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A Smart Mobile Application prototype to enhance the Engagement of Physicians with Pharmaceutical Companies in Egypt - An Exploratory Study

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A Smart Mobile Application prototype to enhance the Engagement of Physicians with Pharmaceutical Companies in Egypt
An Exploratory Study

Abstract

Pharmaceutical companies are at the heart of the mobile revolution, and surely this technology will modify ways to deliver, consume, measure, and pay for healthcare. Recently, the healthcare ecosystem has radically changed to be more sophisticated due to many crises and challenges in the current global business milieu (e.g., COVID-19 and Russian-Ukrainian War). Therefore, the necessity to select smart tools that improve physician engagement at minimal cost is highly urgent. Several types of research acknowledge the impact of mobile applications on physicians' engagement. Although the Egyptian pharmaceutical industry is huge and highly competitive, unfortunately, no research investigated the characteristics of mobile application to enhance the physicians' engagement with Egyptian's pharmaceutical firms. Therefore, this research explored the characteristics, benefits, barriers, and medical information required for the mobile application. Then, the researcher suggested a mobile application prototype to advance this engagement. A quantitative survey using a questionnaire and descriptive analysis is applied in this empirical research. The research provided excellent evidence and a guideline to encourage Egyptian pharmaceutical companies to develop intelligent applications to enhance physician engagement.

Keywords: Engagement, mobile application, physician, pharmaceutical companies.
JEL: M30

نموذج أولي لهاتف ذكي لتعزيز مشاركة الأطباء مع شركات الأدوية في مصر

دراسة استكشافية

تقع شركات الأدوية في قلب ثورة الأجهزة المحمولة ، وبالتأكيد ستعمل هذه التكنولوجيا على تعديل طرق تقديم الرعاية الصحية واستهلاكها وقياسها ودفع تكاليفها. في الآونة الأخيرة ، تغير نظام الرعاية الصحية بشكل جذري ليصبح أكثر تعقيدًا بسبب العديد من الأزمات والتحديات في بيئة الأعمال التجارية العالمية الحالية ، (على سبيل المثال ، COVID-19 والحرب الروسية الأوكرانية). لذلك ، فإن ضرورة اختيار الأدوات الذكية التي تعمل على تحسين مشاركة الطبيب بأقل تكلفة هي ضرورة ملحة للغاية. تأكد العديد من الأبحاث تأثير تطبيقات الهاتف المحمول على مشاركة الأطباء. لكن على الرغم من أن صناعة الأدوية المصرية ضخمة وتنافسية للغاية ، للأسف ، لا توجد أبحاث مصرية تبحث في خصائص تطبيقات الهواتف الذكية لتعزيز مشاركة الأطباء. لذلك ، فإن هذا البحث يعتني بيشرح تلك الخصائص و مميزاتها و تأثيرها. بعد ذلك ، اقترح الباحث نموذجًا أوليًا لتطبيق الهاتف المحمول لتعزيز هذه المشاركة. ولقد تم استخدام أسلوب الأبحاث الكمية من خلال استخدام استبيان وتحليل وصفي للبيانات في هذا البحث التجريبي . ولقد قدم البحث أدلة ممتازة ومبادئ توجيهية لتشجيع شركات الأدوية المصرية على تطوير تطبيقات ذكية لتعزيز مشاركة الأطباء .

1. Introduction

Pharmaceutical companies are at the heart of the mobile revolution, and surely this technology will modify ways to deliver, consume, measure, and pay for healthcare. The fast speed of innovative and wide applicability of mobile applications (e.g., augment and virtual reality for larger engagement of physicians, 3-d printing drugs, medicines' digitization, and diseases diagnosis via an artificial intelligence) has injected this revolution and permits the advancement of business profitability, (Patil 2020). The healthcare mobile applications market (e.g., analyzing pharmaceutical information, regulating client prescriptions, securing client records) is now evaluated to be worth $52.2 billion and is estimated to be $178 billion by 2026, (Dibuh and Evgeny 2022). Such non-traditional marketing tools should be characterized by novelty and cost-effectiveness to increase or even retain the Healthcare Professionals' HCP's level of engagement in such turbulence and fierce competition found in the pharmaceutical market. Recently, the healthcare ecosystem has changed to be more sophisticated due to many crises and challenges in the current global business milieu. For example, the continuous crisis – Corona Virus or Covid-19 pandemic- has confirmed the essential role of the adoption of a sustainable communication system (e.g., mobile applications) in the healthcare industry to control the epidemics, trace infected persons, discover treatment, and enhance the drug usage (Wang et al, 2020). This pandemic has aggressively stressed the importance of virtual consultations between physicians and patients who are willing to remain using them during or after the pandemic, (Clarivate 2020). Virtual consultation has increased globally from less than 20% before Coronavirus to more than 80% now, (Bestsennyy et al. 2021). Similarly, U.S. physicians have averagely reported at least 5 rep-meeting every month before the pandemic. Now, the number has decreased to 1.5 visits per month, (Bestsennyy et al. 2021). Simultaneously, many European countries have similar circumstances like Switzerland, Russia, and Italy, which restricted sales rep's visits.

