. 101-132.
- Coulson, S., 2018. Water resistance will democratise the mobile phone industry. *Electronics World*. **124** (1979), pp. 38-39.
- Çakır, F. & Demir, B. N., 2014. Üniversite öğrencilerinin akıllı telefon satın alma tercihlerini belirlemeye yönelik bir araştırma. *Dokuz Eylül Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*. **29** (1), pp. 213-243.
- Damanpour, F., Walker, R.M. and Avellaneda, C.N., (2009). Combinative effects of innovation types and organizational performance: A longitudinal study of service organizations. *Journal of Management Studies*. **46**(4), pp. 650-75.
- Daşkiran, L., 2012. PC'lerden sonraki çağın başlangıcı: Tablet bilgisayarlar. *Bilim ve Teknik Dergisi*. **5** (535), pp. 48-55.
- Deniz, M., 2008. Kobilerde Yenilik, Yenilik Stratejileri ve Bir Uygulama. *SÜ İİBF Sosyal ve Ekonomik Araştırmalar Dergisi*, p. 141-175.

- Despa, M. L., 2014. Evolution and trends regarding the concepts of innovation and invention. *Informatica Economica*. **18** (1), pp. 139-151.
- Dodgson, M., 1989. Generating technological innovation : E.B. Roberts (Ed.), (Oxford University Press, 1987) pp. 299. Research Policy, Elsevier, **18**(5), pp. 305-306.
- Edison, H., Nauman B. A., & Richard, T., 2013. Towards innovation measurement in the software industry. *Journal of Systems and Software*. **86** (5), pp. 1390-1407.
- Eke, E., 2010. Türk telekomünikasyon sektöründe serbestleşme. *Süleyman Demirel Üniversitesi, Vizyoner Dergisi*. **2** (1), p. 85.
- Eleren, A., 2007. Markaların Tüketici tercih kriterlerine göre analitik hiyerarşi süreci yöntemi ile değerlendirilmesi: Beyaz eşya sektöründe bir uygulama. *Yönetim ve Ekonomi*. **14** (2), p. 51.
- Elrefaei, L. A., Hamid, D. H., Bayazed, A. A., Bushnak, S. S. & Maasher, S. Y., 2018. Developing iris recognition system for smartphone security. *Multimedia Tools and Applications*. **77** (12), pp. 14579–14603.
- Erdem, B., Gökdeniz, A. and Met, Ö., 2011. Yenilikçilik ve İşletme Performansı İlişkisi: Antalya’da Etkinlik Gösteren 5 Yıldızlı Otel İşletmeleri Örneği. *Dokuz Eylül Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*. **26**(2), pp. 77-112
- Ersoy, B.A. and Şengül, C. M., 2008. Yenilikçiliğe yönelik devlet uygulamaları ve AB karşılaştırması. *Yönetim ve Ekonomi*. **15** (1), pp. 59-74.
- Fialova, V. and Hronova, P., 2016. Innovation Within The Moravskoslezský Region – Small And Medium Sized Enterprises. *International Journal of Entrepreneurial Knowledge*. **4** (1), pp. 30-39.
- Gandotra, N. K., 2010. Innovation culture for sustainable competitive advantage. *Asia Pacific Journal of Research in Business Management*. **1** (2), pp. 51-59.
- Gonzalo, R. B., Reillo, R. S., Jimenez, J. L. And Redondo, C. S., 2018. Attack Potential Evaluation in Desktop and Smartphone Fingerprint Sensors: Can They Be Attacked by Anyone? *The University Group for Identification Technologies, Carlos III University of Madrid, Hindawi*. p.1

