MASTER

Multichannel customer management strategy for digital services in European healthcare

Gieros, O.K.

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O. K. Gieros

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Student identity nr. 0786765

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Supervisors:

dr.ing. J.P.M. Wouters, TU/e, ITEM
dr.ir. I.M.M.J. Reymen, TU/e, ITEM
MSc Anthonie Bol, Genzyme
TUE. School of Industrial Engineering.
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Abstract
The scope of this research is focused on digital services, such as websites and applications, dedicated to patients affected by Multiple Sclerosis (MS) and their Health Care Professionals (HCPs) in the five main European countries: Germany, UK, France, Italy and Spain. This paper will result in recommendations and tips for pharmaceutical industry on how to improve understanding of their target audience behavior and as a result improve the adoption rate of digital services which are provided to them. In particular way, the importance of multichannel customer management strategy introduction and the aspects that need to be taken into account during this process will be explored.

In order to do so, the research method based on real observations and not behavioral intentions of users will be a core of this research. This alternative research method needs to be used in order to be compliant with European restrictions, which does not allow pharmaceutical companies to directly contact with potential patients or their health care professionals. Thus, the dataset of real observations will be analyzed in order to derived insights regarding the correlations between actual usage of digital solutions and factors such as (1) multichannel approach (2) ease of use and (3) brand perception. Furthermore, the moderating effect of channel type, target audience and purpose of using the service will be explored.

The results of this paper can be used to help Genzyme N.V. as well as other pharmaceutical companies to make the choices when designing their multichannel strategy of digital services by understanding better digital behavior and preferences of their target audience. Moreover, the applicability of using approximations of variables to test the conceptual models will be explored in the context of technology adoption and multichannel theories.
Executive summary

In order to shape a proper multichannel strategy, deep understanding of customers behaviors, expectations and interaction preferences across different channels is crucial (Stone, Hobbs, & Khaleeli, 2002). The goal of this research is to develop guideline, for Genzyme and rest of pharmaceutical industry, on how to improve the adoption rate of digital services provided to MS patients and their physicians. The guideline will explain steps needed to improve

Methodology

In the beginning of the research an elaborate literature review has been conducted into three different domains:

- Technology adoption theories
- Health believe theories and trust in service provider
- Multichannel customer management

The most influential articles for this research are: Venkatesh et al. (2003), Neslin et al, (2006) and Kim & Park (2012). Based on mostly appearing factors, digital services adoption model for pharmaceutical industry has been developed. This type of model has been chosen because next to multichannel impact, brand perception and ease of use, it takes into account moderation effects which is crucial for deeper understanding of target audience adoption behaviors. These moderators can be channel type, audience & purpose of digital services.

To be able to test the proposed model, an analysis has been made based on the current market research data. All digital services provided to MS patients and their physicians in Europe have been identified and used to validate model based on specification and usage rate of those solutions. The research, done by using the SmartPLS statistical software, describes when, how and by whom the proposed model should be used in practice and how it affect actual usage.

Results

First of all, the proposed digital services adoption model has proven to outperform the policy that is currently used at Genzyme. As can be seen from the graph above, the model has been run under various moderation. The results shown significant impact of multichannel impact and brand perception on actual usage.
In order to use the proposed model in practice, below decision model has been developed, which is guiding pharmaceutical companies to make the most effective decision for their multichannel strategy, as presented by figure below.

The decision model shows how the developed tool can be used in practice, once an opportunity arises. Thanks to that, the effort that Genzyme would put in implement their multichannel strategy, brings the highest results.
Based on this research, several following key highlights Genzyme should keep in mind have been derived:

- The complementary channels coverage such as social media channels, positively influence the digital solution success.
- When it is possible you should co-brand services with patient association or non-pharma related company instead of branding alone.
- The references to external sources and experts opinions might reduce negative effect on brand perception on actual usage of service. (e.g. professional may be even branded).

**Conclusion**

This research has extended the current literature of technology adoption: (1) by using different types of research methods test the model; (2) by combining it with health care context and (3) by incorporating into multichannel customer management strategy.

Further research could extend the developed model, by including parallel qualitative research and extending range of target audience.

Another contribution of this research is, that it uses approximations of tested variables and measure users behavior based on historical data without interacting with target audience which created new possibilities and provide with both theoretical and practical values.
Preface

This thesis is dedicated to my family and friends that always supported me and kept me motivated. In particular way I would like to thank my parents which give me the opportunities to study in Eindhoven and for their continuous emphasis on working hard and finishing my studies. Without their support this would not be possible. Many thanks to my friends, that were always my backrest in the difficult moments. In particular way to Paolo, for being there for me and helping with every day struggles, Natalia and Anna for being always there to listen and direct my focus correctly.

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1 Introduction

The challenge of today’s business is not just to sell a product or service, it is to create a long term relationship with customer which is based on trust and mutual benefits (Payne & Frow, 2004). In order to achieve it the close relationship and understanding of target audience diverse needs have to be taken into account. According to Neslin et al., this can be done by introducing the multichannel customer management strategy which may result in improvement in meeting customer values (Neslin, et al., 2006). Neslin et al., defined multichannel customer management as “the design, deployment, coordination, and evaluation of channels through which firms and customers interact, with the goal of enhancing customer value through effective customer acquisition, retention, and development” (Neslin, et al., 2006). However, in order to introduce multichannel strategy properly and gain desired outcomes, the proper preparation needs to take place. First of all, the knowledge of target audience behaviors towards the final product and their preferences needs to be well explored (Verhoef, Venkatesan, McAllister, Malthouse, Krafft, & Ganesan, 2010). That is even more important in case of new to the market products or services where target audience behavior is not well explored yet (Bohlin, Brennan, Kaltenbach, & Thomas, 2014).

There are many theories and papers written to help to understand behavior towards using or buying new services. Some of them focus on technology adoption (Davis F. D., 1989), others on brand perception (Belanger & Carter, 2008) or demographic differences (Venkantesh & Davis, 2000). In fact, the willingness to use certain service is a complex decision making process that is based on many factors (Sharma & Mehrrotra, 2007). Because it strongly depends on context and service type, there is number research papers which goal is to check the applicability of different theories taking into account various contexts (Al-Gahtani, 2001). The focus of this study is on digital services adoption in the niche pharmaceutical and healthcare market and in particular way on Multiple Sclerosis patients and their healthcare professionals (HCPs) digital adoption behavior.

Multiple sclerosis (MS), is a “chronic disease that affects each person differently, with symptoms ranging from numbness in the limbs or forgetfulness to paralysis or loss of vision. MS is caused when the body’s immune system attacks the central nervous system, damaging the myelin sheath – the protective layer covering the nerves that carry signals between the brain and spinal cord and the rest of the body” (Genzyme.com). Genzyme N.V and five other pharmaceutical companies, provide the treatments available to European patients affected by this disease. Currently there is no cure but there are treatments that greatly improve patients quality of life and reduce the speed of disease progression.

Genzyme, which is “one of the world’s leading biotechnology companies, has set itself the goal to influence the lives of people suffering from a serious illness at major positive. Since 1981, Genzyme has grown from a small start-up to a diversified enterprise with approximately 10,000 employees in locations around the world and right now Genzyme is part of the Sanofi Group” (Genzyme.com).

Genzyme N.V. EMEA headquarter is in the process of building a comprehensive multi-channel strategy across Europe. With multiple product launches in the last two years and new ones in the pipeline, it is of the utmost importance that Genzyme makes the right decisions to put their efforts and resources in (Internal source).
In order to be able to shape a proper multichannel strategy, first of all, the company needs to understand their customer behavior and define the expectations and interaction preferences that their target audience has across different channels (Stone, Hobbs, & Khaleeli, 2002). Analyzing the behavior and understanding the proper way to meet target audience needs are the first steps to build multichannel strategy which could increase customer satisfaction (Neslin & Shankar, 2009).

This paper expands the knowledge in the field regarding MS patients and their HCPs behavior towards using websites and applications dedicated to them by pharmaceutical concerns. Taking into account that pharmaceutical industry is not allowed to directly contact patients or HCPs, thus a non-standard research method needs to be used for collecting the data. This research is based on current market situation of digital solutions in order to allow understanding of existing trends in this area and to be able to derive relevant conclusions.

The primary goal of this research is to understand how different factors such as brand perception, ease of use and multichannel approach determinate the ‘success’ in the area of digital solutions under different circumstances. Secondly, the relevance of alternative method to evaluate technology acceptance models by using approximations will be explored in pharmaceutical context. It is expected to provide a recommendation to pharmaceutical companies on which features they should put most attention on when introducing digital services to patients and HCPs in order to overcome possible adoption barriers and which methods should be used to achieve that.

In this chapter, the description of the research context will be provided. First of all, the importance of providing digital solutions, such as websites and mobile applications, by pharmaceutical companies will be described and therefore the importance of research in this area will be emphasized. Secondly the goal of this research and literature review of important areas will be provided in order to come up with proper methodology which would help to answer the main questions risen by this research.

1.1 Importance of digital services

According to Zeithaml and Bitner “customer service is the service provided in support of a company’s core products” (Zeithaml and Bitner, 2000). That is clearly applicable in case of pharmaceutical industry that should not only sell drugs but should be mainly focused on providing treatments as a whole. Therefore, the relevance of providing additional services to target audience both after product purchase but also before and during decision making process may be identified (Asiegbu Ikechukwu & Igwe Sunny, 2012).

Taking into account different roles that digital services offered to MS patients and their HCPs are playing, they may be divided into following categories: (a) Treatment adherence and education (b) Added value and reputation (c) Awareness and direct-to-patient communication management.

Below, the short description of each of those roles that digital services in pharmaceutical industry are playing and its importance.

a) Treatment adherence and education

According to Chan and others, “the value of a drug, among others, depends on the trade-off between treatment effectiveness and side effects” (Chan, Narasimhan, & Xie, 2014). Following this principle, companies primary goal should be to assure the highest effectiveness and reduce side effects of their products. One way to achieve that is by helping patients to adhere to their therapies.
According to Fisher, patients which are not adhering properly to their therapy are often negatively influencing the results of their treatment (Fisher, 2009). This, in result brings negative consequences both for patients as well as for the company’s image. In order to avoid this phenomenon, the deep understanding of why patients do not adhere to their treatment is needed.

