Saimaa University of Applied Sciences
Faculty of Business Administration, Lappeenranta
Degree Programme in International Business

Kirill Borisov

Distribution and localization of mobile health applications in China

Thesis 2018

Abstract

Kirill Borisov
Distribution and localization of mobile health applications in China, 59 pages, 2 appendices
Saimaa University of Applied Sciences
Faculty of Business Administration, Lappeenranta
Degree Programme in International Business
Thesis 2018
Instructors: Ms Jaana Tanhuanpää, Senior Lecturer, Saimaa University of Applied Sciences; Mr. Esa-Petri Tirkkonen, Lappeenranta University of Technology (LUT) UNI-HAID

The objective of the study was to identify which factors in the distribution and localization process of a mobile health application a small western company should focus on entering the Chinese market. The research was conducted for the mobile development startup project UNI-HAID to help them understand better the Chinese mobile market and its unique aspects before making the market entry decision.

Data for this study was collected through an online questionnaire. 89 Chinese mobile application users answered the questions of the survey. The survey consists of 15 questions mostly related to mobile health applications and their distribution and localization. Books, news articles, research papers and other sources related to the topic of mobile software localization and distribution, the mobile application market in China and mobile health market were used in addition to the survey research in order to conduct a better analysis of mobile health application trends in China.

As a result of this thesis survey, the most efficient distribution channel for the mobile health application in the Chinese market was distinguished, the specific aspects of mobile application localization in China were described and main risks of entering the Chinese mobile health application market were identified. Recommendations to the client company were given according to the study results. Further study on health insurers as a mobile health application distribution channel in China is required.

Keywords: mHealth, mobile application, Chinese market, localization, distribution channels

Table of contents

Glossary

Mobile application - a software program for a mobile device

Mobile health (mHealth) - the practice of medicine using new mobile technologies

Operating system (OS) - a set of programs that control the way a computer system works

IOS - the operating system developed by Apple for their mobile devices

Android OS - the operating system developed by Google for mobile devices

3G, 4G, 5G - the 3rd, 4th or 5th generation of wireless mobile communication

The Word of mouth - product or service recommendation by a satisfied customer to the prospective customer

1   Introduction

People use mobile phones for almost every aspect of their life: for example, financial operations are performed via mobile online banking services, shopping is done on the mobile applications, and computer games are partly replaced by mobile phone games. Smartphones have a significant number of functions nowadays. New applications in different fields of use appear on mobile application stores practically every day. Mobile phones are not just communication devices but very powerful multitasking tools in the 21st century. Thereby, mobile device and mobile application industries have a meaningful influence on all the fields of life these days.

The healthcare area is not an exception for the mobile technology penetration, even though mobile health is a noticeably young field in comparison with the other mobile industries. Mobile health applications can vary significantly in functionality, but all of them serve to improve or control the health level of their users.

The western mobile health market already has major players in the field; therefore, competition is very intensive. The most attractive area for mobile health application developers these days is Asia. The greatest attention of mobile application providers is drawn to the People's Republic of China due to the specific economic and political features. Firstly, the fact that more than 700 million Chinese smartphone users were identified already by the end of 2015 makes China a very attractive market for mobile software developers (Seufert 2015). Secondly, mobile health is a prosperous area of business in China. A wide range of factors foster the development of the Chinese mobile health application market. Highly developed mobile infrastructure provides the internet connection between more than 724 million mobile device users inside the country (AppsFlyer 2017). Moreover, there are many opportunities for mobile health application business in China due to the lack of medical workers and highly qualified doctors. (Chen, Yin and Xie 2014.)

However, Chinese mobile application market penetration is not an easy task for western developers. The services of Google are banned in the People's Republic of China; thereby western Android developers struggle to find appropriate distribution

channels for their applications. Furthermore, there is a wide range of regulations in the field of mobile applications and mobile health in China. The mobile application providers are at risk of breaking the law in the case of ignorance of all the nuances of local legislation.

One of the most important factors of successful mobile market penetration in China is localization (Bock 2017). Software developers need to make their application user-friendly for the prospective customers in the new market. China is very different from other countries in terms of language, culture and mentality. Mobile application providers have to understand the main aspects of mobile software localization in China in order to get their users.

1.1 Goals and delimitations

The objective of the thesis was to identify which factors in the distribution and localization process of a mobile health application a small western company should focus on when entering the Chinese market. The research was conducted for the mobile development startup project UNI-HAID to help them understand better the Chinese mobile market and its unique aspects before making the market entry decision. UNI-HAID can benefit from the research work significantly. Firstly, the results from the study provide information about the points of localization and distribution. Secondly, the information collected from literature sources and findings from the empirical part allow optimization of the company's operations and choosing the appropriate distribution channels. Thirdly, the research helps to avoid a wide range of risks and legal problems.

The research had a range of delimitations. The object of the study was only the Chinese market. In every country the market has its own characteristics and the findings from this particular research work can be applied only to the application market in China. Moreover, the research has temporary value due to the rapid growth of the Chinese market and its changeability. Furthermore, the study is designed only for health mobile applications developed for the Android operation system.

1.2 Client organization

The client company of the research work is the startup organization UNI-HAID, operating under the control of Lappeenranta University of Technology. The main project of UNI-HAID is the development of a hearing aid application prototype for mobile devices working in the Android operating system. Furthermore, the organization conducts research to find the ways for the commercialization of the hearing aid application. The main purpose of the mobile application projected by the organization is to provide improvement of hearing abilities for people with hearing disorders. In comparison to traditional hearing aids, the product of UNI-HAID can be used temporarily, moreover, the solution will be less costly for users and easy to access. (Hearing aid application 2017.)

This project was developed as a business idea in the Summer LaunchPad event. Members of the group participated in competitions and received awards. Supervisors of the project are professor Jari Porras and project manager Antti Knutas. (Hearing aid application 2017.)

Currently, the team consists of three programmers, a designer and business/marketing persons. The team is supervised by LUT staff along with a steering group for the project. In addition, a support group of specialists has joined the team for advisory purposes. (Hearing aid application 2017.)

1.3 Research questions

Based on the objective of this thesis, the main research question is "Which factors in the distribution and localization process of a mobile health application should a small western company focus on when entering the Chinese market?". The sub-questions cover the main aspects of mobile application publishing:

1. "What distribution channels to use when entering the Chinese market with mobile health applications?"
2. "What is specifically involved in mobile health application localization in the Chinese market?"

3. "What main risks and legal issues can appear in the process of entering the Chinese mobile application market? "

2 Mobile health application industry

2.1 Mobile health industry

The information space and electronic carriers are actively transformed to be able to obtain specific medical information. This fact contributes to the development of medical integrated information systems, remote patient support, diagnosis, and treatment, for instance (Kuznetsov, Chebotarev and Uzdenov 2014). The popularity growth of smartphones among mobile phone users over the world has created a significant impact on a new segment of electronic health systems - mhealth (Tarasenko 2014).

Istepanian, Jovanov and Zhang (2004), in their article for the IEEE Transactions on Information Technology in Biomedicine, defined M-health as a complex of "*mobile computing, medical sensor, and communications technologies for health-care*".

In the mHealth research provided by the World Health Organization (2011), mobile health is described as medical services upheld by various mobile wireless devices and portable gadgets. MHealth implies the use of mobile devices' special functions. These functions are video, photo, voice and short messages; mobile communication systems (3rd and 4th generation); geolocation services; and wireless connection abilities, for instance (World Health Organization 2011.)

The implementation of information systems in the field of healthcare not only improves the effectiveness of medical services but also provides cost reduction, such as a decrease in the number of hospitalizations and treatment adherence improvement (Statista 2014).

Figure 1 shows the prospective cost savings in the field of healthcare by means of mobile health technologies as of 2014.
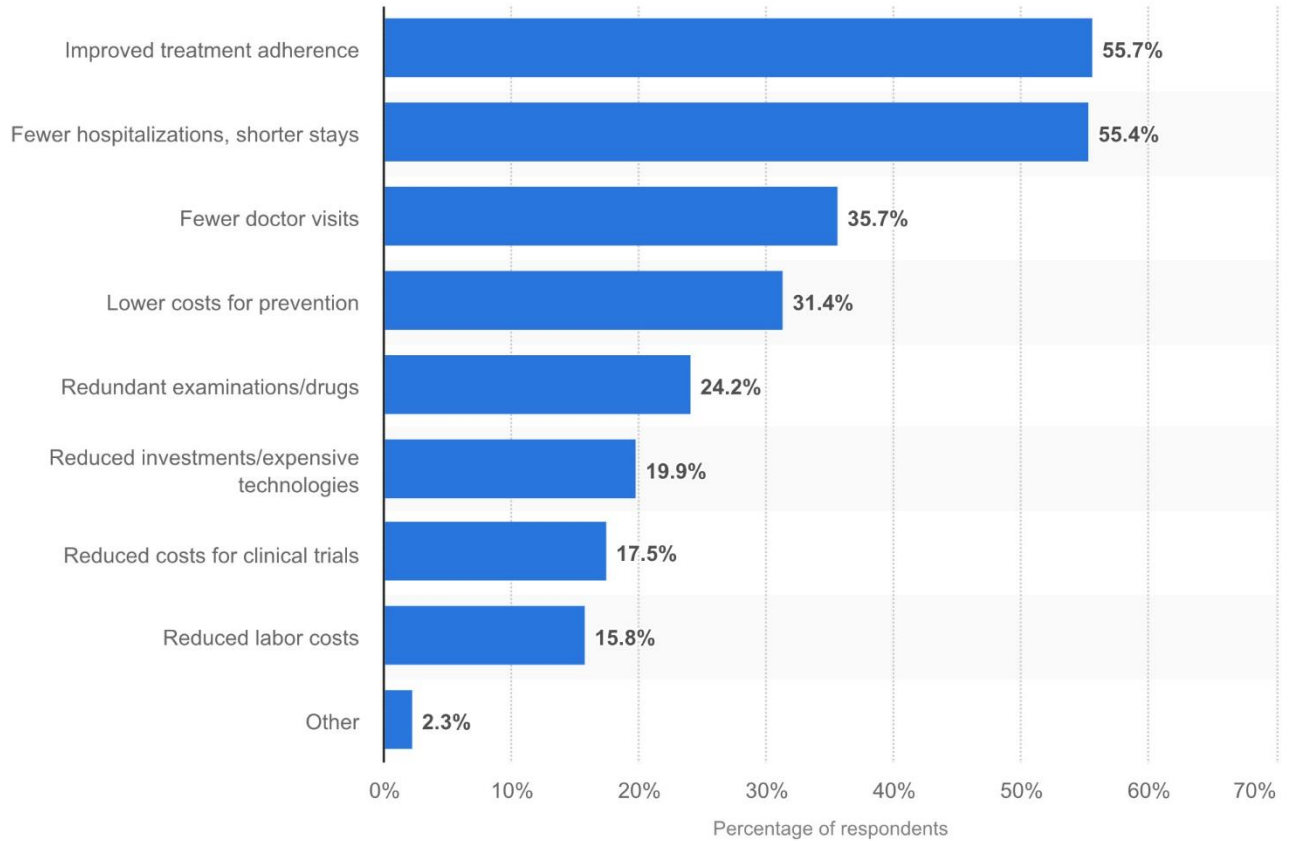
Figure 1. Potential cost savings in health care by mHealth in 2014 (Statista 2017)

A third of the respondents mentioned that fewer doctor visits can make a serious contribution to cost savings in health care. Moreover, mHealth provides optimization of human resources and reduces the labor costs. (Statista 2017.)

According to Istepanian, Laxminarayan, and Pattichis (2006), mobile technologies would have a positive impact on the way how different healthcare organizations provide their medical services globally, causing the enhancement of future healthcare services.

The mobility of specialists, in time collaboration and communication are highly important aspects of the healthcare system. Before the widespread of mobile phones in the 1990s professionals in the medical field used pagers for mobile connection with patients and colleagues. The emergence of Personal Digital Assistants (PDA) in the 1990s offered medical professionals a more convenient solution to organize

their contacts and other data. Now there is a device on the market which combines the functions of a pager, PDA and mobile phone, namely "smartphone". (Burdette, Herchline and Oehler 2008.)

The mHealth application market has existed for approximately ten years. The first mass market for medical mobile applications was implemented in Apple App Store by Apple in 2008; however, there was a number of digital healthcare solutions before. (Research2Guidance 2017.)

Apple launched a new category called "Apps for Healthcare Professionals" in its application store in 2011. The new section became a distinctive feature of the Apple Appstore. (Lewis 2013). In 2013 "Apps for Healthcare Professionals" was divided into subsections (Dolan 2011). Google launched its own application store called "Android Market" for devices using the Android operating system in October 2010. In March 2012 "Android Market" was rebranded and got a new name of "Google Play". The application store of Google also offered a wide range of medical applications for Android users. (Payne, Wharrad and Watts 2012.) Some application developers started to make their products available for both "Apple Appstore" and "Google Play" (Murfin, 2013).

2.2   Categorical review of mobile health applications

There is a big variety of medical and health applications created by 2017. Categorizing mobile health applications is a complicated process due to a considerable number of products in this field. There were no articles containing a systematic review of mobile health and medical applications before 2012, when Mosa, Yoo, and Sheets (2012) were the first authors to classify smartphone-based healthcare technologies according to the functions and specialization. This chapter describes the most popular categories selected from the article by Mosa, Yoo and Sheets (2012) and other scientific publications.

Disease Diagnosis Applications

Disease diagnosis applications for mobile devices are valuable tools for making a diagnosis at the bedside. Software in this category can be very cost effective. Some clinical tests are very costly and medical workers tend to avoid them. Identification of the most relevant tests according to the symptoms will exclude unnecessary tests. (Sarasohn-Kahn 2010.)

Medical Calculator Applications

Medical calculators are programs for computing different clinical indices and formulas. The most used indices in medicine are body mass index, individual drug dosing, and body surface area. Most clinical calculations require the use of complex equations with a big load of entry parameters. Mobile applications for a clinical calculator have an interface to allow the users simplified parameter input and score calculation. The users do not have to know the exact formula for making medical calculations. (Eknoyan 2007.)

