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COVID-19 Pandemic and Digitalization of Service Organizations: A Trademark Approach

COVID-19 Salgını ve Hizmetlerin Dijitalleştirilmesi: Bir Marka Yaklaşımı

Hale Alan*

Abstract: The Coronavirus (COVID-19) pandemic, which deeply affects almost all countries around the world, has unprecedented effects on businesses and industries so far. During the ongoing COVID-19 pandemic, there was a greater need for the use of internet technologies and digital applications. Due to the necessity of using digital technology-based applications to meet these needs, all countries have focused on digitalization today and have given more importance. Innovations using various advanced technologies are needed to overcome the various problems associated with this viral pandemic. Innovation allows firms to create unique products or services from competitors aiming to create value for customers. In this respect, digital technologies greatly change the evolution of product or service innovation. In the last 10 years, the effects of digital transformation on services and service innovations are rarely predictable. The aim of this study is to reveal the reflections of the digitalization effect and digital transformation on service innovations during the COVID-19 pandemic. This researches focus on digital service mark applications in the pandemic. It is possible to determine the digitalization tendency through the classes in the service mark application dataset. For this, digital service innovations are classified according to the international nice classification system. In this study, service mark applications are used as a dataset to analyze the digitalization effect on services. Analysis of service marks may contribute to a better understanding of innovation in services. As a result, it is seen that the areas most affected in the service sector are related to business management services such as human resources applications, and e-commerce platforms that aim to serve customers. In addition, it has been revealed that the digitalization tendency is high, especially in the health, education and tourism sectors.

Structured Abstract: The service sector is transforming with digitalization. Several disruptive technologies have already changed the manufacturing sector, production, productivity, and quality. Digital technologies are helpful for distance education, remote and online learning, telemedicine service for proper preventive and control of this virus, collect information for healthcare systems for proper controlling and treating of COVID-19 patients during the emerging of COVID-19 pandemic. Digital technologies of Industry 4.0 which help to solve the problems of this virus. This Industry 4.0 technologies could provide a lot of innovative ideas and solutions for fighting local and global problems. These technologies provide wireless connectivity in the manufacturing and service sector to enhance automation.

This study aims to reveal how the digitalization effect and transformation reflected on service innovations in the COVID-19 pandemic process. In this research, digital service mark applications made as domestic mark applications were taken as a focus in the pandemic. It is possible to determine the tendency of digitalization in the categories of service marks. For this, digital service innovations are grouped according to

* Dr. Öğr. Üyesi, Akdeniz Üniversitesi, Manavgat Sosyal ve Beşeri Bilimler Fakültesi, Yönetim Bilişim Sistemleri Bölümü
Asst. Prof. Dr. Akdeniz University, Manavgat Faculty of Social and Humanitarian Sciences, Department of Management Information Systems

ORCID 0000-0002-2444-1551

haletpe@gmail.com

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international trademark classification classes (nice class), and it is possible to make inferences about which class digital applications are made the most. The research questions of the study are as follows; "What is the branding tendency of digital service innovations that emerged in the COVID-19 pandemic and in which service sectors is digitalization more effective?"

Due to the COVID-19 (coronavirus) pandemic, the whole world is experiencing an emergency, and the importance of a robust digital infrastructure and widespread digitalization of services, especially for rural areas, such as the countryside, focusing on connectivity and accessibility to services related to fundamental life requirements. It was understood by everyone that the use of digital technologies increased during the pandemic period. The digitization is not only about infrastructures, but also about the use of these technologies and digital skills. COVID-19 showed issues that concern all sectors in the world and all sectors should take seriously. At the beginning of these, traditional supply chains and production ecosystems have failed and applications that are fully digitally activated and provide adaptive solutions should be started. The virus has shown only this need and urgency and has led to the acceleration and further spread of digital transformation and change.

In this research, the textual data is considered in the light of text mining analysis. The method involves establishing categories and then counting the number of instances in which those categories are used in a particular item of text. In this study, text mining method was used. In recent years, the importance given to studies using databases and text mining method has increased (Melnik, Giarratana & Torres, 2014). Since text mining methods alone do not produce comprehensible results, expressions with complex structures can be classified meaningfully using natural language processing techniques and several programs together. For text importation, natural language processing algorithms and text data visualization KH Coder text mining software is used. Service marks cover the nice classes between 35th and 45th from 45 classes in total, which are included in international mark classifications.

In the pandemic, official trademark bulletins published in the period to be examined within the scope of the research were downloaded from the Turkish Patent and Trademark Office web page, in order to determine the reflection of the digitalization in the services they provide as a crisis strategy and as a precautionary measure to continue their activities. From the beginning of the pandemic to the 31st of May, six trademark bulletins were published. For this reason, it is also appropriate to examine the trademark bulletins covering 2020 applications since it will be beneficial to look at the dates when the COVID-19 virus appeared. In order to search the official trademark bulletins and make the transactions of the trademark owners easily, since 2015, usage is provided through an application belonging to TURKPATENT that can be installed on a personal computer. This application made it easy to confirm the analysis of the research terms determined in the research and saved time. Since the research examines the digitalization efforts and trends, the terms of research have been chosen by this tendency.

In this study, the relationship between the COVID-19 pandemic and the digitalization of the service sector is revealed. Protecting digital services with branding is one of the strategies of businesses. The pandemic occurs with the transmission of diseases fed by the mobility of people affecting the whole world. The service sector is the sector most affected by crises such as epidemics. Millions of people have been unemployed worldwide and businesses have had to close. COVID-19 pandemic affects the lives of individuals and businesses negatively, as it is worldwide. It is normal for businesses to view this situation as a crisis. Those who succeed in surviving this process with the least harm by developing the most useful strategies will be the winner of this struggle. While better scenarios are valid for businesses that provide services with digital applications, it is thought that businesses that have just completed digital transformation immediately go to correct their deficiencies and have achieved this as an essential requirement for survival.

According to the results of this study, it is seen that the most affected business areas in the service sector are related to business services, and e-trading platforms aiming to provide services to customers in every production area occur online. In addition to the digitally transformed businesses that offer basic needs, there are also online businesses that are thought to be established to provide services such as business consultancy, real estate consultancy, health consultancy, and pharmaceutical consultancy. It is seen that digital service innovations related to the business areas most affected by pandemic are high. The reason for this may be that businesses implement new strategies to tackle this crisis. Especially in the health, education and tourism sectors, this tendency has been revealed to be high. Digitization should be considered as a single remedy for the loss of these areas. The number of digitalized service marks that have been increasing and increasing over the years has also been affected by the pandemic. In the next process, the branding tendency will be directed

towards digital services, digitalization of services and new service applications of enterprises that are strengthened by information technologies.