- Gökçe, N. and Tellioglu, T., 2013. AR-GE giderlerinin kayıtlanması ve raporlanması. *Afyon Kocatepe Üniversitesi İ.İ.B.F. Dergisi*. **15** (1), pp.121-132.
- Gubbi, J., Buyya, R., Marusic, S., and Palaniswami, M., 2013. Internet of things (IoT): A vision, architectural elements, and future directions. *Future Generation Computer Systems*. **29** (7), pp. 1645-1660.
- Güvel, E.A. and Aytun, C., 2013. Telekomünikasyon Altyapısı ve Ekonomik Büyüme: Farklı Gelir Grupları Üzerine Bir Uygulama. *Business and Economics Research Journal*. **4** (3), pp. 1-20.
- Hillerman T., Souza J. C. F., Reis A. C. B., and Carvalho R. N., 2017. Applying Clustering and AHP Methods for Evaluating Suspect Healthcare Claims. *Journal of Computational Science*. **19**, pp. 97- 111.
- Ilori, A. B., Lawal, A. and Simeon-Oke, O. O., 2017. Innovations and innovation capability in palm kernel processing industry in southwestern Nigeria. *International Journal of Innovation Science*. **9** (1), pp. 102–114.
- İşler, A. Ş., & Bilgin, A., 2002. Eğitim fakültesi sınıf öğretmenliği adaylarının yaratıcılık hakkındaki düşünceleri. *Uludağ Üniversitesi Eğitim Fakültesi Dergisi*. **15**(1), pp. 133-152.
- Karaarslan, İ. A., Budak, L., 2012. Üniversite öğrencilerinin cep telefonu özelliklerini kullanımlarının ve gündelik iletişimlerine etkisinin araştırılması. *Journal of Yaşar University*. **26** (7), pp. 4548-4571.
- Karaaslan, A. and Tuncer, G., 2010. Uluslararası rekabet gücünün artırılmasında temel devlet politikaları. *Dumlupınar Üniversitesi Sosyal Bilimler Dergisi*. **1** (26), pp. 23-45.
- Korkmaz, T. and Uygurtürk, H., 2012. Finansal Performansın TOPSIS Çok Kriterli Karar Verme Yöntemi İle Belirlenmesi: Ana Metal Sanayi İşletmeleri Üzerine Bir Uygulama. *Eskişehir Osmangazi Üniversitesi İİBF Dergisi*. (7), pp. 95-115.
- McLean, L. D., 2005. Organizational culture's influence on creativity and innovation: A review of the literature and implications for human resource development. *Advances in Developing Human Resources*. **7** (2), pp. 226-246.

- Monjezi, M., Dehghani, H., Singh, T.N., Sayadi, A.R. and Gholinejad, A., 2010. Application of TOPSIS method for selecting the most appropriate blast design. *Arabian Journal of Geoscience*. **5** (1), pp. 95-101.
- Özer, M. and Çiftçi, N., 2009. Ar-Ge Harcamaları ve İhracat İlişkisi: OECD Ülkeleri Panel Veri Analizi. *Dumlupınar Üniversitesi Sosyal Bilimler Dergisi*. (23), pp. 39-49.
- Özbek, V., Alnıacık, Ü., Fatih, K., Akkılıç, M. E. and Eda, K., 2014. Kişilik özelliklerinin teknoloji kabulü üzerindeki doğrudan ve dolaylı etkileri: Akıllı telefon teknolojileri üzerine bir araştırma. *International Review of Economics and Management*. **2** (1), pp. 36-57.
- Özkoçak, Y., 2016. Türkiye’de akıllı telefon kullanıcılarının oyalanma amaçlı tercih ettikleri mobil uygulamalar. *Global Media Journal TR Edition*. **6** (12), pp. 106-130.
- Porter, M., 1990. The Competitive Advantage of Nations. *Harvard Business Review*. March-April.
- Saaty, T. L., 1990. How to Make A Decision: The Analytic Hierarchy Process. *European Journal of Operational Research*. **48**, pp. 9-26.
- Saaty, R. W., 1987. The analytic hierarchy process-what it is and how it is used. *Mathematical Modelling*. **9** (3-5), pp. 161-176.
- Saaty T. L., 2008. Decision Making with The Analytic Hierarchy Process. *Int. J. Services Sciences*. **1** (1), pp. 83-98.
- Satı., Z. E. and Işık, Ö., 2011. İnovasyon ve Stratejik Yönetim Sinerjisi: Stratejik İnovasyon. *CBÜ Sosyal Bilimler Dergisi*. **9** (2), pp. 538-559.
- Sayadi, M.K., Heydari, M., and Shahanaghi, K., 2009. Extention of VIKOR Method for Decision Making Problem with Interval Numbers. *Applied Mathematical Modelling*. **33** (5), pp. 2257-2262
- Schulzrinne, H., Xiaotao, W., Sidiroglou, S., and Berger, S., 2003. Ubiquitous computing in home networks. *IEEE Communication Magazine*. **41** (11), pp. 128-135.