There are different reasons for patients to non-adhere to their treatment. In case of 40% of patients it is due to poor perceived efficacy, for 45% due to side effects and for older people due to complexity associated with being on several parallel therapies (Ilyuk, Irmak, Kramer, & Block, 2014). However, the reason that is mentioned mostly (by 60% of chronically ill patients) is simply “forgetting” (Dunbar-Jacob & Mortimer-Stephens, 2001). Patients skip their medications relatively less in case of strong symptoms of disease whereas more often when there are lack of symptoms or side effects occurring (Dunbar-Jacob & Mortimer-Stephens, 2001) which is the case of Multiple Sclerosis. According to Saini et al. also the doses frequency affect patients adherence to treatment (Saini, Schoenfeld, Kaulback, & Dubinsky, 2009). Their research proved that patients were more compliant with once-daily doses than with multiple doses per day (Saini, Schoenfeld, Kaulback, & Dubinsky, 2009).

Taking into account that patients play a pivotal role in creating perceived treatment satisfaction, it is important to support patients with their daily treatment in order to achieve better treatment outcomes. In order to do that pharmaceutical companies started to use digital services to support their patients via several activities.

1. Make prescribed therapy adherence easier for patients

Therapy can be perceived by patients easier when they are properly and continuously motivated. Therefore, to achieve it, companies provide monitoring and motivational programs dedicated to their patients (Camacho, 2014) which are the main goal of many online services in this field.

2. Help patients correctly follow their therapy

In order to be able to follow proper therapy plan, patient have to be able to effectively plan his financial resources in order to be able to pay for prescribed medicines. Thus, companies provide them with advice and help to finance their therapy as planned (Camacho, 2014). Thanks to mobile applications dedicated to patient, they can learn how to plan their resources effectively and where to get additional help when needed in order to continue with their treatment.

3. Educating patients

The motivation to adhere to the treatment and to the recommendations given by physicians can be achieved by educating patients and helping them to understand the reasons and importance of good treatment adherence (Camacho, 2014).

b) Added value and reputation

Close relationship with patients create an opportunity for companies to improve the effectiveness of their programs by stimulating their patient to adhere to their therapy plan (Bates 2008 in (Camacho, 2014). Moreover, according to Fischer, relationship with patients and their involvement are crucial elements for gaining patients trust (Fischer, 2009). Therefore, digital services help
companies to understand patients’ needs better, to create a trust, which is a crucial element in healthcare industry, and to support treatment adherence by patients. This could lead to customer satisfaction and prevents patients from switching to another treatment available on the market.

Perceived product value and increase patient satisfaction, can be achieved by providing different kind of additional services to patients. According to Kuo and others, “users not only use a certain service but also feel the value added of the service, which elevates the simple use of service to enjoyment” (Kuo, Wu, & Deng, 2009). Therefore, it can become a competitive advantage for companies to differentiate and satisfy different customer needs to create long-term relationship. For the pharmaceutical industry it also means that patients’ quality of life might improve and number of side effects decrease.

   c) Increase awareness about the disease

The EU countries, do not allow by law to advertise for prescription-only medicines (Fischer, 2009). However it is possible to interact with patients in order to create awareness around disease without promoting specific treatment brand (Camacho, 2014). Digital services can be used as a marketing communication tool that increases disease and treatment awareness, which further can lead to earlier disease diagnosis and to treatment initiation. Moreover in order to avoid contacting target audience directly, it is possible to derive several insights regarding users behavior and their preferences based on online behavior of users.

1.2 Problem statement

There are thousands of people suffering from Multiple Sclerosis in main European countries among which almost 260,000 are currently on treatment (Figure 1). Because of this significant number of patients, the pharmaceutical market for MS treatments is also getting more competitive. At the moment there are six pharmaceutical companies which in their portfolio provide treatments for MS. Those are Novartis, Bayer, Genzyme, Merc, Biogen idec and TEVA.
In order to stay competitive, companies offer to patients and their HCPs digital services that can add value to their core product. Thanks to those services pharmaceutical companies are able to control and improve treatment adherence, create awareness about the specific types of treatments as well as motivate patients during the whole treatment cycle (Camacho, 2014). Furthermore it results in better treatment outcomes and therefore higher customer satisfaction connected to this (Camacho, 2014). Moreover digital services are helping to build stronger brand image and patient loyalty which makes treatment more competitive on the market. Nevertheless, in order to create all mentioned above values, the provided services must be used by their target audience, which in case of Genzyme is difficult to assure because of low patients adoption rate of provided solution (Internal source).

Understanding the importance of staying competitive, Digital Excellence Department of Genzyme N.V., which role within EMEA headquarter is to support business units in achieving their strategic goals through digital solutions, tries to reach bigger amount of users for their digital solutions.

Recently many new applications and web based services have been developed by Genzyme (Internal source). However they are not as successful as Genzyme expected, and they reach relatively low amount of users (e.g. low number of downloads of Genzyme application within European countries shown by Figure 10-14 in Appendix1 in comparison with the target audience volume from Figure 1).

Even though, the services provided by Genzyme are at standard quality level compared with other solutions on the market, and even if those services are all developed in accord with target audience needs, the level of their success differs between the solutions provided, which reflect Figures 10-14 in Appendix 1. The Figures, present significant differences in number of patients that adopted different digital solutions provided by Genzyme. None of them have acquired a satisfactory number of users considering the size of the market (Figure 1) and comparing to competitors. Lack of knowledge and explanation on why some of digital services for MS patients and their HCPs are adopted better compared to others, lead to the following problem statement of this research:

**Insufficient knowledge of how end users perceive different aspects of digital solutions provided by MS treatment providers leads to misalignment of what and how is offered by the industry and what is desired of them by their audience.**

In order to increase number of users it is important to provide them with the services that satisfy their needs and understand the factors influencing patient and HCPs intention to use certain types of digital services. The usage of digital services, in this research is meant by the number of visits of online services or downloads per applications. From this paper, it is expected to provide a recommendation to pharmaceutical companies on which factors should be considered in order to create digital services that would maximize perceived added value to their target audience. In order to achieve that, and assure repetitive, high usage of digital services provided to target audience, the
adoption behavior needs to be explored. In order to address the problem statement, the understanding of drivers that influence MS patients and HCPs usage of digital services needs to be explored.

Therefore, in response to this problem following research questions have been created:

(1) *What are the drivers that influence MS patients and HCPs usage of digital services?*

(2) *Is the way of perceiving digital services by MS patients and HCPs based on same factors?*

(3) *What can a pharmaceutical company do to increase the usage of their digital services by MS patients and their HCPs?*

(4) *Which type of service, through which channel, how and to whom should be dedicated in order to maximize usage of digital service provided by Genzyme?*

Because the topic is relatively new and the pharmaceutical context specific there is no literature addressing directly those questions. Therefore in order to gain a proper insight into the research questions, first the wide literature in the area of technology adoption, pharmaceutical industry perception and multichannel approach needed to be reviewed.

Moreover because of the problem with collecting data directly from patients and HCPs, companies struggle with lack of insights into their target audience usage behavior. Thus the alternative technique of data collection and data analysis needs to be performed in order to gain desired insights. Thanks to this research the applicability of using digital approximations for technology adoption model and multichannel analysis will be validated.
2 Literature review

Existing literature propose many different factors in order to explain behavior towards adopting new digital services in healthcare context. However, keeping in mind mistrust to pharmaceutical industry (Fischer, 2009) and context of chronically ill patients and their health care professionals, the factors driving adoption of digital services may differ from those which applicability have been proven in different contexts, including healthcare institutions. Therefore, the research about patients and HCPs perception on services offered by pharmaceutical industry digitally, is still missing in existing literature. In order to explain their behavior, several reviewed in this paper theories need to be taken into consideration.

The literature review, have been performed in the area of adoption theories of online services, incorporating health related behaviors and pharmaceutical companies perception. As a result of key words searching and snowballing method, the literature to be reviewed have been selected. Moreover, in order to relate to each aspect of this research context, four main categories have been distinguished (1) adoption theories, (2) health believe theories, (3) trust in service provider (4) multichannel marketing. Thank to this approach, combining the findings from theories of adoption, health related behaviors, and taking into account both trust issues as well as social influence in digital age, the list of factors shown by Table 3 in Appendix 2 has been derived. All factors have been assigned to the main categories in order to show the level of similarity and point the factors that have been mostly repeated in existing literature. Moreover, all of the variables listed in the Table 3 have been suggested by literature to have the final influence on Actual usage. Even though in most of the cases such as, in case of technology adoption theory, the relations between factors and Actual usage are mediated by Behavioral intention to use, which is “a measure of the likelihood a person will employ the application” (Lederer, Maupin, Sena, & Zhuang, 2000), it is commonly known that it further determines the Actual usage (Davis F. D., 1989). Therefore, also mediators have been included in the Table 3 in order to present all correlations between chosen factors.

Summing up, literature review shown that there are several factors that could be used in order to explain adoption behavior of patients suffering from Multiple Sclerosis and their HCPs towards digital service offered to them. In this chapter, the results of literature review will be presented with emphasis on more detail description of each group of variables derived from literature review, as well as, the similarities between different categories of theories that have been reviewed. As a result, the list of variables, common for all theories have been selected for the conceptual model and has been presented in chapter 2.4.

2.1 Digital services

During the literature review process, several definitions of digital services have been used among the authors. There are different definitions used to describe websites, web based services, mobile applications or social media activities (Holzinger & Errath, 2007), (Lea-Cox, 2009). In order to be consistent, for the purpose of this research, the “digital services” definition has been created to combine both mobile and web based services, tools and applications that are entirely automated and can be controlled by the customer of the service. In particular, term digital services encompasses five following web based services:
1. Website - defined as “a connected group of pages on the World Wide Web regarded as a single entity, usually maintained by one person or organization and devoted to a single topic or several closely related topics” (Dictionary.com Unabridged, 2015).

2. Forum - defined as “a website or section of a website that is used for public discussion of a specific topic and on which users can submit or read messages” (Dictionary.com Unabridged, 2015).

3. Web blog - defined as a “way for an average person to publish material of any topic he or she wishes to discuss in a website” (Hsu & Lin, 2008). For this research it will be meant as any personal or professional space on the internet commonly sponsored and updated by the owner of the blog - blogger.

4. Mobile application - defined as “typically a small, specialized program downloaded onto mobile devices” (Dictionary.com Unabridged, 2015). For this research any applications published in Android or iOS (Apple) market will be considered.

5. Social Media - defined as “websites and other online means of communication that are used by large groups of people to share information and to develop social and professional contacts” (Dictionary.com Unabridged, 2015). For this research any social media groups and accounts in portals such as: Twitter, Facebook, Google+ and YouTube will be considered.