Keywords: Digitalization, Coronavirus, COVID-19, Pandemic, Service Innovation, Servicemark, Trademark, Branding

Öz: Dünya genelinde neredeyse tüm ülkeleri derinden etkileyen Coronavirus (COVID-19) salgını işletmeler ve endüstriler üzerinde şimdiye kadar eşi benzeri görülmemiş etkilere sahiptir. Halen devam etmekte olan COVID-19 salgını sürecinde internet teknolojileri ve dijital uygulamaların kullanımına daha fazla ihtiyaç duyuldu. Bu ihtiyaçların giderilmesinde dijital teknoloji tabanlı uygulamaları kullanma zorunluluğu nedeniyle günümüzde tüm ülkeler dijitalleşmeye odaklandı ve daha fazla önem verdiler. Bu viral salgınla ilgili çeşitli problemlerin üstesinden gelmek için çeşitli ileri teknolojilerin kullanılması ile yapılan inovasyonlara gereksinim vardır. İnovasyon, firmaların müşteriler için değer yaratmayı amaçlayan rakiplerden benzersiz ürünler veya hizmetler üretmelerine olanak tanır. Bu bakımdan dijital teknolojiler, ürün veya hizmet inovasyonunun gelişimini büyük ölçüde değiştirir. Son 10 yılda, dijital dönüşümün hizmetler ve hizmet inovasyonları üzerindeki etkileri nadiren tahmin edilebilmektedir. Bu çalışma, dijitalleşme etkisinin ve dijital dönüşümün COVID-19 pandemisindeki hizmet inovasyonlarına yansımalarını ortaya çıkarmayı amaçlamaktadır. Bu araştırmada, pandemiye dijital hizmet markası başvurularına odaklanılmıştır. Hizmet markası başvuru bilgilerindeki sınıflar üzerinden dijitalleşme eğilimini belirlemek mümkündür. Bunun için dijital hizmet yenilikleri uluslararası marka sınıflandırma sistemine göre sınıflandırılmaktadır. Bu çalışmada, hizmetler üzerindeki dijitalleşme etkisini analiz etmek için hizmet marka başvuruları veriseti olarak kullanılmıştır. Hizmet markaları analizi, hizmetlerde yeniliğin daha iyi anlaşılmasına katkıda bulunabilir. Sonuç olarak, hizmet sektöründe en fazla etkilenen faaliyet alanlarının insan kaynakları uygulamaları gibi işletme yönetimi hizmetleri ve müşterilere hizmet vermeyi amaçlayan e-ticaret platformları ile ilgili olduğu görülmektedir. Ayrıca, özellikle sağlık, eğitim ve turizm sektörlerinde dijitalleşme eğiliminin yüksek olduğu ortaya çıkmıştır.

Anahtar Kelimeler: Dijitalleşme, Korona virüs, COVID-19, Salgın, Hizmet İnovasyonu, Hizmet Markası, Ticari Marka, Markalaşma

Introduction

A globally spreading epidemic is called as “pandemic”. It is the most famous example of the 1918 Spanish flu pandemic that infected more than a third of the world's population and killed about 50 million people. Since 1918, there have been several influenza outbreaks such as H1N1 in 1957 and 1968 and 2009. Other examples include Black Death in the 14th century, severe acute respiratory syndrome (SARS) virus in 2003, and HIV/AIDS. Many factors affect how far a situation spreads. Two of the most important are how easily the condition is transmitted from one person to another, and especially when people move by plane because infections can be brought to new parts of the world within hours. These definitions may seem simple, but implementing them in developing, real-world situations are complicated. For example, HIV, which started in West Africa, was an epidemic in Africa for decades, then it became an epidemic in the late 20th century. But within twenty years of the 21st century, it makes sense to say that HIV is now endemic in some parts of the world (Morens, Folkers and Fauci, 2009). The new type of coronavirus (COVID-19), which emerged on December 1, 2019, in Wuhan, China, has rapidly spread throughout the world and has become a global epidemic, and was declared a pandemic by the World Health Organization on March 11, 2020. This epidemic has economic and social impacts in our country as in the rest of the world. The economic and social effects of the epidemic are not similar to every sector and region. The COVID-19 epidemic, which took the whole world under its influence and brought social and economic life to a standstill, changed our lifestyle, ways of doing business, and habits.

Companies have now become "mobile companies" that are developing rapidly, having a flexible structure, developing their products quickly, and putting them on the market quickly. The

speed and nature of the changes and their basic rules allow the emergence of the need to manage digital transformations, depending on the characteristics of a country's socio-economic and political development. It can be said that the leading countries of the world are constantly following the way of increasing and improving their digital transformation capacity. It is important to create a new organizational system and a new social production structure for the development of the digital economy and to meet the social conditions for the continuity of digital transformations. Many companies may think they are digital today and look like that. But very few businesses can be said to be fully digital. Companies have learned to transform paper media into digital workflows. Companies can be digitalized using internal business portals, video chat, social media, and many online tools. But being digital requires much more as a process that all employees should be involved with, focusing on solutions that cover all departments and functions of the business.

Digital technologies greatly change the development of product or service innovation as entrepreneurs allow them to offer new value proposals for the customer (Kannan & Li, 2017; Teece & Linden, 2017). Digital innovation has been defined as new combinations of digital and physical components to produce new products or services by easily combining digital data from many different sources to "offer a variety of services that solve product and industry boundaries" (Yoo et al. 2010: 726).

Digital services have become a theory because they are the center of digital innovation and are therefore important in facilitating service innovation. As Lusch and Nambisan (2015) emphasize, it has been recognized that information technology play a dual role as a processed (enabling) and performative (initiator or actor) resource for service innovation. Digital innovation also makes it possible to create value through services, and this has a disseminating effect on digital service ecosystems (Yoo, et al. 2010). It is the explosion and rapid rise of IT-related service innovation occurring in the world, arising from the rapid growth of information technology (IT) in a digital world. The service revolution and service innovation are inextricably linked with the information technology (IT) revolution and digitalization (Rai & Sambamurthy, 2006).

