Research paper/Оригинальная статья
https://doi.org/10.51176/1997-9967-2022-3-49-65
МРНТИ 06.56.21
JEL: M21, O32, O33

The Process of Telemedicine Implementation in the Context of the Digitalization Process in Kazakhstan

Raushan S. Makasheva[1*], Leila A. Tussupova[1], Roland Giese[2]

[1]Turan University, 16a Satpayeva str., 050013, Almaty, Kazakhstan
[2] University of Applies Science, Hochschule Zittau/Gorlitz, 16 Theodor-Korner-Allee, 02763, Zittau, Germany

Abstract

The purpose of this work is to study the process of telemedicine implementation in the context of digitalization of Kazakhstan to identify problems. Development of recommendations for solving these problems, both in the public and in the private sectors of medical services. The scientific significance of the work lies in the contribution of new knowledge on the issue of telemedicine in the example of Kazakhstan, since this issue has been underxplored. The results of this study can be used to further develop the digitalization process of healthcare in the Republic of Kazakhstan. A qualitative method is used, a semi-structured interview with experts in the field of telemedicine implementation was conducted. Atlas.ti software is used for data processing. As a result of the analysis of the interviews, the limitations and problems of the implementation of telemedicine in the country were identified, such as high costs for the provision of IT services and the quality of the Internet, as well as the government's weak interest in cooperation with the private sector. However, despite these obstacles, the private sector is interested in implementing telemedicine. Analysis of world official data showed that the telemedicine market is growing rapidly, and there is a demand for consultations using telemedicine in the Kazakhstani market. Therefore, there is a need to develop this direction. Recommendations were offered to solve the problems of telemedicine implementation in Kazakhstan. Eliminating the identified problems can accelerate the process of healthcare digitalization, which is a contribution to the development of this area.

Keywords: Digitalization, Digital business, eHealth, Telemedicine, Economics, Strategy, Digital Transformation.

For citation: Makasheva, R. S., Tussupova, L. A., & Giese, R. (2022). The process of telemedicine implementation in the context of the digitalization process in Kazakhstan. Economics: the Strategy and Practice, 17(3), 49-65, https://doi.org/10.51176/1997-9967-2022-3-49-65

*** Corresponding author: Makasheva R.S**. – PhD, Turan University, 16a Satpayeva str., 050013, Almaty, Kazakhstan, 87018426570, e-mail: 20210806@turan-edu.kz

Conflict of interests: the authors declare that there is no conflict of interest.

Financial support. The study was not sponsored (own resources).

The article received: 29.07.2022
The article approved for publication: 08.08.2022
Date of publication: 30.09.2022

Қазақстандағы цифрландыру үдерісі жағдайында телемедицинаны енгізу процесі

Макашева Р.С.[1*], Тусупова Л.А.[1], Гизе Р. [2]

[1]Тұран университеті, Сатпаев 16А, 050013, Алматы, Қазақстан

[2] Циттау-Герлитц Қолданбалы ғылымдар университеті, Теодор-Корнер 16, 02763, Циттау, Германия

Түйін

Денсаулық сақтау саласын цифрландыру бүгінде әлемнің барлық елдері үшін өзекті мәселелердің бірі болып табылады. Жаһандық Ковид-19 пандемиясы және онымен байланысты карантиндік шектеулер салдарынан экономикалық күйзелістер - денсаулық сақтау саласын дамыту қажеттілігін көрсетті. Қазақстан үшін де бұл сұрақ өзекті, сондықтан цифрландыру арқылы денсаулық сақтаудың тиімділігін және бүкіл халыққа медициналық көмектің қолжетімділігін арттыру, атап айтқанда денсаулық сақтау саласының негізгі қызметін ақпараттық жүйелермен біріктіру, мобильді цифрлық технологияларды пайдалану қажет, мобильді қосымшалар, электронды денсаулық паспорттарын енгізу және қағазсыз ауруханаларға көшу қажеттілігі бар. Бұл жұмыстың мақсаты – Қазақстандағы цифрландыру жағдайында телемедицинаны енгізу үдерісін зерттеу. Жұмыстың ғылыми маңыздылығы телемедицина мәселесі бойынша әдебиеттерге Қазақстан мысалында жаңа білімдердің қосылуында, өйткені бұл мәселе аз зерттелген. Осы зерттеудің нәтижелерін Қазақстан Республикасындағы денсаулық сақтауды цифрландыру үдерісін одан әрі дамыту үшін пайдалануға болады. Зерттеу үшін сапалы әдіс қолданылады, оның құралы телемедицинаны енгізу саласындағы сарапшылармен жартылай құрылымдық сұхбат болып табылады. Atlas.ti бағдарламалық құралы мәліметтерді өңдеу үшін қолданылды. Ресми деректерді талдау телемедицинаны пайдалана отырып, консультацияларға сұраныс бар екенін көрсетті, сондықтан бұл саланы дамыту қажет. Сондай-ақ, зерттеу нәтижесінде елде телемедицинаны енгізудің шектеулері мен проблемалары анықталды, мысалы, IT-қызметтерін көрсетуге және Интернеттің сапасына кететін жоғары шығындар, сондай-ақ мемлекеттің жеке сектормен ынтымақтастыққа мүдделілігінің әлсіздігі. Мемлекеттік және жеке сектор үшін қолайлы жаңа медициналық қызметтерді енгізу жүйесін әзірлеу ұсынылады. Бұл проблемаларды жою денсаулық сақтау саласын цифрландыру үдерісін жеделдетуге септігін тигізеді, бұл осы саланың дамуына қосқан үлес болып табылады.

Түйін сөздер: цифрландыру, цифрлық бизнес, eHealth, телемедицина экономика, стратегия, цифрлық трансформация.

Дәйексөз үшін: Макашева Р.С., Тусупова Л.А., Гизе Р. (2022). Қазақстандағы цифрландыру үдерісі жағдайында телемедицинаны енгізу процесі. Экономика: стратегия және практика, 17(3), 49-65, https://doi.org/10.51176/1997-9967-2022-3-49-65

***Хат-хабаршы авторы: Макашева Р.С.** – PhD, Тұран университеті, Сатпаев 16А, 050013, Алматы, Қазақстан, 87018426570, e-mail: 20210806@turan-edu.kz

Мүдделер қақтығысы: авторлар мүдделер қақтығысының жоқтығын мәлімдейді.

Қаржыландыру. Зерттеу демеушілік колдау керсеткен жок (меншікті ресурстар).

Мақала редакцияға түсті: 29.07.2022
Жариялау туралы шешім қабылданды: 08.08.2022
Жарияланды: 30.09.2022

Процесс внедрения телемедицины в контексте процесса цифровизации Казахстана

Макашева Р.С.[1*], Тусупова Л.А.[1], Гизе Р. [2]

[1]университет Туран, ул. Сатпаева 16А, 050013, Алматы, Казахстан,
[2] университет прикладных наук Циттау-Герлитц, ул. Теодор-Корнер 16, 02763, Циттау, Германия

Аннотация

Цифровизация здравоохранения сегодня является одним из актуальных вопросов для всех стран мира. Гглобальная пандемия Ковид-19 и связанные с ней карантинные ограничения, а в последствии - экономические потрясения, показали необходимость развития здравоохранения. И Казахстан не исключение, поэтому есть необходимость повышать эффективность деятельности здравоохранения и доступность медицинской помощи для всего населения с помощью цифровизации, а именно интеграции основной деятельности сферы здравоохранения с информационными системами, использования мобильных цифровых приложений, внедрения электронных паспортов здоровья и переход на «безбумажные» больницы. Целью данной работы является исследование процесса внедрения телемедицины в контексте цифровизации Казахстана. Научная значимость работы состоит во вкладе новых знаний в литературу по вопросу телемедицины на примере Казахстана, поскольку данный вопрос мало изучен. Результаты данного исследования можно использовать для дальнейшего развития процесса цифровизации здравоохранения в РК. Для исследования использован качественной метод, инструментом которого является полуструктурированное интервью с экспертами в области внедрения телемедицины. Для обработки данных используется программное обеспечение Atlas.ti. Анализ официальных данных показал, что есть спрос на консультации с помощью телемедицины, поэтому есть необходимость развития этого направления. Также были выявлены ограничения и проблемы внедрения телемедицины в стране, такие как высокие затраты на предоставление ИТ-услуг и качество интернета, а также слабая заинтересованность правительства в сотрудничестве с частным сектором. Рекомендуется разработать систему внедрения новых медицинских услуг, удобную и комфортную для государственного и частного секторов. Устранение данных проблем может ускорить процесс цифровизации здравоохранения, что является вкладом в развитие данной сферы.

Ключевые слова: цифровизация, цифровой бизнес, eHealth, телемедицина, экономика, стратегия, цифровая трансформация.