Drug Reference Applications

Drug reference mobile applications are frequently useful in the field of healthcare. They usually include the names of medicaments, doses, indications, cost of the drug, pharmacology and other characteristics. (Adibi 2015.)

Health and Fitness Applications

The health and fitness section of mobile applications has a wide range of subcategories and is one of the most popular mHealth categories among regular users. Health and fitness applications provide users with a proper diet and general healthcare information; help to improve fitness activities and lose or gain weight; and consult during pregnancy, for example. In most of the cases, fitness applications require input of personal data about the user, such as physical parameters, gender, and date of birth. Fitness software use a combination of smartphone sensors, detectors, output and input devices to gather, process and analyze the data of the user in the process of his activity. In addition, there are applications on the market

that have the possibility to be synchronized wirelessly with wearable devices and sensors. (Zheng, Ding, Poon, Lo, Zhang, Zhou, Yang, Zhao and Zhang 2014.)

Hearing Aid Applications

The market of health mobile software likewise offers applications that allow users to transform their smartphone into a personal hearing aid. Applications of this type catch the sound using the microphone of the smartphone to adapt the income signal for the hearing abilities of the user. Some of the hearing aid applications only increase the volume of the incoming signal, while other more complex applications offer similar functionality that can be found in a regular hearing aid. Advanced applications of this segment can lower the background noise and focus on the sound signals that are far away. (Medwetsky 2015.)

2.3   Mobile health application market size

Mobile health is one of the most vigorously developing segments of the mobile application industry. MHealth started to grow rapidly approximately ten years ago and tends to continue growing today. By the year 2017 roughly 325,000 health applications were present in the major application stores. Compare to 2016, the amount of medical applications in the mobile application market increased by 78,000. However, most applications in this segment are developed for the Android operating system. MHealth products for the Android operating system met a growth rate of 50% after 2016. In the case of the IOS operating system, the amount of health applications grew with only by 20% in 2016. (Research2guidance 2017.)

Since 2013, the global amount of mHealth application downloads had been nearly doubled by the year of 2016 (Figure 2).
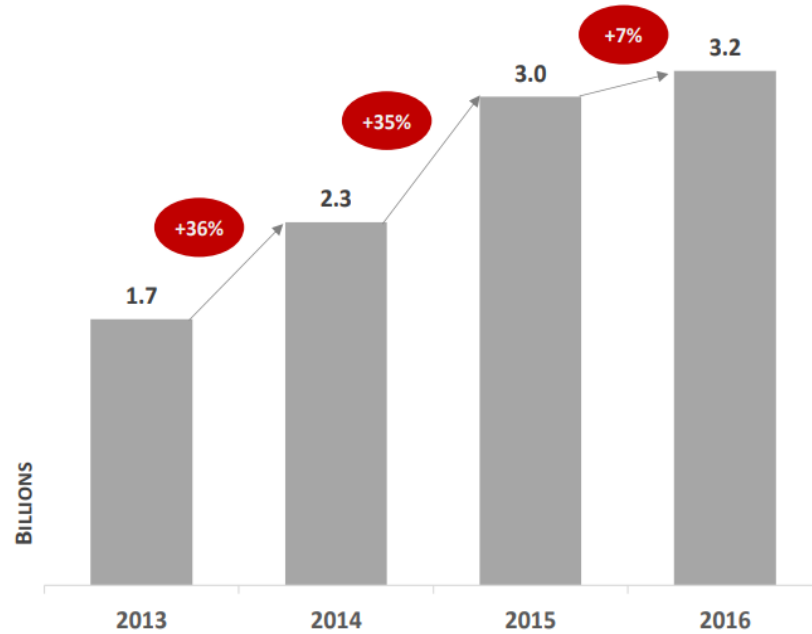
Figure 2. mHealth app download growth (Research2guidance 2016)

According to the study by Research 2 Guidance (2016), the total volume of the mHealth market increased from $718 million in 2011 to $12.5 billion in 2016, which demonstrates a significant growth of demand for mobile health applications. (Research2guidance 2016).

The total amount of 325,000 medical applications in 2017 met the expectation to get 3.7 billion estimated downloads. This figure demonstrates a rise of 16%. The download growth is mostly supported by two operating system platforms: Android and IOS. Android has had the greatest amount of mHealth applications downloads by this year. The role of other operating system platforms in the industry is not significant. The demand for medical applications is meeting the supply these days. (Research2guidance 2017.)

The number of mhealth application publishers increased with the rate of 45% in 2017. This trend demonstrates that mobile application developers face the

increasing of supply in the market. The second important reason of the mHealth market growth is the steady rise of start-up organizations. Nearly $5.4 billion was invested into mobile health start-up companies in 2016. (Research2guidance 2017.)

3 Mobile application market in China

3.1 Overview of mobile application market

The population of China is approximately equal to 1.4 billion of people and the major part of these people have access to the internet. Likewise, the number of mobile device users is nearly 724 million people, which is 96.3% of the total of internet users in the country, as shown in Figure 3. (AppsFlyer 2017.)
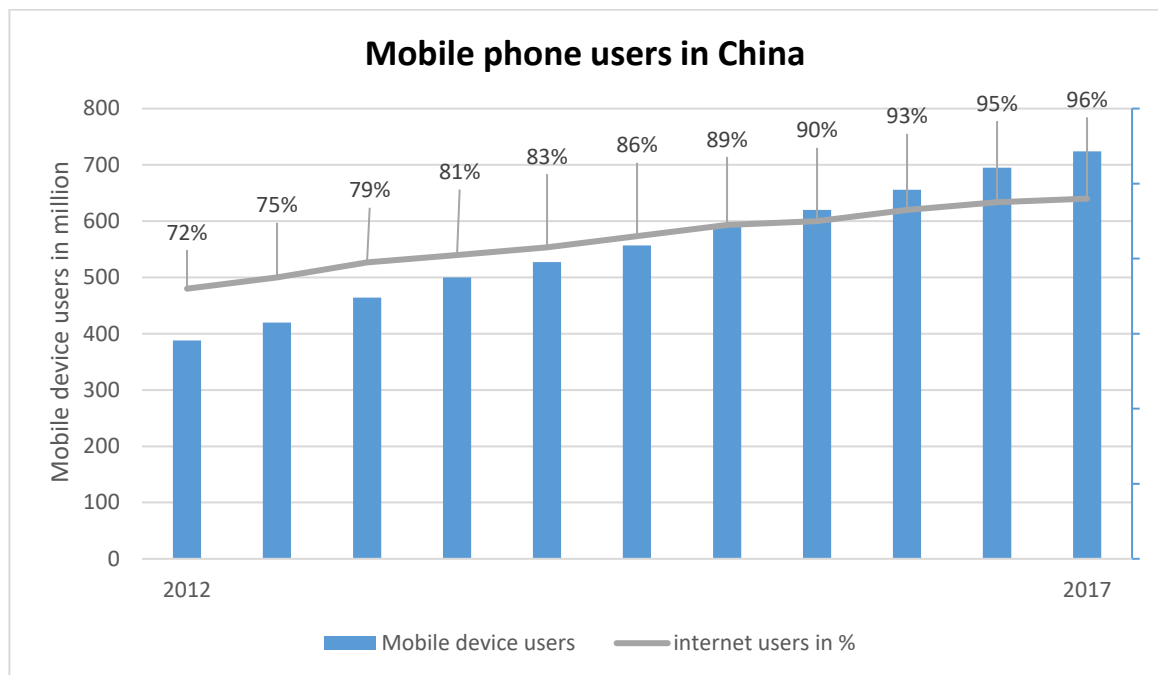

Figure 3. Mobile phone users in China (AppsFlyer 2017)

The mobile infrastructure in China is highly developed: 25% of Internet accesses is supported by a 4G connection. However, the cost of data is noticeably high: the average monthly salary is $886, and the cost of one megabyte in China is $1.13. Therefore, the share of Wi-Fi connections is considerably high and exceeds 70%. (AppsFlyer 2017.)

The great number of mobile phone users reflects the number of functions that people use in their devices. These days smartphones are used as payment devices in China. The number of customers using smartphones for payments increased by approximately 31% and reached the number of 469 million people. The leading service for mobile transactions in China is WeChat. The average amount of monthly payments per user in WeChat is 55. 94% of people that make internet purchases use the mobile phone as the device for payment. The smartphone is also regularly used as a gaming device in China. China generates nearly a quarter of the total revenue in the global video games market, which equals $24.6 billion. (Charochkina 2017)

Google was banned in China in 2010. This event influenced significantly the whole digital ecosystem in China and promotion of mobile applications for Android devices has changed without the Google Play in the local market. There are more than 200 application stores and platforms for mobile application distribution in China. The vital aim for most of Android developers in China is to launch their application in one of the ten most popular application stores in the country. (Charochkina 2017.)

Figure 4 displays the rating of the most popular application stores in China published by Newzoo (2017) on its website.

IMAGE	RANK	APPSTORE	APPSTORE IN CHINESE	COVERAGE	CHANGE
	1	Myapp (Tencent)	腾讯应用宝	24.7%	-
	2	360 Mobile Assistant	360手机助手	14.9%	-
	3	Xiaomi App Store	小米应用商店	12.1%	-
	4	Xiaomi Game Center	小米游戏中心	11.5%	-
	5	Baidu Mobile Assistant	百度手机助手	10.3%	-
	6	Huawei App Market	华为应用市场	10.3%	-
	7	Oppo App Store	OPPO软件商店	7.8%	-
	8	Sogou Mobile Assistant	搜狗手机助手	4.2%	-
	9	Vivo App Store	VIVO应用商店	3.5%	NEW!
	10	Google Play Store	谷歌应用商店	3.5%	-

Figure 4. 10 most popular Android application stores in China (newzoo.com 2017)

Almost 25% of the Chinese Android application market belongs to Myapp (Tencent). Tencent is followed by 360 Mobile Assistant with the rate of 14.9%. The Google Play Store has only a 3,5% market share in China, while it is the most popular Android application store in the world.

Android applications represent 78.4% of the Chinese mobile application market. However, it is complicated to reach the target user in China due to the absence of Google Play in the market. The application in most countries is just a point of sales, and developers advertise their products in different media outside the application store. Ratings and special application selections are provided by the application markets. In Chinese application stores, the inside promotion of applications is not free. (AppsFlyer 2017.)

The promoting of mobile applications in China is mostly done in social media outside the shops. Influential Western players are banned in the country (e.g. Facebook, Instagram, and Twitter). One example of the effective promotion tools in China can be Tencent Corporation platforms, which allow advertising the product in the popular

Chinese messengers WeChat and QQ (Charochkina 2017). Likewise, the researchers in AppsFlyer (2017) mention the following popular social media in the country: Toutiao, Weibo, and Baidu Tieba. However, the social media more likely lead users into the application stores of the same company (if the application is advertised in a 360 DSP social media, the user will be redirected to download this application from 360 Mobile Assistant). (AppsFlyer 2017.)

3.2 Chinese mobile health application industry

The field of mobile medicine in China is actively expanding. In 2014 the market of mobile health in the country increased with the rate of 28.5% compared to the previous year; in 2016 the rate of growth was projected to reach the figure of 69.7% and in the year 2017 the forecasted percent of mHealth market growth in China is 75%. (Statista 2017.) The growth rate is illustrated in Figure 5.
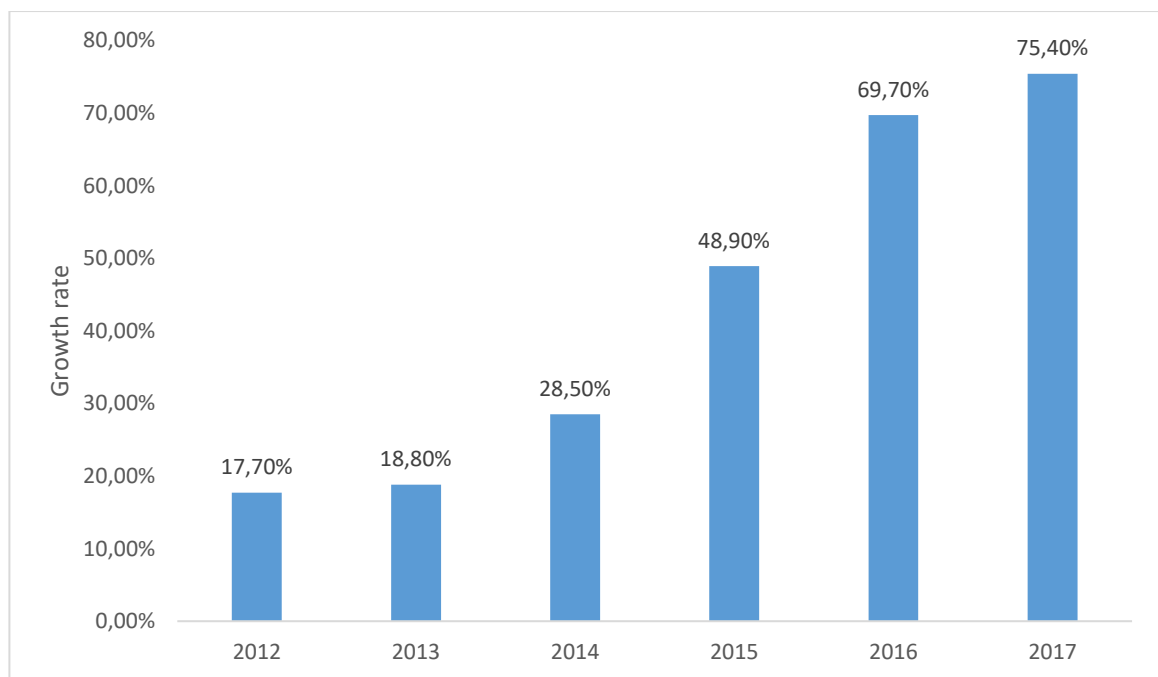

Figure 5. Growth rate of China's mHealth market from 2012 to 2017 (Statista 2017)

MHealth market value in China reached nearly $1.05 billion in 2016, and was projected to exceed $1,5 billion by the end of 2017 (Sferrazza 2017).