2.2 Theories selected
There is number of theories and papers related to web based services success factors (Zhou, 2011); and usage rate determinates (Ahn, Ryu, & Han, 2007). Some of them provide with guidelines on how to improve the usage rate with the proper marketing strategies (Fan & Tsai, 2010) by making the website more visible in search engines (Eysenbach & Köhler, 2002) or by taking into account design issues (Flavian, Gurrea, & Orús, 2009). In this research however, different approach have been taken. The focus have been put on more deep analysis of users behavior which took its based in technology adoptions and behavioral models but also taking into account the specifics of healthcare context and trust which is related to it.

Because users’ acceptance of new digital systems is the primary factor in service success (Wu, Wang, & Lin, 2007). First of all, the adoption theories have been reviewed in order to explain the mechanism of end users intention to use certain digital services.

Many models have been created over the years to explain people’s intention toward using the new technology and solutions. Several of them, that take their origin in Theory of reasoned action have been selected for this research purpose. Those were: Technology Acceptance Model (TAM) and following TAM 2 and TAM 3; Theory of Planned Behavior and last but not least Unified theory of acceptance and use of technology (Chang, 1998). As a result of evolution of those theories, UTAUT model has been created (Min, Ji, & Qu, 2008). Figure 2 present the variables that are explaining intention to use according to this model. As a main factors influencing usage behavior, four main variables have been distinguished: (1) performance and effort expectaney, which may be explained by the tradeoff between usefulness and ease of use that is perceived by potential user of the system (Venkatesh, Morris, Davis, & Davis, 2003), (2) social influence, which is “the person’s perception that most people that are important to him think he should or should not perform the behavior” (Davis F. D., 1989) and (3) facilitating conditions, which are explained as “the degree to which an individual
believes that an organizational and technical infrastructure exists to support use of the system” (Venkatesh, Morris, Davis, & Davis, 2003).

Secondly, in order to address the specific context of this research, which is a health issues, the theories explaining health related behavior have been reviewed. The decision to include it has been made in order to take into account motivators that specific target audience of this research may be triggered by. As a result, both health believe model and social cognition theory have been explained.

Taking into account that Health Belief Model itself is one of the oldest social cognition models it has been chosen to explain the patients behavior in this context. According to (Glanz, Rimer, & Viswanath, 2008) ”HBM is used to understand why people accept preventive health services and why they do or do not adhere to other kinds of health care regimens”. The model present the trade-off between benefits that come from certain behavioral changes and obstacles and barriers of those changes that patients often perceive. Apart from benefits and barriers, there are also other elements that trigger people to undertake the decision to change their behavior. Those are (1) cues to action such as social influence, reminders, symptoms occurrence or medical information provided (Glanz, Rimer, & Viswanath, 2008), (2) perceived seriousness, severity and susceptibility of a disease, and (3) demographic variables (Janz & Becker, 1984). Both factors refer to balance of risk perception connected to not taking versus taking the specific action. Therefore it indicates the difference in behavioral changes depending on symptoms and disease stage.
Moreover, there is lack of trust, which pharmaceutical industry is struggling with (Fischer, 2009) and which could potentially be an issue that influence end user’s choice to use the services provided to them by pharmaceutical company. Therefore the trust in service provider must be considered in case of this research. As a result of literature review in this topic, several main thoughts have been distinguished. First of all, trust in service provider, next to customer previous satisfaction and relationship commitment, is a determinant of company image (Kim, Kim, Kim, & Kang, 2008) and a mediator between risk perception and decision making (Miron-Shatz, Doniger, & Hanoch, 2014). Company image itself can also influence a buyer trust perception (Wu, Yeh, & Hsiao, 2011). It is because customers use to consider the good brand image as a factor that decreases the buying risk (Wu, Yeh, & Hsiao, 2011), therefore the buying behavior is more likely to happen. Moreover, also the direct influence of trust on intention to use web services as well as influence mediated by perceived risk factor have been proven (Bélanger & Carter, 2008).

Last but not least, multichannel marketing aspect needs to be mentioned in order to address the channel mix advantages and challenges that can influence users intention to use digital services. By providing an insight on existing findings in this field it is possible to gain more wide overview on how company can stimulate and improve the adoption of digital services by their target audience. From the reviewed literature it has been concluded that the large part of social and emotional developments of today’s youth are currently occurring via Internet and mobile phones (O’Keefe & Clarke-Pearson, 2011). Taking into account that many chronically ill people suffer also from depression and dissociation from society (Gh, Hazavehi, Baghianimoghadam, & Mohebi, 2007), social media activities may play for them an important role. Talking about online channels activities, multichannel customer management term, which is “the use of more than one channel or medium to manage customers in a way that is consistent and coordinated across all the channels or media used” (Stone, Hobbs, & Khaleeli, 2002) must be further explained. Performed by companies, online activities enhance brand loyalty and stimulate trust by providing certain experience to their users (Laroche, Habibi, Richard, & Sankaranarayanan, 2012). Higher number of channels available create a perception of a better service which further influence loyalty (Neslin, et al., 2006). The same author however mentioned that if wrongly managed, the multichannel offering may decrease loyalty rather than improve it (Neslin, et al., 2006). Therefore, there are many challenges that companies needs to overcome in order to successfully approach their multichannel offering. One of them is proper channel segmentation (Neslin & Shankar, 2009). The problem arise because many times segments with different needs may make different demands on the same channel (Neslin & Shankar, 2009) or because it is difficult to provide the expected service level for the target audience through certain channel (Stone, Hobbs, & Khaleeli, 2002). This problem is also associated with data standardization. Multichannel approach face the challenge to standardize the data to be used by all different channels, which in many cases is really difficult (Stone, Hobbs, & Khaleeli, 2002). Other mostly mentioned in scientific literature challenges were multiple data and channels integration (Neslin, et al., 2006), channels cannibalization (Sharma & Mehrotra, 2007) and channels perception analysis that differs among different customer segments (Verheof, Neslin, & Vroomen, 2007). According to (Stone, Hobbs, & Khaleeli, 2002) it is only possible to help companies to determine their tactics and strategies in multichannel area, no theoretical paper will be able to provide company with a complete recipe for multichannel management introduction (Stone, Hobbs, & Khaleeli, 2002).
2.3 Theories similarities

TAM model variables can be recognized in many situations and contexts. One of them is multichannel customer management theory, where technology adoption theories can explain further the mechanism of choosing different channels for searching and purchasing by the push and pull model (Chiu, Hsieh, Roan, Tseng, & Hsieh, 2011). Push factors are those that keep the person away from online activities because of lack of believe that the one can manage to use this channel (Chiu, Hsieh, Roan, Tseng, & Hsieh, 2011). The pull factor on the other side is “alternative attractiveness” that different channel creates (Chiu, Hsieh, Roan, Tseng, & Hsieh, 2011). Thus, it is similar to TAM models where the ease of use and usefulness of technology determines the intention to use it, but also health believe model, where perceived benefits and barriers plays a pivotal role in decision making process. Another factors mentioned by multichannel literature as affecting channel changes were: online experience, influence of people around and switching costs (Chiu, Hsieh, Roan, Tseng, & Hsieh, 2011). The last one include the emotional, habits, learning costs, psychological and social risk (Chiu, Hsieh, Roan, Tseng, & Hsieh, 2011). Those, on the other hand, reflects the social influence and previous experience that decrease status quo perception, which are the parts of UTAUT model. Social influence has been also mentioned in TAM models as “perceived change of social status while using a solution” or in Health believe model as a factor that influence a cues to take an action. As proved, all those theories mentioned in literature review are using similar factors in order to provide an explanation of decision making process in case of digital services usage.

However, there are many different definitions of the same variables used in different context. According to Lederer and others, ease of use of www predicts (1) ease of understanding and (2) ease of finding it; whereas its usefulness is predicted by information quality (Lederer, Maupin, Sena, & Zhuang, 2000). Lederer and others also mentioned slow speed of downloading or viewing Web pages, visualizing where they had been and could go to find information and organization of pages as some other commonly mentioned by user barriers (Lederer, Maupin, Sena, & Zhuang, 2000). On the other side, some other authors using Technology adoption models for World Wide Web context (Teo, Lim, & Lai, 1999); (Moon & Kim, 2001); (Thompson, 1998) used the common definitions which have been only slightly adapted to address the www usage context. Moon and Kim defined perceived ease of use as “the strength of one’s belief that interacting with a WWW would be free of effort” whereas perceived usefulness as “the strength of one’s belief that using a WWW will enhance his or her work performance” (Moon & Kim, 2001). The overview of variables derived from literature review as well as their different definitions, which sometimes are explaining similar factors, have been presented by Table in Appendix 2.

2.4 Variables selected

Based on the literature review, several groups of variables have been selected to represent the aspects that may influence actual usage of digital services in case of patients and their HCPs. The main groups distinguished from literature suggest that factors that may help to explain this phenomenon are following: (1) **Brand perception**, closely correlated with trust in service provider and perceived risk of using services provided by organization, which may be reduced by previous experience with the same company (2) **Social influence** and multichannel approach, that are explained by other people’s impact on potential usage behavior and advantages of proper multichannel marketing, (3) **Perceived ease of use**, determined by peoples abilities to perform certain tasks required to use a service and their self-efficacy, (4) **Perceived usefulness**, reflected by
people’s beliefs and expectations regarding outcomes of the service, (5) Demographic difference, connected with the differences in each audience group that point the relevance of proper customer segmentation, (6) some other variables connected with voluntariness of using the service, trust and trade of between gains and losses connected to patients health status.

First of all, perceived usefulness factor that is a base of all technology acceptance models (Davis, Bagozzi and Warshaw, 1989) as well social cognitive theories (Bandura, 1977) has to be mentioned. The usefulness has been used as a determinant of usage in case of UTAUT model (Venkatesh, Morris, Davis, & Davis, 2003), Health Believe model (Glanz, Rimer, & Viswanath, 2008) or multichannel theories. Defined as a “performance expectancy” (Venkatesh, Morris, Davis, & Davis, 2003), “perceived benefits” (Glanz, Rimer, & Viswanath, 2008) or alternative attractiveness in case of multiple channels usage (Neslin & Shankar, 2009). In TAM 2 this factor has been explored further and pre-determinants of it were found (Venkantesh & Davis, 2000). In a large part usefulness has been explained by subjective norms and perceived change of social status (Venkantesh & Davis, 2000). This in case of digital world and patients which may be suffering from depression and dissociation from society (Gh, Hazavehi, Baghianimoghadam, & Mohebi, 2007), can be represented by social media influence on potential users. However, in order to assure the high impact of social media on usage decision, the proper multichannel online strategy needs to be in place (Montoya-Weiss, Voss, & Grewal, 2003). Therefore, perceived usefulness, reflected by people’s beliefs and expectations regarding outcomes of the service (Venkatesh, Morris, Davis, & Davis, 2003) in a large part may be represented by social influence of other users with a proper multichannel approach in place. Taking into account digital nature of services and fact that they are always as a complementary solutions for their users, the pull factor and social influence may be the strongest pre-determinant of usefulness concept in this case. It is because the role of digital services is always focused on improving the treatment outcomes and support patients in their daily life.

