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# Evaluation of the wearable technology market within the scope of digital health technologies[*]

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**ABSTRACT**

Owing to developments occurring in digital technologies together with electronic and mobile technologies, the businesses have turned towards the technology element more in order to differentiate. Wearable technologies which are rapidly developing technologies, have increased their popularity and become a focus of interest for the businesses to create new markets and produce new technological products. Wearable technologies, which are called as technologies integrated onto the accessories and outfits used by people and have been involved in several sectors, have a particular impact on the health sector. By means of wearable technologies, private data is transferred to smart devices via smart detectors and thus, the individual's follow-up related to her/his medical condition is fulfilled properly. Wearable health technology products, with their use aimed at increasing the wealth of communities, are turning into a need rather than a personal choice every passing day. Therefore, this study focuses on wearable technological products, which attract the attention of people and the businesses which plan to increase their sales by creating new markets. The purpose of this study is to examine and give information about wearable health technology products and their market, which positively affect community health within the wearable technology products market. The study primarily gives information about the development of wearable technology and wearable health technology. Then it gives information about wearable technology and wearable health technology market and touches upon the situation of the market in Turkey and in other countries. Consequently, it is seen that the wearable health technology market is a rapidly developing market. An increase in the demand for products that may increase people's quality of life, make instant health follow-up and ease their life; will create a market potential for the businesses. Thus wearable health technology market is considered as a very attractive market for both producers and consumers.

# Dijital sağlık teknolojileri çerçevesinde giyilebilir teknoloji pazarının değerlendirilmesi

**ÖZ**

Elektronik ve mobil teknolojiler ile birlikte dijital teknolojilerde meydana gelen gelişmeler sayesinde işletmeler farklılaşmak için teknoloji unsuruna daha fazla yönelmiştir. Süratle gelişen teknolojiler olarak karşımıza çıkan giyilebilir teknolojiler, popülerliğini her geçen gün arttırarak işletmelerin yeni pazarlar oluşturmaları ve yeni teknolojik ürünler üretmeleri adına ilgi odağı olmuştur. İnsanların kullandıkları aksesuarların ve kıyafetlerinin üzerine entegre edilen teknolojiler olarak adlandırılan ve pek çok sektörde yerini alan giyilebilir teknolojilerin özellikle sağlık sektörü üzerinde önemli bir etkisi bulunmaktadır. Giyilebilir teknolojiler sayesinde kişiye özel veriler akıllı algılayıcılar ile akıllı cihazlara aktarılmakta, böylece kişinin sağlık durumunun takibi doğru bir şekilde gerçekleştirilmektedir. Giyilebilir sağlık teknolojisi ürünleri, toplumların refah düzeylerini arttırmaya yönelik kullanımları ile gün geçtikçe kişisel tercihten öte ihtiyaca dönüşebilecek niteliktedir. Bu nedenle, hem insanların hem de yeni pazarlar oluşturarak satış rakamlarını arttırmayı planlayan işletmelerin ilgisini çeken giyilebilir teknoloji ürünleri bu çalışmanın ana konusu olmuştur. Bu çalışmanın amacı, giyilebilir teknoloji ürünleri pazarı içerisinde toplum sağlığını olumlu yönde etkileyen giyilebilir sağlık teknolojisi ürünlerinin ve pazarının incelenmesi ve pazar durumu hakkında bilgi verilmesidir. Çalışmada öncelikle giyilebilir teknolojinin gelişimi ve giyilebilir sağlık teknolojisi hakkında bilgi verilmektedir. Ardından giyilebilir teknoloji ve giyilebilir sağlık teknolojisi pazarları hakkında bilgi verilerek, pazarın Türkiye ve diğer ülkelerdeki durumuna değinilmektedir. Sonuç olarak giyilebilir sağlık teknolojisi pazarının hızla gelişmekte olan bir pazar olduğu görülmektedir. İnsanların hayat kalitesini arttıran, anlık sağlık takibini yapan ve yaşamını kolaylaştıran ürünlerin talebine yönelik oluşacak bir artış, işletmeler açısından pazar potansiyeli oluşturacaktır. Dolayısıyla, giyilebilir sağlık teknolojisi pazarı hem üretici hem de tüketici açısından oldukça cezbedici bir pazar olarak karşımıza çıkmaktadır.