- Sharma, A., 2017. Looking beyond dual cameras in smartphones. *PC Quest*. **30** (5), p.8.
- Shefer, D. and Frenkel, A., 2005. R&D, Firm Size and Innovation: An Empirical Analysis. *Technovation*. **25** (1), pp. 25-32.
- Shyjith, K., Ilangkumaran, M. and Kumanan, S., 2008. Multi-criteria decision-making approach to evaluate optimum maintenance strategy in textile industry. *Journal of Quality in Maintenance Engineering*, **14** (4), p. 375-386.
- Tavassoli, S. and Karlsson, C., 2015. Persistence of various types of innovation analyzed and explained. *Research Policy*, **44** (10), pp. 1887-1901.
- Terziođlu, M., 2008. İşletmelerde İnovasyon Yeteneđi: Denizli Tekstil Sektörü Örneđi. *Çukurova Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, **17** (3).
- Türedi, S., 2013. Bilgi ve İletişim Teknolojilerinin Ekonomik Büyümeye Etkisi:Gelişmiş ve Gelişmekte Olan Ülkeler İçin Panel Veri Analizi. *Gümüşhane Üniversitesi Sosyal Bilimler Ekonomik Dergisi*. **7**, pp. 298- 322
- Uzkurt, C., 2010. İnovasyon Yönetimi: İnovasyon Nedir, Nasıl Yapılır ve Nasıl Pazarlanır. *Asobilgi*. Ankara: Ankara Sanayi Odası Yayın Organı. **39**, pp. 41-42.
- Yıldız, F., 2014. Türkiye’de telekomünikasyon sektörüne yönelik vergisel düzenlemelerin değerlendirilmesi. *Dumlupınar Üniversitesi Sosyal Bilimler Dergisi*. **1** (39), pp. 311-326.
- Yılmaz, H., 2004. Akıllı ev’in dünyadaki ve Türkiye’deki yeri. *Best Dergisi*. (38).
- Zanella, A. and Vangelista, L., 2014. Internet of things for smart cities. *IEEE Internet Things Journal*. 1(1), pp. 22–32.
- Zavadskas, E., K. and Turksis, Z., 2010. A New Additive Ratio Assessment (ARAS) Method in Multicriteria decision-making. *Technological and Economic Development of Economy*. 16 (2), pp. 159-172.
- Zerenler, M., Türker, N. and Şahin, E., 2007. Küresel teknoloji, araştırma-geliştirme (Ar-Ge) ve yenilik ilişkisi. *Selçuk Üniversitesi Sosyal ve Ekonomik Araştırmalar Dergisi*. (17), pp. 659-660.