Для цитирования: Макашева Р.С., Тусупова Л.А., Гизе Р. (2022). Процесс внедрения телемедицины в контексте процесса цифровизации Казахстана. Экономика: стратегия и практика, 17(3), 49-65, https://doi.org/10.51176/1997-9967-2022-3-49-65

*** Корреспондирующий автор: Макашева Р.С.** – PhD, университет Туран, ул. Сатпаева 16А, 050013 г. Алматы, Казахстан, 87018426570, e-mail: 20210806@turan-edu.kz

Конфликт интересов: авторы заявляют об отсутствии конфликта интересов.

Финансирование. И сследование не имело спонсорской поддержки (собственные ресурсы).

Статья поступила в редакцию: 29.07.2022
Принято решение о публикации: 08.08.2022
Опубликовано: 30.09.2022

Introduction

The concept of digital change has become a key priority for a company's development process. Especially digital business transformation is required in the era of sustainable development. For this reason, all steps which lead to digitalization are led by several changes in several aspects of business management. These are business development model and strategy, company structure, and organizational culture (Vukšić et al., 2018).

In recent years, the digital transformation of economy has covered various fields, including the healthcare system. This article attempts to explore how the digitalization process in the healthcare system, particularly in the private sector, is run in Kazakhstan. The digitalization of healthcare is one of the effective methods to achieve the SDGs. In addition, it provides the most excellent coverage of the population with medical services through which every citizen can get timely access to the multifunctional health care needed without experiencing financial difficulties.

The digitalization of healthcare today is one of the pressing issues for all countries. The global Covid-19 pandemic and the associated quarantine restrictions, and in the aftermath of the economic shocks, have shown the need to develop healthcare. And Kazakhstan is no exception, so there is a need to improve the efficiency of healthcare and the availability of medical care for the entire population through digitalization, namely the integration of the main activities of the healthcare sector with information systems, the use of mobile digital applications, the introduction of electronic health passports and the transition to paperless hospitals. Currently, the State Program for the Development of Healthcare of the Republic of Kazakhstan for 2020-2025 has been adopted to provide quality and affordable medical care. Concurrently, the state program "Digital Kazakhstan" focuses on improving living conditions for people and the economy due to using modern digital technologies in the medium term. It is also focused on transforming the economy on a new path that will ensure the creation of a long-term digital economy.

During the last two decades, in Kazakhstan, there has been a gradually introduction of projects associated with the health informatization of the healthcare system. This is the creation and implementation of the Unified Health Information System. This project did not achieve its goals because there was no integrated and strategic approach that would take into account the institutional development, potential and, while, incentives that could affect all project participants.

Healthcare modernization through digitalization is regarded among important mechanism for domestic medicine improvement. Even though there are successful implementations of projects, the complete introduction of digitization methods in the work of medical institutions remains rather low. Notwithstanding, recently a new concept has appeared in world medical practice - telemedicine. Telemedicine is a system of provision of medical services and interaction between medical workers through the application of telecommunication technologies. For instance, monitoring of condition of patients and consultations (RBC Trends, 2022)

Now patients can consult with any specialists without leaving their homes, and medical staff can exchange experiences, which is relevant, especially in the context of COVID- 19 (Bokolo et al., 2021). With the help of telemedicine, the risk of infection through direct contact has been eliminate. Thus the issue of a shortage of specialists can also become secondary. The process of implementation of online consultations into medical practice has also accelerated.

Technologies in telemedicine are applicable almost in every medical sphere. Moreover, they proved to be more useful. For instance, it can be pediatrics (a sick child no longer needs to be taken to a doctor), psychotherapy (psychotherapists conduct online sessions), dermatology (due to high quality images, dermatologists can conduct medical examinations of a patient suffering from psoriasis, eczema, bedsores, etc.), neurology (results of blood pressure are provided to specialists through the usage of remote monitoring, blood pressure indicators) or resuscitation (this is specific to cases when a patient can no longer be transported to another clinic, an urgent video call to a more competent specialist can save the patient's life).

Turnover of the telemedicine market worldwide in 2019 comprised $49,9 billion. Further forecasts for 2030 predicts that turnover will increase up to $459,8 billion (Statista, 2021). The forecast shows that the market is growing and will continue to grow. This emphasizes the importance for the Government of the country, representatives of healthcare and IT technologies as well, to direct their focus to the telemedicine market. This is a new market. Therefore, it ensures the diversification of the national economy. Additionally, this obvious fact is regularly reflected in governmental documents at various levels. Nevertheless, project implementation is accompanied by common issues such as legislative and financial obstacles.

Legislative obstacles primarily block the development of new markets. In particular, in the Republic of Kazakhstan, the rules governing telemedicine are very brief. At the same time, in Russia, the law on TM has been in force for several years now, and the State Duma is considering regulations that allow remote diagnosis and treatment.

The purpose of this work is to study the process of telemedicine introduction in the context of the digitalization of Kazakhstan by interviewing experts in this field. Atlas.ti software was used for data processing. The scientific significance lies in the contribution of new knowledge in the literature on the issue of telemedicine in the example of Kazakhstan since this issue is underexplored.

Literature review

Telemedicine is "a two-way audio and video communication for remote medical consultation. The article will tell you how things are today with telemedicine in the healthcare system of the Republic of Kazakhstan, what equipment is needed to provide remote services, what types of telemedicine consultations exist, and how to implement remote services in medical organizations.

In the old Health Code dated September 18, 2009, No. 193-IV, the term "telemedicine" was used as a set of organizational, financial, and technological measures that provide remote medical services. In this case, the patient or the attending physician receives a remote consultation with another doctor using ICT that do not contradict national standards. However, the new Health Code of July 7, 2020 No. 360-VI abandoned the use of the term "telemedicine" and applied the concept of remote medical services.

Medical services or telemedicine is a field of medicine based on the use of computer and telecommunication technologies based on innovative information technologies for remote online consultations. The exchange of information between medical staff, in particular specialists, can also be added. This ensures the improvement of the quality of diagnosis provided by the specialists and treatment process of specific patients. An important aspect of telemedicine is the use of two-way audio and video communication. Telemedicine involves both online consultations and regular health checks, as well as a remote examination of the patient. Remote medical services are provided in outpatient, inpatient, hospital-replacing conditions, at home, outside a medical organization, in sanatorium and resort organizations at the actual location of the patient or his legal representative.

Digital transformation has influenced the global development of the economy. However, provided literature review have shown that authors define digital transformation differently. There are three paths that businesses undergo in terms of the digitalization process. The first approach is more client oriented and their needs. The second approach is related to the company strategy change through operation strategy and system transformation. The third approach is a combination of the first and the second approaches. Most importantly, the processes of client orientation and business model transformation are conducted simultaneously (Berman, 2012).

A model of business digitalization can be divided into four stages. First, the impact of business digitalization, which is related to the business scope, trends, fields that the business is developing in or interested. Second, the digitalization drivers are based on the business scope and identify the further scale of business. Third, the digitalization scenarios are developed through the analysis of digitalization drivers and mostly are created because of the main drivers. Fourth, the digitalization goals are defined through the study of preceding stages (Parviainen et al., 2017).

Some studies relate digital change investigation to its components identified from the definition. Thus, the influence that digital transformation has on economy is investigated with digital products application. There are digital products, which include information and communication technology listed by categories. The categories include the application of digital products in services provision as consumer, productivity, telecommunication, manufacturing, consultancy, rental, and others (Mićić, 2017).

Based on such development there are created business types as digital and non-digital. A growing number of studies are devoted to the investigation of the differences between digital business strategies with non-digital. Thus, three features are identified, which are shown in figure 1.

Firstly, digital business has field boundaries, as it manages a particular scope of business activity. Secondly, scale plays a considerable role in business strategy, requiring particular digital technologies and skills. The digital performance of a company, including digital culture and tools has an impact on the speed of company performance. To a great extent, digital business largely depends on online platforms and the degree of the acquisition of the platform by the users (Bakos et al., 2008; Bharadwaj et al., 2013; Gauthier et al. 2018).

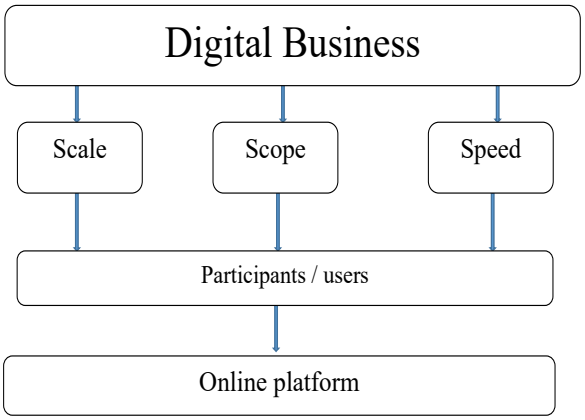


Figure 1 - Digital business features

Note - complied by the author

Nevertheless, the application of digital products in a company is usually driven by certain factors such as consumer satisfaction, digital-skills and talents, and impact on the labor force's productivity, profitability and competitiveness. Such selection is explained by the impact of key areas of digital change, such as business development models, consumer service, and a company functioning process. However, digital technologies and digital skills inclusion stand out as the key drivers of digital change. In other words, they assist in identifying the field of business activity (Morakanyane et al., 2017).