## 1. Introduction

The evolution of digital and mobile technologies has changed many aspects of our lives. Internet connectivity has become easy and increasingly important for many, and access to data and information has become low-cost, manageable and comfortable. Such technological advances have led to the emergence of wearable technologies that lay the groundwork for the next stage of the digital revolution, where technology is not only usable but also wearable (Sultan, 2015, p. 523). Wearable technologies are one of the important applications of the Internet of Things, a concept used for devices that can send and receive data via internet (Sönmez Çakır et al., 2018, p. 85). Along with the proliferation of the Internet of Things, devices that can connect to each other via internet offered consumers the opportunity to take control of their health and make healthy life choices (Aydin, 2019, p. 615). The rapid development of electrical sensing and flexible electronics technology supported the development of wearable health technologies. The wearable health technologies are one of the important applications within the scope of digital health technologies such as e-health, m-health, telemedicine, digital hospital, robotic applications, artificial intelligence, 3D printers. Wearable health technologies have unique advantages such as excellent real-time processing, flexibility, and compatibility with wide area processing technology. Wearable health technologies contribute not only to the improvement of health status, but also to the development of medical technology by gathering

information about human health and obtaining large amounts of data (Lou et al., 2020, p. 1). Wearable health technologies have the potential to revolutionize healthcare with the vast amount of data collection and the ability to communicate with other devices. They offer great opportunities to monitor patients with heart and circulatory problems, diabetes or low blood sugar. Wearable health technologies have been proven to have a positive effect on operation costs by replacing traditional health monitoring systems (Key, 2019, p. 1-2), as well as to be a suitable tool for solving the problem of effective medical service in real time thanks to wearable sensors and related systems (Lou et al., 2020, p. 38).

The concept of wearable technology has entered our lives as a result of the integrated working of devices with each other and the human body. The popularity of the concept is increasing day by day, and it is possible to find the use of wearable technology products in many areas (Sönmez Çakır et al., 2018, p. 85). Wearable technologies are an important market that can provide value-added services such as physical and mental health monitoring, localization and navigation, sports analytics, health insurance analytics, financial payments. Related researches estimates that the wearable technology market value will approach 58 million dollars by 2022, 100 billion dollars by 2023 and 150 billion dollars by 2026 (Demirci, 2016, p. 986; Poongodi et al., 2020, p. 246-247). Not only wearable technology products are increasing in variety and number, but also the demand for them is increasing day by day in parallel with the developments in the wearable technology market.

The popularity of the wearable technology market and the increasing consumer demand for wearable technology products encouraged the development of wearable health technology products, and the wearable health technology market has become one of the fastest growing markets of the last decade (Casselman, et al., 2017, p. 1012). Because of this popularity of the wearable technology market and the increasing consumer demand, this paper addresses the wearable technology market. Hence, the purpose of this study is to examine and give information about wearable health technology products and their market, which positively affect community health within the wearable technology products market.

## 2. Development of wearable technology and conceptual framework

The starting point of wearable technology dates back to the 13th century. In this period, the Opus Majus published by Roger Bacon included the use of glasses and corrective lenses. A few centuries later, French-born mathematician Jean Leurechon documented the first hearing aid known as the ear trumpet in the 17th century. The first glass contact lens that fits the entire eye was introduced in the 19th century, and a large number of wearable devices were produced thanks to the electronic technology advancing in the mid-20th century. The fastest development of wearable technology started in the 21st century with a ring that enables to monitor patients' health status at any time with the sensors placed on it (Casselman et al., 2017, p. 1011). Wearable technology has developed and advanced much faster especially after 2010, so innovative and creative products have found use in many areas of life (Özgüner Kılıç, 2017, p. 99-100). Wearable technology has become one of the important applications that rapidly develop in the global market and provide innovative products in line with the developments in information and communication technologies.