Access to the appropriate healthcare services in China is very limited; however, the mobile health option with its accessibility and personalization is a prospective solution for the stated problem. For a better understanding of mobile health applications in China, the system of healthcare in the country should be analyzed. Some specific characteristics make mobile health applications popular in society (Hsu, Liu, Yu, Zhao, Chen, Li and Chen 2016). An essential problem of medicine in China is the low doctor to patient ratio in rural areas. If in a city the ratio is 2.18 for 1000 patients, in a rural area the rate is four times lower, as it was reported for the year of 2009 by Yiyi Chen, Zhou Yin and Qiong Xie (2014). Due to the limited medical resources and places in hospitals and clinics in non-urban areas, patients have to move to cities with the aim to get medical care. The aforementioned phenomena make access to high-level medicine enormously difficult for people from the rural and urban areas. (Chen, Yin and Xie 2014.)

While the level of healthcare and medical resources accessibility in China are poor, there is a good tendency of mobile health development. The level of mobile communication system and Internet services in China is the same as in the most developed countries in the world. Only in 2014 there were more than 1 billion of mobile phone owners in the country and more than 80 million people with an internet access. People in China have a big interest in the new technologies and renew their electronic devices with a considerable enthusiasm. The level of smartphone use in the country is higher than in the United States. The 4th generation mobile connection spread in China exceeds the rate of 80%. In a couple of years the country is planning to switch the status of inside connection level to the 5th generation broadband era. (Li, Zhang, Chi, Chen, Li and Wang 2014.) Furthermore, a Wi-Fi connection is provided in the most of Chinese public places and is free to access. A good level of telecommunications and Internet systems in the country and a high rate of mobile devices implementation provides an excellent base for mHealth development in China. The development of mobile health in China can help to reduce the number of chronical diseases among the population and prolong the life expectancy. (Sun, Guo, Wang and Zeng 2016.)

4 Publishing of mobile applications in China

4.1 Distribution and distribution channels

Distribution is a set of activities that provide the movement of goods from the stage of production to consumption by customers. Distribution requires continued transformation of material and information flows which move from producer to consumer. (Gorchels, West and Marien 2004.)

The distribution of services provides the convenient conditions for the realization of services for the client in terms of location, time and form. There is no physical movement of services in this type of distribution. It is based on forms of payment, booking and transfer of information about services. (Gorchels, West and Marien 2004.)

There are two main factors in the process of distribution: logistics (the actual delivery of the products to the end user) and the type of distribution channels. Distribution channel is a system of business partners and often intermediaries that participate in service or product delivery to the customer. All types of distributors, wholesalers, internet services, or retailers can play the role of distribution channel. There are two types of distribution channels: direct and indirect. The direct distribution channel allows the buyer to get the product directly from the producer. Indirect distribution channel provides customers with the services of a retailer or other third-party company. (Investopedia n.d.) A well-organized combination of distribution channels is an essential aspect of business, since it has a significant impact on the financial performance. (Gorchels, West and Marien 2004.)

4.2 Mobile applications distribution channels

A mobile application can be created as a service or as a final product but it can be also a mixture of both. This feature of mobile applications provides them with a good variety of distribution channels (Perez 2010). The most popular mobile application distribution channels comprise application stores, pre-loads, web discovery

optimization, press, pay-per-installs, application giveaways, application mobile web versions, and TV advertisement.

Application stores

One of the most popular ways to distribute the mobile application these days is through a service of an application store. There is a great number of application stores in the modern digital market: Apple Appstore with content for smartphones and tablets using the IOS operating system; Google Play with the software for Android devices; Nokia's Ovi Store for Nokia gadgets; Microsoft Windows Phone Market; and a great number of independent application stores. (Perez 2010.)

Pre-loads

Pre-loads is a very attractive distribution channel for developers nowadays. The service of pre-installation is quite costly for the application provider; however, this channel is one of the most effective ones for distribution. In addition, there is a high competition among developers to have their applications pre-installed on the exact device. (Perez 2010.)

Web discovery optimization

Discovery optimization of the developer's website in the popular internet search engines can be a vital solution for product distribution. A link to the application or the widget may be situated on web pages of a popular site or on the pages of a social network. The link will directly bring the users to the appropriate application download page according to the operating system of the device. (Perez 2010.)

Press

Exclusive reviews by the press was recommended as a good way to promote the product or service a long time ago. These days press review is still a very effective solution to distribute the product. Mobile software products are not an exclusion. A good paid PR campaign in the press or social media can promise a success for a qualitative product. (Perez 2010.)

Pay-per-installs

Pay-per-installs as a method of mobile application promotion which provides users with a reward for the application downloads. The reward can be money or virtual goods and bonuses. Mobile application providers have the possibility to fix their own limits for the budget per day and target the segment of customers they need to reach in the first place. (Perez 2010.)

Applications Giveaways

Free downloads offer in a fixed period of time can be an effective distribution solution. If the mobile application is appreciated by users who downloaded it for free, the paid version of the product will be promoted by word of mouth and high ratings of the application. (Perez 2010.)

Mobile Web Version of the application

An online mobile version of the application can provide a noticeably wide spreading of the digital product. The distribution channel of this type allows bringing the application to the devices with different operating systems via the web. The customer can use the application in the web browser of his device. Additionally, most operating systems allow users to save links to such applications on the home screen of the device, which makes the use of the software convenient. (Perez 2010.)

TV advertisement

TV advertisement is an efficient solution for the mobile application developers. The use of this distribution channel is not significantly expensive these days and makes the product noticed by a wide segment of people. The disadvantage of the channel is a poor reputation caused by prospected forgery of application developers. However, if the advertisement has a clear message that there will be no additional fees after installation of the application, the campaign still can be successful. (Perez 2010.)

4.3 Mobile health applications distribution channels

According to the research of Research2Guidance (2017), health insurers have become the number one distribution channel in the market of mobile health applications and was predicted to keep the place as an important distribution channel in future (Research2guidance 2017).

Until 2017 application stores were the best distribution channels for medical applications. Nevertheless, health insurers growing over the years overtook application stores in the sphere of application distribution. Other mHealth distribution channels have lost their popularity in last few years. Physicians and hospitals were considered as the most efficient distributors in 2010. However, these days publishers prefer to use application stores and health insurers. Other popular in the past channels including pharmacies and healthcare webpages, are not considered as effective distribution channels today. (Research2guidance 2017.)

4.4 Mobile applications distribution in China

The Chinese mobile market with approximately half a billion prospective users is often attractive to western developers. However, the Chinese mobile application market is not easy to enter. The most of Google services including Google Play are banned in the country. This phenomenon has caused the emergence of a large number of local application stores. Rapid publishing of Android applications is not possible in this market. All the details of application promotion, such as rating or place in the top, are usually discussed with the application store. (WINFOX 2015.)

There are more than 300 application stores in China and all of them have different requirements for mobile application developers. The income from the application depends on the application market. The most part of the income usually goes to the application store. To enter the Chinese market of mobile applications, connections are needed. Before the product release, all the details of publishing are discussed between developers and application store managers; the developer provides the localization of the application and sends the APK (Android application package) file to the application store. (AppsFlyer 2017.)

Application distribution through Apple Appstore in China will be noticeably easier for software developers in comparison with distribution through local Android markets. Apple provides strict regulations for the publishing process in its application store and allows users to purchase digital products via the popular service UnionPay. Developers only need to provide the localization of the application into the Chinese language. (AppsFlyer 2017.)

Another popular distribution channel for mobile applications in China is pre-installation. The new Android smartphones in the country are sold with some amount of pre-installed applications. Application pre-installation adds more value to the device and allows the developer of this application to distribute the product effectively. However, there is a high competition among applications to be installed on the mobile devices of popular brands before sales. In addition, there are strict regulations announced by the Chinese authorities in 2013 about the software that can pre-installed by mobile device manufacturers. (Livingston 2013.)

4.5   Localization

A successful software product in one country can get users in any other country of the world in the case of qualitative localization. Experienced mobile application developers entering a foreign market put the localization process on the first place. Before localizing the application, developers should remember that the process of localization is not just a translation of the written content. (Bock 2017.)

Newmark (1988) in his book "A Textbook of Translation" claims that translation *"is rendering the meaning of a text into another language in the way that the author intended the text".* Language localization, at the same time, means the adaptation of the product or service into the language of another country to meet the difference of the culture. Besides the text translation, the process of localization can also include graphical adjustments, implementation of modifications according to the target users' habits and culture, layout and design adjustment, measurement and currency unit conversion according to local standards, numerical format adaptation, and

adjustments to meet the approval of local authorities. The aim of localization is to adapt the product or service for the target users. (Day Translations Blog 2015.)

In the case of mobile application localization, the space aspects of the application are vital for the product localization. The application provider should consider the length of the words and space needed for them in a different language. There are languages with the rule of writing from right to the left or vertically. The design of the application needs to be adjustable and able to be extended. Android and IOS platforms offer developers convenient tools for numerical converting, making the process of localization much easier for the mobile application providers. (Bock 2017.)

4.6 Mobile application localization in China

There are many unique aspects in the process of application localization for the Chinese market. Oliver Bock (2017) claims in his article that technical details should be considered by developers first of all before the localization process. One of the main obstacles of application launch in the country is the Chinese Great Firewall. Therefore, the choice of the server is another important technical nuance of localization. A local server should be used in China to avoid connection problems from the users' side. Furthermore, there is a great number of standards for encoding the text into Chinese: ISO-2022-CN, GBK, and EUC-CN, for example. However, the most practical standard for encoding is Unicode (UTF-8). According to the article "Beginner's Guide To App Localization For The Chinese Market", Unicode is able to support all the Chinese characters. (Bock 2017.)

Translation of the software content is another important factor of successful product localization. The content of a qualitative product must have correct grammar and syntax. However, the style of the brand should not be changed. Chinese people are known for love and respect to their language. The amount of translated content will influence the popularity of the product. The content can include headings, descriptions of images, system and fault messages, among other features. (Bock 2017.)

Most of Chinese people do not follow western trends. This fact necessitates foreign developers to adapt the product for the Chinese culture carefully. To begin with, integration of local social network services in the application is essential for a successful penetration into the Chinese market of mobile applications. Texts in Chinese usually take 70% of the space needed for English texts with the same context (Bock 2017). Colors in the Chinese culture are very meaningful for people. Chinese users of mobile applications prefer bright colors; dark and dim hues are not appreciated by local customers. Moreover, each color in Chinese culture has a specific meaning different from the meaning of this color in other countries. (Mitra 2017.) Animated objects are another popular trend in Chinese mobile applications. Minimalism in design appreciated by western users is not a practical solution in Asia, especially in China. Chinese mobile application users prefer to see the interface full of objects, links and textual messages. QR code is a significantly trendy feature of mobile applications that Chinese developers implement regularly. QR codes allow users to get a quick access to interesting campaigns. (OpenJaw Technologies 2018.)

Numerical and language standards in China differ from the standards of western countries. The main specifications of the Chinese language and numerical standards are described below:

- The date in China should be coded as year.month.day.
- The Chinese currency is RMB (¥).
- Metrics are encoded in the metric system.
- The sequence of data in a Chinese address is country, province, city, street.
- The name format in the Chinese language has the order of the surname on the first place and given name on the second. (Bock 2017.)

4.7 Laws and regulations

The development of the mobile health industry is highly supported by the Chinese government but regulations and standards in the field are not reaching the appropriate level at this moment. (Sun et al. 2016.)

China has one of the most restricted internet environments in the world. There are two main levels of Chinese internet control. The first level has the unofficial name of the Great Firewall. The Great Firewall is a system for controlling access to foreign internet content. The project of the Great Firewall was launched by the Chinese government in 1998. In the same year, the second level online restriction named the Golden Shield was implemented by the Ministry of Public Security. The Golden Shield is a system of domestic internet monitoring. Each level of authority in the country has its own systems of control in the net. At the beginning of internet restrictions implementation, China blocked the entire sites. These days the filters of monitoring systems have been improved. These innovations allow the authorities to block only certain pages instead of the whole online resource. (The Economist 2013.)

However, the field of mobile applications in China was not controlled virtually before 2012 and there were almost no regulations in this industry. The Ministry of Industry and Information Technology (MIIT) announced the project of an evaluation system for mobile applications in November 2012. According to the announced law, every mobile application must be approved by the authorities before publishing. The new law was not received by people positively because it was the first sign of censorship in the industry of mobile applications. (Caster 2012.)

In 2014 the government of China issued the first list of limitations for mobile messengers in the area of news announcement. The main target of the new regulations was popular among Chinese users messaging services such as WeChat. According to the issued law, only sources officially recognized by the authorities can publish news and information approved by the government. Another statement of the law requires from users the registration on the services of this type with an official ID number. (Kan 2014.)

In November 2015 MIIT of China issued a new set of regulations called "Preinstallation and Distribution of Applications for Smart Mobile Devices Interim Administrative Provisions". The aim of this set of laws is the regulation of pre-installed software and application distribution in the country. (Kwm 2016.)

On August 1, 2016 the Cyberspace Administration of China ("CAC") launched new regulations for the mobile application industry. The official name for the new regulations list is "Rules on the Management of Mobile App Information Services". The new set of laws is a reaction of Chinese authorities to the enormous rise of the mobile application industry and the growth of piracy in it. The aim of the restrictions is to enhance the privacy security in the industry and to develop the content control in terms of censorship support. According to the new rules, application developers have to verify the users' profiles with the personal data: mobile phone numbers, ID numbers, and so on. Another requirement to the application provider is the recording of the users' activity in a period of 60 days. Moreover, the rules require the appropriate qualification and licenses from the mobile service providers to ensure that they have permission to provide the service according to the law. (Kaja and Carlson 2016.)

Data privacy has an important place in the concept of aforementioned rules. The providers of mobile applications have to follow privacy aspects. Likewise, a mobile service should contain filters for content monitoring and illegal data identification. All illegal content must be reported to the authorities according to the law. Forbidden content includes pornography, gambling propaganda, offensive or politically sensitive materials. Application stores have to enhance the security systems according to the new rules, improve the contract regulations with the application publishers. Application stores, additionally, have to register in the provincial authority departments in the period of 30 days before starting commercial online activities. The software markets must check that private information of users is protected, the provided content is legal and the copyrights are respected. (Kaja and Carlson 2016.)