Secondly, the ease of use which is the basis of all technology acceptance models must be brought. Perceived ease of use, determined by peoples abilities to perform certain tasks required to use a service (Venkatesh, Morris, Davis, & Davis, 2003) and their self-efficacy (Glanz, Rimer, & Viswanath, 2008) is used by most of reviewed theories to explain users behavior. Both health believe model (Glanz, Rimer, & Viswanath, 2008), technology acceptance theories (Venkatesh, Morris, Davis, & Davis, 2003) and social cognitive theories (Conner & Norman, 2005) proven the importance of this variable as an predictor of users behavior.

Also brand perception, closely correlated with trust in service provider (Kim et al., 2008) and perceived risk of using services provided by organization (Bélanger & Carter, 2008), which may be reduced by previous experience with the same company (Falk, Schepers, Hammerschmidt, & Bauer, 2007), must be mentioned. The “perceived credibility and benevolence of a target party” (Kim et al., 2008) build loyalty and partnership relationship with customers (Wiertz, De Ruyter, Keen, & Streukens, 2004) by decreasing the risk perception (Miron-Shatz, Doniger, & Hanoch, 2014).

Last but not least, demographic differences, connected with the differences in each audience group that point the relevance of proper customer segmentation, occurred in the reviewed theories ((Venkatesh, Morris, Davis, & Davis, 2003), (Glanz, Rimer, & Viswanath, 2008), (Conner & Norman, 2005)). Taking under consideration the fact that people living conditions can affect people’s cognition (Conner & Norman, 2005), it become important to include his factor in case of this research.
Therefore, patients and their HCPs perceptions and their expectations regarding digital services offered to them, may differ.
3 Conceptual model creation

In order to address the most appropriate definitions and factors, the multichannel theory has been taken as a base of the model. According to Neslin, offering of different channels to the customer corresponds to effective acquisition, development and retention of relationship (Neslin, et al., 2006). Moreover, it also enhance customer value (Neslin, et al., 2006) and improve the purchase which in case of this context is the usage of digital services. Therefore the multichannel impact defined in this research, as amount of users that use the social media marketing channels has been taken into account as a predictor of usage. Furthermore, in order to address several factors driving customer to use specific channels such as right channels to the right audience and with the right purpose (Neslin & Shankar, 2009) the three moderators such as service channel, purpose of channel and target audience have been created to address the possible differences that need to be taken into account measuring the effect of multichannel impact on actual usage.

Next to multichannel approach which has been addressed as a determinant of usage of digital services, also technology adoption theories has been taken into account as a base of conceptual model. Two factors has been derived from TAM models in order to explain the users behavior. First of all the perceived ease of use needs to be added as one of the main determinants in conceptual model, which in this research is measured as need to follow registration process which requires effort from the user upfront. Secondly the determinants of perceived usefulness need to be addressed. According to TAM2 model, the main determinant of perceive usefulness as well as one of the main that influence usage are subjective norms which can be defined as “the person’s perception that most people that are important to him think he should or should not perform the behavior” (Davis F. D., 1989). Because the focus is on digital services, this concept is already mostly covered by multichannel impact factor where social media users can play a role of influencers. Moreover, the importance of the digital services for patients and HCPs which depends on topic of the service needs to be taken into account. Last but no least the trust in service provider has been added as a determinant of digital services usage. The reason was to address the importance of relationship between brand perception which determinates the trust (Bélanger & Carter, 2008) and risk perception (Wu, Yeh, & Hsiao, 2011) and actual usage (Falk, Schepers, Hammerschmidt, & Bauer, 2007).

The following hypotheses, derived from the literature, have been created to be validated by this research:

H1: There is a correlation between Multichannel impact and Actual use of digital service in healthcare.

In the literature review part it has been proven that in many cases multichannel approach is used to reach to bigger audience and increase number of customers. This model will test this dependency in case of digital services.

H2: Brand perception is correlated with Actual use of digital service.

Literature review proved that brand perception plays a pivotal role in case of intention to use services by building trust and loyalty. Therefore it is understandable to include this variable as a predictor of actual usage. In case of digital services for MS community there are three possibilities of pharmaceutical company to be involved (1) fully involved (2) partly involved (3) not involved.
Because of questionable reputation of pharmaceutical industry, this hypothesis will provide the insight into whether or not perception of pharmaceutical brand matters in case of using the supportive digital solutions by MS community.

**H3:** Ease of use is correlated with Actual use of digital services.

All technology acceptance models proved that ease of use is a predictor of intention to use a specific technology. Therefore it has been also included in this model. As a ease of use factor, the need to log in has been used.

**H4:** Channel type, Purpose of the channel and Audience are mediating the relationship between Multichannel impact and Actual use of digital services.

One of the main challenges that has been derived from multichannel customer management theories has been the proper resource allocation across different channels. It has been implied that the way in which different segments of customers are assigned to different channels which are covering different content actually makes difference. Therefore channel type, purpose and audience have been used as an independent variables and included in the conceptual model. By hypothesis 4, it will be checked how those three factors can moderate the impact of multichannel approach on the actual usage. In particular way, it will test: (1) how different customer types perceive the multichannel approach, (2) how the topic of digital services can determine the importance of multichannel approach and whether or not for some topics it is more important to use several channels than for the others in order to stimulate actual usage. In particular way this will reflect how the purpose of the service as a reflection of usefulness may intermediary affect actual usage; (3) are some channel types require more multichannel approach that the others to improve their usage?

**H5:** Channel type, Purpose of the channel and Audience are moderating the relationship between Brand perception and Actual use of digital services.

Similar to hypothesis 4 also hypothesis 5 has been based on the reviewed multichannel theories. In particular way the following assumption have been made: (1) audience type can differently perceive the brand and may moderate the correlation between that and the usage e.g. HCPs may be more skeptical to the pharmaceutical brands that patients or the other way around; (2) importance of brand perception in case of usage may differ depends on topic of the service and channel type used. For example, brand perception may be more important in case of professional website than in case of educational application.

**H6:** Channel type, Purpose of the channel and Audience are moderating the relationship between Ease of use and Actual use of digital services.

The ease of use may have a differently power of correlation with actual usage in case of customer type, channel type and topic of solution. It may not be of importance whether user need to log-in to in order to get into professional website but it may be a case if that’s for educational purpose. Moreover, the ease of use may be perceived as a barrier more for HCPs than for patients because of data privacy issue. Users may also perceive it as fewer barriers in case of forum than in case of other websites.
Based on the factors that were mostly mentioned in the literature review and can explain the intention to use in the context of this research, the following conceptual model has been proposed (Figure 4). It combines the technology adoption theories with multichannel customer management theories keeping in mind theories of brand perception and social cognitive theories. Because the intention to use has been always proven to determine the actual usage, only the correlations with actual use will be used for this research purpose.

![Figure 4 Conceptual model – Digital services adoption model](image)

Once model is created, the measurement of each variables needs to be specified. Because of regulatory limitations, that make it difficult to conduct direct interviews with patients, the following data had to be collected based on observations in order to measure the relationships between certain variables. The data set, this research is focused on is a list of all digital solutions offered by pharmaceutical companies to MS patients in the 5 biggest European markets and their specifications and success rates.

Taking into account that proxies of the variables had to be deducted from the real observations, thus further explanation on the way each factor, that appears in the conceptual model, has been measured needs to be explored. Below list of all units of analysis used in this research is explained.

**Ease of use** that would be perceived by user, is defined as the degree to which the prospective user expects the new technology to be free of effort (Davis, Bagozzi, & Warshaw, 1989). According to Vakantesh, both computer self-efficacy and objective usability are main antecedents of perceived ease of use (Venkatesh & Davis, A model of the antecedents of perceived ease of use: Development and test., 1996). However that is only applicable when user gain an experience working with the system by himself. (Venkatesh & Davis, A model of the antecedents of perceived ease of use: Development and test., 1996). In case of this research, it will be addressed by an amount of effort required from user to start using the service. Similar measurement has been conducted by Shen & Chiou, where the perceived ease of use has been measured by the level of complexity of the
registration process (Shen & Chiou, 2010) and have proven the accountability of this measure. Therefore, the digital solutions collected will be shared for those that do need the user interaction such as registration or entering data to perform certain need and those that does not need user interaction to provide an online service. This will allow to measure the amount of effort that user needs to put in order to access certain service which therefore is in accord with the primary definition of Davis. It is assumed that the users perceive the task that takes more time and which is more complex as the one that would require more effort from him.

**Multichannel impact** in this research will be measured by an amount of followers of complementary channels with regard to the market size. According to Kim et al., the increased adoption of social media sites, the online traffic of other websites also increased (Kim & Huang, 2014). Moreover different social media channels provided simultaneously also help consumers to integrate information and resources that can be further used towards their purchase decisions (Kim & Huang, 2014). Therefore, in this research it will be measured by an amount of users of the complementary channels connected to the main solution taking into account the target audience. If the main solution detected is a website the examples of complementary solutions would be:

- An application connected to this website,
- Social media channels with the same brand name.

Adding the estimated number of users of each complementary channel will allow to estimate the number of users this solution could reach to – multichannel impact, later on it unable to measure possible correlation between multichannel impact and actual usage of the service.

**Brand perception** in this research will be measured based on the organizations that are branding the solution. The pharmaceutical companies which have relatively lower reputation that non-profit organizations or patient associations could achieve better results (in case of number of users) when collaborating with an external party than if brand the solution itself. By mapping the solutions in this way, the possible brand perception influence on usage can be detected in analysis taking into account strong pharmaceutical company reputation. Therefore to each digital solution, the name of the company that is supporting/sponsoring or branding the website or application with the visible to user logo will be assigned. Based on that the solution will be shared for those that are branded by pharmaceutical company, those that are branded by other organization/company and are not branded by pharmaceutical company but by other organization/association which are not connected with pharmaceutical companies.