The term wearable is used for devices that measure the data of a user in real time with built-in sensors (receivers) and then send them to a networked device (Key, 2019, p. 2). These devices provide real-time feedback from integrated built-in sensors, use and analysis of the collected data (Erdmier et al., 2016, p. 141). The term wearable is often used in conjunction with terms such as technology (wearable technology), devices (wearable devices), but all of these terms refer to electronic technologies or computers that are incorporated into clothing and accessories that can be worn comfortably on the body (Sultan, 2015, p. 521). Wearable technology is a concept used to express the tools worn or carried by the person, such as glasses, clothes, jewelry that contain sensors or other technologies (Aydan and Aydan, 2016, p. 326). In general, wearable technologies integrated on the used accessories or worn clothes are defined as products that transfer data to smart devices through smart sensors (Sönmez Çakır et al., 2018, p. 85).

One of the most important features of wearable technologies in electronic devices is to enable data to be exchanged between a network and a device thanks to its ability to connect to the internet.

Therefore, in order for a product to have a wearable technology feature, it must transfer the information from smart sensors to the smartphone by connecting it via Bluetooth or wireless network (Özgüner Kılıç, 2017, p. 100). Wearable technologies have access to some of the communication capabilities and real-time data of the user. It can store these data in its own memory and transfer them by connecting with different devices when necessary (Demirci, 2018, p. 986). Wearable technologies have functions that are not found in smartphones, tablets and computers such as scanning, monitoring, and giving feedback, as they have the ability to scan psychological status with sensors integrated in clothing or accessories. In addition, they have specific features such as data entry and exit, data storage and data transfer (Aydin, 2019, p. 615).

The operation of the sensors integrated in wearable technology products depends on various techniques such as optical, electrical, electrochemical and piezoelectric effect. The purpose of the sensors integrated into wearable products designed for different parts of the body is to provide valuable information to users (Poongodi et al., 2020, p. 252). Figure 1 shows the products that can be worn in different parts of the body.
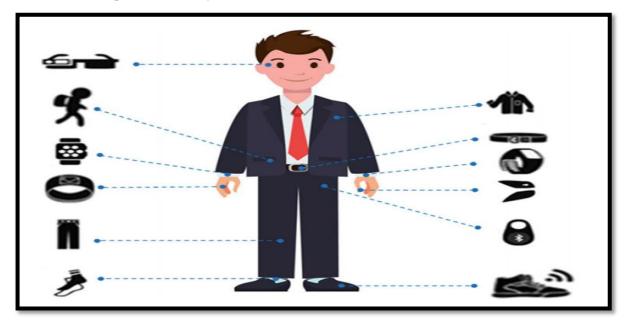


Figure 1. Wearable technology products for different body parts

Source: Poongodi et al., 2020, p. 252

As can be seen in Figure 1, the wearable technology products can be used for different purposes in three parts of the body consisting of head, body, arms and legs. These products are headband, hat, glasses, contact lens, hearing aid, earring, wristband, bracelet, arm band, arm cuff, watch, rings, smart fabric, belts, underwear, smart jackets, trousers, socks and shoes. However, smart watches, smart glasses, trackers and fitness wristbands are among the most commonly used wearable technology products. There are major developments in wearable technologies especially for health and exercise areas but also for entertainment and play areas. (Demirci, 2018, p. 986).

The wearable technology market, which is predominantly related to the health, has great potential in the health sector, and important developments are expected in this market in the future. The number of academic studies on the wearable health technology market, which has become one of the fastest growing markets of the last decade, has been increasing in recent years. In this study, the wearable technology market is discussed in terms of health, and the studies in the field of wearable health technology are examined. When the studies in the literature are reviewed , it is seen that the studies in the field of wearable health technologies in Turkey are insufficient, and the number of studies in the foreign literature has increased in the last decade.