This study aims to reveal how the digitalization effect and transformation reflected on service innovations in the COVID-19 pandemic process. In this research, digital service mark applications made as domestic mark applications were taken as a focus in the pandemic. It is possible to determine the tendency of digitalization in the categories of service marks. For this, digital service innovations are grouped according to international trademark classification classes (nice class), and it is possible to make inferences about which class digital applications are made the most. The research questions of the study are as follows; "What is the branding tendency of digital service innovations that emerged in the COVID-19 pandemic and in which service sectors is digitalization more effective?" In order to find answers to the research questions, the study was first started by explaining the concepts of digitalization and digital transformation, then the digitalization of services and the concepts of trade and service marks were explained. The theoretical part ended with a description of the importance of digital service innovations in the pandemic. In the research, analyzes were made using the text mining method, and the frequencies of the digital branding tendency and expressions were determined using the determined research terms.

1. Theoretical Background

1.1. Digitalization and Digital Transformation

Organizations are increasingly taking advantage of their opportunities, developing products and services, and interacting digitally with customers and other stakeholders. Current concepts such as mobile computing, social media, and big data are the driving forces of future businesses, and other digital-based technologies have led to the disruption of many industries as well as developing new capabilities and transforming business cultures due to increased competition and collaboration.

Although the digitization term is generally expressed as the application of digital technologies, digitization is achieved through advances in the creation, transfer, storage, and analysis of data. The increase in the availability of digitized data has the potential to structure, shape, and influence the modern world as a digitalization potential (Brennen & Kreiss, 2016). Digitalization is a business strategy. It is not a technology application. It is seen that the concepts of internalization (IoT), industry 4.0, digitization, remote imaging, and smart businesses are used at the beginning of the concepts related to digitalization (Parida, Sjödin & Reim, 2019). Today, all countries of the world are affected by digital transformation. The development of artificial intelligence, digital transformation, and ubiquitous automation, called the Fourth Industrial Revolution, has allowed companies to focus on creating new technologies using tools such as ecosystems, cloud computing applications, and networks and virtual platforms, which are essential to abandon their activities not related to their core competencies and concentrate on their core competencies.

1.2. Digitalization of Services and Service Innovations

Innovation is considered as an important factor in the survival and performance of service providers (Agarwal & Dev, 2003). Innovation allows firms to produce unique products or services from competitors that aim to create value for customers (Clarke & Adler, 2016). Economists have classified the manufacturing industries, as well as divided service companies into groups that share similar innovative features, trying to reduce the variety of services. According to the literature of the service sector, services are grouped under two types, namely narrow and comprehensive classification. Narrow scope services include production, agriculture, construction, mining, forestry, fishing, hunting, public administration, and defense services. The comprehensive classification extends to all services except construction, public administration, and defense (Kanapathy, 2003).

In business and management studies (Berry et al. 2006; Michel et al. 2008; Ordanini & Parasuraman, 2011; Sawhney, et al. 2005), there is a broader interest in services. It argues that service innovation is different from the product (commodity) innovation and therefore new theories and research methods are required (Fitzsimmons & Fitzsimmons 2000; Kallinikos et al. 2013). Although service innovation creates value and interest in many definitions has increased, no consensus has emerged regarding the service innovation process. The innovation process in services does not make it obligatory to obtain or create technical knowledge. Therefore, patents have major weaknesses as indicators of service innovation (Coombs & Miles, 2000). Miles Andersen, Boden, and Howells (2000) emphasized that the protection strategies used in the service industry are different from manufacturing companies, that service companies grow without a distinctive branding culture, and therefore many innovations are not protected. Innovation efforts tend to focus heavily on manufacturing and technology-intensive industries. Researches, linking the system of innovation and intellectual property rights, has focused exclusively on the patent, which can be considered as an invention (Miles et al., 2000). Service innovations are an integral part of digitization and information technologies.

Rust (2004) emphasized that the service industry and information technologies are closely related, and services are primarily driven by information. Besides, Lusch et al. (2007) discuss movements towards open standards, greater connectivity of people and objects, network prevalence, and higher human expertise, and how to exchange more services. Many service innovations will be related to digital transformation.

1.3. Trademarks and Service Marks

The brand is the focus of marketing activities that affect consumer behavior and separate products and services. For manufacturers and consumers, the brand may have different goals, but the common goal is to take advantage of the brand and branding as it has become part of economic life (Alan and Yeloğlu, 2013). When the brand is taken under legal protection, it is defined as a trademark and provides many rights and benefits to its owner.

It can be used without registering a trademark or service mark. However, if someone tries to use your brand or uses a similar brand, you cannot protect your brand. Nice Classifications help businesses to identify the nature of the related good or service and seek adequate intellectual property protection. 35-45 Services are divided into eleven classes. The division is based on the businesses that provide the services. These classifications exist so that businesses registering a trademark can identify the nature of the related good or service and seek adequate intellectual property protection. Internationally, the Nice International Classification System makes a trademark easy to recognize, categorize, and register among all signatory countries.

Schmoch (2003:154) emphasized that the potentials of brands especially as an indicator of innovation in the service sector. According to him, the analysis of the service sector becomes difficult due to the lack of suitable statistical data. He stated that, unlike patents, trademarks are applied to services as well as products, thus opening up the service area. Besides, trademark data provides a large number of trademark applications that provide statistically significant results, and these data can be accessed from electronic databases, segregated by industry, and finally, it is emphasized that comparisons can be made thanks to international databases, the latest OHIM, which is an international database (Schmoch, 2003). However, Schmoch (2003) has investigated whether brands are related to innovations in the service industry and concludes with this research that commercial innovations meet all prerequisites to create an indicator for service innovation. He noted, however, that in order to interpret international level indicators based on trademark practices, it is necessary to consider the characteristics of national and regional legal systems and require more research to be more aware of the structure of trademark practices between offices. Although the literature on trademarks is limited, it has been increasing in recent years, especially in Europe. Sandner (2009) investigated how patent and trademark portfolios affect the market value of European markets.

In order to answer the question of whether the trademark can indicate to innovative activities, previous researches have demonstrated productivity with trademarks (Greenhalgh & Rogers, 2007) or stock market value (Sandner & Block, 2011) and trademarks and innovativeness (Amara et al., 2008; Schmoch, 2003). After then, other researchers tried to use trademarks as an indicator of innovation (see. Gatrell & Ceh, 2003; Malmberg, 2005; Mendonca et al., 2004; Millot, 2009; Schmoch & Gauch, 2009). Päällysaho and Kuusisto (2008) found that companies providing services often use some form of protection. Therefore, trademarks are primarily used to separate a company's services from potentially competitive services. In particular, when patent protection is not possible, trademarks appear to have a positive impact on innovation success (Schmoch, 2003). Gotsch and Hipp (2012) have already shown that international distribution markets, competitive market environments and highly standardized services increase the number of trademark registrations.