**Actual use**, usually defined as the intention of using certain products or services which lead to actial usage is measured by interviewing potential usage. In this paper, it will be actual usage determined by estimated number of downloads of mobile applications, estimated number of visits based on searches in google search engine in case of web sites, blogs, forums. The actual use will be calculated based on volume of actual and not potential users with regards to the target market size in certain country in order to be able to compare solutions between each other. Thanks to that the usage volume of certain digital solutions across European countries can be explored and solutions could be compared between each other. The data has been collected using the online tools such as statshow which gave an insight into the number of usage of each solution.
4 Methodology
In order to validate hypothesis, the number of tests will be performed using regression analysis. Due to lack of requirements for multivariate normal data, minimum requirements on measurement levels and possibilities to use also for smaller samples (Chin, 1998), the Smart PLS software has been chosen to be used for this analysis. First of all the collected data will be described more in detailed in order to understand the appropriateness of methodology used. Secondly, the steps taken to analyze data will be explained in order to test conceptual model and validate hypotheses.

4.1 Data description
Data that will be used in this research has been collected for market research purpose of Genzyme N.V. and reflects the benchmarking of all digital services provided to MS patients and their HCPs in five main European countries. In particular way, it is composed of list of all digital services developed and branded not only by pharmaceutical industry but also by other companies, patients organizations or other associations. The purpose of the research was to understand existing market situation and compare existing solutions. Therefore each of the digital services listed have been assessed on the basis of certain criteria, which will be described below. As a result 435 different cases of digital services initiatives provided to target audience have been found and listed.

Based on additional information collected about each of digital services found, it become possible to create following categories of services presented by Table 1.

<table>
<thead>
<tr>
<th>idsol</th>
<th>login</th>
<th>use</th>
<th>soltype</th>
<th>aud</th>
<th>purp</th>
<th>brand</th>
<th>multi</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>9.453384</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>69055</td>
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<tr>
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<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>70273</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0.001141</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>161991</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>1.380806</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 1 Data collection excel sheet example.

Data collected in the Table 1, distinguished 7 categories representing different aspects of digital solutions collected. First column from Table 1 represents the unique id number of each digital solution collected. Second row shows whether or not user needs to go through log-in procedures in order to gain access to the digital service. The nominal variable has been used here, representing lack of log-in procedures by 0 and log-in required by 1. Third row of Table 1 presents the usage rate, which has been calculated from number of downloads during the year 2014 (in case of applications) and estimated amount of visits based on amount of searches in google search engine (in case of web based solutions) both shared per target market size shown by Figure 1. The USE variable is a numerical, dependent variable. Fourth row in Table 1, represent solution type of certain digital services. Thus, 1 stands for channel types that requires user interaction such as forum, social media or applications and 0 stands for those that do not need special interaction from users such as blogs or websites. Next row in Table 1 presents the audience type. Two target audience groups are distinguished here: (1) Patients and (2) HCPs. Depends on to who the solution is dedicated, following 1 for patients or 0 for HCPs has been assigned to each solution. Seventh row from Table 1 present the purpose of the service. Taking into account the name, description and target focus of the solution, two different goals of digital services were distinguished here: (1) professional and (2) educational. The next row in Table 1, shows the brand category which takes into account the profile of the organizations that branded the solutions with its visible logo. Two different variables here are
possible: “branded” by pharmaceutical industry, where number 0 has been assigned or by other association, for which number 1 has been assigned. Last but not least the multichannel category has been assigned to each solution, which has been measured by the number of users of the complementary channels that are combined with the main digital service shared per the amount of their target users. By complementary channels here are meant the Applications and SM (Social Media) accounts connected with the main platform. With number of users here is meant the amount of downloads in case of application and amount of likes/followers in case of SM account.

Thanks to this categorization, different variables presented by conceptual model (Figure 4) could be measured. The detailed description of each factors measurements has been showed by Table 4 in Appendix 3.

Moreover, in order to properly analyze the data and provide the answer to research questions, several steps needs to be assured. First of all, the descriptive of data will be provided in order to gain an overview of variables that will be used for further analysis. Secondly appropriateness of data to perform regression analysis will be judged and corrections applied when needed.

**Descriptive**

First of all, in order to check for appropriateness of model that has been developed, the closer look on data set which has been collected need to be done. Therefore descriptive of data has been checked in order to understand the shape of the sample that has been collected.

Table 5 in Appendix 4 presents the descriptive of each variable including the range and frequencies. Having the closer look on the shape of collected data provide an overview on market situation and trends in the field of digital services in Europe and to derive several following conclusions.

First of all, Table 5 shows frequencies of certain values within the whole sample. Thanks to them it become possible to conclude that in more than 50% of cases, digital services do not have social media channel corresponding to them in place. Moreover, most of the services (over 70%) are dedicated for professional purposes, such as helping in communication between patients and hcps or facilitating patient diagnosis. Much less (only around 27% of all collected data) are educational focused digital solutions. Furthermore, majority of them are dedicated to patients explicitly, require to log-in and are not branded by pharmaceutical company. Almost 66% of all mapped digital services are websites and blogs which do not require input from the user. Only 34% of all solutions are forums, social media channels and mobile applications. In case of Usage, the Figure 15 shows the histogram that presents the distribution of collected data.

Taking into account that in almost 50% of cases there is no social media channel in place next to main solution, and that testing the model will require to test many interactions, the decision to group multichannel variable into 2 main groups have been made. Therefore, 2 values have been distinguished in case of this variable: (1) none, which represents situation where there is no multiple channels connected to main digital service or where there are no followers in social media, and (2) multichannel, representing the situation where social media channels connected to the main platform exists and have number of followers.

Moreover taking into account shape of Use variable data shown by histogram (Figure 15), it has been concluded that in order to improve the shape of the data for further analysis the logarithmic
transformation is need to be applied. As a result the improved data shape shown by histogram in Figure 16 has been obtained for further analysis.

4.2 Data analysis
Knowing the descriptive of data, next step is to test the appropriateness of conceptual model that has been proposed in this paper. In particular way, the influence of (1) Multichannel impact (2) Brand and (3) Log-in on Actual Use will be tested taking into account the possible influence of three moderator variables.

Thus in this chapter, following questions will be answered:

1) Are the interactions statistically significant?
2) Is the model statistically supported?
3) What are the strengths and directions of the relationships?

Moreover, the existence of moderation effects of audience, brand type and purpose on the relationships H1, H2 and H3 will be explored, testing following hypotheses:

1. The audience type (Patient vs HCPs) moderates effect on the relationships H1, H2 and H3.
2. The Brand type (Branded, No-branded) has moderation effect on the relationships H1, H2, H3.
3. The purpose of the service has moderation effect on the relationships H1, H2 and H3.

In order to understand the statistical correlations between the variables and support or reject hypothesis, the SmartPLS software for Partial Least Squares Structural Equation Modeling have been used. In particular way, the partial least squared analysis and bootstrap method have be applied to analyze data.

Correlation coefficients
First of all, the whole data set has been investigated to check for the correlation between different variables from the conceptual model. The result of this analysis is presented by Table 7 in Appendix 4. Next to that, the model with moderators and moderation effects have been tested in order to understand the strengths of relationship tested on the whole data set. As a result of this regression analysis, the following model shown by Figure 5 in Chapter 5 has been obtained.
5 Results

Figure 5 presents only significant correlations by blue lines. Not all of the correlations within the model have got confirmed to be relevant in predicting Actual usage of digital services in pharmaceutical MS industry.

![Diagram showing significant correlations](image)

* Correlation is significant at the 0.05 level
** Correlation is significant at the 0.01 level

Figure 5 Analysis results of significant correlations

The beta values have been shown by Figure 5 to visualize the relevance and impact each variable have on correlations and/or depended variables. The same outcome of analysis shown the R square=0.434, from which it may be concluded that 43.4% of the total variation in Actual use can be explained by proposed conceptual model. It means that many factors which are in the model influence the usage rate of digital services and as a result more people are using those digital services with have certain features. Thus, it allows to accept the conceptual model proposed by this research as a relevant one and continue with analysis.

Outcomes of analysis, presented by Tables 2, shows the positive and significant correlation between Brand and Usage variables (β= 0.37, p<0.01), and between Multichannel and Usage (β= 0.26, p<0.05). The positive correlation between actual usage and multichannel impact may indicate that high number of social media followers is related to success of digital service and allow to support Hypothesis 1 of conceptual model.

Moreover, brand perception among other factors from the conceptual model predicts usage mostly. It also shows significant and positive correlation with actual usage. This correlation indicates that digital solution which are branded by pharmaceutical company have negative effect on digital service success factor reflected by number of usages. Analogically services which are branded by external
organizations scored relatively higher on actual usage. Thus hypothesis 2 from conceptual model has been supported.

On the other side, Need to login variable shown relatively small (β= 0.190), and not significant correlation with Usage ( p<0.05). Therefore it can be concluded that the data used for the analysis has not supported the hypothesis about interaction between ease of use and actual usage by showing it to be non-significant and thus hypothesis 3 has been rejected at this point.

<table>
<thead>
<tr>
<th>Interactions</th>
<th>Significance level</th>
<th>Beta values</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1: Multichannel - Usage</td>
<td>0.011</td>
<td>0.255*</td>
</tr>
<tr>
<td>H2: Branded - Usage</td>
<td>0.000</td>
<td>0.367**</td>
</tr>
<tr>
<td>H3: Login - Usage</td>
<td>0.720</td>
<td>0.190</td>
</tr>
</tbody>
</table>

Table 2 Interactions effects.

However, the same analysis as shown by Table 3, also rejected number of hypothesis regarding moderations effects.

<table>
<thead>
<tr>
<th>Mediations effects</th>
<th>Significance level</th>
<th>Beta values</th>
</tr>
</thead>
<tbody>
<tr>
<td>H4.1: Audience on H1</td>
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<td>0.448*</td>
</tr>
<tr>
<td>H4.2: Purpose on H1</td>
<td>0.738</td>
<td>0.015</td>
</tr>
<tr>
<td>H4.3: Channel type on H1</td>
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</tr>
<tr>
<td>H5.1: Audience on H2</td>
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<tr>
<td>H6.3: Channel type on H3</td>
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<td>-0.010</td>
</tr>
</tbody>
</table>

Table 3 Moderation effects.

To sum up, the Table 3 has been created in order to underline several following outputs derived from performed analyses as well as to show the significance of moderation variables effects on actual usage. Most of hypothesis regarding moderation effects have been however rejected.