The field of mobile medicine in the country is likewise strictly controlled by Chinese authorities. The China Health and Family Planning Commission issued specific

regulations for mHealth called "remote medical information system construction technology guide" in 2015. The guide defines the main standards and functions of the national remote medicine. There are five main requirements listed in the guide. The first requirement states that a prospective information system has to be implemented according to the strict standards. The second statement requires that on all levels there is a cooperation and medical information sharing from the healthcare institutions. The third requirement refers to the standards of uniform and technical barriers of medical remote systems. In the fourth statement, management tasks, including the evaluation index, were described. The final point of the guide was issued to encourage the activity in society and promote the mobile health medicine. (Sun et al. 2016.)

5   Research method

The quantitative research method was selected to find the answers for the research questions according to the specification of the study. The meaning of quantitative research method can be described by the definition by Aliaga and Gunderson (2000): Quantitative research is *"Explaining phenomena by collecting numerical data that are analyzed using mathematically based methods (in particular statistics)"*.

The empirical research for this thesis was conducted in the form of an online survey via the website wjx.cn. Such popular online survey providers as Google Forms or Survey monkey are banned in the territory of China. This fact motivated the author to search for a local service provider in China to conduct an online survey. The general purpose of the survey was statistics generation for a numerical description of the study population. The major method of survey data gathering is asking questions from the respondents. (Fowler 2009.)

Snowball method was used to collect data from the representatives of the targeted population. Snowball sampling is a data collection method where the researcher contacts the representatives of the target group he already knows and asks them to forward the questionnaire to other representatives of the target group. This method

allows to conduct data gathering when it is hard to reach the populations for sampling. (Faugier and Sargeant 1997.)

The research work was designed to collect and analyze data from Android operating system users in China. The collected data demonstrates the respondents' habits and preferences related to mobile health applications and the channels of distribution they would prefer to use.

Numerous books, news articles, research papers and other sources related to the topic of mobile software localization and distribution, the mobile application market in China and mobile health market were used additionally in the survey in order to conduct a better analysis of mobile health application trends in China.

6 Empirical findings

6.1 Results of the questionnaire

The results from the questionnaire are presented in this chapter. There were 89 respondents answering the questions of the survey. The survey consisted of 15 questions mostly related to mobile health applications and their distribution and localization. Questions number 6 and 7 are multiple choice questions. Question concerned the foreign languages respondents know is an open-ended question.

Age

The first question of the online survey was about the age of the participants.The results are shown in Graph 1.
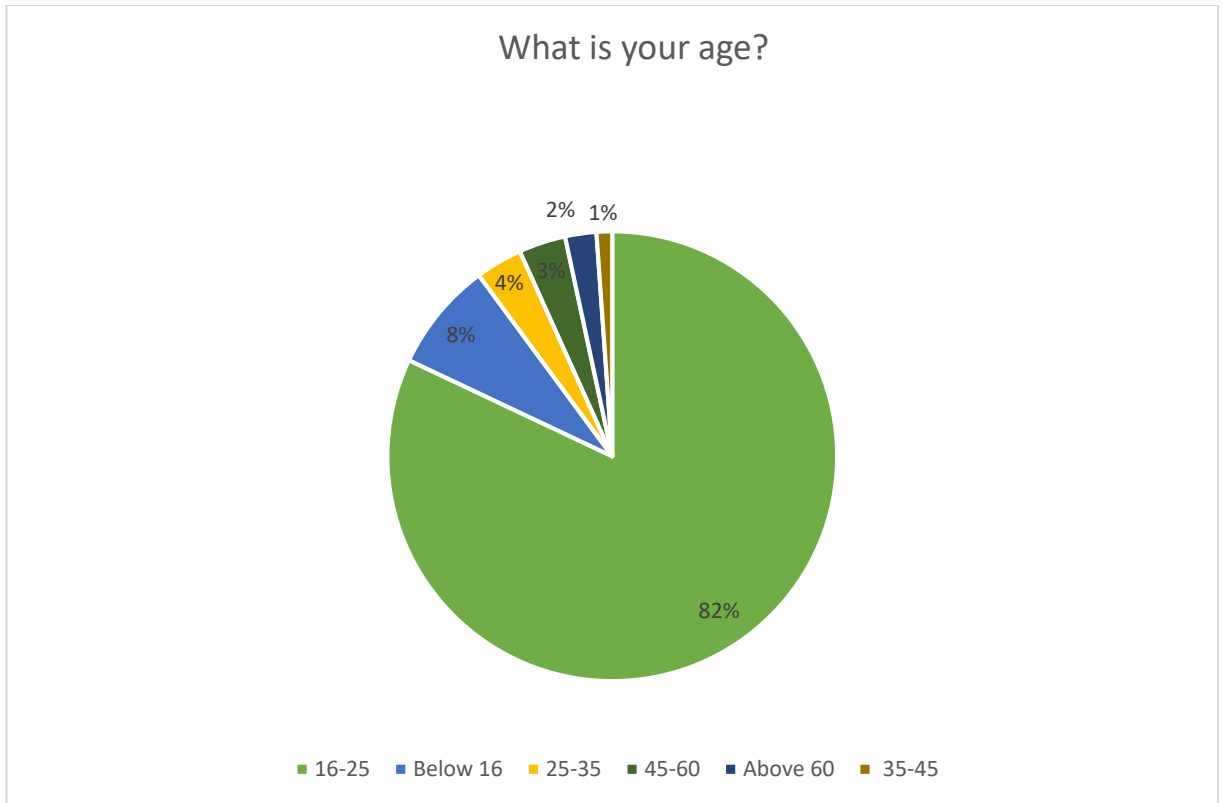

Graph 1. What is your age?

The age group of young people in the range of 16–25 years prevails in the research population with the quantity of 73 people and representing 82% of the total. 8% of the respondents are younger than 16 and 2% are above 60. The middle age group is represented in the survey only by 4%.

Foreign languages

Totally four languages were mentioned by the participants when answering the question about the foreign languages knowledge. Graph 2 demonstrates the results.
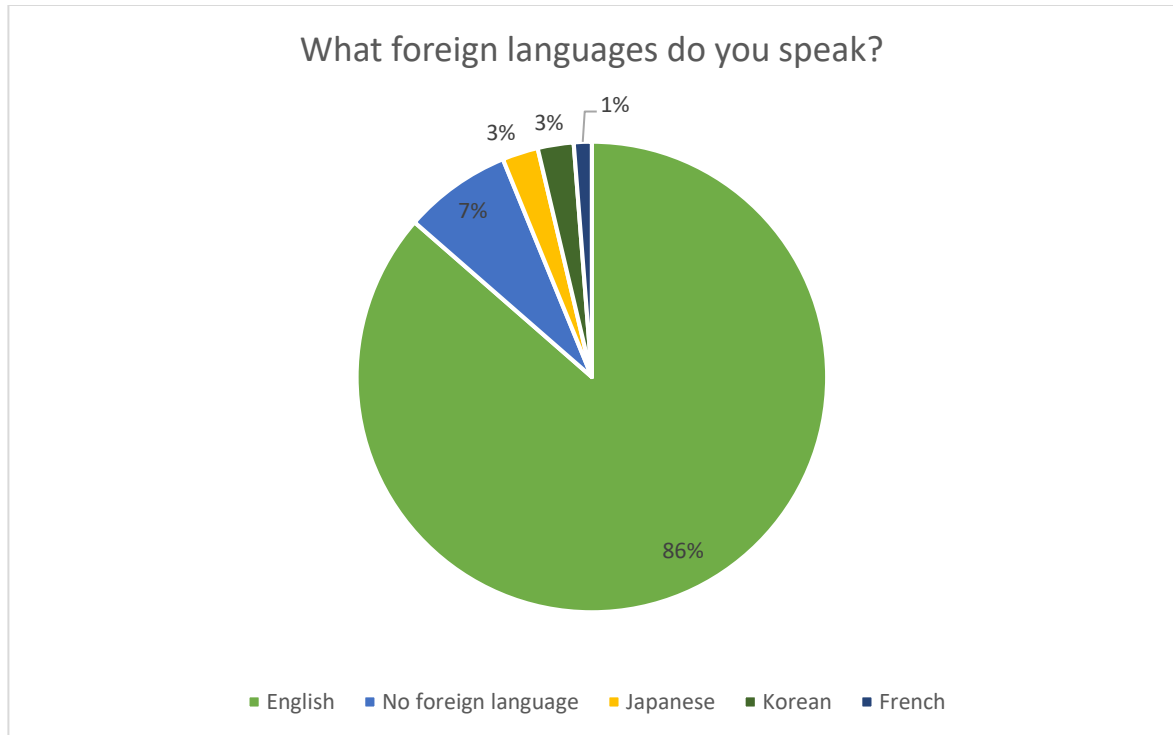
Graph 2. What foreign languages do you speak?

The graph illustrates that 87% of the participants speak English. The share of both the Korean and Japanese languages is 3% each. Notably, 6% of the respondents do not speak any foreign languages.

The favorite application store

The application stores the respondents prefer to use are described by popularity in Graph 3.
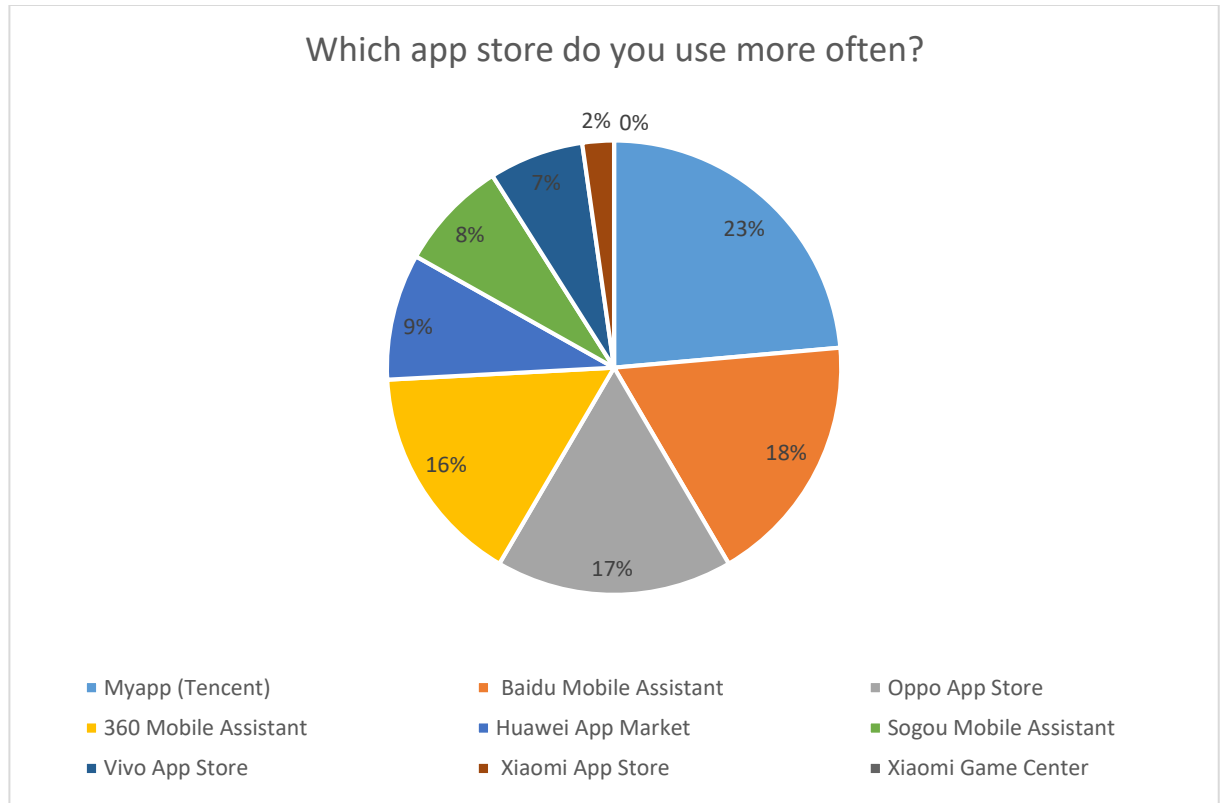
Graph 3. Which app store do you use more often?

Myapp (Tencent) was chosen by the majority of participants, which is 23% of the total. Baidu Mobile Assistant was chosen by 18% of the respondents which is five people fewer than in the case of Myapp (Tencent) application store. Oppo Appstore and 360 Mobile Assistant have the 3rd and the 4th place respectively with a difference in only 1%. Xiaomi Game Center was not chosen by any of the respondents.