In studies conducted mainly in Turkey, current and future state of wearable health technologies, applications, the effects on health services, and problems have been evaluated (Aydan and Aydan,

2016; Aydın, 2019; Bostancı, 2015; Demirci, 2018). Various studies conducted in foreign literature are mainly about the wearable technology for healthcare, acceptance of individuals and healthcare professionals, consumers' and healthcare professionals' perceptions of wearable health technology products, adoption of wearable technology in healthcare and wearable health technology products by individuals. (Adapa et al., 2018; Canhoto and Arp, 2017; Chau et al., 2019; Cheung et al., 2019; Gao et al., 2015; Kalantari, 2017; Li,. et al., 2016; Lunney et al., 2016; Nasir and Yurder, 2015; Talukder et al., 2019; Talukder et al., 2020; Wen et al., 2017; Zhang et al., 2017). In addition, some foreign studies have evaluated the current and future state, benefits of wearable technology and wearable devices though they are few in number (Casselman et al.,2017; Chan at al., 2012; Erdmier et al., 2016; Krey, 2019; Lou et al., 2020).

### 3. Wearable health technologies

Health is the most important application area of wearable technologies. Health problems such as increasing health costs worldwide, insufficient health services in underdeveloped regions, and the low number of health personnel have accelerated the transition to wearable health technologies (Sönmez Çakır et al, 2018, pp. 88-89). Wearable health technologies have a technological infrastructure where the person's health status can be monitored, their health data can be stored, and they are informed about their health status. Wearable health technologies provide continuous digital measurement of a person's real-time health parameters. Thus, patients and physicians can obtain high-quality and clinical data by reviewing the measurement of bio signals such as heart rate, respiratory rate, blood pressure, physical activity, temperature, sweat, and emotion (Poongodi et al., 2020, p. 247).

Current and potential uses of wearable health technologies include real-time monitoring of health-related data, access to health-related data, and medical training, including courses such as anatomy, surgery, and clinical skills (Sultan, 2015, p. 523). Data obtained by the use of wearable health technologies provides various benefits to people, patients, healthcare professionals, healthcare organizations and society in terms of managing health, monitoring health status remotely, reducing healthcare costs and improving healthcare services (Erdmier et al., 2016, p. 141). It is possible to summarize the benefits of wearable health technologies as follows (Aydan and Aydan, 2016, p. 331):

✓ Users may monitor themselves, detect negative behaviors and reduce them,

✓ Patients can be motivated in managing and controlling health,

✓ Physicians can have more information about the patient and personalized health services can be developed,

✓ It can improve the life quality of individuals and patients,

✓ It can help saving time,

✓ Patient relatives or healthcare providers can be notified in case of emergencies,

✓ Medical education can be improved,

✓ Data can be collected on a social scale and a database can be created,

✓ Precautions can be taken for diseases,

✓ Health policies can be directed in the light of the data collected.

The traditional physician-patient model undergoes significant changes with wearable health technology products. The sensors integrated in the wearable health technology products facilitate the monitoring of the health condition of the person and the diagnosis and treatment stages for the physician. Nowadays, wearable health technology products which are constantly attached to the body allow different health parameters to be monitored and the data obtained to be transmitted to both users and health personnel on time (Aydin, 2019, p. 614). The wearable health technology products are composed of devices that enable more people to follow their own health status and send the health-related data to the related physician or healthcare provider at the same time (Demirci, 2018, p. 990). Products used for the purpose of monitoring, diagnosing and treating health status help to collect both clinical (pulse, sugar level, etc.) and behavioral (walking, going up the stairs, etc.) data for medical

purposes. Accordingly, the wearable health technology products used today includes devices that remind to take medications, inject insulin to diabetes patients at certain times, follow motor activity and monitor biochemical data (Bostancı, 2015, p. 549). In addition, blood pressure monitors, electrocardiograms, blood glucose meters, and even ultrasound scanners are among the wearable health technology products that can be connected to smartphones through various applications to monitor health-related data. Devices that monitor the glucose level, contact lenses, wristbands that automatically report emergency services by detecting the fall of the elderly, and sleep monitoring pajamas for babies are among the new products added to the wearable healthcare market recently (Casselman et al., 2017, p. 1012).