Other Sources

- Ada, S., Tatlı, H., 2012. Akıllı telefon kullanımını etkileyen faktörler üzerine bir araştırma. *Thesis for the B.A. degree*. Kahramanmaraş: Sütçü İmam University Faculty of Economics and Administrative Sciences.
- Afşar, Y., 2017. Türkiye’de telekomünikasyonun gelişimi ve talebinin ARDL yaklaşımı ile analizi. *Thesis for the M.A. degree*. Eskişehir: Eskişehir Anadolu University, Institute of Science and Technology.
- Ahmad, W., Ahmad, T. and Ahmad, B., 2018. Pricing of mobile phone attributes at the retail level in a developing country: Hedonic analysis. <https://www.sciencedirect.com/science/article/abs/pii/S0308596118301629?via%3Dihub>. [accessed 11 January 2018]
- Akyos, M., 2006. Firma düzeyinde yenilikçilik (Yenilik) ve bilgi yönetimi. http://www.sistems.org/know_info1.htm. [accessed 15 October 2018].
- Araujo, J., Matos, R., Conceição, V., Alves, G. And Maciel, P., 2017. Impact of capacity and discharging rate on battery life time: A stochastic model to support mobile device autonomy planning. *Pervasive and Mobile Computing*, [online], **39**, pp. 180-194.
- Ashton, K., 2009. That ‘internet of things’ thing [online]. RFID Journal, <http://www.rfidjournal.com/articles/view?4986>. [accessed 5 September 2018].
- Aslan, A., 2014. Akıllı ev kavramı ve otomasyon sistemleri. *Thesis for the M.A. degree*. İstanbul: Haliç University, Institute of Science and Technology.
- Avea, 2017. [Online] www.avea.com.tr. [accessed 20 April 2017].
- Baykal, B., 2007. İnovasyon ve Sürdürülebilir Kalkınma İlişkisi: Türkiye. *Thesis for the M.A. degree*. İstanbul: Marmara University, Institute of Social Sciences.
- Bilgi Teknolojileri ve İletişim Kurumu (BTK), 2018. *Pazar Verileri Raporu*. Ankara
- Bilgi Teknolojileri ve İletişim Kurumu (BTK), 2018. Pazar Verileri Raporu [online]. <https://www.btk.gov.tr/uploads/pages/pazar-verileri/2018-2ceyrekraporu.pdf>. [accessed 5 July 2018]

- Bilgi Teknolojileri ve İletişim Kurumu (BTK), 2017. [Online] www.btk.gov.tr. [accessed 20 April 2017].
- Bilgi Teknolojileri ve İletişim Kurumu (BTK), 2017. Türkiye elektronik haberleşme sektörü üç aylık pazar verileri raporu 2017 Yılı 4. Çeyrek [online]. , <https://www.btk.gov.tr/uploads/pages/2017-q4.pdf>. [accessed 8 May 2018].
- Bonnington, C., 2015. The tablets that paved the way for the iPad [online]. Wired, <https://www.wired.com/2015/01/history-of-tablets/>. [accessed 23 December2017].
- Böbrek, A., 2011. Sabit Ve Gsm Telefon Kullanıcılarının Memnuniyet Düzeylerini Belirleyen Faktörler Üzerine Bir Araştırma. *Thesis for the M.A. degree*. Isparta: Süleyman Demirel University, Institute of Social Sciences.
- Clair, DS., 2008. A study of innovation in collegiate business education, graduated school od education and psychology. *Thesis for PhD degree*. USA: Pepperdine University.
- Corcoran, P. and Costache, C., 2016. Biometric Technology and smartphones. *IEEE Consumer Electronics Magazine*, [online] 8 April 2016, <https://ieeexplore.ieee.org/document/7439439>. [accessed 18 November 2018].
- Deloitte, 2018. A new era of connectivity is on the horizon, <https://www2.deloitte.com/us/en/pages/technology-media-and-telecommunications/articles/telecommunications-industry-outlook.html> [accessed 19 November 2018], pp. 2-3.
- Devrez, G., 1970. İşletmelerde araştırma ve geliştirme fonksiyonu. *A.Ü. SBF Dergisi*, [online], 25(4), pp. 234-286. http://www.politics.ankara.edu.tr/dergi/pdf/25/4/9_Guney_Devrez.pdf. [accessed 7 January 2018].
- Ersan, G., 2011. Türkiye'nin Rekabet Gücünün Ve İnovasyon Performansının OECD ve AB Ülkeleri İçerisinde İyi Örnekler Oluşturan Ülkeler İle Karşılaştırılması. *Thesis for the M.A. degree*. Gebze: Gebze Yüksek Teknoloji Enstitüsü, Institute of Social Sciences.
- Flockett, A., 2017. One for all: water resistance in the mobile industry [online]. P2i Marketing, <https://www.p2i.com/blog/2017/05/25/one-for-all-water-resistance-in-the-mobile-industry/>. [accessed 12 November 2018].