The price of the mobile health application

The information about the amount of money people are ready to pay for a mobile health application is provided in Graph 4.
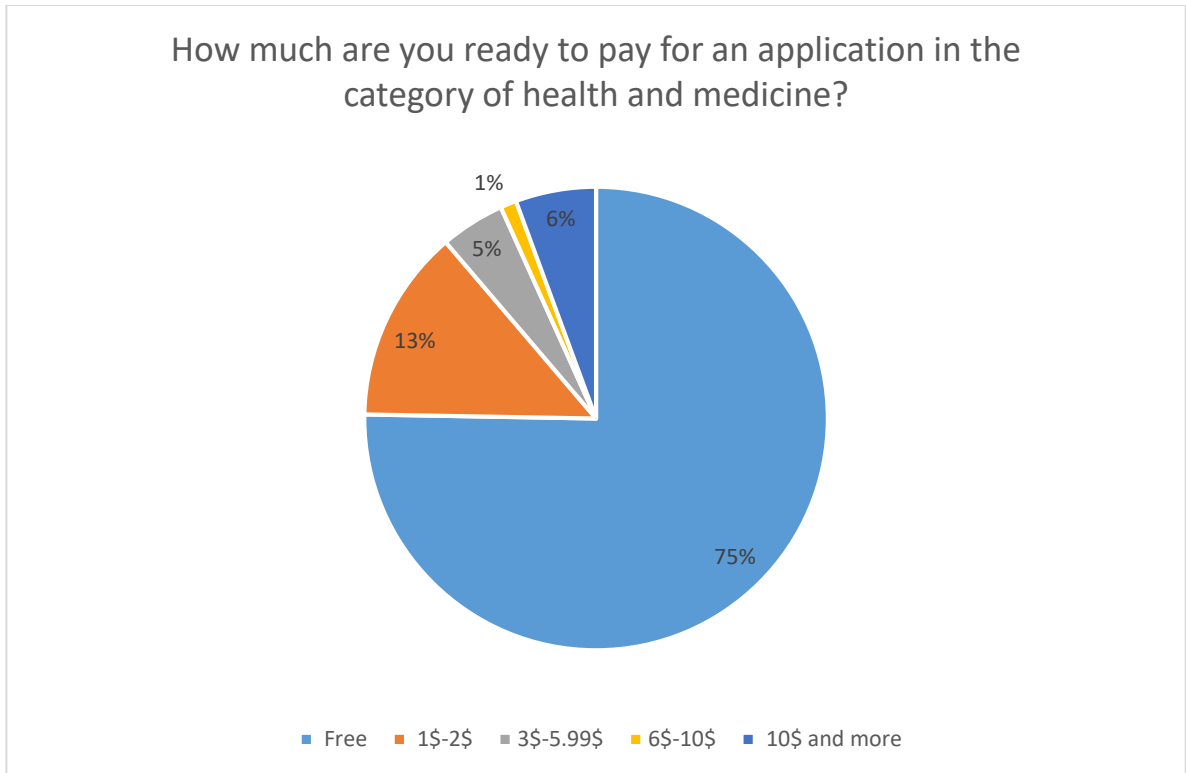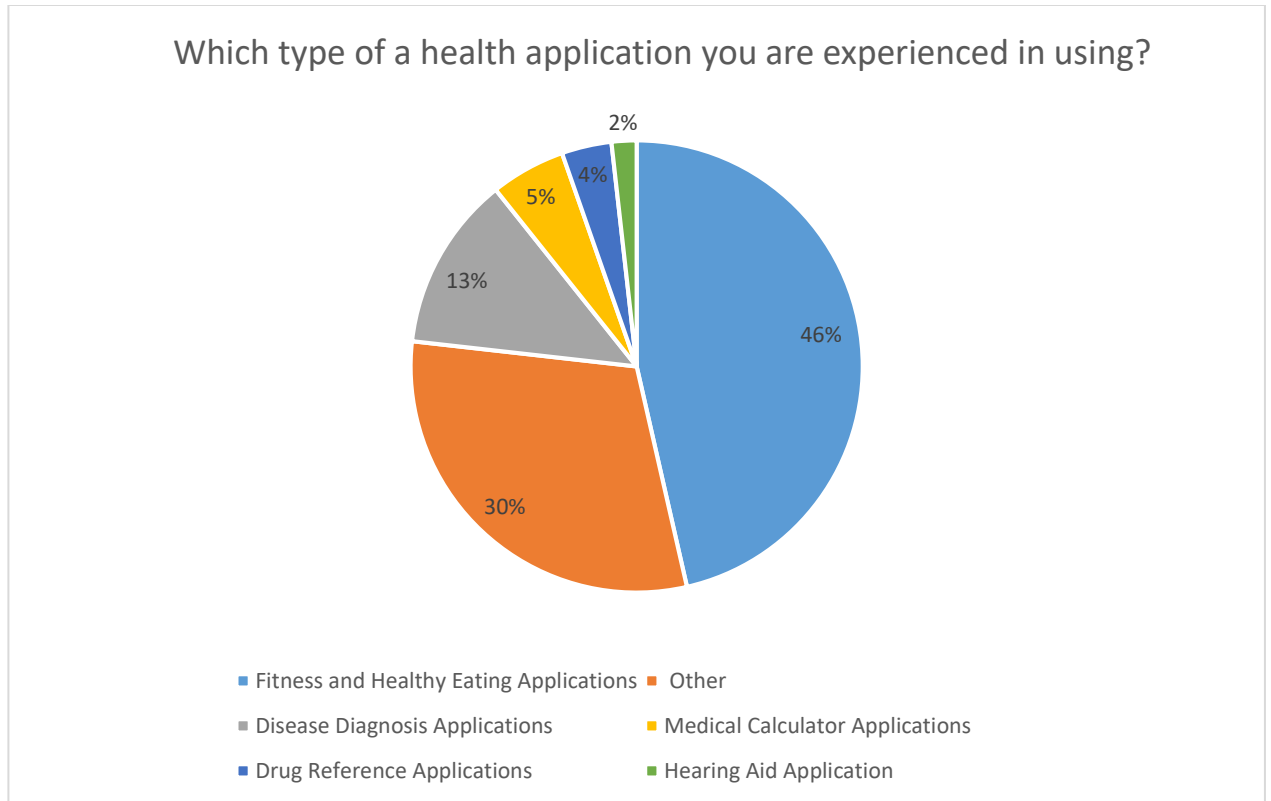

Graph 4. How much are you ready to pay for an application in the category of health and medicine?

75% of the respondents are not ready to pay for medical applications. The price range of 1-2 is favored among the survey participants who are ready to pay for mobile health applications, comprising the 13% of the total result. 6% of the respondents are ready to pay 10$ and more for mobile health applications.

Mobile health application experience

The answers to the multiple-choice question about the type of a mobile health application respondents are experienced in using are illustrated in Graph 5.
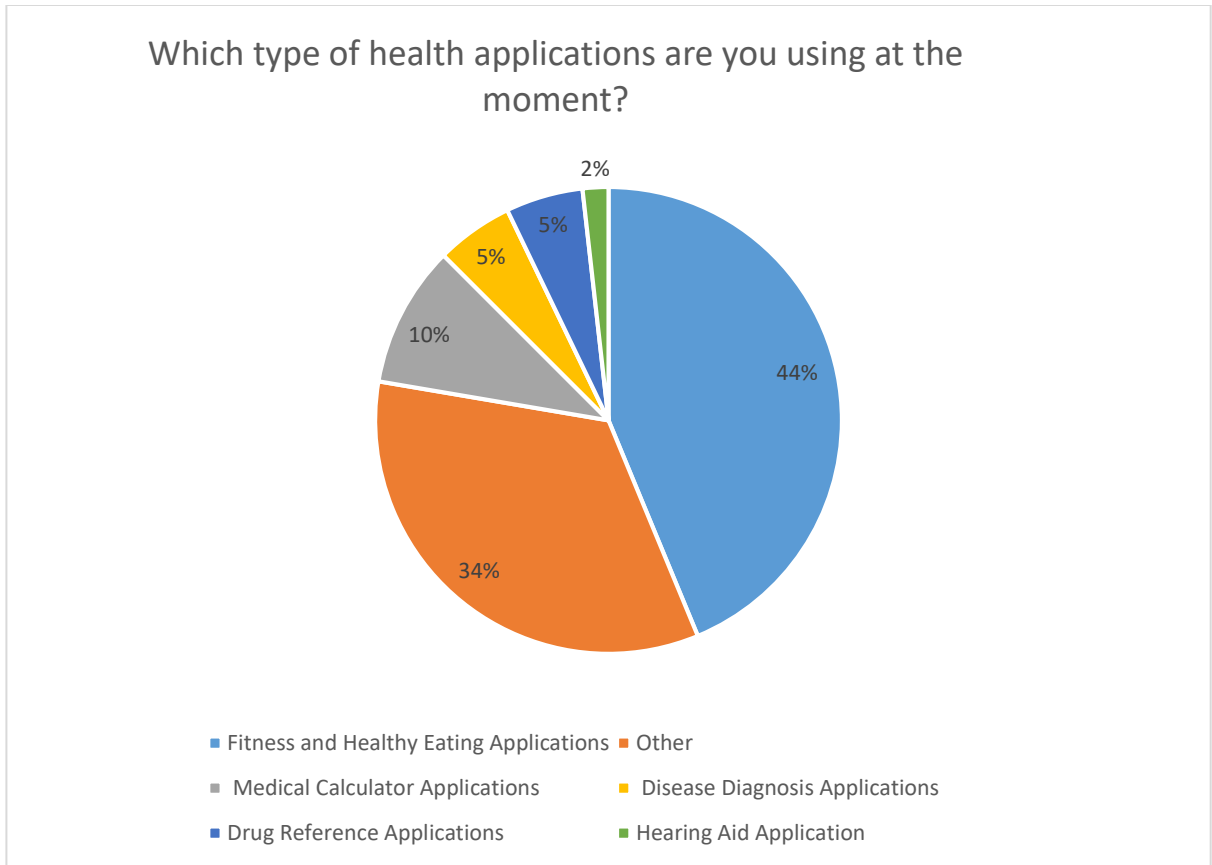
Which type of a health application you are experienced in using?

- Fitness and Healthy Eating Applications ■ Other
- Disease Diagnosis Applications ■ Medical Calculator Applications
- Drug Reference Applications ■ Hearing Aid Application

Graph 5. Which type of health application are you experienced to use?

Some participants, 45% of the answers, have the experience of using fitness and healthy eating applications. A significant number of users claimed that they used other types of mobile health applications not mentioned in the questionnaire. 12% of the answers say about the experience of using disease diagnosis mobile applications. 5% of choices belong to medical calculator application. Hearing aid applications as a choice was presented just by 2%.

The current use of mobile health applications

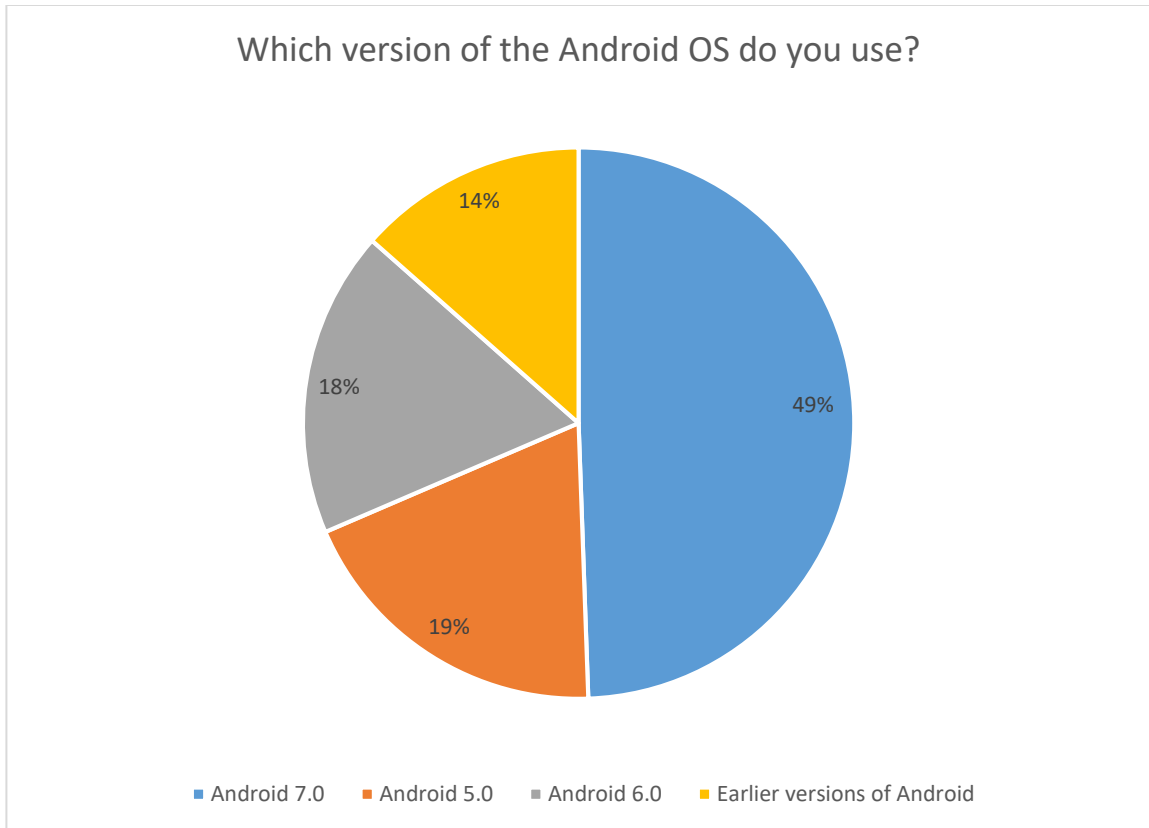The information about the current use of mobile health applications by respondents is provided in Graph 6.

Graph 6. Which type of health applications are you using now?

The most popular answers to this question were fitness and healthy eating applications and the group "Other", as it was in the previous questions. A hearing aid application got 2% of choices, and a medical calculator application position got 10% of answers.

Android OS version

The version of the Android operating system was the main topic of this question. The findings are displayed in Graph7.

Which version of the Android OS do you use?

14%

18%

49%

19%

■ Android 7.0 ■ Android 5.0 ■ Android 6.0 ■ Earlier versions of Android

Graph 7. Which version of the Android OS do you use?

49% of the participants use the 7.0 version of the Android operating system and 51% of the participants used an earlier version.

Importance of native language support

The respondents were asked if support in their native language in the mobile application is important. The results are shown in Graph 8.

Is it important for you that the application supports your native language?