1.4. The Importance of Digital Service Innovation during the COVID-19 Pandemic

Due to the COVID-19 (coronavirus) pandemic, the whole world is experiencing an emergency, and the importance of a robust digital infrastructure and widespread digitalization of services, especially for rural areas, such as the countryside, focusing on connectivity and accessibility to services related to fundamental life requirements. It was understood by everyone that the use of digital technologies increased during the pandemic period. The digitization is not only about infrastructures, but also about the use of these technologies and digital skills. COVID-19 showed issues that concern all sectors in the world and all sectors should take seriously. At the beginning of these, traditional supply chains and production ecosystems have failed and applications that are fully digitally activated and provide adaptive solutions should be started. The virus has shown only this need and urgency and has led to the acceleration and further spread of digital transformation and change. Countries and cities around the world have made infrastructure innovation a priority to protect their physical systems to remain intact during natural disasters such as earthquakes, tsunamis and hurricanes. However, epidemic diseases have shown that these methods are not sufficient when

it comes to providing connections and reaching our society during biological disasters. In the ongoing covid-19 pandemic, more acceptance of online services around the world and increasing the need for internet services for industries came to the fore.

With the COVID-19 pandemic, education services suddenly ceased to be compulsory. Educational institutions and educators had to apply distance education methods. According to Akat and Karataş (2020), the students' learning process was negatively affected and students who have been stripped of their freedom due to COVID-19 are deeply concerned about when face to face education will happen. Offices and workplaces were closed and those with workforce digital infrastructures and information technology facilities that could work from home started to work from their homes. Businesses will need to ensure that they can continuously collect and analyze the relevant data efficiently to keep things running smoothly and safely. They need to be able to control access from remote workers and home networks to corporate data centers and cloud services. Governments have to rely on digital tools to communicate with their citizens to implement the measures taken. The way we live and work with Pandemic changes fundamentally. This will have a long-term impact on our society and economy, and while trying to return to normal as soon as possible, it is clear that some of these new transformations will remain constant in our lives.

Service innovations related to information technologies should positively affect people's daily activities and actions based on implicit implementations. Failed digital service innovations are innovations that do not adequately develop applications and are therefore not valued (Löbler and Lusch, 2014). In this unprecedented situation, people are quickly adapting to innovative ways of building and doing business with empowered connectivity, and digital transformation is no longer just a question, but a core activity for many industries.

The pandemic is expected to cause great damage to the world economy this year. It is important not to miss the digital business opportunities that are emerging right now, without minimizing the devastating impact of COVID-19. While these generally respond to short-term needs, they have the potential to be long-standing changes in the digital environment after the current crisis has passed. Digital areas emerging with pandemic and predicted to develop after the epidemic are seen in every area of our lives. First of all, digital health initiatives and practices will increase. As consumers focus more on their health for prevention, innovations in Covid-19 information and treatment-related healthcare are emerging. These innovations should develop useful solutions that will help reduce the risks of epidemic transmission, alleviate consumer anxiety and also provide assurance to help them cope with these difficult situations. With the help of more flexible arrangements, doctors have begun setting up health hotlines or giving support through digital platforms. Examples of possible spreading applications are Definitive Healthcare and FluPhone flu spreading measures that track hospital bed capacity in the USA. Those who do not care about the urgency of the digital transformation or are inadequate will likely be left behind by the transformation and the continuity of the businesses will be at risk.

Digitization and digital transformation are associated with Industry 4.0 technologies, and these technologies are capable of providing better digital solutions for our daily lives during this crisis (Cheng, Liu, Qiang and Liu, 2020). Various benefits of Industry 4.0 technologies have been reported to alleviate the effects of the COVID-19 pandemic (Javaid, Haleem, Vaishya, Bahl and Suman, 2020). Planning of COVID-19 related activities, providing a better experience for healthcare and other employees without risk, providing timely medical support using this smart supply chain, robotic treatment of infected patients to reduce the risk of doctors training Usage areas such as promoting purposeful virtual reality environment are mentioned (Haleem and Javaid, 2019; Ren, Zhang and Wang, 2020). Other digital service developments are in banking services by Banks. Banks started digital access to customers by switching to remote sales and service teams, making flexible payment arrangements for loans and mortgages. In order to meet the fundamental needs and

requirements of people in the epidemic, markets have turned towards online orders and home delivery. Educational institutions have turned into online learning and visual classes, which are distance education model applications. These are the remedies that are thought to keep the economies alive and keep the flow of life. Because if the economies retreat, demand recovery will be unpredictable.

2. Data and Methods

Trademark analysis offers a possible solution to overcome the current weaknesses of traditional innovation research and measurement concepts developed especially for manufacturing industries (Hipp & Grupp, 2005). Previous empirical studies have shown that trademark analysis can be used as an alternative approach (eg, Amara et al., 2008; Gotsch and Hipp, 2011; Mendonça et al., 2004). Analysis of trademarks may contribute to a better understanding of innovation in services that go beyond traditional survey-based indicator concepts (Schmoch, 2003:152). By doing this, researchers, policymakers and entrepreneurs can learn about the possibilities and limitations of trademarks as an innovation indicator to better define, understand and compare innovation activities in the service industries.

March 11, 2020, which is the date declared as a pandemic by the World Health Organization, was accepted as the start date of this research. Therefore, in this study, research terms were investigated in service mark applications between 11 March and 31 May 2020. For this research, the trademark statistics are obtained from the official statistics page of the Turkish Patent and Trademark Office and the trademark application information is published regularly from the trademark bulletins. The trademarks bulletins are registered as platforms where trademark application information is made available to the public, while the trademarks are registered, it is decided to be published in the Official Trademark Bulletin after the formal and legal examination to be carried out by the Turkish Patent and Trademark Authority.

In this research, the textual data is considered in the light of text mining analysis. The method involves establishing categories and then counting the number of instances in which those categories are used in a particular item of text. In this study, text mining method was used. In recent years, the importance given to studies using databases and text mining method has increased (Melnyk, Giarratana & Torres, 2014). Since text mining methods alone do not produce comprehensible results, expressions with complex structures can be classified meaningfully using natural language processing techniques and several programs together. For text importation, natural language processing algorithms and text data visualization KH Coder text mining software is used. Service marks cover the nice classes between 35th and 45th from 45 classes in total, which are included in international mark classifications. The service sector nice class headings and titles covered by each class are shown in table 1.