In order to show moderations effects and achieve better understanding on their impact, following interaction plots, presented by Figures 6-9, have been brought and explained in this chapter.
First of all, the hypothesis 1, stating that high number of social media followers is related to success of digital service, has been supported. The strength of this correlation ($\beta = 0.255$, $p<0.05$), is however significantly moderated by audience type ($\beta = 0.448$, $p<0.05$), supporting **hypothesis 4.1**. As presented by Figure 6, the multichannel impact seems to be stronger when digital solutions are dedicated to patient than in case of those which are dedicated to HCPs.

This phenomenon may be explained by health believe model affecting patients behavior. Their decision on using certain service may depend on cues to action which may come from other patients that have similar problems. The might find those supportive group of people via social media or forums dedicated specifically to this target audience where other patients may share their experience, suggestions, opinions and recommendations on different treatments or everyday life tips.

On the other side, physicians does not share same need for multichannel usage. It suggests that HCPs do not value interactions with other users and their opinions. They may rely more on scientific sources and not complementary channels designed by pharmaceutical industry. Moreover, HCPs are even more reluctant to use those digital services which are linked to other online channels.
The impact of multichannel approach on actual usage has not shown to be significantly moderated by any other moderators proposed in conceptual model. Both the purpose and channel type have not shown to significantly influence interaction between multichannel approach and actual usage of digital services ($p > 0.7$ and $p > 0.4$). Thus, hypothesis 4.2 and 4.3 have been rejected.

Secondly, solutions branded by pharmaceutical company seems to have stronger negative impact on HCPs than on patients ($β = 0.020$, $p < 0.05$). Performed analysis supported hypothesis 5.1 showing significant moderation effect of audience type on brand perception influencing actual usage. As presented by Figure 7, both HCPs and patients seem to be more willing to use services which are not branded by pharmaceutical companies, however in case of HCPs this moderation is much stronger.

Based on Figure 7, it can be concluded that physicians are more reluctant to use digital services which are branded by pharmaceutical companies directly. This phenomenon does not occur that strongly in case of patients. It might suggest that HPCs are more sensitive to adopt digital solutions which are anyhow connected with pharmaceutical companies which treatment they prescribes. Moreover, it might suggest luck of trust and luck of believe that information found there could be relevant and objective.

On the other hand, patients do not seem to have same fear as their HPCs. No relevant difference in adoption rate could be found between those services which are branded by pharmaceutical company and those that are not. Pharmaceutical logo does not seem to affect their lack of trust in digital service relevance or decrease usage rate significantly.
Purpose of the service shown to significantly moderates the correlation between brand perception and actual usage ($\beta = 0.078$, $p<0.05$). Therefore, in case of digital services that are aimed at educating their users, the brand perception is better predicting actual usage than it is in case of professional solutions. Thus hypothesis 5.2 has been also supported. As shown by Figure 8, professional digital services are not being used if they are branded by pharmaceutical companies. Similar trend is visible in case of educational services, where the difference in usage of branded and not branded solution is even higher.

From Figure 8, it may be derived the conclusion that there is a general trend for not adopting digital services when it comes to information or professional usage. This phenomenon is not that strong in case of entertaining or educational solutions, which may be connected to the fact that target audience is more sensitive regarding brand of solution when it comes to promotional or educational usage than in case of professional solutions. It may be caused by the fact that professional knowledge is usually supported by external sources and should be more reliable and subjective than in case when users are educating by author of service itself. Therefore, references to external sources and experts opinions might reduce negative effect on brand perception on actual usage of service.
Figure 9 Interactions plot – moderating effect of Channel type on the relationship between Brand and Actual usage.

There is also higher correlation between brand perceptions towards actual usage in case of non-interactive solutions. Significance of moderation effect of solution type on the model (β = -0.199, p<0.05), allows to support the hypothesis 5.3. In case of digital solutions such as websites and blogs the correlations between brand perception and actual usage are higher than in case of interactive solutions such as forums or mobile applications. As shown below by Figure 9, only in case of non-interactive solutions there is a high ratio between adoptions of pharmaceutical branded versus externally branded services. Thus, it may be concluded that in case of services such as websites and blogs users are more willing to adopt those which are not branded by pharmaceutical industry, whereas in case of forums and applications the effect is opposite.

The reason for this phenomenon may be that in case of interactive solution such as forums or mobile applications, the brand perception is not relevant due to the fact that users are sharing their opinion and have their input in creating added value to service. On the other hand, if that is a simple website or blog, user is more skeptical because the whole idea of those type of services is to get information which is in case of pharmaceutical brands may be perceived not objective enough or as a part of hidden marketing campaign.

Furthermore, no significant moderation effects on ease of use have been found. Despite the fact that digital solution is dedicated to patients or HCPs, if it is interactive or not and which type of channel is using, the impact of ease of use on actual usage remains the same and insignificant. Therefore both hypothesis 3 and 6 can be fully rejected.
5.1 Decision making model for multichannel strategy

In order to summarize results from this chapter and make it possible to implement findings in practice, another model had to be created to summarize results. Therefore, based on the results derived from the data analysis, the decision making model presented by Figure 10 has been designed.

The goal of decision making model for multichannel strategy in pharmaceutical industry is to guide pharmaceutical companies to make the most effective decision for their multichannel strategy. As presented by Figure 10, there are several moments when company may take different decisions regarding their multichannel approach.

![Decision making model for multichannel strategy in pharmaceutical industry](image)

First of all, the decision regarding service creation needs to be made and which type of digital service will it be. Based on this insight the division into interactive and non-interactive solutions can be done. In case of solutions which do not require interaction from user, the decision to don't brand explicitly with the logo of pharmaceutical company should be taken. Otherwise it is still an option.

Second, decision point is to check whether the purpose of the service is professional or educational/promotional. Based on this, model directs to the next decision steps. Next, the model asks to decide who the target audience of this service is. Last, but not least, the check regarding existing multiple channels needs to be made.

Same steps may be done for complementary channels. When multichannel approach is in place, existing channels should be continuously maintained and checked if their profile has not changed by going through decision tree again.

As a result, model suggest per each channel which approach should be taken in order to implement multichannel strategy in the most effective way and assure highest amount of users per main channel.
6 Conclusions

To sum up, the conceptual model presented in chapter 3 has not been completely supported by the data analysis which has been performed. Only three out of six hypothesis have been fully proven by analysis in this paper. Thanks to this research, several insights regarding determinants of digital services success could be derived.

First of all, it has been proven that complementary channels coverage such as social media channels, positively influence the digital solution success as well. Analysis shown that number of social media followers positively improve usage of digital service. This however may also indicate that higher usage of digital service increase the social media channels usage. Nevertheless as mentioned in literature review, proper multichannel approach improve channel coverage as well, therefore multichannel impact may play a pivotal role in promoting digital services. Moreover, multichannel impact shown strong significance as standing alone factor, none of the mediators such as channel type or purpose were able to significantly change its impact on usage of digital solution. Therefore it may be concluded that complementary channels, if successful, improve usage of channels despite the purpose and type of solutions such as website, mobile application, blog or forum. It means that educational websites and professional blogs would similarly have reach higher usage level once a complementary channels reach higher coverage. However, this phenomenon shown to be affected by audience type and thus it can be concluded that, in case of patients the effect of multichannel approach on willingness to use the solution is higher than in case of HCPs. Patients, more often use digital solutions which seem to be successful on social media or which provide successful mobile application next to their core digital service which may provide evidence on social media influence factor relevance in case of patients is stronger than in case of HCPs.

Secondly, apart from multichannel impact, also brand perception shown to determine the amount of users of digital services. This research shown that digital solutions provided by pharmaceutical companies usually reach lower amount of users compared with digital solutions offered by other organizations or associations which are not connected with treatments industry. However, it has been proved that this correlation is slightly mediated also by other factors such as audience, solutions type and purpose. In particular way, this phenomenon is stronger in case of non-interactive solution when compared with applications or forums. This can be connected with trust issue, which in case of services where user interaction is not required, plays a stronger role. On the other hand in case of interactive services, the brand of service provider does not play a significant role and does not affect patients and HCPs usage decisions at all. It means that brand matters more in case of informative websites and blogs than in case of interactive solutions such as forums or applications. This may be the important implication for pharmaceutical companies to avoid branding the solutions such as websites or blogs due to high impact of brand perception on usage behavior.

Next to channel type, also in case of professional services, the impact of brand perception may be slightly higher than in case of educational ones. This may be connected to the fact that target audience is more sensitive regarding brand of solution when it comes to information or professional usage than in case of entertaining or educational solutions. Moreover the correlation between brand perception and usage is also mediated by audience type. In case of patients the brand perception seems to determine the actual usage more than in case of HCPs.
In this research ease of use does not influence success of digital solutions significantly. This may be caused by user’s perception that when portal is protected by password it may provide more personalized environment. Moreover many times the login on such platforms is optional and therefore the users may be triggered to login in order to gain access to extended functionality. In this case however the user already have an experience with the platform and if decided to take an effort to log in, it is because the benefits that would gain from this service have been already presented to him in the convincing way.

6.1 Academic implications
This paper provides several implications into existing theories both regarding research methods used to analyze users behavior as well as in the field of new IT solutions acceptance in the field of healthcare industry.

In particular way, this paper could be the contribution to researches regarding determinants of patients and HCPs intentions to use medical devices or new technology provided by healthcare industry. It provides the insight into patients and HCPs perception on services offered by pharmaceutical industry digitally. It combined several theories from existing literature in order to better explain behavior towards adopting new digital services in pharmaceutical context by both patients and their HCPs.

As a result, the model which takes its bases in the technology adoption and multichannel customer management theories, keeping in mind brand perception and social cognitive theories have been developed. It confirms importance of multichannel approach for success of digital services. Moreover trust related to brand also confirmed to be a significant predictor of actual usage. The entire hypothesis confirmed that technology adoption theory is only partly applicable for this particular healthcare context and data collected used in this paper.

The model created has been tested using the approximations of the factors. The real data have been used in order to analyze actual behavior and not only intention to use. Moreover this type of research allows to have an insight into actual trends and situation on the market. Another advantage of the research based on approximations in this case was understanding the tendencies that are occurring under different circumstances and gives a possibility to find also hidden intentions of target audience that may not occur in case of qualitative research. Moreover, this research proved that dataset based on approximations may be used for testing technology and multichannel adoptions models.