12%

88%

■ yes ■ no
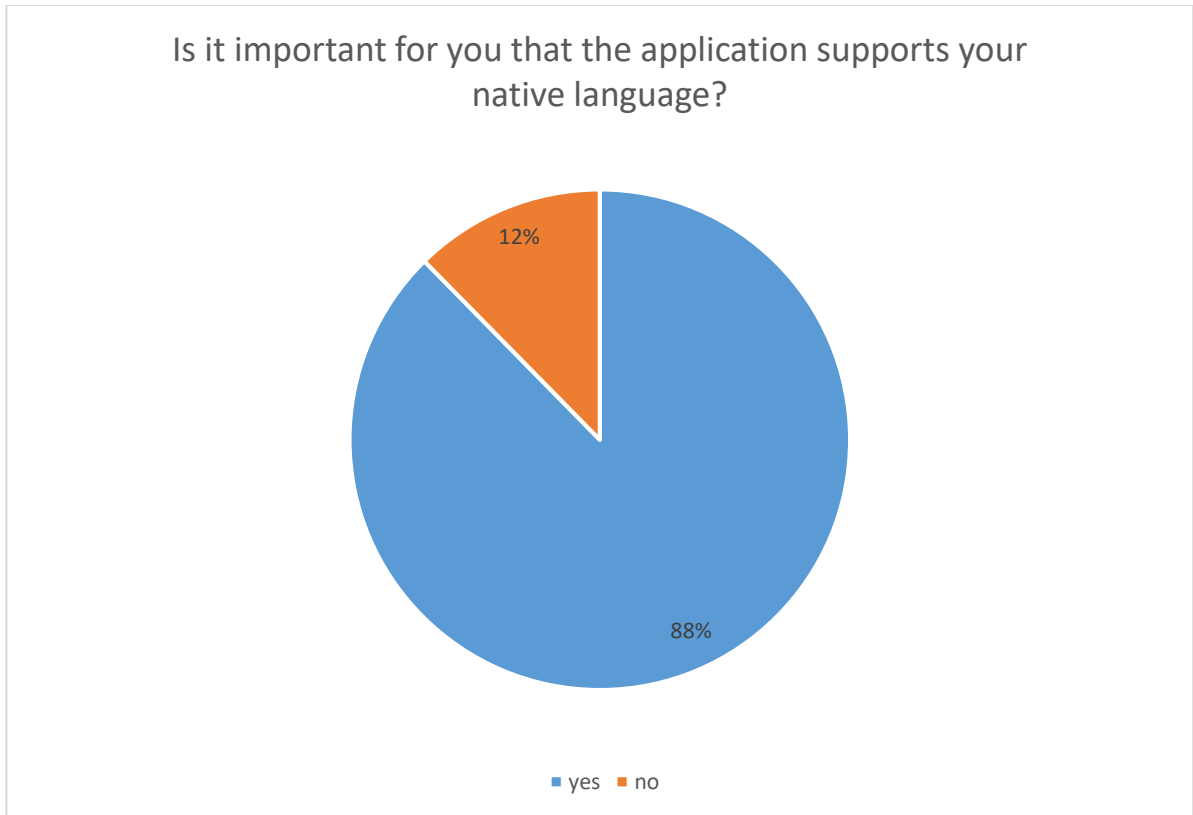
Graph 8. Is it important for you that the application supports your native language?

As the graph shows for 88% of participants it is important to have the application content translated into their mother tongue and for the other 12% this matter is not important.

Importance of the number of application downloads

The attitude of the respondents to the number of application downloads in application stores by other users is presented in Graph 9.

Is the number of application downloads important for you?
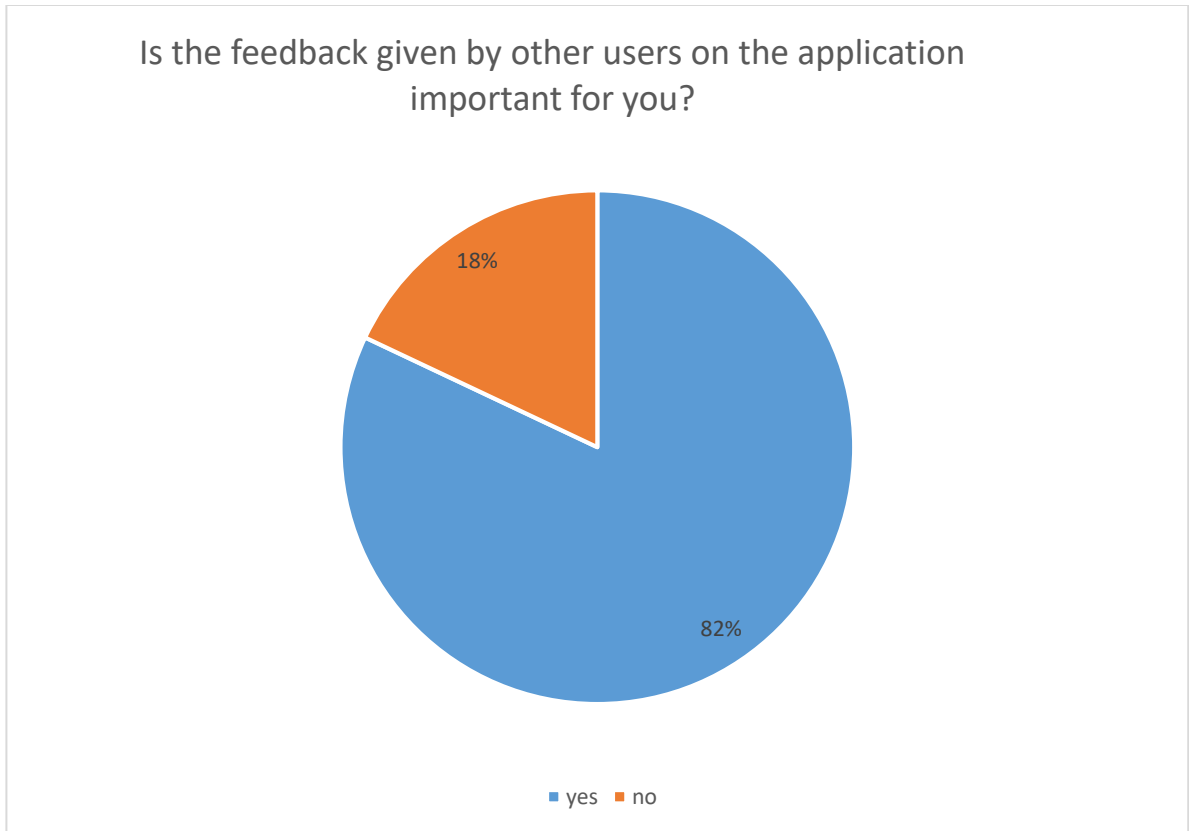
28%

72%

- yes ■ no
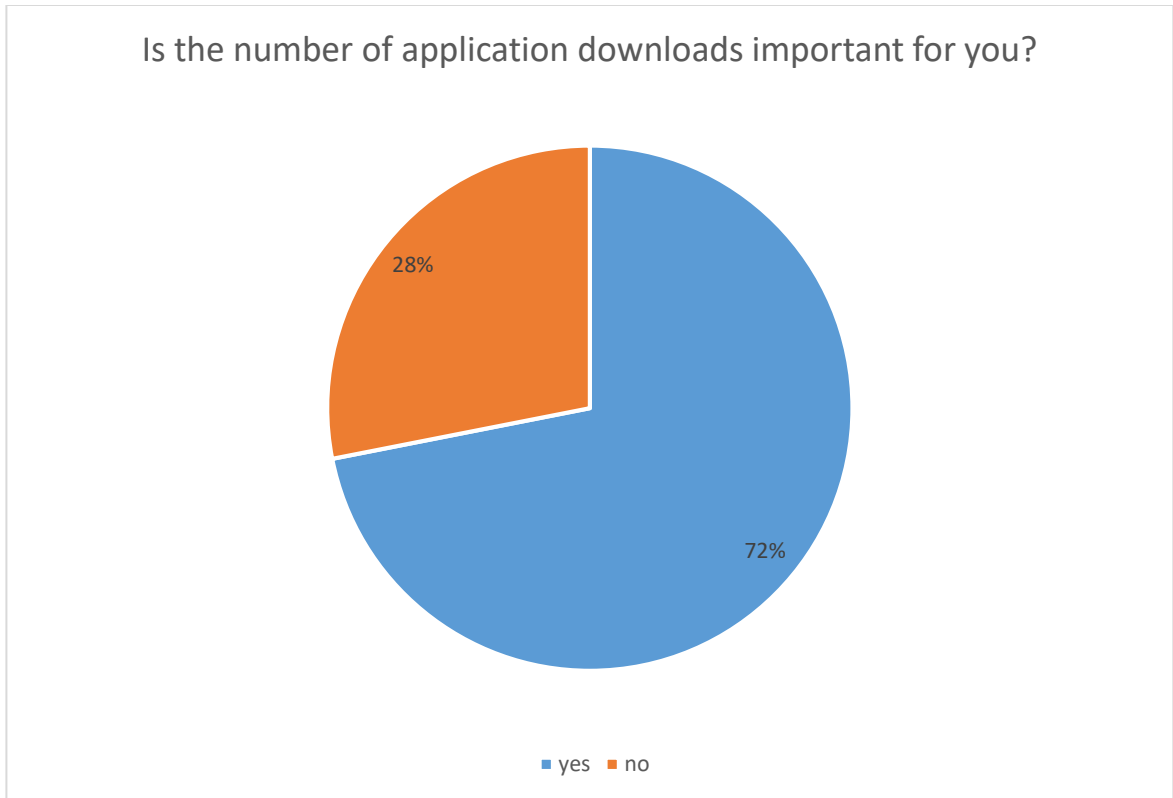
Graph 9. Is the number of application downloads important for you?

72% of participants stated that they pay attention to the number of downloads before installing the application.

Importance of application feedback

The importance of feedback on the application in social media and application stores for users is demonstrated in Graph 10.
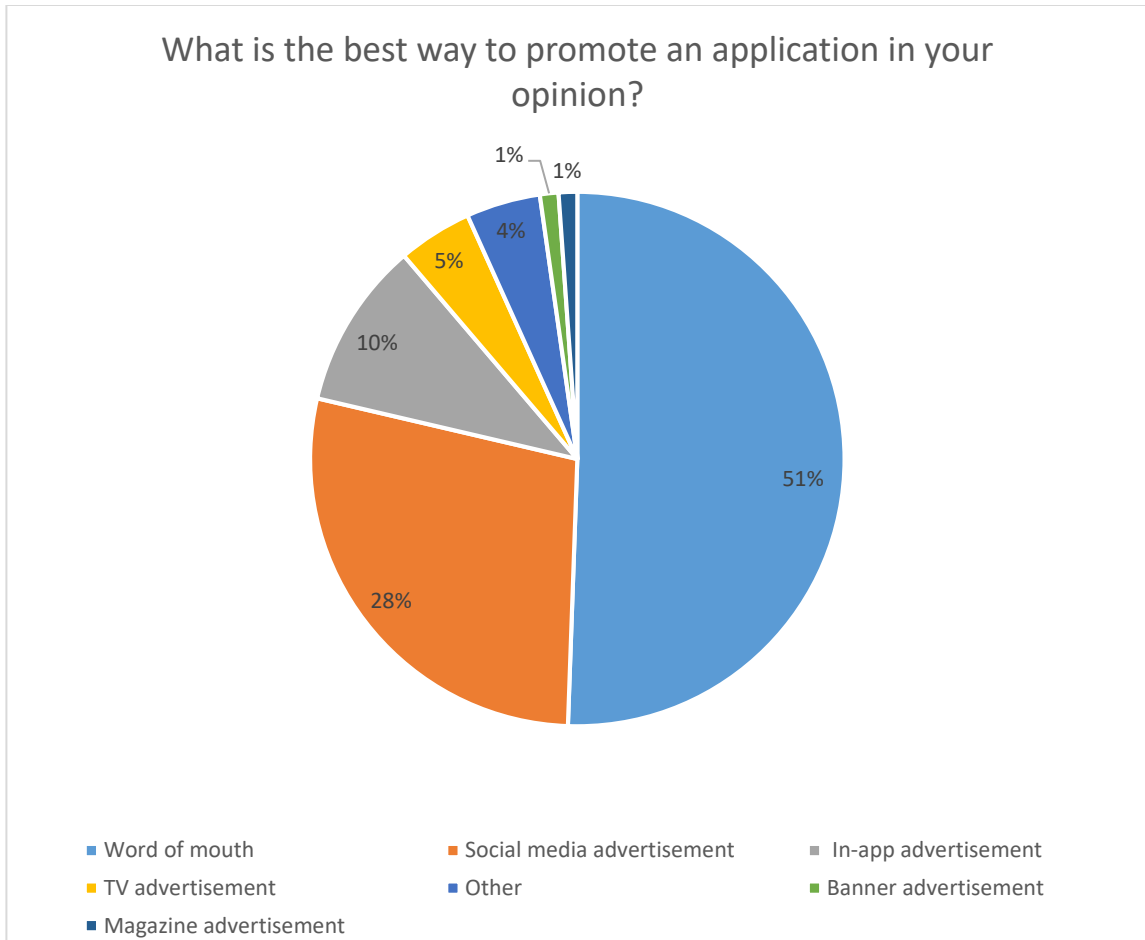

Graph 10. Is the feedback given by other users on the application important for you?

For 82% of the respondents the application feedback is important.

The best way to promote the application

The respondents were asked to choose the most effective channel of promotion for an application in their opinion. Graph 11displays the findings.


Graph 11. What is the best way to promote the application in your opinion?

51% of the participants chose word of mouth. The second popular choice, supported by 28% of the respondents was social media advertisement. 10% voted for in-app advertisement.