A broader description of the digital transformation impact on business is given as well. There are identified ten types of effects on businesses as an outcome of business digital transformation. The results are custom related, management process and staff, business and product development, networking establishment, data management, and marketing. Particular causes drive the impacts of digital skills and digital culture (Pousttchi et al.,2019).

Therefore, the digitalization has impacted many industries, among which there is the healthcare sector (Biesdorf et al., 2014). With the rise of technology implementation in all sectors of the economy, healthcare services are undergoing a digital reorganization of services provision. The application of digital technologies has four significant questions. The first three questions are related to the services provision if they remain availably, and the access will increase to minor population. Next is accessibility of the services and acceptability. The last one considers the qualification of the workforce and the ability to provide quality service. Consequently, scientific studies have defined three significant dimensions of digital healthcare services investigation. They are related to application of digital technologies considering its benefits and drawbacks; the transformation of functioning processes as organizational cycles and management; workforce related changes as digital skills and mindset (Lapão, 2018).

Some scientists stressed the impact of digital platform implementation in healthcare as telemedicine. They claimed that the application of platforms, especially in client-oriented fields could help to reduce costs (Visconti & Morea, 2020). For instance, it reduces time spent on organizational processes as visits to organization or digital documentation reduces expenses on paper. Others put their attention on the use of technologies in eHealth delivery as a positive trend, emphasizing the importance of digital skills level of the employees. Digital technologies and tools application, based on their study can contribute to sustainable eHealth system development. Digital tools implementation help to reduce losses an institution can have due to poorly coordinated management (Beaulieu & Bentahar, 2021). The following could be related to this drugs shortage, reduction of time-spent, patients' management, etc.

Research on healthcare system digitalization in Kazakhstan is not studied enough. There prevail studies which explore the general state of healthcare system digitalization. There has emphasized the importance of digital skills development among medical staff and the population (Kazybayev, 2010). This is associated with using special applications in all aspects of eHealth. For instance, patients' information storage, appointment organization, medical institutions operation management, etc. There has been discussed the importance of healthcare system digitalization for industries. Moreover, the importance of digital platforms application has been underlined in the example of a medical institution in Kazakhstan (Sarsenova, 2020). The importance of telemedicine development in remote regions as a fast way of information transition between patients and medical institutions has also been emphasized (Urazova et al., 2020). Moreover, they emphasized the impact of digital tools on the healthcare service availability as "k-vrachu.kz", which allows making appointments online. This study expands the literature by comparing the process of telemedicine implementation in the private and public sectors.

Based on the provided literature review, the main factors of digital development in private sector of the healthcare system are scale, scope, and speed. It seems fair to say that digitalization has a positive effect on business development,

and today the medical services sector is also part of a large and profitable business. Therefore, there is a need for the digitalization of healthcare in general. Research on the issue of telemedicine was mainly carried out in developed countries, developed countries were studied little. Therefore, the scientific significance of this study lies in the contribution of new knowledge in the literature on the issue of telemedicine in the example of Kazakhstan since this issue has been little studied.

Methodology

The methodology was adapted to current research objectives. Thus, most qualitative studies on digital transformation of businesses conduct three case studies of three firms in different fields. This research, there is provided a descriptive analysis of one particular sector – healthcare. Further, an expert interview will be conducted to provide a deeper analysis of digital transformation in medicine as an emerging market in Kazakhstan. Thus, the current study was carried out in the following two stages:

1. The first part is related to descriptive statistics analysis of digital healthcare development, particularly data on the issue of telemedicine at the country and world levels.

2. The second part will include a semi-structured interview with an expert on the implementation of digital transformation of healthcare services. The questions will be divided into four groups of questions, which will be based on the provided literature review. Thus, the questions were taken from the research of Parviainen et al. (2017) and adapted to the interview approach described below. Atlas Ti. Software is used for interview results interpretation and analysis.

The interview will include three main groups of questions: scope, scale, and speed. The last questions will be related to digital skills and mind-set.

Scope. Questions are aimed at the analysis of the directions of private healthcare performance. For instance, there can be fields that are more profitable in digital medicine or those that are expensive in digital transformation.

Scale. Questions are directed at analyzing digital medicine dependence on the number of patients and probably will help reveal some hidden challenges.

Speed. Questions are directed at the analysis of the speed of activities performance and its effect on the productivity of digital tools.

Skills and mind-set. The final group of questions will be aimed at exploring the importance of digital culture in a company. Based on the literature review, digital skills and culture lie as core conditions of digital tools adoption in a company.

A modern person puts a high priority on mobility, the ability to constantly "be in the know", keep the state of personal health under control without sacrificing time because waiting in line at the clinic is sometimes very problematic. Therefore, the current development of actions, as eHealth development, shows the following. Consumers' future expectations are not therapeutic or surgical treatment methods but mobile telemedicine. Remote consultation now makes it possible to use personal time rationally. The following areas are gaining great popularity (60%) in teleconsultations in Kazakhstan: cardiology, cardiac surgery (adult and children), arrhythmology, interventional cardiology, and cardiac resuscitation.

Analysis

The COVID-19 pandemic has had a serious impact on the telemedicine market. In the first half of 2020, when the practice of social distancing and self-isolation was introduced in many countries around the world, medical institutions were forced to limit the face-to-face admission of patients. Simultaneously, the number of telemedicine consultations began to grow. This spurred the development of the telemedicine market in the "doctor-patient" mode, the volume of which is significantly less than the "doctor-doctor" one.

The main share of the world market is made up of telemonitoring of patients and teleconcilium in the ratio of 48% to 32%. China and the United States are leading countries in terms of telemedicine spending and telemedicine market development.

The dynamics of the development of the telemedicine market are growing rapidly, this can be seen from the data for 2015-2020 (Figure. 2).

In 2015, the market was $12.8 billion, but in 2020 it has grown to $60.9 billion, i.e. five times. According to the Global Telemedicine Market Outlook, the telemedicine market will reach $186.7 billion by 2027. Annual growth will be about 18.2% (Figure 3).

Almost $13 billion in 2019 came from the telemonitoring segment, i.e. remote monitoring of the patient's condition. The demand for this service is explained by the increase in life expectancy and, consequently, the number of elderly patients and the increase in the number of people suffering from cardiovascular diseases. In the cardiological segment, the telemedicine market is expected to grow most actively - by 22% per year.

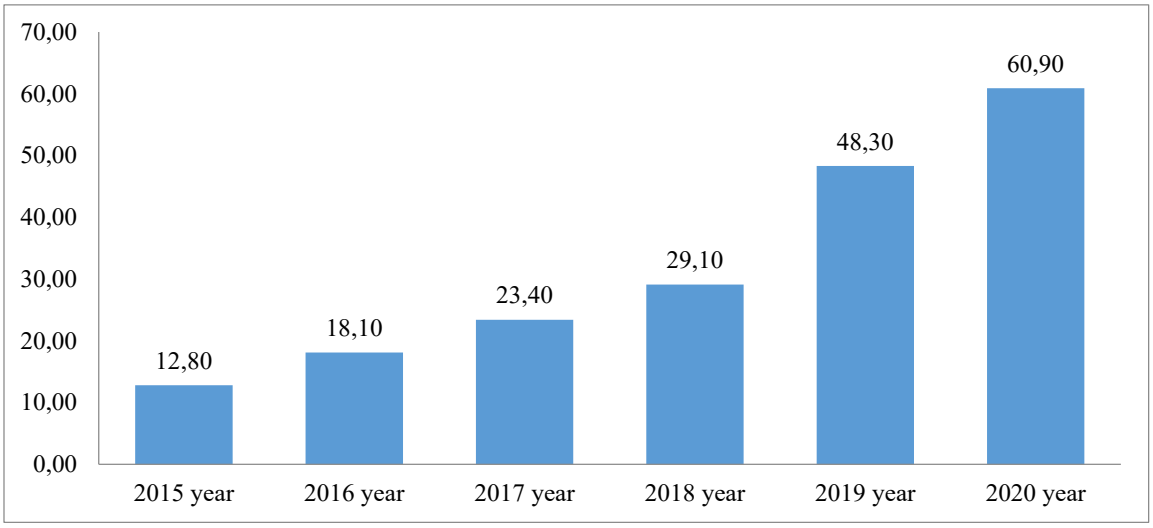


Figure 2 - Dynamics of the French telemedicine market for 2015-2020

Note - compiled by the author based on the source [https://www.mordorintelligence.com]

Figure 3 - Global telemedicine market

Note - source [https://www.gminsights.com/]

Another area is telemedicine hospital services or telehospital, which refers to remote consultations of doctors in hospitals with other specialists during the period when the patient is being treated and additional help is required. This segment is expected to grow by 19% per year.