Wearable health technology products are generally divided into two classes. First-class wearable products, including fitness trackers and smart watches that can measure users' running distance, calories burned or heart rate, are characterized by ease of use. Unlike first-class wearable products, second-class wearable products used for medical purposes not only collect data about a person's physical condition, but also make medical recommendations. Second-class products consist of devices that are worn by the patient (wearable portable medical device) or implanted into the patient's body (embedded device), thereby allowing early detection of risks such as a close heart attack (Key, 2019, p. 2). Sensors in second-class products especially help to monitor health parameters and obtain important data. Figure 2 shows examples of parameters that can be monitored with the help of sensors integrated in wearable health technology products used in different parts of the body.
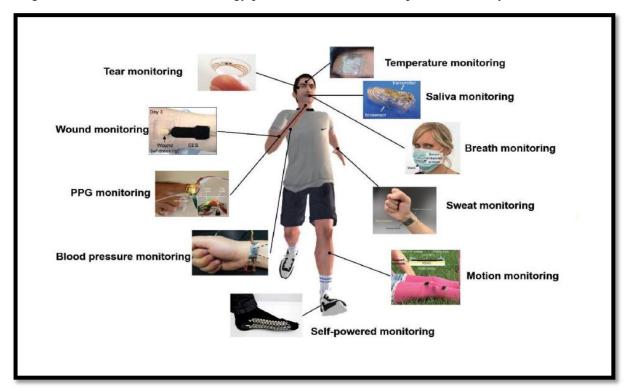


Figure 2. Wearable health technology products

Source: Lou et al. 2020, p. 2.

Figure 2 shows representative examples of wearable health technology products that provide real-time monitoring of health status with the help of integrated smart sensors. In this context, some examples of wearable health technology products help to monitor tears via smart lens, body temperature via temperature sensors, saliva for tooth protection, breathing via face mask, perspiration via biosensors, activity via strain sensors, personal power via friction electrification generators, blood pressure via pressure sensors, photoplethysmogram (PPG) via photodetector, and scars via electroencephalogram (EEG) sensors.

Wearable health technologies offer people a better quality of life, and can also play an important role in diagnosing diseases, planning treatment, and solving problems that may arise in the health system. In parallel with the benefits they offer to the society, the demand for wearable health technology products is increasing day by day. The wearable health technology market flourishes in consequence of increasing health awareness, increasing health costs, people preferring virtual networks instead of face-to-face communication, and a strong combination of new technologies. In addition, the market continues rapidly to present wearable health technology products used in the stages of continuous monitoring of any disease, responding to emergencies on the instant, informing the authorized health institutions, and even contributing to the recovery period after surgery. The market pursues to create new areas for wearable health technology products (Özgüner Kılıç, 2017, p. 106).

Despite the enormous benefits of wearable health technology applications, which arouse great interest in the world, various threats may emerge with the more widespread use of these technologies. Threat elements such as data security and privacy, malware, connection dependency, and lack of integrated tools to efficiently process large amounts of data are considered as weaknesses of wearable health technologies like every other system that produces data and transfers the related data over a link (Bostancı, 2015, p. 551). Issues such as security and privacy while dealing with big data are important but often neglected. Studies are needed on how to make wearable health technologies safe and how to protect patients' data (Key, 2019, p. 1). At the same time, it is important to establish standards and make the necessary legal arrangements for the use of wearable health technologies both individually and institutionally in order to prevent security and privacy violations and to control the risks that may arise.

## 4. Wearable technology market

Innovation is one of the effective tools that businesses can use to continue their activities in an increasingly competitive environment, increase their efficiency and profitability, sustain growth in existing markets and enter new markets. However, the success of an enterprise depends on its understanding and monitoring of its customers, and then producing products and services according to the expectations of the customers. Achieving this situation will increase the tendency of consumers to innovations, making it easier for customers to adopt and buy the products (Açıkgöz, 2019, p. 1).