Table 1: Service Marks International Nice Class Headings

Nice Class	Nice Class Headings
35	Advertising; Business management; Business administration; Office functions
36	Insurance; Financial affairs; Monetary affairs; Real estate affairs
37	Construction services; Installation and repair services; Mining extraction, oil and gas drilling
38	Telecommunications services
39	Transport; Packaging and storage of goods; Travel arrangement
40	Treatment of materials; Recycling of waste and trash; Air purification and treatment of water; Printing services; Food and drink preservation
41	Education; Providing of training; Entertainment; Sporting and cultural activities
42	Scientific and technological services and research and design relating thereto; Industrial analysis, industrial research and industrial design services; Quality control and authentication services; Design and development of computer hardware and software
43	Services for providing food and drink; Temporary accommodation
44	Medical services; Veterinary services; Hygienic and beauty care for human beings or animals; Agriculture, aquaculture, horticulture and forestry services
45	Legal services; Security services for the physical protection of tangible property and individuals; Personal and social services rendered by others to meet the needs of individuals

Resource: <https://www.turkpatent.gov.tr/TURKPATENT/commonContent/MClassification/>

The words to which the trademark application was made were included in the research by using all the titles are shown in Table 1. Beside these words, figures or signs are also protected as “service mark”. Since this research was carried out with the method of text mining, only the word mark applications were taken into consideration. Wordmarks (wordmarks contain product names and slogans used for the service industry.

3.3. Research Process

In the pandemic, the trademark bulletins published in the period to be examined within the scope of the research were downloaded from the Turkish Patent and Trademark Office web page, in order to determine the reflection of the digitalization in the services they provide as a crisis strategy and as a precautionary measure to continue their activities. From the beginning of the pandemic to the 31st of May, six trademark bulletins were published. For this reason, it is also appropriate to examine the trademark bulletins covering 2020 applications since it will be beneficial to look at the dates when the COVID-19 virus appeared. In order to search the official trademark bulletins and make the transactions of the trademark owners easily, since 2015, usage is provided through an application belonging to TURKPATENT that can be installed on a personal computer. This application made it easy to confirm the analysis of the research terms determined in the research and saved time. Since the research examines the digitalization efforts and trends, the terms of research have been chosen by this tendency.

From health to education, from cleaning to hobby services, the effects of digitalization are experienced in every service sector title. The expressions we frequently hear with digitalization and industry 4.0, which are determined as “.com, com.tr, .net, .edu, www, e-trading, e-consulting, e-logistics,” in all reference words made as 35-45 classes determined as research terms. In the research, all service mark applications are listed using the excel program. KH Coder Text Mining Program imports excel files. As free software, KH Coder text mining program performs co-occurrence, co-

word, clustering, term extract, and term frequency analysis. Besides, dendrogram visualizes analysis with plots and frequency maps.

3. Analysis and Findings

The analysis started with the regulation of the expressions of service mark applications. Since the text mining software does not support Turkish language, the Turkish characters in the dataset are changed and the program is understood and operated datasheet easily. Statistical information of trademark information are presented in table 2.

Table 2: Distribution of Trademark and Service Mark Applications by Years

Year	Domestic		Foreign				Total			
	Number	Change (%)	Number	Change (%)	Madrid Protocol Applications		Total	Change (%)	Total	Total Change (%)
					Amount	Change (%)				
2010	73142	22,23%	4083	12,67%	7903	-2,94%	11986	1,87%	85128	18,89%
2011	103747	41,84%	4724	15,70%	9252	17,07%	13976	16,60%	117723	38,29%
2012	97311	-6,20%	4731	0,15%	9101	-1,63%	13832	-1,03%	111143	-5,59%
2013	93320	-4,10%	4869	2,92%	10419	14,48%	15288	10,53%	108608	-2,28%
2014	97145	4,10%	4936	1,38%	9463	-9,18%	14399	-5,82%	111544	2,70%
2015	95962	-1,22%	5033	1,97%	9684	2,34%	14717	2,21%	110679	-0,78%
2016	94575	-1,45%	4785	-4,93%	7816	-19,29%	12601	-14,38%	107176	-3,17%
2017	106099	12,19%	4614	-3,57%	10395	33,00%	15009	19,11%	121108	13,00%
2018	105550	-0,52%	4776	3,51%	9682	-6,86%	14458	-3,67%	120008	-0,91%
2019	119412	13,13%	4802	0,54%	10139	4,72%	14941	3,34%	134353	11,95%

Resource: <https://www.turkpatent.gov.tr/TURKPATENT/statistics/>

In Table 2, the numbers of the last ten years of both trade and service marks are presented. The number of applications and rate of changes according to the nice classifications of the service sectors are shown in Table 3.