However in order to fully profile and understand the factors which affect usage of digital services in pharmaceutical context, the research should be supplemented by performing also qualitative research afterwards. That could provide reasoning and further explanation regarding both supported and non-supported hypothesis.

This method has been most appropriate for this research because it create a possibility to see the real trends on the European market. From the data which has been analyzed, Genzyme can derive an overview on their actual user’s preferences and variables that affect their digital choices. Further qualitative research needs to be conducted in order to validate those results and be able to understand further reasoning behind target audience behavior.
6.2 Managerial implications

This paper brings an insight into the several behavioral motivations that triggers patients and HCPs to use digital services, the role of trust in service provider and multichannel approach in it. In particular way it proved the importance of multichannel approach and trust in brand in case of digital services successes in the field of Multiple Sclerosis patients providing digital services to patients, companies should pay attention to several following aspects. Genzyme may use the model which has been designed in this paper as a guideline when introducing the multichannel strategy successfully. It helps to decisions which are taking their origin in main results of data analysis in this research.

First of all, importance of multichannel approach needs to be taken into account when introducing new digital service to the healthcare market. If possible the channels should be combined in a way that links most amounts of potential users and direct to the main digital service. Moreover, pharmaceutical companies should take into account that social influence can play a pivotal role in digital service adoption. The well maintained social media channel should be implemented in ordered to attract higher number of users and social media channel followers. Extra effort should be put especially for services dedicated to patients as analysis proved that for this group of users in particular way usage is strongly influenced by social media channels and healthcare professionals interested in MS. Therefore, in order to stay competitive and be successful existence.

Secondly, the brand issue should be taken into account by pharmaceutical companies once introducing their digital services. The fact that branded solutions score relatively lower on number of users, allow us to suspect that it determinates the success of digital solution. Analysis performed on data set has proven that, brand perception has been positively correlated with amount of usage. That phenomenon could be explained by mistrust to pharmaceutical industry that the target audience is struggling with or general feeling towards the brand. In order to assure success of solution, companies could co-brand them with the non-profit organization or brand with the new/individual logo that would be consistent across all channels developed next to the service. Thanks to this approach, the attitude towards the brand that users have could be overcome and in the future help to build more trust and loyal relationship with target audience. According to data used in this paper, the audience which turned to be mostly sensitive under this aspect are HCPs. Moreover, this phenomenon seems to be stronger in case of forums and application where brand matters more compared with non-interactive solutions such as websites or blogs. Therefore, this may be the important implication for pharmaceutical companies to avoid branding the solutions such as forums or applications due to high impact of brand perception on usage behavior.

Moreover, the new way of data analysis used in this research opens new possibilities for companies and gives guidelines on how to use existing data to gain insight into behavior of their target audience. Deriving conclusions from approximations of variables, extend the possibilities to perform market research in the pharmaceutical and healthcare industry without contacting directly target audience. It helps to analyze the actual data in order to forecast future behavior and understand better preference of audience which may help to build the proper marketing strategy.

To sum up, all of the information that have been derived from scientific literature and data analysis in this paper might be used by pharmaceutical companies which are operating in European countries to understand better their target audience. It can help to make decisions during new digital service development process as well as help with multichannel strategy introduction. In particular way, it
gives an overview on values and aspects which affect the adoption of digital services in the field of pharmaceutical industry which nowadays spread their marketing and customer management activities more among the digital world. As a result, this research would help companies to better serve their customers, build up the trust and loyalty and improve satisfaction of provided products and services in the same time providing deeper insights into the usage behaviors.
7 Limitation and future research

Despite of relevant managerial and academic implications, there are several limitations of this paper which need further investigations and could be addressed in the future research.

First, only purely quantitative method has been used to measure appropriateness of conceptual model proposed in this study. Therefore, obtained results could not be confronted with qualitative responses of target audience and neither its appropriateness validated. By adding the qualitative questionnaires for target audience as a complementary research method, could help to understand their behavioral intentions as well as other factors which could affect their choices.

The statistical data used in this study allowed to distinguish two types of target audience such as patients and HCPs. However, no additional information on contextual factors which could be helpful to interpret the results or to explain variations in target audience behavior were recognized. Thus, the risk that information obtained from online statistics may be inaccurate or incomplete may be higher than in case of qualitative analysis directed to target audience.

Thus, in order to confirm the findings and further explain patients behavior, the research including MS patients and HCPs qualitative survey is recommended to be performed as a follow up to this research.

Secondly, in this research only approximations of variables have been used. Thus, knowing the limitations of this research method, further validation of used variables should be performed. Moreover, further investigation regarding different observable factors should be taken in order to define unobservable factors via factor analysis. Thanks to this, more variables influencing certain behaviors could be taken into account.
Bibliografia


Fan, W. S., & Tsai, M. C. (2010). Factors driving website success—the key role of Internet customisation and the influence of website design quality and Internet marketing strategy. Total Quality Management, 21(11), 1141-1159. (brak daty).


Appendixes

Appendix 1: Genzyme digital solutions usage numbers

Figure 11 Number of downloads per Genzyme applications in Germany during the year 2014.

Figure 12 Number of downloads per Genzyme applications in Spain during the year 2014.
Figure 13 Number of downloads per Genzyme applications in France during the year 2014.

Figure 14 Number of downloads per Genzyme applications in Italy during the year 2014.
Figure 15 Number of downloads per Genzyme applications in UK during the year 2014.
**Appendix 2: Summary of literature review - factors influencing actual usage of digital services.**

<table>
<thead>
<tr>
<th>Main factor</th>
<th>Factor</th>
<th>Theory</th>
<th>Mediators</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brand perception</td>
<td>brand image</td>
<td>(Wu, Yeh, &amp; Hsiao, 2011)</td>
<td>buying risk, purchase intention</td>
<td>(Wu, Yeh, &amp; Hsiao, 2011)</td>
</tr>
<tr>
<td>image</td>
<td>(Wiertz, De Ruyter, Keen, &amp; Streukens, 2004)</td>
<td>trust, intention to cooperate with the firm</td>
<td>perception of company image (Wiertz, De Ruyter, Keen, &amp; Streukens, 2004)</td>
<td></td>
</tr>
<tr>
<td>trust</td>
<td>(Miron-Shatz, Doniger, &amp; Hanoch, 2014)</td>
<td>decision making</td>
<td>(Miron-Shatz, Doniger, &amp; Hanoch, 2014)</td>
<td></td>
</tr>
<tr>
<td>trust</td>
<td>(Falk, Schepers, Hammerschmidt, &amp; Bauer, 2007)</td>
<td>perceived usefulness, perceived risk</td>
<td>trust in service provider and service quality</td>
<td></td>
</tr>
<tr>
<td>trust and risk</td>
<td>(Chen &amp; He, 2003)</td>
<td>brand loyalty</td>
<td>tradeoff between perceived trust in service provider and risk connected with action to be performed;</td>
<td></td>
</tr>
<tr>
<td>trust in service provider</td>
<td>Kim et al., 2008</td>
<td>brand perception, loyalty</td>
<td>“perceived credibility and benevolence of a target party” (Kim et al., 2008).</td>
<td></td>
</tr>
<tr>
<td>trust in service provider</td>
<td>(Bélanger &amp; Carter, 2008)</td>
<td>perceived risk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>trust in service provider</td>
<td>(Bélanger &amp; Carter, 2008)</td>
<td>none</td>
<td></td>
<td></td>
</tr>
<tr>
<td>image/brand perception</td>
<td>(Wu, Yeh, &amp; Hsiao, 2011)</td>
<td>trust</td>
<td>brand perception (Wu, Yeh, &amp; Hsiao, 2011)</td>
<td></td>
</tr>
<tr>
<td>partnership</td>
<td>(Wiertz, De Ruyter, Keen, &amp; Streukens, 2004)</td>
<td>trust, intention to cooperate with the firm</td>
<td>partnership relationship with customers</td>
<td></td>
</tr>
<tr>
<td>personal trusting base</td>
<td>(Li, Valacich, &amp; Hess, 2004)</td>
<td>trust</td>
<td>reflects personal tendencies for faith in humanity (Li, Valacich, &amp; Hess, 2004)</td>
<td></td>
</tr>
<tr>
<td>risk perception</td>
<td>(Miron-Shatz, Doniger, &amp; Hanoch, 2014)</td>
<td>trust</td>
<td>(Miron-Shatz, Doniger, &amp; Hanoch, 2014)</td>
<td></td>
</tr>
<tr>
<td>institution-based trust</td>
<td>(Li, Valacich, &amp; Hess, 2004)</td>
<td>trust</td>
<td>elements such as company stability (Li, Valacich, &amp; Hess, 2004)</td>
<td></td>
</tr>
<tr>
<td>perceived risk</td>
<td>(Falk, Schepers, Hammerschmidt, &amp; Bauer, 2007)</td>
<td>none</td>
<td>level of risk perception</td>
<td></td>
</tr>
<tr>
<td>Demographic variables</td>
<td>(Age)</td>
<td>UTAUT</td>
<td>-</td>
<td>(Venkatesh, Morris, Davis, &amp; Davis, 2003)</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>(Gender)</td>
<td>UTAUT</td>
<td>-</td>
<td>(Venkatesh, Morris, Davis, &amp; Davis, 2003)</td>
<td></td>
</tr>
<tr>
<td>Demographic variables</td>
<td>HBM</td>
<td>-</td>
<td>Individual characteristics including demographic, psychosocial, and structural variables that can affect perceptions (Glanz, Rimer, &amp; Viswanath, 2008)</td>
<td></td>
</tr>
<tr>
<td>Socio-structural factors</td>
<td>Social cognitive theory</td>
<td>refer to barriers and opportunities in peoples living conditions such as economic status or education which in turn can affect people’s cognition (Conner &amp; Norman, 2005);</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multichannel approach</td>
<td>multichannel marketing</td>
<td>(Verhoef, Venkatesan, McAlister, Malthouse, Krafft, &amp; Ganesan, 2010)</td>
<td>customer relationship</td>
<td>multichannel marketing activities in place</td>
</tr>
<tr>
<td>social media activities</td>
<td>(Laroche, Habibi, Richard, &amp; Sankaranarayanan, 2012)</td>
<td>experience, trust, brand loyalty</td>
<td>refers to range of companies activities performed through social media;</td>
<td></td>
</tr>
<tr>
<td>channel integration</td>
<td>(Montoya-Weiss, Voss, &amp; Grewal, 2003)</td>
<td>channel usage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>more channels</td>
<td>(Neslin, et al., 2006)</td>
<td>none</td>
<td>number of channels to collaborate with customers</td>
<td></td>
</tr>
<tr>
<td>multichannel approach</td>
<td></td>
<td>customer management</td>
<td>multiple channels provided to approach with customers</td>
<td></td>
</tr>
<tr>
<td>multichannel approach</td>
<td>(Stone, Hobbs, &amp; Khaleeli, 2002)</td>
<td>brand perception</td>
<td></td>
<td></td>
</tr>
<tr>
<td>multichannel approach</td>
<td>(Chiu, Hsieh, Roan, Tseng, &amp; Hsieh, 2011)</td>
<td>brand loyalty, firm-within-lock-in</td>
<td></td>
<td></td>
</tr>
<tr>
<td>channel association</td>
<td>(Inman, Shankar, &amp; Ferraro, 2004)</td>
<td>channel usage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>perceived severity and susceptibility</td>
<td>HBM</td>
<td>perceived treat, health promoting behavior</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>perceived seriousness, severity and susceptibility of a disease (Glanz, Rimer, &amp; Viswanath, 2008)</td>
<td></td>
</tr>
<tr>
<td>Perceived Ease of Use</td>
<td>Theory</td>
<td>Description</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------</td>
<td>--------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>self-efficacy</td>
<td>Social cognitive theory</td>
<td>&quot;people’s beliefs in their capabilities to perform a specific action required to attain a desired outcome&quot; (Conner &amp; Norman, 2005)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>computer self-efficacy</td>
<td>TAM3</td>
<td>perceived ease of use, perceived belief about ability to use computer to perform a certain task (Vekatesh, 2000)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effort Expectancy</td>
<td>UTAUT</td>
<td>behavioral intention, the degree of ease associated with the use of the system (Venkatesh, Morris, Davis, &amp; Davis, 2003)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>perception of external control</td>
<td>TAM3</td>
<td>perceived ease of use, a facilitating conditions that make user believe that the use of system is supported by organization and technology needed (Vekatesh, 2000)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Facilitating Conditions | UTAUT | none | "the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system" (Venkatesh, Morris, Davis, & Davis, 2003) |