Wearable technology is now being applied in many different consumer sectors such as sports, medical, personal safety, and lifestyle computing. Examples of their applications include: fitness, activity tracking, health management, wearable camera, and smart clothing (Cheng and Mitomo, 2017). According to PwC's (2014) report; wearable technologies provide better nutrition, control of exercise, improved access to medical data, greater involvement of patients and individuals in the clinical decision phase, and more accurate diagnosis of disease or health problems. Thanks to these technologies, users have the opportunity to control and manage their own health, while healthcare institutions potentially reduce their costs and improve their services thanks to devices that they can monitor their patients remotely. The use of wearable technologies has increased significantly over the years. Figure 3 shows the number of wearable technological products worldwide as past, current and future forecast data.
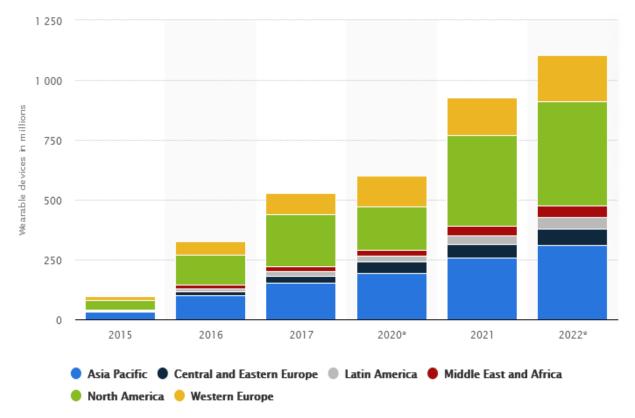
Figure 3. Number of connected wearable devices worldwide by region from 2015 to 2022

Source: Statista Research Department, 2020

In 2015, 30.4 million wearable technology products are sold in Asia Pacific, 5 million in Central and Eastern Europe, 1.83 million in Latin America, 4.09 million in Middle East and Africa, 38.65 million in North America, 16.75 million in Western Europe. In 2016, 99.8 million wearable technology products are sold in Asia Pacific, 17.5 million in Central and Eastern Europe, 12.6 million in Latin America, 14 million in Middle East and Africa, 127.1 million in North America, and 54.3 million in Western Europe (Özgüner Kılıç, 2017, p. 105). Wearable technology products are getting popularity in North America and Asia Pasific. The growth of the wearables market in North America is highlighted by figures that expect 25 percent of the adult population in the United States to be using a wearable device by 2022. Ownership of wearables in Asia Pacific regions is already high among those living in China, Thailand, and Vietnam. These regional trends mirror developments within the global market that forecast shipments of wearables to reach more than 300 million by 2023 (Statista Research Department, 2020).

While the business and daily lives of the consumers are facilitated on the one hand, the businesses can gain more profit and market share on the other hand thanks to the new products (Açıkgöz, 2019, p. 3). Wearable technologies are rapidly advancing to become an important sector due to the addition of a new product every day to wearable technology products, the expected market share to be reached in the coming years, and the increasing interest of consumers.

### 5. Wearable Health Technology Market

People are getting more conscious about health because of the increase of obesity, diabetes and hypertension diseases arising from the sedentary lifestyle (Markets & Markets Report, 2017). As the society becomes more conscious, it shows more and more interest in wearable and mobile healthcare products and uses them widespread. The health market, which is one of the most important markets in the world, will continue to grow with the increase of individuals' healthy lifestyle choices. The reports about the future state of the global wearable medical device market volume predict that wearable medical device market volume will be 27.8 billion dollars in 2022 (Markets & Markets Report, 2017),

87 billion dollars in 2025 (Global Markets Insights Report, 2020), and 93.19 billion dollars in 2027 (Grand View Research Report, 2020).

The healthcare industry has been a slow adopter of technology applications mainly due to its fragmented and highly complex systems. However, with the advent of Internet of Things (IoT), wearable technology and smart connected devices, patients get an opportunity to take charge of their health and act upon it. Healthcare providers no longer remain custodians of patient information and can positively influence patients to enhance engagement and health outcomes (Gopal, 2015).

Health and fitness, and other medical applications, are areas where wearables are expected to play a transformative role. However, the application of wearable devices has potential in any industry where hands-free data collection is highly valued. Wearables can be generally divided based on consumer or non-consumer applications. These two categories can be further segmented based on the particular sector the product targets. The consumer market segments for wearables include; General consumer, Fitness and sports, Fashion and apparel, Home automation and Remote identification, Gaming and recreation. The non-consumer market segments include; Defense and security, Enterprise and industrial, Healthcare (Salah et al., 2014).