- Gartner, 2018. *Gartner Says Worldwide Sales of Smartphones Returned to Growth in First Quarter of 2018*. May. Egham, UK.
- Güçül, N. G., 2008. Akıllı ev sistemleri ve uygulaması. *Thesis for the M.A. degree*. Ankara: Gazi University, Institute of Science and Technology.
- Gül, F., 2010. Akıllı ev sistemleri. *Thesis for the M.A. degree*. Ankara: Gazi University, Institute of Science and Technology.
- Güler, D., 2016. Analitik Hiyerarşi Yöntemi ve Coğrafi Bilgi Sistemleri İle Alternatif Katı Atık Düzenli Depolama Alanı Yer Seçimi: İstanbul İli Örneği. *Thesis for the M.A. degree*. İstanbul: İstanbul Teknik Üniversitesi, Institute of Science and Technology.
- Günay, D., 2017. İnovasyon, Teknoloji ve Bilim. 2. *Ar-Ge İnovasyon Zirvesi ve Sergisi*. İstanbul: MMG.
- Heriřçakar, E., 1999. Gemi Ana Makine Seçiminde Çok Kriterli Karar Verme Yöntemleri AHP ve SMART Uygulaması. *Gemi İnşaatı ve Teknolojisi Teknik Kongresi*. İstanbul, pp. 240-256
- Hill, S., 2018. How does fast charging work? Here's every single standard compared [online]. <https://www.digitaltrends.com/mobile/how-does-fast-charging-work/> . [accessed 11 January 2018].
- IDC., 2014. Worldwide smartphone shipments top one billion units for the first time, according to IDC [online]. <https://www.businesswire.com/news/home/20140127006506/en/Worldwide-Smartphone-Shipments-Top-Billion-Units-Time>. [accessed 10 October 2018].
- ITU., 2016. ICT facts and figures 2016 [online]. <https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2016.pdf> [accessed 29 August 2017].
- İleri, N., 2009. Telekomünikasyon hizmetlerinde fiyatlandırma stratejileri. *Thesis for the M.A. degree*. Ankara: Ankara University, Institute of Science and Technology.

- İsmail, N., 2017. How innovative technology is turning the tide for telecoms [online], <https://www.information-age.com/innovative-technology-turning-tide-telecoms-123469489/>. [accessed 19 November 2018].
- Kanber, S., 2010. İmalat sanayinde inovasyon: Sanayi kuruluşlarında inovasyon aktivitelerinin inovasyon performansı üzerindeki etkilerinin incelenmesi. *Thesis for the M.A. degree*. Adana: Çukurova University, Institute of Social Sciences.
- Kekolahti, P., Kilkki, K., Hämmäinen, H. And Riikonen, A., 2016. Features as predictors of phone popularity: An analysis of trends and structural breaks. *Telematics and Informatics*, [online]. **33** (4), <https://www.sciencedirect.com/science/article/abs/pii/S0736585316300740?via%3Dihub>. [accessed 11 January 2018].
- KPMG, 2010. Accounting Under IFRS: Telecoms. https://www.kpmg.de/docs/20100301_Telecom_Accounting_under_IFRS.pdf [accessed 29.04.2019].
- Kurbetçi, Z.E., Şen, N. and Başkan, B., 2003. Akıllı ev teknolojisi. *Elektrik-Elektronik-Bilgisayar Mühendisliği 10. Ulusal Kongresi ve Fuarı*. 18 October 2003 İstanbul, pp. 287-293.
- Kurt, A. [nd]. Türk Telekomünikasyon Sektörü ile Ülke Ekonomisindeki Gelişmeler Arasındaki İlişkinin Varlığı ve Boyutunun Ekonometrik Analizi. Telekomünikasyon Kurumu, 1-10.
- Kuş, M., 2011. Türk telekomünikasyon sektöründeki piyasa aksaklıkları ve bunların düzenlenmesi. *Thesis for the M.A. degree*. İstanbul: Marmara University, Institute of Social Sciences.
- Kutup, N., 2011. Nesnelerin İnterneti; 4H Her Yerden, Herkesle, Her Zaman, Her Nesne İle Bağlantı. 30 November – 2 December 2011 İzmir: XVI. Türkiye'de İnternet Konferansı inet-tr'11.
- Morgül, T., 2014. İnovasyon. *Thesis for the B.A. degree* Yalova: York University Turkey Representation Section Faculty of Business Administration.
- Motorola, 2018. [online] <https://www.motorola.com/us/TurboPower/turbopower.html> [accessed 11 December 2018].