Telephone consultations occupy a significant share of the global telemedicine market — they accounted for $18 billion in 2019. It includes helplines where professional doctors are involved, able to provide remote assistance or, if necessary, redirect the call to emergency services.

Also, the development of the market is affected by the increasing spread of smartphones with high-resolution cameras and access to the Internet in the most remote corners of the world. Today, there are many applications that monitor health indicators. The functionality of applications, as a rule, includes clarification of the diagnosis, diagnostics using selfies or skin pictures, online consultation.

GMI (GMI, 2021) predicts that the global mobile health app market will grow to $312 billion by 2027. It can also be noted that about 40% of the participants in the worldwide telemedicine market do not belong to the healthcare sector. Among the most popular applications in the world are those produced by medical device manufacturers and major IT developers: AT&T, Allscripts Healthcare Apple Inc., Omron Healthcare Inc., Samsung Electronics Corporation, Philips Healthcare, Bayer Healthcare, LifeWatch, AG and others.

Before conducting qualitative analysis, it has great importance to consider official data, related to telemedicine implementation. Getting the picture of medical institutions readiness for digitalization is vital, and can be observed through the data on the process of telemedicine implementation in public medical institutions.

At the beginning of 2019, of healthcare organizations equipped with computer equipment comprised 94.1%. At the level of cities and district centers, 65.8% of healthcare organizations are provided with access to the Internet. In healthcare organizations of the republic, the implementation of medical information systems (MIS) amounted to 65.1%. Data on the regional level showed that 16.3 million electronic health passports had been created and filled in MIS, which is 89% of the total population (Parliament of the Republic of Kazakhstan, 2020). Targeted allocation of funds for investment costs. To conduct digitalization of healthcare is not provided. This reduces the possibility to calculate the amount of funds. However, healthcare digitalization will use private sector stimulation to encourage IT companies to independently invest in healthcare digitalization, including through public-private partnerships.

Expected effects of digitalization at the end of 2020:

- savings of about 187 million tenge on the purchase of paper on medical paper records;
- reducing the number of purchased consumables for honey. images (fluorography, X-ray, mammography, etc.) for 2 billion 165.6 million tenge;
- reduction in the time of registration of blood sampling by 2.5 times (by 60%) due to electronic services;
- reduction of time spent for obtaining laboratory test results due to electronic services by five times (by 80%);
- reduction of time spent on the appointment of referrals for laboratory and diagnostic studies due to electronic services by four times (by 75%);
- reduction in the time spent on the issuing house calls services (by 80%) by five times;
- reducing the time for making an appointment with a local doctor (by 80%) by four times, when making an appointment with narrow specialists by 86.6% (by seven times) due to electronic services.

Next, data on telemedicine will be considered (Figure 4).

In 2021, the number of inventory items in regional hospitals decreased by 11, i.e. from 144 to 133, compared to 2020, the reduced inventory was in the Karaganda region (10) and one inventory in the Turkestan region.

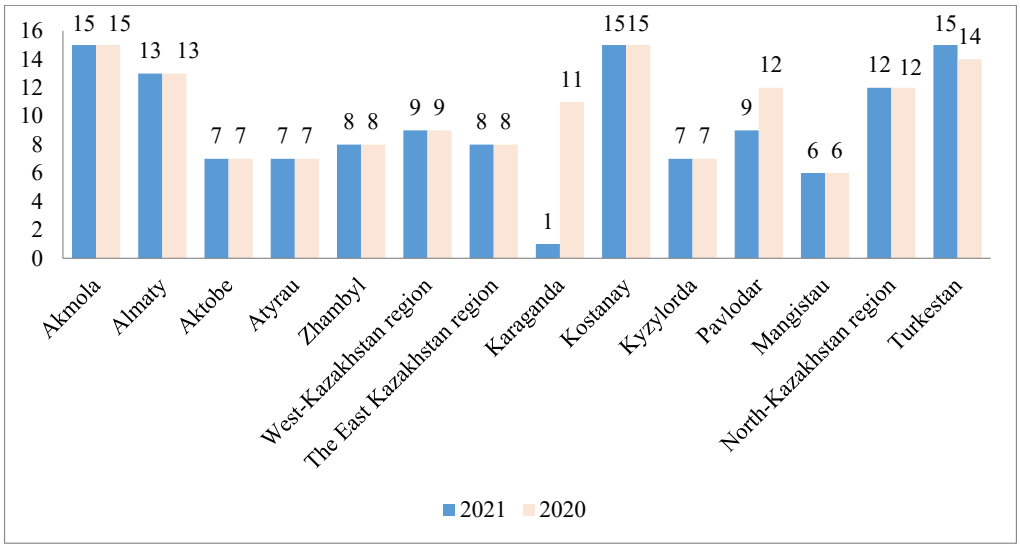


Figure 4 - Amount of material asset of regional hospitals in the regions of Kazakhstan

Note - compiled by the author based on the source [https://www.gov.kz]

Table 1 - Data on the number of planned and conducted telemedicine (TM) consultations on regional inventory items for 2020 and 2021

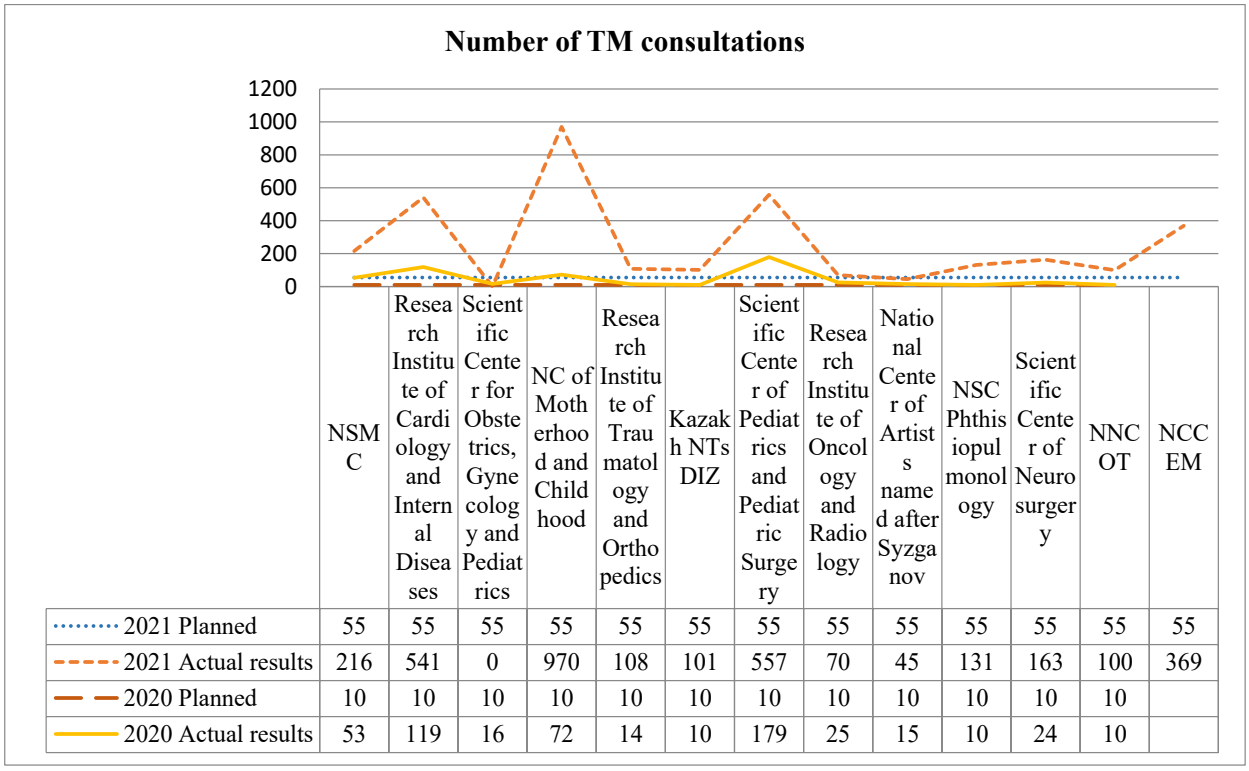
№	Regional goods and materials	2020			2021		
		Plan Actual quantity Execution in %	Plan Actual quantity Execution in %	Plan Actual quantity Execution in %	Plan Actual quantity Execution in %	Plan Actual quantity Execution in %	Plan Actual quantity Execution in %
1	Akmola	300	484	161	1650	1890	115
2	Almaty	260	117	45	1430	7	0
3	Aktobe	140	39	28	770	700	91
4	Atyrau	140	82	59	770	334	43
5	Zhambyl	160	144	90	880	1141	130
6	West-Kazakhstan region	180	398	221	990	2969	300
7	The East Kazakhstan region	160	20	13	880	308	35
8	Karaganda	220	0	0	110	0	0
9	Kostanay	300	327	109	1650	1375	83
10	Kyzylorda	140	210	150	770	1026	133
11	Pavlodar	240	34	14	990	982	99
12	Mangistau	120	141	118	660	848	128
13	North Kazakhstan region	240	282	118	1320	1211	92
14	Turkestan	280	796	284	1650	2878	174
	Total	**2880**	**3074**	**107**	**10640**	**10043**	**94**
Note - compiled by the author based on the source [https://www.gov.kz]							