The potential applications of wearables for medical and health purposes are vast (Salah et al., 2014). Global wearable medical devices market, based on the device type was segmented into diagnostic & monitoring devices and therapeutic devices. In 2017, diagnostic & monitoring devices segment held the largest share by the market, by device type. This is mainly attributed to the rise in the prevalence of chronic illnesses, leading to an increased awareness regarding maintaining good health (Premium Market Insight Report, 2020). For the patient, a wearable device can collect information on heart rate, brain activity, sleep patterns, glucose levels, blood pressure, stress levels and more. And such a device enables better sharing of insights with physicians and/or caregivers (Salah et al., 2014).

Across the developed world, healthcare systems face tremendous challenges driven by rising costs, increasing demand and big improvements in addressing complex conditions. Improvements in technology offer the most likely solution to meeting this rising demand at a low cost. There has been a lot of recent activity in the wearable technology space in healthcare. An increase in wearable technology that qualifies as a medical device that will be user-friendly and cheap, and enables providers to offer more tailored care to patients is expected (Steel and Bennett, 2014).

Table 1 shows important players of the market, market types and market applications presented in Healthcare Market Research Report prepared by Global Smart Wearables.

**Table 1**

**Global smart wearables in healthcare market**

| | | |
|---|---|---|
| | – | Apple |
| | – | Fitbit |
| | – | Jawbone |
| | – | Misfit |
| | – | MyKronoz |
| | – | Samsung |
| *The Major Market Players* | – | Xiaomi Technology Co. Ltd |
| | – | Garmin Ltd |
| | – | Qualcomm Technologies, Inc |
| | – | Adidas Group |
| | – | Sony Corporation |
| | – | Jawbone, Inc |
| | – | Lifesense Group |
| | – | Smart Wrist Wearables |
| | – | Smart Patches |
| | – | Smart Clothes |
| *Market by Type* | – | Smart Head / Neck Wearables |
| | – | Smart Ear Wearables |
| | – | Smart Eye Wearables |
| | – | Other Smart Wearables |
| | – | Activity / Fitness Tracking (SMEs) |
| *Market by Application* | – | Monitoring & Diagnostics |
| | – | Others |

Source: Report Consultant, 2020

The demand for wearable technology products grows more in the health sector as the level of awareness of individuals increases in parallel with their knowledge, and long and healthy life expectancy upraises. The change in the social structure, the inability to find time in an intense pace of work, and the desire to monitor the health status of children and family elders remotely can increase the demand for wearable health products. Businesses that want to meet the rapidly increasing demand and find a place in the market make efforts to develop wearable technology products that can improve the quality of life of individuals and to put them on the market. Thanks to these products, individuals can have a sense of peace and security even if they are alone since they have products that constantly follow their health information (Özgüner Kılıç, 2017, p. 108).

## 6. Wearable health technology market in Turkey

There is no detailed data report on wearable health technology products in Turkey since individual measurement applications are not widely used and also the necessary infrastructure is absent to integrate with applications of health services in Turkey (Aydan and Aydan, 2016, p. 333).

Although there is no market data as a report, there are some information on wearable technology products in Turkey. Gittigidiyor, which is a subsidiary of eBay and one of the most important e-commerce sites in Turkey, was conducted a research "Wearable Technology in Turkey" in July 2016. According to the survey conducted on 700 customers online by Gittigidiyor, 48% of the participants stated that they were willing to buy at least one wearable technology product, 71% stated that they had heard about wearable technology and 72% were interested in this technology. The research also revealed that users mostly prefer smart devices for health purposes. While the wearable technological product that 54% of the participants want to have the most is "Smart Watch", "Smart Glasses" and "Smart Bracelet" come next respectively. Interest in smart watches has been increasing day by day in line with the increasing demand for healthcare applications (Günen, 2016). The study gives an idea about Turkey's potential on sales of wearable technology products.