- Murat, G. and Kulualp, H., 2008. Yöneticilerin Yeniden Yapılanma Sürecinde İnovasyona Bakış Açısı: Kardemir Örneği. *Thesis for the M.A. degree*. Kütahya: Dumlupınar University, Institute of Social Sciences.
- OECD, 2002. Bilimsel ve teknolojik faaliyetlerin ölçümü; Araştırma ve deneysel geliştirme taramaları için önerilen standart uygulama. Frascati Kılavuzu. https://www.tubitak.gov.tr/tubitak_content_files/BTYPD/kilavuzlar/frascati_tr.pdf. [accessed 27 January 2018].
- Oppo, 2018. [online] <http://www.oppo.com/en/technology/vooc/html> [accessed 11 December 2018].
- Oslo Manual, 2005. Yenilik verilerinin toplanması ve yorumlanması için ilkeler. OECD Avrupa Birliği, 3rd edn., pp.33-53, http://www.tubitak.gov.tr/tubitak_content_files/BTYPD/kilavuzlar/Oslo_3_TR.pdf. [accessed 5 April 2018].
- Perenson, J. M., 2012. New Ipad vs. Android tablets: Is it game over? . https://www.pcworld.com/article/251947/new_ipad_vs_android_tablets_is_it_game_over.html. [accessed 15 October 2018].
- Qualcomm, 2018. [online] <https://www.qualcomm.com/solutions/mobile-computing/features/quick-charge> [accessed 11 December 2018].
- T.C. Maliye Bakanlığı, 2005. *Yıllık Ekonomik Rapor*. Ekim. Ankara.
- Tezgiden, M., 2008. Ülkemizde planlı dönemde telekomünikasyon alanında yapılan düzenlemelerin sektöre etkisi. *Thesis for the M.A. degree*. Ankara: Bilgi Teknolojileri ve İletişim Kurumu.
- Topçuoğlu, A., 2004. Teknolojik değişimin genel ekonomik etkileri. *Thesis for the M.A. degree*. İstanbul: Marmara Üniversitesi, Institute of Social Sciences.
- Trokielewicz M, Bartuzi E, Michowska K, Andrzejewska A, and Selegat M., 2015. Exploring the feasibility of iris recognition for visible spectrum iris images obtained using smartphone camera [online]. <https://www.spiedigitallibrary.org/conference-proceedings-of-spie/9662/1/Exploring-the-feasibility-of-iris-recognition-for-visible-spectrum-iris/10.1117/12.2205913.short>. [accessed 10 January 2019].

Türk Dil Kurumu, 2018.

http://www.tdk.gov.tr/index.php?option=com_bts&view=bts&kategori1=verilst&ayn1=bas&kelime1=telekom%C3%BCnikasyon.

Ubak, 2017. [Online] www.ubak.gov.tr. [accessed 20 April 2017].

Vodafone, 2017. [Online] www.vodafone.com.tr. [accessed 20 April 2017]

Ware, R., 2018. Understanding Smartphone Storage, [online]. <https://www.lifewire.com/smartphone-buying-guides-577502>. [accessed 11 January 2018].