| Perceived Benefits vs Barriers | HBM | health promoting behavior | perceived benefits of action and barriers to action (Glanz, Rimer, & Viswanath, 2008) |

| Calculative Trusting Base | (Li, Valacich, & Hess, 2004) | trust | tradeoff between gains and losses in case of outcomes (Li, Valacich, & Hess, 2004) |

| Service Quality | (Wiertz, De Ruyter, Keen, & Streukens, 2004) | trust, intention to cooperate with the firm | level of perceived service quality |

| Attitude Toward Act | Theory of reasoned action | behavioral intention | "an individual positive or negative feelings about performing the target behavior" (Davis F. D., 1989) |

<p>| Perceived Treat | HBM | health promoting behavior | (Glanz, Rimer, &amp; Viswanath, 2008) |</p>
<table>
<thead>
<tr>
<th>Perceived usefulness</th>
<th>HBM</th>
<th>health promoting behavior</th>
<th>strength of one's belief in one's own ability to complete tasks and reach goals (Glanz, Rimer, &amp; Viswanath, 2008)</th>
</tr>
</thead>
<tbody>
<tr>
<td>computer anxiety</td>
<td>TAM3</td>
<td>perceived ease of use</td>
<td>the level of discomfort or fear to use a computer (Vekantesh, 2000)</td>
</tr>
<tr>
<td>computer playfulness</td>
<td>TAM3</td>
<td>perceived ease of use</td>
<td>which is again an attitude toward technology (Vekantesh, 2000)</td>
</tr>
<tr>
<td>Objective usability</td>
<td>TAM3</td>
<td>perceived ease of use</td>
<td>is a result of comparison between the systems based on effort needed to perform a specific task (Vekantesh, 2000)</td>
</tr>
<tr>
<td>Perceived ease of use</td>
<td>TAM, TAM2, TAM3</td>
<td>behavioral intention</td>
<td>&quot;individual perception of effort that have to be put in order to perform the task&quot;(Davis F. D., 1989)</td>
</tr>
<tr>
<td>perceived enjoyment</td>
<td>TAM3</td>
<td>perceived ease of use</td>
<td>the level of enjoyment which a person achieve while using a certain system (Vekantesh, 2000)</td>
</tr>
<tr>
<td>Goals</td>
<td>Social cognitive theory</td>
<td></td>
<td>Goals, that should be as specific as possible to facilitate changes in behavior (Bandura, 1977)</td>
</tr>
<tr>
<td>Job relevance</td>
<td>TAM2</td>
<td>perceived usefulness</td>
<td>the applicability of the system to the job that the person is performing (Venkantesh &amp; Davis, 2000)</td>
</tr>
<tr>
<td>Outcome expectancies</td>
<td>Social cognitive theory</td>
<td></td>
<td>people’s beliefs on how the outcome of their actions will be like (Conner &amp; Norman, 2005)</td>
</tr>
<tr>
<td>Perceived usefulness</td>
<td>TAM, TAM2, TAM3</td>
<td>behavioral intention</td>
<td>an individual perception that performed task will bring a desired outcomes (Davis, Bagozzi and Warshaw, 1989)</td>
</tr>
<tr>
<td>Perceived usefulness</td>
<td>(Falk, Schepers, Hammerschmidt, &amp; Bauer, 2007)</td>
<td>None</td>
<td>one’s perception on how well the task will been performed (Venkantesh &amp; Davis, 2000)</td>
</tr>
<tr>
<td>Performance expectancy,</td>
<td>UTAUT</td>
<td>behavioral intention</td>
<td>users perception of an desired outcomes of system (Venkatesh, Morris, Davis, &amp; Davis, 2003)</td>
</tr>
<tr>
<td>Output quality</td>
<td>TAM2</td>
<td>perceived usefulness</td>
<td></td>
</tr>
<tr>
<td>Factors influencing usage of digital services</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Result demonstrability</td>
<td>TAM2</td>
<td>perceived usefulness</td>
<td>the level of possibility to see a tangible outcome by user (Venkatesh &amp; Davis, 2000)</td>
</tr>
<tr>
<td>(Experience)</td>
<td>UTAUT</td>
<td>-</td>
<td>(Venkatesh, Morris, Davis, &amp; Davis, 2003)</td>
</tr>
<tr>
<td>(Experience)</td>
<td>TAM2 (moderator)</td>
<td>-</td>
<td>(Venkatesh &amp; Davis, 2000)</td>
</tr>
<tr>
<td>Previous experience</td>
<td>relationship commitment</td>
<td>Kim et al., 2008</td>
<td>brand perception, loyalty</td>
</tr>
<tr>
<td>user satisfaction</td>
<td>Kim et al., 2008</td>
<td>brand perception, loyalty</td>
<td>satisfaction of other products or services provided by this company (Kim et al., 2008)</td>
</tr>
<tr>
<td>offline channel satisfaction</td>
<td>(Falk, Schepers, Hammerschmidt, &amp; Bauer, 2007)</td>
<td>perceived risk</td>
<td>satisfaction from services provided via offline channels</td>
</tr>
<tr>
<td>Social influence</td>
<td>cognitive trusting base</td>
<td>(Li, Valacich, &amp; Hess, 2004)</td>
<td>trust</td>
</tr>
<tr>
<td>cues to action</td>
<td>HBM</td>
<td>health promoting behavior</td>
<td>cues to action such as social influence, reminders, symptoms occurrence or medical information provided (Glanz, Rimer, &amp; Viswanath, 2008)</td>
</tr>
<tr>
<td>Image</td>
<td>TAM2</td>
<td>perceived usefulness</td>
<td>perceive change of social status that the person believes will increase by using the innovative solution (Moore &amp; Benbasar, 1991)</td>
</tr>
<tr>
<td>Social influence</td>
<td>UTAUT</td>
<td>behavioral intention</td>
<td>the degree to which an individual perceives that important others believe he or she should use the new system (Venkatesh, Morris, Davis, &amp; Davis, 2003)</td>
</tr>
<tr>
<td>Subjective norm</td>
<td>TAM2</td>
<td>perceived usefulness, image, behavioral intention</td>
<td>refer to social influence;</td>
</tr>
<tr>
<td>Subjective Norms</td>
<td>Theory of reasoned action</td>
<td>behavioral intention</td>
<td>&quot;the person’s perception that most people that are important to him think he should or should not perform the behavior&quot; (Davis F. D., 1989)</td>
</tr>
</tbody>
</table>
### Appendix 3: Descriptive

#### Table 5 Research methodology

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Actual use</td>
<td>Number of downloads during the year 2014 (in case of applications) and estimated amount of visits based on amount of searches in google search engine (in case of websites) both shared per target market size (numerical, dependent variable).</td>
</tr>
<tr>
<td>Ease of use</td>
<td>Presence of log-in procedures to be performed by user in order to gain access to digital service (nominal variable).</td>
</tr>
<tr>
<td>Multichannel impact</td>
<td>The number of users of the complementary channels that are combined with the main digital service shared per the amount of their target users (numerical variable). By complementary channels here are meant the Apps and SM (Social Media) accounts connected with the main platform. With number of users here is meant the amount of downloads in case of application and amount of likes/followers in case of SM account.</td>
</tr>
<tr>
<td>Brand influence</td>
<td>The profile of the organizations that branded the solutions with its logo. Three different variables here are possible: “branded” by pharmaceutical industry, “co-branded” with non-pharmaceutical organization or “non-branded” by pharma (nominal variables).</td>
</tr>
<tr>
<td>Channel type</td>
<td>Five different types of solutions can be distinguished: (1) website (2) application (3) blog (4) forum and (5) social media channel. Because of their features connected to users experience they have been spread into two types of solutions: (1) interactive – those that need users interaction during the usage such as application, forum or social media and (2) non-interactive such as website and blog.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Taking into account the name, description and target focus of the solution, two different goals of digital services were distinguished: (1) professional and (2) promotional and educational.</td>
</tr>
<tr>
<td>Audience</td>
<td>Two target audience groups are distinguished here: (1) Patients and (2) HCPs. Depends on to who the solution is dedicated, one of them has been assigned to the solution.</td>
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### Appendix 4: Data analysis

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<th>Variable</th>
<th>Values</th>
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<td>151</td>
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<td>not pharma branded</td>
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Table 6 Descriptive statistics- frequencies
Figure 16 Histogram of USE data distribution.

Figure 17 Histogram of Use variable improved by log10 function.
### Correlations

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</tbody>
</table>

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Table 7 Correlation matrix