Table 3: Numbers of Trade and Service Mark Applications by Years

Nice Class	2015		2016		2017		2018		2019	
	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign
01	2029	859	2015	828	2386	922	2119	813	2401	915
02	1174	284	1180	232	1274	299	1135	285	1346	239
03	4232	1632	4415	1472	5040	1592	5013	1705	6800	1756
04	1121	330	1082	273	1472	370	1261	305	1554	341
05	4777	1992	4941	1667	5713	1976	5808	1795	6602	1924
06	2888	583	2899	444	3082	539	3010	586	3218	637
07	4165	1230	3971	960	4688	1336	4467	1278	5012	1364
08	1203	398	1193	289	1295	421	1114	353	1576	403
09	6659	3262	6595	2612	7280	3583	7491	3507	8788	3926
10	1651	767	1576	635	1656	822	1607	719	2209	820
11	3115	916	2830	721	3115	1121	2922	949	3502	891
12	2081	902	2100	735	2376	956	2146	943	2534	867
13	509	70	600	35	575	41	587	50	600	67
14	1957	670	1898	461	2124	590	2215	493	2774	525
15	359	58	411	25	352	65	377	47	458	57
16	4846	973	4885	786	5329	1035	4968	882	5958	835
17	1547	384	1407	340	1489	443	1398	388	1619	477
18	2086	878	1974	678	2316	843	2164	728	2849	851
19	3740	383	3299	325	3426	395	2969	381	2632	425
20	3600	512	3412	381	3910	606	3550	501	4169	585
21	2039	559	2009	470	1943	624	1856	577	2425	640
22	575	106	634	77	640	146	583	122	760	131
23	596	65	615	51	640	80	532	88	800	87
24	2674	419	2428	281	2765	433	2543	380	3261	400
25	8791	1420	8427	1212	9532	1537	9164	1328	11230	1424
26	813	152	812	84	867	152	818	126	1064	117
27	1247	180	1266	114	1204	199	1093	177	1131	161
28	1556	593	1585	475	1781	744	1703	684	2089	661
29	8531	533	8690	448	9122	534	8743	529	10491	550
30	9398	902	9599	786	10154	898	10908	840	12786	780
31	2706	329	2645	258	2893	317	2705	296	3233	332
32	2648	493	2673	404	2781	504	2734	450	3166	429
33	1183	325	762	222	785	262	785	250	1108	243
34	438	408	535	312	567	374	610	281	771	374
35	35533	2287	35757	1872	42236	2240	43484	2324	53048	2563
36	4994	573	5119	480	5706	557	5032	680	4767	683
37	9222	781	9221	605	10074	757	8526	680	7418	782
38	4698	661	4573	599	4003	690	3861	774	4270	792
39	4431	512	4152	422	4492	479	4522	521	5645	561
40	3051	352	3014	283	3469	331	3336	336	3812	370
41	11529	1268	11937	1118	12849	1383	12728	1419	14940	1434
42	6878	1562	7231	1223	7910	1607	8276	1706	8863	2001
43	12187	630	12197	501	13975	496	14249	548	17328	535
44	2939	516	3130	405	3680	498	3860	514	5233	544
45	1401	261	1379	241	1814	299	1970	348	2499	343
Total	193.797	32.970	193.073	26.842	214.780	34.096	210.942	32.686	248.739	34.842

Resource: <https://www.turkpatent.gov.tr/TURKPATENT/statistics/>

Table 3 shows the distribution of all trademark applications for the last five years by Nice class. There are 45 titles in total in Nice classification. Those between 35-45 of these titles are mark applications for the service sector. The highest number of applications are made in the 35th grade, followed by the 41st and 43th grades. To summarize, 35th grade services; businesses, management and office services, 41 is training services, 43 is also temporary accommodation, food and beverage supply, packaging, etc. relates to services.

When the information about 2020 is analyzed, it is determined that 42084 trademark applications were made between 01.01.2020-31.05.2020 in total. Of these, 39612 applications are domestic applications and 2472 applications belong to foreign trademark applications that are within the scope of the Madrid Protocol (international brand protection agreement). Applications belonging to the service sector among these applications are divided into classes in Table 4.

Table 4: 2020 year Service Mark Applications by Nice Classes

Nice Classes and Headings	Number
35-Advertising; business management; business administration; office functions	18080
36-Insurance; financial affairs; monetary affairs; real estate affairs	1736
37-Building construction; repair; installation services	2714
38-Telecommunications	1446
39-Transport; packaging and storage of goods; travel arrangement	1955
40-Treatment of materials	1279
41-Education; providing of training; entertainment; sporting and cultural activities	4622
42-Scientific and technological services and research and design relating thereto; industrial	3311
43-Services for providing food and drink; temporary accommodation	4317
44-Medical services; veterinary services; hygienic and beauty care for human beings or	1729
45-Legal services;	895
Total Service Mark Applications	42084

The numbers of service mark applications for 2020 are given in Table 4 by Nice classes. Service mark applications can be made by selecting as many classes as desired in an application. There may be more than one class that the brand is related to, or the brand owner may want to protect their rights that their brand is also producing in other classes. Analyzes were made using only domestic trademark applications. Descriptive statistics of the data sheet are shown in table 5.

Table 5: Percentage of Research Terms By Nice Classes

Research Terms	Related Nice Classes (n)											Total Application	
	35	36	37	38	39	40	41	42	43	44	45	(n)	(%)
Wordmarks beginning with "www"	85	7	18	13	37	2	26	10	10	4	2	214	0,52
Wordmarks ending with ".com"	467	21	43	30	106	8	84	71	29	22	7	888	2,16
Wordmarks ending with ".net"	6	2	2	2	2	2	10	2	0	0	2	30	0,072
Wordmarks including ""e-xxx"	19	0	0	3	1	0	5	8	0	1	0	37	0,089
Total	577	30	63	48	146	12	125	91	39	27	11	1169	2,84
Total Paragraphs	42084												
Types of Words (n)	41162												
Mean of Term Frequency	2,24												
Std. Deviation of Term Frequency	8,28												

According to Table 5, a total of 42084 lines of data are available in the data set for 2020. The data dropped to 41162 lines by removing the expressions that were repeated frequently and determined as meaningless from these data.

It is observed that the services are dense in the 35th class in the distribution of the titles of the service sector by classes. The services in this group show a direct digitalization tendency. Services in this group; covers the services of bringing together the goods in every sector with the online marketplace (website) (specified services can be provided by retail, wholesale stores, electronic media, catalogs and other similar methods) and delivery to customers through online platforms. It can be said that every business that does not have an online platform in the period of pandemic has gone through this problem and the applications have increased under this class due to the expectation that they will want to protect these services with the brand.

In the digitalized jobs online pet sales services, business consultancy services, online food ordering services and e-trading companies related to each product group are seen. One of the sectors that are damaged due to pandemic is the tourism sector, which includes tour arranging, setting a place for travel, providing travel related tickets, courier services. The reason for the negative impact of the tourism sector is that the first restrictions are made in this sector due to the spread of epidemic diseases worldwide. Online platform applications of tour and travel companies are the majority of applications made during 2020. Digitalization tendencies are also high in educational services. It is seen that there are online education platforms and distance education sites in the applications made. It is seen that real estate consultancy and real estate brokerage services are now oriented towards online services. It can be said that the least digitalized sector is in the security services class.

Results and Discussion

In this study, the relationship between the COVID-19 pandemic and the digitalization of the service sector is revealed. Protecting digital services with branding is one of the strategies of businesses. The pandemic occurs with the transmission of diseases fed by the mobility of people affecting the whole world. The service sector is the sector most affected by crises such as epidemics. Millions of people have been unemployed worldwide and businesses have had to close. COVID-19 pandemic affects the lives of individuals and businesses negatively, as it is worldwide. It is normal for businesses to view this situation as a crisis. Those who succeed in surviving this process with the least harm by developing the most useful strategies will be the winner of this struggle. While better scenarios are valid for businesses that provide services with digital applications, it is thought that businesses that have just completed digital transformation immediately go to correct their deficiencies and have achieved this as an essential requirement for survival.