Yüksek, Y.S., 2015. Bilim teknolojileri ve değerler, fırsatlar ve riskler. *Medeniyet İnşası Türkiye Vizyonu Uluslararası Kongresi*. 05 November 2015 İstanbul.

APPENDICES



SURVEY

Aşağıda yer alan anket akıllı telefon seçiminde satın alma kararını etkileyen inovatif özelliklerden hangisinin tüketiciler için daha önemli olduğu kararının belirlenmesine yönelik Damla Vuranok tarafından Bahçeşehir Üniversitesi, Sosyal Bilimler Enstitüsü, İşletme Ana Bilim Dalı yüksek lisans tezi için yapılmaktadır.

Araştırma bilimsel bir nitelik taşıdığından bilgiler gizli tutulacaktır.

Katkılarınız için teşekkür ederim.

Katılımcı Bilgileri

Cinsiyet: K/E

Yaş:

Eğitim Durumu :

Medeni Hal:

Değerlendirme Kriterleri

Aşağıda belirtilen inovatif özellikleri karşılıklı olarak değerlendirerek önem derecesini işaretleyiniz.

Araştırma Sorusu: Sizce akıllı telefon satın alma kararına etki eden aşağıdaki inovatif özelliklerden hangisi daha önemlidir?

Örnek : İlk soru için sizce akıllı telefon satın alırken “Su Geçirmezlik”, “Parmak İzi teknolojisi” özelliğine göre daha önemli ise; sol tarafta yer alan skalayı kullanmanız gerekmektedir. Son derecede önemli ise “9”, orta derecede önemli ise; “3” değerini kullanabilirsiniz. Eşit derecede önemli ise herhangi bir kolonda “1” değerini kullanınız. Eğer “Parmak İzi teknolojisi”, “Su Geçirmezlik” özelliğine göre daha önemli ise; sağ tarafta yer alan skalayı kullanmanız gerekmektedir.

Değerlendirmede Kullanılacak Skala Açıklamaları

Önem Derecesi	Tanım
1	Eşit Derecede Önemli
3	Orta Derecede Önemli
5	Kuvvetli Derecede Önemli
7	Çok Kuvvetli Derecede Önemli
9	Son Derecede Önemli
2, 4, 6, 8	Ara Değerler

9 ölçeğini kullanarak (9 son derece önemli ve 1 eşit öneme sahip) lütfen sizin için önemli olan seçtiğin (A sol taraf ve B sağ taraf) ne derece önemli olduğunu sarı ile boyayarak değerlendirin.

A Seçeneği	Önemlilik Derece									B Seçeneği								
	Son derece önemli	Çok önemli	Önemli	Az önemli	Eşit Öneme	Az önemli	Önemli	Çok önemli	Son derece önemli									
Su geçirmezlik	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Parmak izi teknolojisi
Su geçirmezlik	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Göz tanıma teknolojisi
Su geçirmezlik	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Hızlı sarj
Su geçirmezlik	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Çift kamera
Su geçirmezlik	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Uzun batarya süresi
Su geçirmezlik	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Yüksek dahili hafıza
Parmak izi teknolojisi	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Göz tanıma teknolojisi
Parmak izi teknolojisi	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Hızlı sarj
Parmak izi teknolojisi	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Çift kamera
Parmak izi teknolojisi	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Uzun batarya süresi
Parmak izi teknolojisi	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Yüksek dahili hafıza
Göz tanıma teknolojisi	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Hızlı sarj
Göz tanıma teknolojisi	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Çift kamera
Göz tanıma teknolojisi	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Uzun batarya süresi
Göz tanıma teknolojisi	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Yüksek dahili hafıza
Hızlı sarj	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Çift kamera
Hızlı sarj	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Uzun batarya süresi
Hızlı sarj	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Yüksek dahili hafıza
Çift Kamera	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Uzun batarya süresi
Çift Kamera	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Yüksek dahili hafıza
Uzun batarya süresi	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Yüksek dahili hafıza