According to Table 1, in 2021 regional hospitals had 10,043 telemedicine consultations out of 10,640 planned. In 2020, these figures were much lower, there were 2,880 planned consultations and 3,074 performed. This means that in 2021, the planned TM consultations were 3.7 times more and conducted 3.2 times more than in 2020. The maximum over fulfillment of the plan in 2021 was in WKO (300%), then Turkestan region (174%), Kyzylorda region (133%), Zhambyl region (130%), Mangystau region (128), and Akmola region (115%). The same areas were in the lead in 2020. Such indicators are associated with the economic and social indicators particular a region, including its territorial location. In Karaganda region, not a single TM consultation was held in 2020 and 2021, as there was no need. The main directions of telemedicine consultations provisions have the following list of specialties:

- functional diagnostics;
- cardiology;
- pulmonology;
- neurology.

Republican clinics had 12 TMCs in 2020, and in 2021 NCCEM joined them, and the number became 13. According to Figure 5, 10 and 55 telemedicine consultations were scheduled at the TMCs of republican clinics in 2020 and 2021, respectively. However, some TMCs are over fulfilling the plan, for example, in 2021, 970 consultations were held at the SC for Maternity and Childhood using digital technologies, and 557 consultations were held at the SC for Pediatrics and Pediatric Surgery. In the same period in 2020, the highest figure was 179 consultations. Regional hospitals fulfilled the Plan for the number of TM consultations by 108%, Republican clinics – by 471%.

In total, 12,289 telemedicine consultations were conducted through the National Telemedicine Network in 2021. Of these, 10,043 consultations were conducted by specialists from regional hospitals and 2,246 consultations by republican clinics. At the same time, transcripts / descriptions of 647 X-rays, 1812 ECGs and 682 ultrasounds are given. In 2020, these indicators were as follows: a total of 3,621 telemedicine consultations were held, of which: 3,074 consultations were conducted by regional hospitals, 547 by Republican clinics. Regional hospitals fulfilled the Plan for the number of TM consultations by 107%, Republican clinics - by 4.5 times.



	NSMC	Research Institute of Cardiology and Internal Diseases	Scientific Center for Obstetrics, Gynecology and Pediatrics	NC of Motherhood and Childhood	Research Institute of Traumatology and Orthopedics	Kazakh NTsDIZ	Scientific Center of Pediatrics and Pediatric Surgery	Research Institute of Oncology and Radiology	National Center of Artists named after Syzganov	NSC Phthisiopulmonology	Scientific Center of Neurosurgery	NNCOT	NCCEM
2021 Planned	55	55	55	55	55	55	55	55	55	55	55	55	55
2021 Actual results	216	541	0	970	108	101	557	70	45	131	163	100	369
2020 Planned	10	10	10	10	10	10	10	10	10	10	10	10	
2020 Actual results	53	119	16	72	14	10	179	25	15	10	24	10	

Figure 5 - Number of planned and conducted telemedicine (TM) consultations in Republican clinics for 2020 and 2021

Note - compiled by the author based on the source [https://www.gov.kz]

These statistical indicators indicate the need and development of telemedicine in the country. It also shows the level of digitalization of healthcare in the country, since the dynamics show that the demand for telemedicine is growing. Since the figures for 2021 are much higher than those for 2020.

Expert interview interpretation and analysis

The analysis of the expert interview was directed at exploring the stage of telemedicine development in Kazakhstan. Current research literature review showed that there had been identified main features of digital business as scope, scale, and speed. This has allowed providing comparison of the process of telemedicine implementation in private sector with state medical institutions. Thus, telemedicine implementation in public medical institutions differs from the private sector in all three aspects – scope, scale, and speed. This is mostly the outcome of the goals of institutions.

The participants in telemedicine implementation stand out private and public sectors. The public sector is represented by state medical institutions. Private sector is represented by private businesses which can be divided into service providers and clients, as shown in figure 6.

Based on the interview, insurance companies, and companies in telemedicine are the leading providers of telemedicine. Telemedicine implementation is easy but requires good quality internet access and mobile gadgets available for both service providers and clients. The period for telemedicine implementation takes up usually 12 weeks. The medical staff does not have to pass difficult training. On the contrary, as telemedicine service provision mainly depends on special applications, knowledge of mobile phone usage (various applications, video calls, etc.) might be enough. Nevertheless, the tricky moment is that no company can afford such a service. Small businesses are rare clients of telemedicine as the price for its implementation is very high. Due to this, telemedicine clients are mostly large companies, which need to provide health safety to their employees in remote areas. For instance, such companies as oil and gas mining. Based on the fact that telemedicine is applicable in remote areas, the scope of its functioning can be expanded outside urban territories.

Although the process of telemedicine implementation does not require magnificent restructuring of a medical institution, there are some difficulties and risks described in figure 7.