Application synchronization with local social media

The respondents' opinion about the importance of mobile application synchronization with Chinese social media is presented in Graph 12.
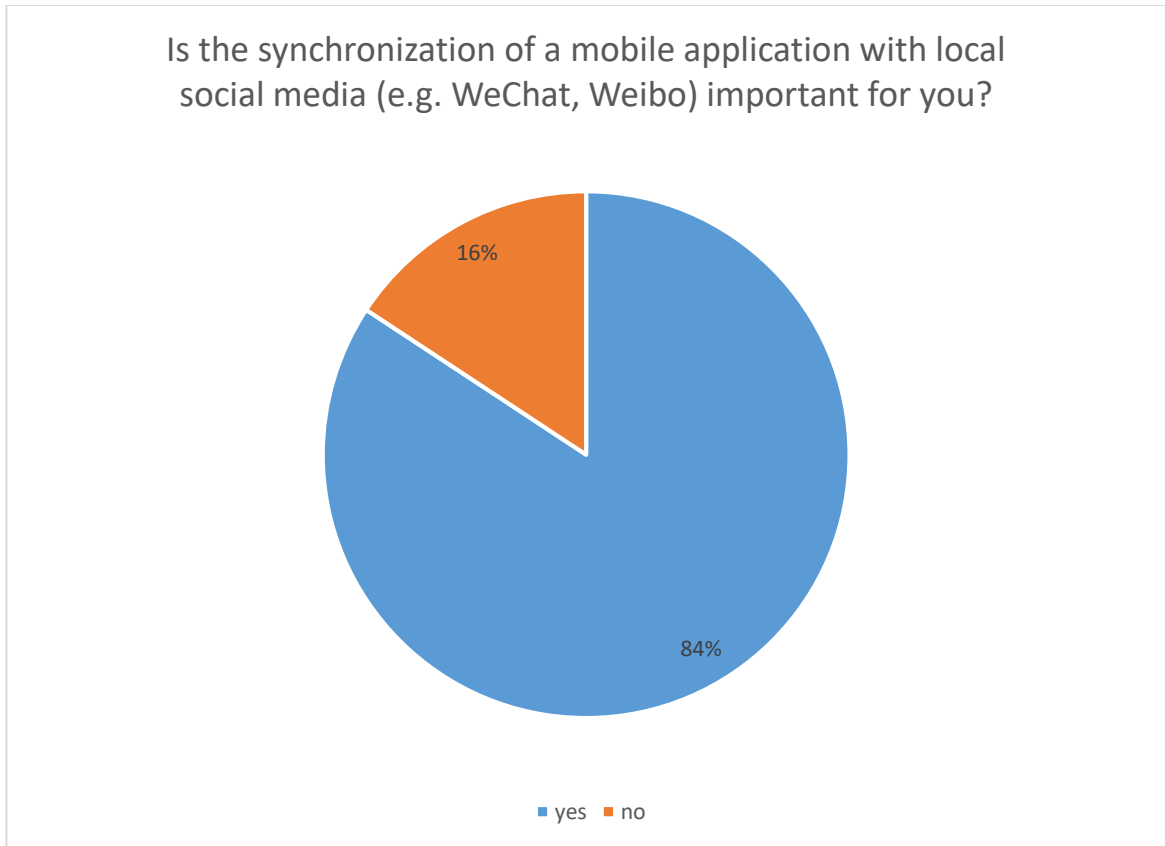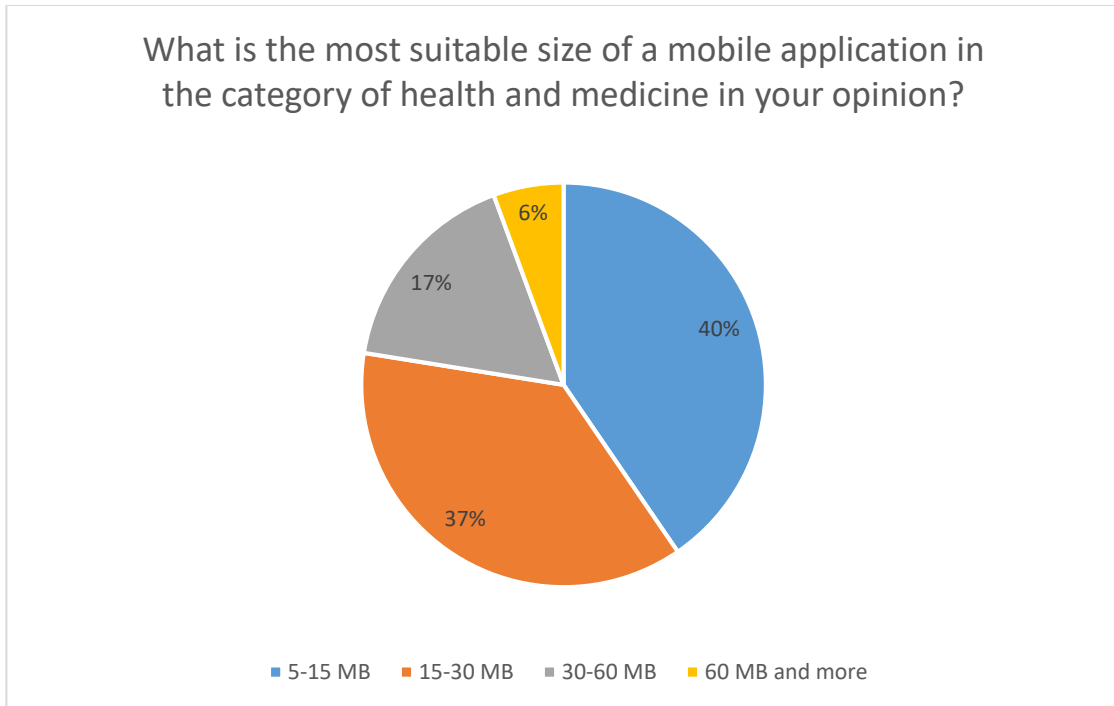

Graph 12. Is the synchronization of a mobile application with local social media (e.g. WeChat, Weibo) important for you?

Only 16% of the respondents think that synchronization is not necessary.

Mobile application size

The most suitable size of a mobile health application was the main topic of the last question in the survey. The results are shown in Graph 13.

Graph 13. What is the most suitable size of a mobile application in the category of health and medicine in your opinion?

As the graph displays, the variants of 5-15 MB and 15-30 MB got the support of 40% and 37% respectively.

6.2   Analysis of the results

All aspects considered, it is possible to affirm that the survey results support the theoretical considerations in most of the cases. The largest part of the respondents stated that mobile application synchronization with local social networks is very important. Furthermore, the application stores that the participants chose as their favorites have almost the same sequence as mentioned in literature (Figure 4). However, Xiaomi Game Center was not mentioned by the respondents and Xiaomi Appstore was selected as the favorite application store only by 2% of users, while both application stores have an about 12% popularity rating among users according to newzoo.com (2017). These results can be explained by the small size of the sample group or by the change of the situation on the Chinese mobile application markets during 2017.

Another key point noticed in the survey results is the language abilities of the respondents. 87% of the survey participants mentioned about their knowledge of the English language. However, 88% of the respondents stated in the questionnaire that the support of their native language in the application is important. This fact proves the information about the love and respect of Chinese people to their mother tongue.

According to the results from the questionnaire the use of disease diagnosis applications lost popularity over the years among the respondents: in the rating of applications that the participants are experienced to use, disease diagnosis applications have the rate of 13% and in the rating of applications that the same participants are using these days the rate is just 5%. A hearing aid application got the rate of 2% in the question about the mobile health applications the respondents have ever used. In the question about the applications used by the respondents currently, the hearing aid application was chosen by the same amount of people. This fact tells that the applications for people with hearing disorders have the chance to find their user in China these days.

Likewise, it is important to notice that most of the respondents are representatives of the 16-25 age group and the health condition of this group is often significantly

different from the other age groups. This fact can explain why fitness and healthy eating applications are the most popular category of mobile health applications among the respondents in this research. However, 2 respondents out of 89 mentioned that they use hearing aid applications. It is possible to make a conclusion that there is a demand for a hearing aid application even in this small sample group of young people.

Word of mouth was chosen by the respondents as the main channel for mobile application promotion in China. These results indicate that users of mobile applications in China prefer to trust the opinions of people they know rather than advertisements on TV and social media. Another interesting fact is that 82% of the survey participants stated that the feedback from other users on the application in social media and application stores is an important criterion for them before the application installation. At the same time, only 72% of the respondents chose the number of other users' application downloads as a meaningful indicator. The fact mentioned above demonstrates that Chinese users trust the opinion of other customers more than the statistics published on the application stores.

Considering the price of a health mobile application, it is obvious that users prefer to download software products for free. However, the survey reveals that 25% of the respondents are ready to pay for a health mobile application and 6% of the participants are ready to pay even 10$ or more for an application from the category of medical software.

The findings about the technical aspects of the applications can likewise be significantly useful. The research indicated that only 49% of the participants use the latest Android operating system and 14% of the participants use an operating system older than the 5.0 version. It is possible to make a conclusion that a mobile application should support earlier versions of the operating system to enter the market of China successfully. Furthermore, the mobile memory can play a big role in the process of the application choice by the user. Only 22% of the questionnaire respondents agree to download an application from the category of mobile health with a size of more than 30 megabytes.

7 Discussion and conclusions

The study shows that entering the Chinese mobile health application market is a very challenging task for western developers. However, millions of prospective users can bring a good profit to a company in the case of successful market penetration in China.

The objective of the thesis was to identify which factors in the distribution and localization process of a mobile health application a small western company should focus on when entering the Chinese market. Therefore, the main research question was stated as follows:

• "Which factors in the distribution and localization process of a mobile health application should a small western company focus on when entering the Chinese market?"

Additionally, three sub-questions were set by the author with the aim to make the topic of the study clearer:

1.   "What distribution channels to use when entering the Chinese market with health mobile applications?"

2.   "What is specifically involved in mobile application localization in the Chinese market?"

3.   "What main risks and legal issues can appear in the process of entering the Chinese mobile health application market?

Based on the literature review, the most popular distribution channel for Android mobile applications in China is local application stores. However, it was likewise stated that pre-installation of applications is the most efficient channel of distribution. Nevertheless, the aim of the study was to find solutions for small business organizations and the application pre-installation is a very costly way to distribute the software product. The best solution for the UNI-HAID organization is to distribute their mobile application through one of the most popular application stores. The

research results show that the most popular application stores among users are Myapp (Tencent), Baidu Mobile, Oppo Appstore and 360 Mobile Assistant.

It was stated in the literature review that health insurers became the best and most popular distribution channel for mobile health applications in 2017. However, this information was generated by ResearchtoGuidance group after an analysis of the global health mobile application market. Data about health mobile application distribution through health insurers in China was not found. Therefore, future research on the health insurers as a mobile health application distribution channel in China is advised.

Another useful result from the research is the identification of the best promotion channel for the mobile application. According to the opinion of Chinese Android device users in the survey, the most effective way to promote a mobile application is word of mouth, and social media was chosen as the second most effective promotion channel. Nevertheless, word of mouth is an unpaid form of promotion that can exist in the frame of the social networks. According to this data, startup developers are advised to promote their application in China through popular Chinese social networks.

The mobile application localization process in China has many specific aspects. The research shows that detailed translation of the application into the Chinese language is significantly important. Although the major part of the research sample group are able to speak English, the study shows that content translation of a mobile application is essential for Chinese users. The advice to a startup company entering the Chinese application market is to avoid using machine translators such as Google Translate. Hiring a professional translator for content localization would be the best solution for the UNI-HAID organization when penetrating a new market. Additionally, the layout of the text in the application should be designed before the translation due to the different character sizes in different countries. Colors and the overall design of a mobile application can play a serious role in the process of choice by users.

The payment method is another important aspect of application localization in China. It was found out that 469 million users in China use smartphones for online payments. The most popular platform for online payments in the country is WeChat. Therefore, a company entering the Chinese market would be advised to adapt their purchasing services to suit the local systems.

The Chinese internet control system is a cause of considerable risks for the western developers entering the market of mobile applications in China. The application should be located on the local servers to reduce the number of connection problems for the application users. Based on the fact that most western social networks and other online resources are banned in China, mobile application providers entering the Chinese market are advised to make sure that all the additional online services connected to their software product work properly in the country.

Laws and regulations in the field of health mobile applications is a significantly important aspect. Privacy security and strong censorship are two basic directions in the policy of the Chinese authorities regarding the mobile application industry. Mobile application providers are strongly advised to monitor the content of their product on a regular basis in order to avoid legal risks and not to break the laws in the country. Furthermore, UNI-HAID should consider the waiting time before local authorities in China will approve the software product to be launched. The minimum period of time for the application consideration in China is 30 days.

Moreover, mobile health application providers in China are required to have the appropriate qualifications and licenses to ensure that they have a permission to provide the service according to the law.

In conclusion, the writer would like to declare that the objective of the thesis was achieved and the research questions were answered. The author acquired valuable knowledge about the mobile health application industry and Chinese mobile application market. Moreover, research and data collection skills were gained by the author during the process of thesis writing. As a result of the study, the most efficient distribution channel for a mobile health application in the Chinese market was

distinguished, the specific aspects of mobile application localization in China were described and main risks of entering the Chinese mobile health application market were identified. Recommendations to the client company were given according to the study results.

Graphs

Figures

References

Adibi, S. 2015. Mobile Health: A Technology Road Map. Springer.

Aliaga, M. and Gunderson, B. 2000. Interactive statistics. Upper Saddle River, N.J.: Prentice Hall.

Beyond the Great [App] Wall of China [Guide]. 2017. AppsFlyer. https://www.appsflyer.com/resources/beyond-great-app-wall-china-guide. Accessed on 16 November 2017.

Bock, O. 2017a. Beginner's Guide To App Localization For The Chinese Market. PhraseApp Blog. https://phraseapp.com/blog/posts/beginners-guide-app-localization-chinese-market. Accessed on 17 December 2017.

Bock, O. 2017b. Why Mobile App Localization is Needed (And How to Do It). PhraseApp Blog. https://phraseapp.com/blog/posts/mobile-app-localization-why-and-how/ Accessed on 19 December 2017.

Broderick, G. and Abdolrasulnia, M. 2009. Men's Sexual Health: Evaluating the Effectiveness of Print- and PDA-based CME. The Journal of Sexual Medicine, 6(9), pp.2417-2424.

Burdette, S., Herchline, T. and Oehler, R. 2008. Surfing The Web: Practicing Medicine in a Technological Age: Using Smartphones in Clinical Practice. Clinical Infectious Diseases, 47(1), pp.117-122. https://www.ncbi.nlm.nih.gov/pubmed/18491969. Accessed on 8 November 2017.

Caster, C. 2012. Will Regulation Kill China's App Market or Save It? Techinasia.com. https://www.techinasia.com/regulation-kill-chinas-app-market-save. Accessed on 23 November 2017.

Charochkina, V. 2017. Почему выходить на китайский рынок приложений адски сложно, но нужно (Why is it difficult to enter the Chinese market of mobile applications, but you need to do it). secretmag.ru. https://secretmag.ru/trends/tendencies/pochemu-vykhodit-na-kitaiskii-rynok-prilozhenii-adski-slozhno-no-nuzhno.htm. Accessed on 16 November 2017.