Daily Sabah reported that wearable technology market is trending upward in Turkey in October 2019. Wearable technology products such as Bluetooth headsets, activity trackers and smart watches are taking up a wider place in people's lives. Anıl Öztekin, Strategy and Product Marketing Director of Mobile Products in Samsung Electronics Turkey, stated that total of 141,000 smart watches are sold in 2018 in Turkey and the amount of the purchase is equal to a market of $31 million, and they expect it to rise to $35 million with an increase rate of 12% at the end of 2019. Current growth rates of the wearable health technologies market and the growth expectations for the upcoming years signifies the importance of the market.

It is important to assess the current situation of the service providers and also to determine whether consumers are ready for a new system like wearable technology in Turkey. For this purpose, if the extent of usage of existing technologies can be revealed, then they can be used as tools in wearable technology (Aydan and Aydan, 2016, p. 335). The report "Digital 2019" published by We are social and Hootsuite shows that 98% of the adult population uses a mobile phone in Turkey, 77% use a smartphone. Desktop computer or laptop usage rate is 48%, tablet usage rate is 25%, internet usage rate is 72%. According to the report, only 9% of the adult population uses wearable technology products in Turkey. Development of necessary technologies and data sharing between relevant institutions and individuals are required for further expansion of wearable health products in Turkey.

## 7. Conclusion

The rapid change in technological developments enables the emergence of different trends and new markets in the global world. Organizations need to innovate in order to survive and to grow in their market. Continuously changing, developing and renewed markets operating in the world can sustain their existence by innovating or keeping up with the expectations of consumers. It is not possible for a person, a business, a market, an environment or the world to remain unchanged and survive without adapting. They have to adapt and use it in the best way as long as they exist.

The health sector has a growth trend due to the increasing population and diversification of consumer expectations. Every development and innovation regarding public health is very valuable since it is one of the important factors affecting the welfare levels of the countries. Therefore, the health problems faced by the society, technology and broad industrial and social conditions that can overcome these difficulties reform the health sector.

Online markets have formed with the development of information and communication technologies. Wearable technology market which is getting more complex and popular attracts attention of marketers who research on the preferences of digital market consumers. It is necessary to invest more in innovation expenditures, and to change and develop marketing strategies in accordance with the market in order to compete in the market as the wearable technology market is becoming more and more widespread and product variety is increasing. Producing effective solutions for health problems by using wearable technologies in the health sector will provide important improvements in terms of public health. In case of an unexpected situation (epidemic diseases, etc.) in the community, instant monitoring of the health status of individuals can help to take it under control in a short time.

Adaptability of users and health systems is one of the most challenging obstacles faced with wearable technology products. Sudden and radical technological changes may not always be easily

accepted by individuals in societies. Users may feel uncomfortable about using these technologies for various reasons. People may be reluctant or resist using these technologies due to difficulties in use, insecurity or excessive exposure to technology (Rutherford, 2010, p. 23). According to the report of Tractica, the market is faced with challenges such as user experience optimization, product reliability, the need for user training and legal procedures. Insecurity about data privacy and security can affect individuals' attitudes towards wearable health technologies. Therefore, as a new and developing market, the growth of the wearable health technologies market and the increase in the number of users may depend on making legal arrangements that will eliminate the risks regarding data security and privacy.

Due to the pandemic (COVID-19), which has recently effected the whole world, it is very important to be able to monitor the health status of individuals instantly. Turkey created "Hayat Eve Sığar" (Life Fits Home) mobile application in order to monitor and determine the instant health status of individuals. Individuals can instantly provide information about their health status and be informed about the risk status of their region, thanks to this application that they can use on their smartphones or tablets. It is possible to gather information about the trust and the usage rate of individuals with the help of this application since people will have to register individually in order to be able to use the application.

Finally, in this paper, because of the lack of research about wearable healthcare technologies, especially in the Turkish market, this paper aimed to investigate the wearable health technology market in Turkey. However, due to the scarcity of data on the wearable healthcare market in Turkey, limited amount of research exists. Therefore, it will be beneficial to conduct research and studies for the Turkish market in future studies. Future research could also examine to determine consumers' adaptation to wearable health technology products and the factors which influence technology acceptance within the frame of the technology acceptance model.

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