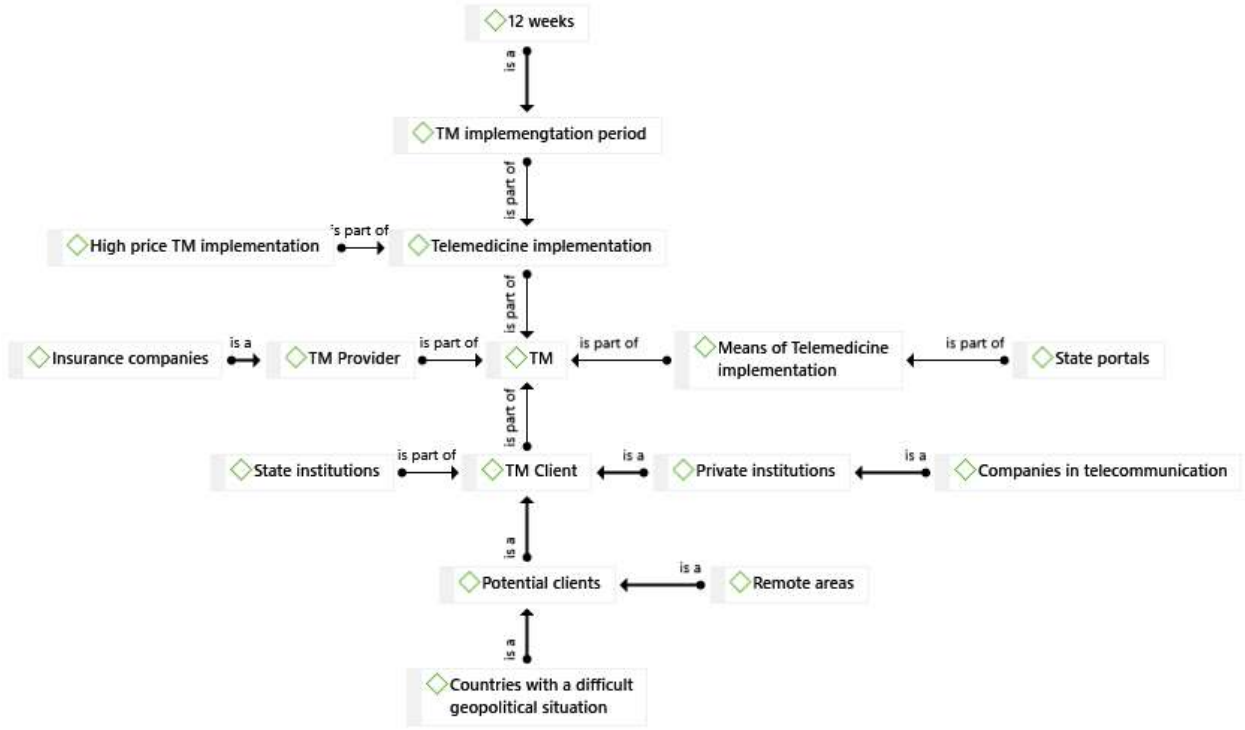


Figure 6 - Telemedicine implementation

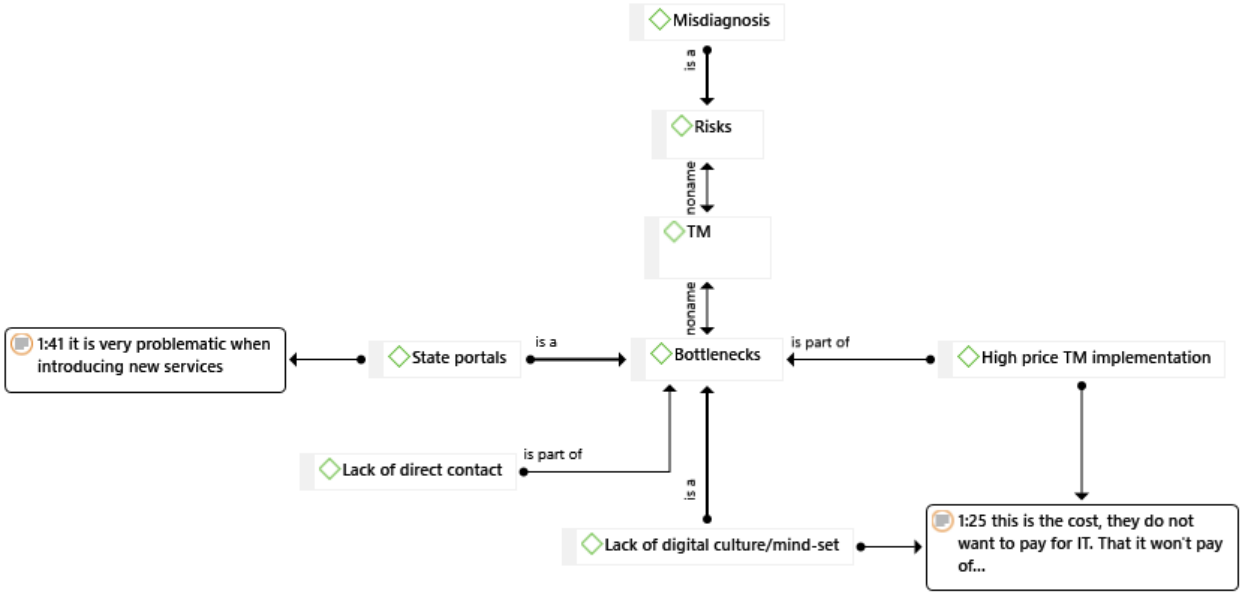


Figure 7 - Telemedicine implementation bottlenecks and risks

There are identified one significant risk as wrong treatment. Part of the reasons for misdiagnosis is because doctors can make quick decisions and miss small but vital details. Among difficulties, there is high price for telemedicine implementation. This is associated with a poor digital mindset and skills. Companies are usually convinced that the investments in this service functioning will not pay off soon, which can cause several financial difficulties. It must be also kept in mind that the traditional process of medical consultations is still among the first choices. At the same time, online consulting is a pushing factor for companies, especially in remote areas. The significant impact on telemedicine implementation plays government. Telemedicine service introduction is registered through state portals, which the Ministry of Health regulates. The government does not express interest in the participation of the private sector, especially when introducing new services.

Despite the difficulties, there are many advantages of telemedicine implementation, which is fruitful and profitable for the private sector mainly (Figure 8).

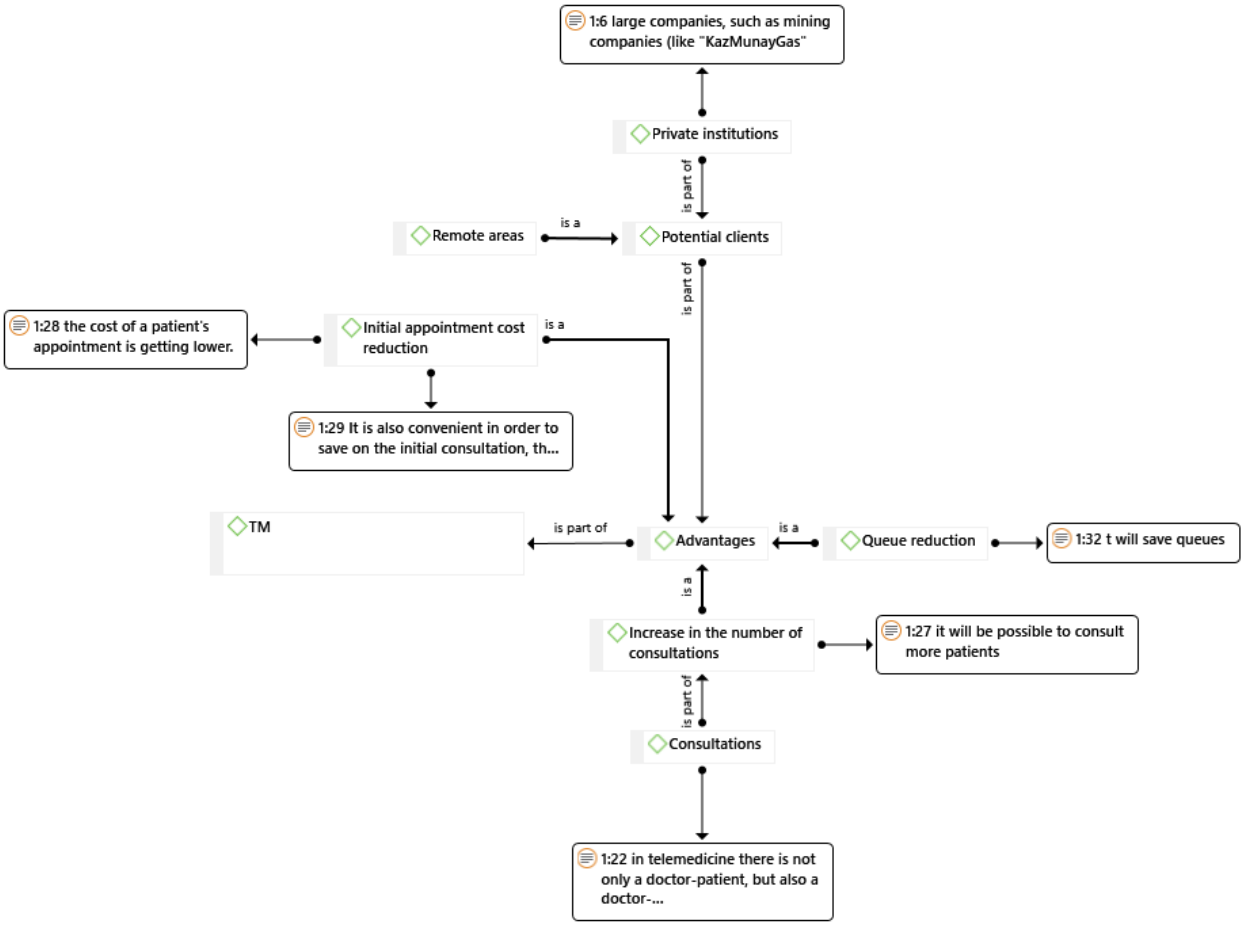


Figure 8 - Telemedicine implementation advantages

Advantages of telemedicine implementation reflect in all three aspects of digital business development: scope, scale, and speed. This is different for the public sector.

Scope (private). The service provision by medical institutions is made through online consultations, with one limitation of surgery provisions. However, private sectors have the possibility to direct their attention to particular services, which are agreed upon contract establishment with clients. This gives the possibility for medical institutions to manage the employment rate better. A clear vision of a list of services provisions can also help reduce costs. Scope (public). For public medical institutions, it is difficult to choose a set of services to provide, as there are usually standard requirements and services provided as a part of "public goods".

Scale (private). Online management of consultations helps to reduce the waiting time. The number of consultations increases as the paper work and registration processes are eliminated. For clients, such a way of appointment allocation reduces expenses. Clients are usually given full information about necessary analysis and documents for the first consultation. Whereas, offline consultations do not provide preconsultations free of charge.

Scale (public). Public medical institutions are not as popular with online consultation of clients. This is doctor-to-doctor consultation or when there is a necessity in a second opinion as analysis results, or x-ray interpretation assistance. All meetings are usually planned and involve medical staff meetings mainly.

Speed (private). Again, as the waiting time reduces, the number of consultations provisions increases, which is profitable for a hospital.

Speed (public). The public sector is not as client oriented. Therefore, some points are still to be achieved. This is first appointment cost reduction, provision of online consultations of patients, etc.

To conclude, it must be mentioned that the public sector is more of functions implementations. It can be predicted that this is a habit of experience. As the public sector follows a particular way of development, it is difficult to develop a digital mindset. Telemedicine implementation is very problematic if a medical institution is not ready for digitalization and functioning. Even the private sector is dependent on a company's culture as digital skills development among staff, readiness for digitalization, etc. The private sector is more client oriented. Therefore, not only convenient both for businesses and clients but profitable as well.