Chen, Y., Yin, Z. and Xie, Q. 2014. Suggestions to ameliorate the inequity in urban/rural allocation of healthcare resources in China. International Journal for Equity in Health, 13(1), p.34.

Day Translations Blog 2015. Translation and Localization: What's the Difference Between the Two? https://www.daytranslations.com/blog/2015/10/translation-and-localization-whats-the-difference-between-the-two-6906. Accessed on 17 December 2017.

Dolan, B. 2011. Apple helps MDs cut thru medical apps clutter. MobiHealthNews. http://www.mobihealthnews.com/13254/apple-helps-mds-cut-thru-medical-apps-clutter. Accessed on 1 December 2017.

Economist 2017. How does China censor the internet? https://www.economist.com/blogs/economist-explains/2013/04/economist-explains-how-china-censors-internet. Accessed on 9 November 2017.

Eknoyan, G. 2007. Adolphe Quetelet (1796 1874) the average man and indices of obesity. Nephrology Dialysis Transplantation, 23(1), pp.47-51.

Faugier, J. and Sargeant, M. 1997. Sampling hard to reach populations. Journal of Advanced Nursing, 26(4), pp.790-797.

Fowler, F. 2009. Survey research methods. Thousand Oaks: Sage.

Gorchels, L., Marien, E. and West, C. 2004. The managers guide to distribution channels. New York: McGraw-Hill.

Hearing aid application 2017. Our story - Hearing aid application. http://www.hearingaidapp.org/our-story. Accessed on 8 January 2018.

Hedley, M. n.d. Chinese Market Entry. B2B International. https://www.b2binternational.com/publications/china-market-entry. Acessed on 16 October 2017.

Hsu, J., Liu, D., Yu, Y., Zhao, H., Chen, Z., Li, J. and Chen, W. 2016. The Top Chinese Mobile Health Apps: A Systematic Investigation. Journal of Medical Internet Research, 18(8), p.e222.

Investopedia n.d. Distribution Channel.   https://www.investopedia.com/terms/d/distribution-channel.asp. Accessed on 15 November 2017.

Istepanian, R., Jovanov, E. and Zhang, Y. 2004. Guest Editorial Introduction to the Special Section on M-Health: Beyond Seamless Mobility and Global Wireless Health-Care Connectivity. IEEE Transactions on Information Technology in Biomedicine, 8(4), pp.405-414.

Istepanian, R., Laxminarayan, S. and Pattichis, C. 2006. M-health. New York: Springer.

Kaja, A. and Carlson, E. 2016. China Issues New Rules for Mobile Apps. Inside Privacy. https://www.insideprivacy.com/international/china/china-issues-new-rules-for-mobile-apps. Accessed on 28 November 2017.

Kan, M. 2014. China aims to rein in mobile messaging apps with new regulations. PCWorld.   https://www.pcworld.com/article/2462720/china-aims-to-rein-in-mobile-messaging-apps-with-new-regulations.html. Accessed on 26 November 2017.

Kuznetsov, P.P, Chebotarev, K.U. and Uzdenov, B.I. 2014. Медицина и виртуальная реальность XXI века: создание синтетических сред, тренды, инновации (Medicine and virtual reality of the XXI century: the creation of synthetic media, trends, innovations). Врач и информационные технологии (Doctor and Information Technology). №3. p. 72-80.

Kwm 2016. China's M.I.I.T. Proposes Broad Regulatory Oversight over Pre-Installed Mobile Phone/Device Applications.

http://www.kwm.com/en/cn/knowledge/insights/chinas-m-i-i-t-to-expand-oversight-over-mobile-phone-apps-20160108. Accessed on 26 November 2017.

Lewis, T. 2013. Apple launches dedicated 'Apps for Healthcare Professionals' collection. iMedicalApps. https://www.imedicalapps.com/2013/02/apple-apps-healthcare-professionals-collection. Accessed on 26 November 2017.

Li, H., Zhang, T., Chi, H., Chen, Y., Li, Y. and Wang, J. 2014. Mobile health in China: Current status and future development. Asian Journal of Psychiatry, 10, pp.101-104.

Medwetsky, L. 2015. Mobile Device Apps for People with Hearing Loss. Expanding the Horizons of Hearing Access. Hearing Loss Magazine. http://hearingloss.org/sites/default/files/docs/HLM_NovDec2015_Medwetsky.pdf. Accessed on 1 December 2017.

Mitra, A. 2017. Lucky Colors in China. ChinaHighlights. https://www.chinahighlights.com/travelguide/culture/lucky-numbers-and-colors-in-chinese-culture.htm. Accessed on 19 December 2017.

Mosa, A., Yoo, I. and Sheets, L. 2012. A Systematic Review of Healthcare Applications for Smartphones. BMC Medical Informatics and Decision Making, 12(1).

Murfin, M. 2013. Know Your Apps: An Evidence-Based Approach to Evaluation of Mobile Clinical Applications. The Journal of Physician Assistant Education, 24(3), pp.38-40.

Newmark, P. 1988. A textbook of translation. Hertfordshire: Prentice HaH International vUIO Ltd., p.5.

Newzoo 2017. Top Chinese Android App Stores. https://newzoo.com/insights/rankings/top-10-android-app-stores-china. Accessed on 19 November 2017.

OpenJaw Technologies 2018. The Rise of QR Code in China and its Effect on the Travel Industry. http://www.openjawtech.com/qr-code-travel-industry. Accessed on 28 December 2017.

Payne, K., Wharrad, H. and Watts, K. 2012. Smartphone and medical related App use among medical students and junior doctors in the United Kingdom (UK): a regional survey. BMC Medical Informatics and Decision Making, 12(1).

Perez, S. 2010. 10 Distribution Channels for Mobile Applications - ReadWrite. ReadWrite. https://readwrite.com/2010/11/17/10-distribution-channels-for-mobile-apps. Accessed on 12 December 2017.

Research2guidance.com. 2016. mHealth App Developer Economics 2016: The current status and trends of the mHealth app market. https://research2guidance.com/r2g/r2g-mHealth-App-Developer-Economics-2016.pdf. Accessed on 8 November 2017.

Research2guidance.com 2017 mHealth App Economics 2017 Current Status and Future Trends in Mobile Health. https://research2guidance.com/wp-content/uploads/2017/11/R2G-mHealth-Developer-Economics-2017-Status-And-Trends.pdf. Accessed on 5 November 2017.

Sarasohn-Kahn, J. 2010. How Smartphones Are Changing Health Care for Consumers and Providers. Oakland, CA: California HealthCare Foundation. http://www.chcf.org/~/media/MEDIA%20LIBRARY%20Files/PDF/PDF%20H/PDF%20HowSmartphonesChangingHealthCare.pdf. Accessed on 9 November 2017.

Seufert, E.B. 2015. Is China attractive to Western mobile developers? Mobile Dev Memo. https://mobiledevmemo.com/china-attractive-western-developers. Accessed on 16 October 2017.

Sferrazza, F. 2017. Mobile medical healthcare trends in China, part 2: How mobile health care can help. TechNode. https://technode.com/2017/02/04/mobile-medical-healthcare-trends-in-china-part-2-how-mobile-health-care-can-help. Accessed 21 November 2017.

Statista 2014. Potential health cost savings through mHealth. Survey. https://www.statista.com/statistics/449430/potential-mhealth-cost-savings-in-health-care. Accessed on 5 November 2017.

Sun, J., Guo, Y., Wang, X. and Zeng, Q. 2016. mHealth For Aging China: Opportunities and Challenges. Aging and Disease, 7(1), p.53.

Tarasenko E.A. 2014. Развитие технологических инноваций в области mHealth: возможности для врачей для профилактики заболеваний, диагностики и консультирования пациентов (Development of technological innovations in the field of mHealth: opportunities for the doctors to prevent diseases, provide diagnoses and counsel the patients). http://cyberleninka.ru/article/n/razvitie-tehnologicheskih-innovatsiy-v-oblasti-mhealth-vozmozhnosti-dlya-vrachey-dlya-profilaktiki-zabolevaniy-diagnostiki-i. Accessed on 5 November 2017.

WINFOX 2015. Правила локализации приложений в Китае: деньги, связи и App Store (Rules for applications localization in China: money, connections and the App Store). http://wnfx.ru/pravila-lokalizatsii-prilozheniy-v-kitae. Accessed on 14 December 2017.

World Health Organization 2011. MHealth. Geneva: World Health Organization, p.6. http://www.who.int/goe/publications/goe_mhealth_web.pdf. Accessed on 17 October 2017.

Zheng, Y., Ding, X., Poon, C., Lo, B., Zhang, H., Zhou, X., Yang, G., Zhao, N. and Zhang, Y. 2014. Unobtrusive Sensing and Wearable Devices for Health Informatics. IEEE Transactions on Biomedical Engineering, 61(5), pp.1538-1554.

Appendices

Appendix 1. Questions for the survey in English.

1) What is your age?
   ☐ Below 16
   ☐ 16-25
   ☐ 25-35
   ☐ 35-45
   ☐ 45-60
   ☐ Above 60
2) What is your sex?
   ☐ Male
   ☐ Female
3) What is your city?
4) What foreign languages do you know?
5) Which app store do you use more often?
   ☐ Myapp (Tencent)　　　　　腾讯应用宝
   ☐ 360 Mobile Assistant　　　360 手机助手
   ☐ Xiaomi App Store　　　　　小米应用商店
   ☐ Xiaomi Game Center　小米游戏中心
   ☐ Baidu Mobile Assistant百度手机助手
   ☐ Huawei App Market　　华为应用市场
   ☐ Oppo App Store　　　　OPPO 软件商店
   ☐ Sogou Mobile Assistant　　　搜狗手机助手
   ☐ Vivo App Store　　　　VIVO 应用商店
6) How much are you ready to pay for an application in the category of health and medicine?
   ☐ Free
   ☐ 1-2
   ☐ 3-5.99
   ☐ 6-10
   ☐ 10$ and more
7) Which type of health application you are experienced in using?
   ☐ Disease Diagnosis Applications
   ☐ Drug Reference Applications
   ☐ Medical Calculator Applications
   ☐ Fitness and healthy eating Applications
   ☐ Hearing aid Application
   ☐ Other

8) Which type of health applications are you using now?
- ☐ Disease Diagnosis Applications
- ☐ Drug Reference Applications
- ☐ Medical Calculator Applications
- ☐ Fitness and healthy eating Applications
- ☐ Hearing aid Application
- ☐ Other

9) Which version of the Android OS do you use?
- ☐ Android 5.0
- ☐ Android 6.0
- ☐ Android 7.0
- ☐ Earlier versions of Android

10) Is it important to you that the application supports your native language?
- ☐ Yes
- ☐ No

11) Is the number of application downloads important for you?
- ☐ Yes
- ☐ No

12) Is the feedback given by other users on the application important for you?
- ☐ Yes
- ☐ No

13) What is the best way to promote an application in your opinion?
- ☐ In-App advertisement
- ☐ Social media advertisement
- ☐ TV advertisement
- ☐ Banner advertisement
- ☐ Magazine advertisement
- ☐ Word of mouth
- ☐ Other

14) Is the synchronization of mobile application with local social media (e.g. WeChat, Weibo) important for you?
- ☐ Yes
- ☐ No

15) What is the most suitable size of a mobile application in the category of health and medicine in your opinion?
- ☐ 5-15 Mb
- ☐ 15-30 Mb
- ☐ 30-60 Mb
- ☐ 60 Mb and more

Appendix 2. Questions for the survey in Chinese.

1) 您的年齡:
   - □ 低於 16 歲
   - □ 16-25 歲
   - □ 25-35 歲
   - □ 35-45 歲
   - □ 45-60 歲
   - □ 60 歲以上

2) 性別:
   - □ 女
   - □ 男

3) 您所位於的城市:

4) 您知道那些外國語言:

5) 您最常使用以下那些應用程式?
   - □ Myapp (Tencent)　　　腾讯应用宝
   - □ 360 Mobile Assistant　　360 手机助手
   - □ Xiaomi App Store　　小米应用商店
   - □ Xiaomi Game Center　小米游戏中心
   - □ Baidu Mobile Assistant　百度手机助手
   - □ Huawei App Market　华为应用市场
   - □ Oppo App Store　　OPPO 软件商店
   - □ Sogou Mobile Assistant　搜狗手机助手
   - □ Vivo App Store　　　VIVO 应用商店

6) 您準備花多少錢在醫療保健與醫藥相關的應用程式上:
   免費
   - □ 1-2
   - □ 3-5.99
   - □ 6-10
   - □ 10$ 或更多

7) 您曾使用過哪些醫療保健應用程式:
   - □ 醫療診斷程式
   - □ 藥物參考程式
   - □ 醫療計算器
   - □ 健身/健康飲食程式
   - □ 助聽器程式
   - □ 其他

8) 哪種應用程式您較常使用:
   - ☐ 疾病診斷程式
   - ☐ 藥物控制程式
   - ☐ 醫療計算器
   - ☐ 健身/健康飲食程式
   - ☐ 助聽器程式
   - ☐ 其他

9) 您使用的是哪個版本的 Android 系統:
   - ☐ Android 5.0
   - ☐ Android 6.0
   - ☐ Android 7.0
   - ☐ 更早版本的 Android

10) 您認為應用程式的語言應該為您的母語嗎?
   - ☐ 是
   - ☐ 否

11) 您會在意下載次數的多寡嗎?
   - ☐ 會
   - ☐ 不會

12) 其他使用者的回覆對您來說是否重要?
   - ☐ 是
   - ☐ 否

13) 您認為推廣應用程式最好的方法是什麼:
   - ☐ 應用程式廣告
   - ☐ 社交媒體廣告
   - ☐ 電視廣告
   - ☐ 旗幟廣告
   - ☐ 報章雜誌廣告
   - ☐ 口碑
   - ☐ 其他

14) 您認為應用程式與本地通訊軟體(WeChat, 微博) 同步重要嗎?
   - ☐ 重要
   - ☐ 不重要

15) 您認為醫療與醫藥程式該佔手機多少記憶體?
   - ☐ 5-15 Mb
   - ☐ 15-30 Mb
   - ☐ 30-60 Mb
   - ☐ 60 Mb 或更多