Enterprises with a lack of digitalization have sought to protect their investments in information technologies in this period as a service mark. In addition to this, it can be said that there are businesses that have been adequately digitalized but want to protect these service innovations by deciding to offer different services with a pandemic. Service marks have a simple but important advantage for their use as an indicator of innovation: all service innovations can be protected with service marks. A trademark is a legally protected symbol used to clearly distinguish the products and services of a company, the products and services of a company, which are the distinctive function of a trademark (Greenhalgh & Rogers, 2007). The trademark may consist of shape, sign or word. The common point is that it has never been used, produced and unique to its owner.

As a country in the fight against the virus, our digital infrastructure needs to be strengthened to cope with the impact of future public health crises. Everything has to be planned in detail so that there is no disruption to the businesses or the customers, without contact, and without any space and time constraints. It is important to integrate technologies such as cloud computing, big data, artificial intelligence and smart systems, which become evident with digitalization, in all areas of life. Health is at the top of everything. Better integration of Artificial Intelligence applications into health services

should be a priority. These technologies can be used to help analyze big data related to the movement of citizens, patterns of disease transmission and health monitoring, prevention measures. It should not be forgotten that in recent years the world has witnessed the rise of SARS, Zika virus, Ebola and now Covid-19, and pandemics have become a rising threat.

Many businesses turned to distance-work or home office models almost overnight. Businesses that can achieve this have improved their artificial intelligence and analytical capabilities in their applications. There is a very rapid acceleration in information technology applications. Digital transformation was essential in this period for businesses with insufficient digital infrastructure and who did not make digital investments before. It is seen that many businesses have been actively using them and have managed to establish an e-commerce business that covers all business functions in a very short time. The new and diverse branches of business triggered digitization investments. Now, businesses have to make innovations in which every detail is considered and that provide security requirements, which will be by redesigning their traditional business. Businesses have begun to take home service. The automaker now performs functions such as commercial transactions, financing, service and home delivery of vehicles traditionally done by dealers. Airlines popularize the passenger experience with contactless journeys that focus on passenger health and safety to make customers feel comfortable flying again. It can be said that various precautionary practices and new services have developed for the mobilization of tourism.

According to the results of this study, it is seen that the most affected business areas in the service sector are related to business services, and e-trading platforms aiming to provide services to customers in every production area occur online. In addition to the digitally transformed businesses that offer basic needs, there are also online businesses that are thought to be established to provide services such as business consultancy, real estate consultancy, health consultancy, and pharmaceutical consultancy. It is seen that digital service innovations related to the business areas most affected by pandemic are high. The reason for this may be that businesses implement new strategies to tackle this crisis. Especially in the health, education and tourism sectors, this tendency has been revealed to be high. Digitization should be considered as a single remedy for the loss of these areas. The number of digitalized service marks that have been increasing and increasing over the years has also been affected by the pandemic. In the next process, the branding tendency will be directed towards digital services, digitalization of services and new service applications of enterprises that are strengthened by information technologies.

Research Limitations and Future Research Directions

There are a few limitations worth noting in this study. First of all, the research data is limited to the pandemic process. It takes a long time and effort to access its data, so only data for the first five months of 2020 could be compiled. The pandemic process is still ongoing and these studies will be carried out to cover a longer period time, which will yield more comprehensive and valid results. In later studies, the qualifications of brand applications can be compared over the years, and even more comprehensive and detailed results can be obtained by comparing with other countries. Besides, the study focused only on the service sector. Since the sectors that are most affected by the pandemic are services, the digitalization trends in the services have been revealed. Analysis of production sector and trademark information can also be made in future studies. Comparisons can be made across sectors more fully and comprehensively.

References

- Agarwal, S. & Dev, C. (2003). Market orientation and performance in service firms: role of innovation. *J.Serv. Mark.* 17(1),68–82.
- Ahmed, S. F. Quadeer, A. A. & McKay, M. R. (2020). Preliminary identification of potential vaccine targets for the COVID-19 coronavirus (SARS-CoV-2) based on SARS CoV immunological studies. *Viruses*, 12(3):254.
- Akat, M. & Karataş, K. (2020). Psychological effects of COVID-19 Pandemic on society and its reflections on education. *Turkish Studies*, 15(4), 1-13. <https://dx.doi.org/10.7827/TurkishStudies.44336>
- Alan, H. & Yeloğlu, H. O. (2013). Branding and Innovativeness, Siirt Üniversitesi, *İktisadi Yenilik Dergisi*, 1 (1), 13-26.
- Amara, N., Landry, R., & Traoré, N. (2008). Managing the Protection of Innovations in Knowledge-Intensive Business Services. *Research Policy*, 37(9):1530–1547. <http://dx.doi.org/10.1016/j.respol.2008.07.001>
- Berry, L.L. Shankar, V. Parish, J.T. Cadwallader, S. & Dotzel, T. (2006) Creating new markets through service innovation. *MIT Sloan Management Rev.* 47(2):56–63.
- Brennen, S. J., & Kreiss, D. (2016). *Digitalization and Digitization*. In K. Bruhn Jensen, R. T. Craig, J. D. Pooley, & E. W. Rothenbuhler (Eds.), *The International Encyclopedia of Communication Theory and Philosophy*. Oxford, UK: Wiley-Blackwell.
- Burford, S. (2011). Complexity and the practice of Web information architecture. *J. Amer. Soc. Inform. Sci. Tech.* 62(10):2024–2037
- Cheng G.J. Liu, L.T. Qiang, X. J. & Liu, Y. (2016). Industry 4.0 development and application of intelligent manufacturing. In 2016 international conference on information system and artificial intelligence (ISAI) Jun 24 (pp. 407-410). IEEE
- Clarke, T. & Adler, J. (2016). Celebrity chef adoption and implementation of social media, particularly pinterest: a diffusion of innovations approach. *Int.J. Hosp. Manag.* 57, 84–92.
- Coombs, R. & Miles, I. (2000). Innovation, measurement and services: The new problematic. In J. Metcalfe & I. Miles (Eds.), *Innovation systems in the service economy: Measurement and case study analysis* (pp. 85–103). Boston: Kluwer Academic.
- Fitzsimmons, J. A. & Fitzsimmons, M. J. (2000). *New Service Development: Creating Memorable Experiences* (Sage, Thousand Oaks, CA).
- Gatrell, J. & Ceh, S. (2003). Trademark data as economic indicator: The United States, 1996–2000. *The Great Lakes Geographer*, 10(1), 46–56.
- Grasselli, G. Pesenti, A. Cecconi, & M. Critical, (2020). Care utilisation for the COVID-19 outbreak in Lombardy, Italy: early experience and forecast during an emergency response.
- Greenhalgh, C. M. Rogers, P. Schautcheck, & V. Sena, (2011). Trademark Incentives, UK Intellectual Property Office.
- Greenhalgh, C. & Rogers, M. (2007). Trade marks and performance in UK firms. Working Paper No 27. DIME Working Papers on Intellectual Property Rights.
- Gotsch, M. & C. Hipp, (2011). Measurement of Innovation Activities in the Knowledge-Intensive Services Industry: A Trademark Approach, *The Service Industries Journal* 32, 2167–2184.