Conclusions

Summing up this study, it can be said that the digitalization of healthcare is using digital technologies to transform traditional business processes in the healthcare sector. Similar to other sectors of the economy, such as banking or sales, where digital technologies improve services by making them faster, cheaper, and more efficient for customers and service providers, there are many examples in healthcare of how digitalization reduces costs, improves the quality and efficiency of medical services. Telemedicine is an exemplary illustration of that, a relatively new service in Kazakhstan. Notwithstanding, it has billions of dollars of turnover worldwide, which indicates the need to develop the telemedicine market in the country. Therefore, this study was carried out to identify the problems that are present in the implementation of telemedicine. The interviews with experts allowed to identify the following problems:

- incorrect diagnosis, and consequently treatment;
- the high cost of introduction of telemedicine;
- availability of the Internet;
- telemedicine systems are subject to hacker attacks
- technical problems (providers need to be trained on how to maintain telemedicine systems properly);
- insufficient qualification of doctors;
- the unwillingness of people to share confidential information;
- low level of public awareness.

The following steps are recommended to resolve these issues:

1. In connection with the development of the telemedicine system, the issue of secure personal data arises, access to which should be allowed only by the patient. In this regard, it is necessary to develop blockchain technologies - a data organization system in which each cell is not tied to a common server and is managed autonomously. It will provide for a ban on changing records retroactively to avoid conflicting interpretations of the results of diagnosis and treatment. Telemedicine systems allow organizing a dialogue with an expert doctor (video conference) at any distance and transmit almost all the medical information necessary for a qualified conclusion (extracts from the medical history, radiographs, computed tomograms, ultrasound images, etc.).

2. So far, significant limitations in eHealth development in Kazakhstan are reflected in two factors. First, in high costs of the IT services provision and the quality of the internet. Secondly, the government poor interest in cooperation with the private sectors. It is recommended to develop a system of new medical services implementation convenient and comfortable for the public and private sectors. The government can develop a cooperation system with the private sector to solve the low quality of internet in remote settlements and establish cooperation with the private sector to attract new investments.

3. Public institutions can take the model of digital business development in the process of public institutions digitalization. The experience of telemedicine clients as users of the digital tool is an exemplary illustration of how public medical institutions can organize their functioning through digitalization. Based on the region and

the rate of disease frequency, medical institutions can direct their scope of functioning towards those disease treatments (which are characteristic to regions) and assistance to local hospitals.

4. The private sector differs in service provision from the public, as it is more flexible. The attitude of the private sector is mostly client oriented. Therefore, service provision meets all requirements of private companies. The government is more oriented in services provided without a client-centered approach, which does not attract large businesses and investments. Government can take the experience of European countries where government attracts private sectors in telemedicine implementation. Simultaneously, the government gains not only investors but partners as well. This is because private sectors are interested in expanding their functioning area. Therefore, they will participate in the internet quality improvement process, the attraction of foreign specialists, etc.

Further studies are recommended to include interviews with telemedicine participants. First, with medical institutions, which had a bad experience with telemedicine in Kazakhstan. This will help to reveal hidden problems of telemedicine implementation. Secondly, with medical staff to learn more about the first-hand experience and provide interview with foreign specialists to identify the benefits of telemedicine in attacking foreign specialists. Thirdly, to assess the patient satisfaction level by providing online services.

Because all mentioned problems of telemedicine implementation are highly dependent on technological support, digital skills, and development of digital technologies. Next, it is essential to analyze digital technologies' impact during the process of telemedicine services provision.

References

1. Bakos, Y., & Katsamakas, E. (2008). Design and ownership of two-sided networks: Implications for Internet platforms. *Journal of Management Information Systems*, *25*(2), 171-202. https://doi.org/10.2753/MIS0742-1222250208
2. Beaulieu, M., & Bentahar, O. (2021). Digitalization of the healthcare supply chain: A roadmap to generate benefits and effectively support healthcare delivery. *Technological forecasting and social change*, *167*, 120717. https://doi.org/10.1016/j.techfore.2021.120717
3. Berman, S. J. (2012). Digital transformation: opportunities to create new business models. *Strategy & Leadership*. https://doi.org/10.1108/10878571211209314
4. Bharadwaj, A., El Sawy, O. A., Pavlou, P. A., & Venkatraman, N. V. (2013). Digital business strategy: toward a next generation of insights. *MIS quarterly*, 471-482.
5. Biesdorf, S., & Niedermann, F. (2014). Healthcare's digital future. *McKinsey & Company*, *1*.
6. Bokolo, A. J., & Petersen, A. S. (2021). Examining the digitalisation of virtual enterprises amidst the COVID-19 pandemic: a systematic and meta-analysis. *Enterprise Information Systems*, *15*(5), 617-650. https://doi.org/10.1080/17517575.2020.1829075
7. Correani, A., De Massis, A., Frattini, F., Petruzzelli, A. M., & Natalicchio, A. (2020). Implementing a digital strategy: Learning from the experience of three digital transformation projects. *California Management Review*, *62*(4), 37-56. https://doi.org/10.1177/0008125620934864
8. Gauthier, C., Bastianutti, J., & Haggège, M. (2018). Managerial capabilities to address digital business models: The case of digital health. *Strategic Change*, *27*(2), 173-180. https://doi.org/10.1002/jsc.2192
9. Ivančić, L., Vukšić, V. B., & Spremić, M. (2019). Mastering the digital transformation process: Business practices and lessons learned. *Technology Innovation Management Review*, *9*(2). https://doi.org/10.22215/timreview/1217
10. Kazybaev, N. K. (2010). Telemedicine consultations in Kazakhstan: first experience. *Bulletin of the Kazakh National Medical University*, *5*(1), 12-13.
11. Lapão, L. V. (2019). The future of healthcare: the impact of digitalization on healthcare services performance. In *The internet and health in Brazil* (pp. 435-449). Springer, Cham. https://doi.org/10.1007/978-3-319-99289-1_22
12. Mićić, L. (2017). Digital transformation and its influence on GDP. *ECONOMICS-Innovative and Economic Research*, *5*(2), 135-147. https://doi.org/10.1515/eoik-2017-0028
13. Ministry of Healthcare of the Republic of Kazakhstan. Report on the number of telemedicine and video consultations of telemedicine centers of regional hospitals and Republican clinics for the 1st quarter of 2020 (2020). [updated October 10, 2020; cited June 15, 2022]. Avaliable: https://www.gov.kz/memleket/entities/dsm/documents/details/100161?lang=ru
14. Morakanyane, R., Grace, A. A., & O'reilly, P. (2017). Conceptualizing Digital Transformation in Business Organizations: A Systematic Review of Literature. *Bled eConference*, *21*, 428-444. https://doi.org/10.18690/978-961-286-043-1.30
15. Parliamentary inquiries. Mazhilis of Parliament of the Republic of Kazakhstan (2020), [updated March 2020; cited May 08, 2022]. Avaliable: https://www.parlam.kz/en/mazhilis/question-details/18175
16. Parviainen, P., Tihinen, M., Kääriäinen, J., & Teppola, S. (2017). Tackling the digitalization challenge: how to benefit from digitalization in practice. *International journal of information systems and project management*, *5*(1), 63-77. https://doi.org/10.12821/ijispm050104

17. Pousttchi, K., Gleiss, A., Buzzi, B., & Kohlhagen, M. (2019, July). Technology impact types for digital transformation. In *2019 IEEE 21st Conference on Business Informatics (CBI)* (Vol. 1, pp. 487-494). IEEE. https://doi.org/10.1109/CBI.2019.00063

18. Projected global telemedicine market between 2019 and 2030. Statista (2021), [May 21, 2021; cited May 08, 2022]. Avaliable: https://www.statista.com/statistics/671374/global-telemedicine-market-size/

19. Sarsenova, A. O., & Popova, T. V. (2020). Industrial Medicine of Kazakhstan in Conditions of Digitalization of Health Care. *In PROSPECTS AND KEY TENDENCIES OF SCIENCE IN CONTEMPORARY WORLD* (pp. 5-11).

20. Telemedicine market. Global Market Insigts (2021) [updated June 02, 2021; cited May 08, 2022]. Avaliable: https://www.gminsights.com/industry-analysis/telemedicine-market

21. Telemedicine market - growth, trends, covid-19 impact, and forecasts (2022-2027). Mordor intelligence (2022) [updated Febriary 08, 2022; cited May 08, 2022]. Avaliable: https://www.mordorintelligence.com/industry-reports/global-telemedicine-market-industry

22. Urazova B. A., Kurmanova G. K., Kim A. A., Sukhanberdina A. A., (2020). The market of medical services of the Republic of Kazakhstan: e-health technologies as a factor in increasing the efficiency of the industry. *Actual Problems of Economics and Management, 2*(26), 128–136.