- Haleem, A. & Javaid, M. (2019). Additive manufacturing applications in industry 4.0: a review. *J. Ind. Integrat. Manag.* <https://doi.org/10.1142/S2424862219300011>.
- Hipp, C. & Grupp, H. (2005). Innovation in the service sector: The demand for service-specific innovation measurement concepts and typologies, *Research Policy*, 34, pp. 517-535.
- Javaid, M. Haleem, A. Vaishya, R. Bahl, S. & Suman, R. (2020). Industry 4.0 technologies and their applications in fighting COVID-19 pandemic, *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, 14 (2020) 419-422
- Kallinikos, J. Aaltonen, A. & Marton, A. (2013). The ambivalent ontology of digital artifacts. *MIS Quart.* 37(2):357–370.
- Kanapathy, V. (2003), Service Sector Development in Malaysia: Education and Health as Alternate source of growth. AT120 Research Conference.
- Kannan, P. K. & Li, H. A. (2017). Digital marketing: A framework, review and research agenda. *International Journal of Research in Marketing*, 34(1), 22–45. <https://doi.org/10.1016/j.ijresmar.2016.11.006>.
- Löbler, H. & Lusch, R. F. (2014). Signs and Practices as Resources in IT-Related Service Innovation, *Service Science*, Vol. 6 No. 3, pp.190-205.
- Lusch, R. & Nambisan, S. (2015). Service innovation: a service-dominant logic perspective. *Mis Quarterly*, 39(1),155–175.
- Lusch, R. F, Vargo, S. L, & O'Brien, M. (2007). Competing through service: Insights from service-dominant logic. *J. Retailing* 83(1):5–18.
- Malmberg, C. (2005). Trademarks statistics as innovation indicator? - A micro study. Lund: CIRCLE Electronic Working Paper Series, Paper no. 2005/17.
- Melnyk, V. Giarratana, M. & Torres, A. (2014). Marking your trade: Cultural factors in the prolongation of trademarks. *Journal of Business Research*, 67(4), 478-485.
- Mendonça, S. Pereira, T. S. & Godinho, M. M. (2004). Trademarks as an Indicator of Innovation and Industrial Change. *Research Policy*, 33(9): 1385–1404. <http://dx.doi.org/10.1016/j.respol.2004.09.005>
- Michel, S, Brown, S.W, & Gallan, A.S. (2008) An expanded and strategic view of discontinuous innovations: Deploying a service-dominant logic. *J.Acad. Marketing Sci.* 36(1):54–66.
- Miles, I., Andersen, B., Boden, M., & Howells, J. (2000). Service Production and Intellectual Property. *International Journal of Technology Management*, 20(1): 95–115.
- Millot, V. (2009). Trademarks as an indicator of product and marketing innovations. Paris: OECD Science, Technology and Industry Working Papers, 2009/6.
- Morens, D. M. Folkers, G. K. & Fauci, A.S. (2009). What is a pandemic? *J Infect Dis.* 200(7):1018-1021.
- Ren, J.L, Zhang, A.H, Wang, X.J. (2020). Traditional Chinese medicine for COVID-19 treatment. *Pharmacol Res*, Mar 4:104743.
- Ordanini, A. & Parasuraman, A. (2011). Service innovation viewed through a service dominant logic lens: a conceptual framework and empirical analysis. *J. Serv. Res.* 14 (1):3–23.
- Päällysaho, S. & Kuusisto, J. (2008). IP protection as a key driver of service innovation: An analysis of innovative KIBS businesses in Finland and the UK. *International Journal of Services Technology and Management*, 9(3–4), 268–284.

-
- Parida, V. D. Sjödin, & W. Reim. (2019). Leveraging digitalization for advanced service business models: Reflections from a systematic literature review and special issue contributions. *Sustainability* 11 (2): 391. <https://doi.org/10.3390/su11020391>
- Rai, A. & Sambamurthy, V. (2006). The growth of interest in services management: Opportunities for information systems scholars. *Inform. Systems Res.* 17(4):327–331.
- Rust, R. (2004). If everything is a service, why is this happening now, and what difference does it make. *J. Marketing* 68(1):23–24.)
- Sandner, P.G. (2009). *The Valuation of Intangible Assets: An Exploration of Patent and Trademark Portfolios*, Wiesbaden, Germany: Gabler.
- Sandner, P. G. & Block, J. (2011). The Market Value of R&D, Patents, and Trademarks. *Research Policy*, 40(7): 969–985. <http://dx.doi.org/10.1016/j.respol.2011.04.004>
- Sawhney, M. Verona, G. Prandelli, E. (2005). Collaborating to create: The Internet as a platform for customer engagement in product innovation. *J. Interactive Marketing* 19(4):4–17.
- Schmoch, U. (2003). Service marks as novel innovation indicator, *Research Evaluation*, 12(2), pp. 149-156.
- Schmoch, U. & Gauch, S. (2009). Service marks as indicators for innovation in knowledge-based services. *Research Evaluation*, 18(4), 323–335
- Teece, D. J. & Linden, G. (2017). Business models, value capture, and the digital enterprise. *Journal of Organization Design*, 6(1), <https://doi.org/10.1186/s41469-0170018-x>
- Yoo, Y. Henfridsson, O. & Lyytinen, K. (2010). The new organizing logic of digital innovation: An agenda for information systems research. *Inform. Systems Res.* 21(4):724–735.