23. Moro Visconti, R., & Morea, D. (2020). Healthcare digitalization and pay-for-performance incentives in smart hospital project financing. *International journal of environmental research and public health*, *17*(7), 2318. https://doi.org/10.3390/ijerph17072318

24. Vukšić, V. B., Ivančić, L., & Vugec, D. S. (2018). A preliminary literature review of digital transformation case studies. *International Journal of Computer and Information Engineering*, *12*(9), 737-742. https://doi.org/10.5281/zenodo.1474581

25. What is telemedicine?. RBC Trends (2022) [updated January 15, 2022; cited May 08, 2022]. Avaliable: https://trends.rbc.ru/trends/innovation/5d8e297f9a79478c40cd4369

Список литературы *(транслитерация)*

1. Bakos, Y., & Katsamakas, E. (2008). Design and ownership of two-sided networks: Implications for Internet platforms. *Journal of Management Information Systems*, *25*(2), 171-202. https://doi.org/10.2753/MIS0742-1222250208

2. Beaulieu, M., & Bentahar, O. (2021). Digitalization of the healthcare supply chain: A roadmap to generate benefits and effectively support healthcare delivery. *Technological forecasting and social change*, *167*, 120717. https://doi.org/10.1016/j.techfore.2021.120717

3. Berman, S. J. (2012). Digital transformation: opportunities to create new business models. *Strategy & Leadership*. https://doi.org/10.1108/10878571211209314

4. Bharadwaj, A., El Sawy, O. A., Pavlou, P. A., & Venkatraman, N. V. (2013). Digital business strategy: toward a next generation of insights. *MIS quarterly*, 471-482.

5. Biesdorf, S., & Niedermann, F. (2014). Healthcare's digital future. *McKinsey & Company*, *1*.

6. Bokolo, A. J., & Petersen, A. S. (2021). Examining the digitalisation of virtual enterprises amidst the COVID-19 pandemic: a systematic and meta-analysis. *Enterprise Information Systems*, *15*(5), 617-650. https://doi.org/10.1080/17517575.2020.1829075

7. Correani, A., De Massis, A., Frattini, F., Petruzzelli, A. M., & Natalicchio, A. (2020). Implementing a digital strategy: Learning from the experience of three digital transformation projects. *California Management Review*, *62*(4), 37-56. https://doi.org/10.1177/0008125620934864

8. Gauthier, C., Bastianutti, J., & Haggège, M. (2018). Managerial capabilities to address digital business models: The case of digital health. *Strategic Change*, *27*(2), 173-180. https://doi.org/10.1002/jsc.2192

9. Ivančić, L., Vukšić, V. B., & Spremić, M. (2019). Mastering the digital transformation process: Business practices and lessons learned. *Technology Innovation Management Review*, *9*(2). https://doi.org/10.22215/timreview/1217

10. Kazybaev, N. K. (2010). Telemedicine consultations in Kazakhstan: first experience. *Bulletin of the Kazakh National Medical University [Vestnik Kazahskogo Nacional'nogo medicinskogo universiteta]*, *5*(1), 12-13. (In Russ.)

11. Lapão, L. V. (2019). The future of healthcare: the impact of digitalization on healthcare services performance. In *The internet and health in Brazil* (pp. 435-449). Springer, Cham. https://doi.org/10.1007/978-3-319-99289-1_22

12. Mićić, L. (2017). Digital transformation and its influence on GDP. *ECONOMICS-Innovative and Economic Research*, *5*(2), 135-147. https://doi.org/10.1515/eoik-2017-0028

13. Ministry of Healthcare of the Republic of Kazakhstan. Report on the number of telemedicine and video consultations of telemedicine centers of regional hospitals and Republican clinics for the 1st quarter of 2020 [Otchet po kolichestvu telemeditsinskikh i videokonsul'tatsiy telemeditsinskikh tsentrov oblastnykh bol'nits i Respublikanskikh klinik za 1 kvartal 2020 goda] (2020). [updated October 10, 2020; cited June 15, 2022]. Avaliable: https://www.gov.kz/memleket/entities/dsm/documents/details/100161?lang=ru (In Russ.)

14. Morakanyane, R., Grace, A. A., & O'reilly, P. (2017). Conceptualizing Digital Transformation in Business Organizations: A Systematic Review of Literature. *Bled eConference*, *21*, 428-444. https://doi.org/10.18690/978-961-286-043-1.30

15. Parliamentary inquiries. Mazhilis of Parliament of the Republic of Kazakhstan (2020), [updated March 2020; cited May 08, 2022]. Avaliable:

https://www.parlam.kz/en/mazhilis/question-details/18175 (In Russ)

16. Parviainen, P., Tihinen, M., Kääriäinen, J., & Teppola, S. (2017). Tackling the digitalization challenge: how to benefit from digitalization in practice. *International journal of information systems and project management*, *5*(1), 63-77. https://doi.org/10.12821/ijispm050104

17. Pousttchi, K., Gleiss, A., Buzzi, B., & Kohlhagen, M. (2019, July). Technology impact types for digital transformation. In *2019 IEEE 21st Conference on Business Informatics (CBI)* (Vol. 1, pp. 487-494). IEEE. https://doi.org/10.1109/CBI.2019.00063

18. Projected global telemedicine market between 2019 and 2030. Statista (2021), [May 21, 2021; cited May 08, 2022]. Avaliable: https://www.statista.com/statistics/671374/global-telemedicine-market-size/

19. Sarsenova, A. O., & Popova, T. V. (2020). Industrial Medicine of Kazakhstan in Conditions of Digitalization of Health Care. *In PROSPECTS AND KEY TENDENCIES OF SCIENCE IN CONTEMPORARY WORLD* (pp. 5-11) (In Russ.)

20. Telemedicine market. Global Market Insigts (2021) [updated June 02, 2021; cited May 08, 2022]. Avaliable: https://www.gminsights.com/industry-analysis/telemedicine-market

21. Telemedicine market - growth, trends, covid-19 impact, and forecasts (2022-2027). Mordor intelligence (2022) [updated Febriary 08, 2022; cited May 08, 2022]. Avaliable: https://www.mordorintelligence.com/industry-reports/global-telemedicine-market-industry

22. Urazova B. A., Kurmanova G. K., Kim A. A., Sukhanberdina A. A., (2020). The market of medical services of the Republic of Kazakhstan: e-health technologies as a factor in increasing the efficiency of the industry. *Actual Problems of Economics and Management [Aktual'nye problemy jekonomiki i menedzhmenta], 2*(26), 128–136. (In Russ.)

23. Moro Visconti, R., & Morea, D. (2020). Healthcare digitalization and pay-for-performance incentives in smart hospital project financing. *International journal of environmental research and public health*, *17*(7), 2318. https://doi.org/10.3390/ijerph17072318

24. Vukšić, V. B., Ivančić, L., & Vugec, D. S. (2018). A preliminary literature review of digital transformation case studies. *International Journal of Computer and Information Engineering*, *12*(9), 737-742. https://doi.org/10.5281/zenodo.1474581

25. What is telemedicine?. RBC Trends (2022) [updated January 15, 2022; cited May 08, 2022]. Avaliable: https://trends.rbc.ru/trends/innovation/5d8e297f9a79478c40cd4369

Information about the authors

***Raushan S. Makasheva** – PhD candidate, Turan University, Kazakhstan, e-mail: 20210806@turan-edu.kz, ORCID ID: https://orcid.org/0000-0002-2548-4510

Leila A. Tussupova – Doctor of Economics, Professor, Turan University, Kazakhstan, e-mail: l.tussupova@turan-edu.kz, ORCID ID: https://orcid.org/0000-0001-7511-1889

Roland Giese – Professor, University of Applies Science, Germany, e-mail: r.giese@hszg.de, ORCID ID: https://orcid.org/0000-0002-3784-5950

Авторлар туралы мәліметтер

***Макашева Р.С.** – PhD докторанты, Тұран университеті, Қазақстан, e-mail: 20210806@turan-edu.kz, ORCID ID: https://orcid.org/0000-0002-2548-4510

Тусупова Л.А. – экономикалық ғылымдар докторы, профессор, Тұран университеті, Қазақстан, e-mail: l.tussupova@turan-edu.kz, ORCID ID: https://orcid.org/0000-0001-7511-1889

Гизе Р.– профессор, Зиттау-Герлиц қолданбалы ғылымдар университеті, Германия, e-mail: r.giese@hszg.de, ORCID ID: https://orcid.org/0000-0002-3784-5950

Сведения об авторах

***Макашева Р.С.** – PhD докторант, университет Туран, Казахстан, e-mail: 20210806@turan-edu.kz, ORCID ID: https://orcid.org/0000-0002-2548-4510

Тусупова Л.А. – доктор экономических наук, профессор, университет Туран, Казахстан, e-mail: l.tussupova@turan-edu.kz, ORCID ID: https://orcid.org/0000-0001-7511-1889

Гизе Р. – профессор, Университет прикладных наук Циттау-Герлитц, Германия, e-mail: r.giese@hszg.de, ORCID ID: https://orcid.org/0000-0002-3784-5950