On the other hand, the large number of competitive Egyptian pharmaceutical companies has also affected the ability of the medical ads representatives to visit physicians and other healthcare teams, (Fitch Solution 2019). This situation could be a reason for message distortion and physicians' rejection of communication with medical representatives. Although, The Egyptian government has established a promising long-term strategy to develop the pharmaceutical industry (e.g., establishing a medicine city to renovate Egypt into a regional pharmaceutical hub), many economic barriers hinder the development of the industry. For example, the devaluation of the Egyptian pound as a part of the deal initiated with the International Monetary Fund (IMF) in August 2016, besides the removal of the host of subsidies on fuel and food, as well as the introduction of value-added tax (VAT), have all resulted in a surging inflation rate over than 30% as per a BMI report (2021). Consequently, pharmaceutical expenditures achieved a negative growth of -41.7% in terms of USD 2.1 billion in 2019 versus USD 3.5 billion in 2018, although it grew in local currency with 7.7% EGP 38.3 billion in 2017 versus EGP 35.6 billion. In 2022 in Egyptian pounds, inflationary pressure contributes to making imports of raw materials more expensive, hurting manufacturers' profit margins, and leading to a shortage in locally

produced medicines. Undesirable consequences of devaluation extended to the innovative drug maker companies because of the increased costs of imported finished medicines to Egypt. Patented drugs in Egypt are forecasted by BMI to decline from USD 1.8 billion in 2016 to USD 1.2 billion by 2021 at a Compound Annual Growth Rate (CAGR) of -7.8% due to floating the pound. Therefore, Egypt's patented drugs companies are expected to decrease their spending from 50% in 2016, to 44% in 2026 as the expansion of pharmaceutical access needs more cost-effective strategies, (Fitch Solution 2019).

Considering all micro and macro challenges, Egyptian pharmaceutical companies are in deep need of innovative mobile applications to understand, communicate, and respond to physicians' needs by recognizing the multidimensional nature of the current healthcare environment, (Clarivate 2020). Certainly, digital marketing solutions sponsored by pharmaceutical companies could play an essential role in overcoming the industry's current challenges in the light of multichannel efforts to reach the broadest segment of physicians at the lowest cost. In other words, this is the time to follow smart money. Several studies have pointed out that two-thirds of HCPs increasingly preferred digital sources such as smartphones and tablets when searching for clinical or drug information. The growth rate of using these tools has increased to 133% over the last five years, (Evans et al. 2020). Consequently, mobile internet adoption generally has enlarged at a rate that is eight times that of the equivalent of desktops ten years ago (GSMA 2021). The mobile is the already worthy layer in the digital marketing mix. Statistics have estimated that there are over 71,000 health and fitness applications available for usage (e.g., 24,000 in the Apple App store and 47,000 in the Google Play Store), (Wetzler 2021).

Many Egyptian pharmaceutical companies decided to employ creative digital solutions and traditional marketing activities to fulfill the varying ways that physicians prefer to receive information and their practices' needs. This approach aims to strengthen brand awareness and product service and extend brand loyalty and physician engagement. Taking into consideration the increased usage of mobiles and tablets over desktops by HCPs, it provides a conclusion that mobile applications can offer greater value to doctors than other digital solutions. For instance, it shows better personalization based on the physicians' needs, interests, usage, and behavior. As a result, it could be an effective tool offered by pharmaceutical companies to satisfy physicians' needs, enhance their engagement, and achieve the desired outcomes in terms of productivity and profitability. Pharmaceutical marketers started to focus on digital media, but at a slower pace than other industries, because of the limitations and companies' codes of conduct that are likely to be stricter in the pharmaceutical industry. This restriction was due to the fear of breaking the privacy of the customers or the confidentiality of the company. However, several Egyptian pharmaceutical companies tried to create mobile applications to target physicians and patients. Unfortunately, these apps lacked the customization level to satisfy their needs, and they were not easy enough to match their experience in application usage. Therefore, the importance of creating a mobile application that would bridge the gap between pharmaceutical companies and physicians is highly important for the following

reasons: 1) to resolve a lot of pressure points that HCPs are suffering from, 2) to enhance the engagement of physicians, and 3) improve the brand loyalty of physicians. Accordingly, the overall aim of the research is to critically explore the characteristics, benefits, and barriers of mobile applications to enhance the engagement of physicians with pharmaceutical companies in Egypt. This research consisted of a literature review, methodology, research analysis and discussion.

1.1. Egyptian Pharmaceutical Industry

Pharmaceutical companies or drug production corporations represent an essential part of the health sector in Egypt to research, develop, market, and distribute drugs. There are 848 pharmaceutical companies in Egypt including only almost 20 multinational companies among other local companies, (Ministry of Planning and Economic Development 2021). These companies produce pharmaceutical medicine with annual total revenues of EGP 86.4 Billion which equals approximately $4.57 Billion U.S. dollars (IbnsinaPharma 2019). In the 1990s, the Ministry of Health established (HoldiPharma) - the Holding Company for Pharmaceuticals- with 12 subordinate public companies to create a strong entity to strengthen their competitive ability. Additionally, there are 17 private firms in the domestic sector, with ten global pharmaceutical corporations. EIPICO is ranked as number one in the local market with a market share of 10-12 %. In addition, Amoun and pharmacy are two other large players in the field, (GAGE 2017) (Hassanin and Hamada 2022). As a result, Egypt exists as the largest producer of pharmaceutical medicine in the Middle East and Africa. Meanwhile, it also maintains its position as the second-largest drugs consumption market, second only to Saudi Arabia, holding a value of EGP 56.6 Billion which equals approximately $2.9 Billion U.S. dollars, (Letter 2022). Egypt's pharmaceutical corporations face regulatory obstacles beyond the economic environment, including delayed governmental approvals for licensing, taxes, intellectual property rights enforcement, and an undesirable pricing scheme. These obstacles have negatively impacted the various industry players characterized by high population growth- urbanization and expansion of the generic drug sector and increased health awareness, (Hassanin and Hamada 2022). Egypt achieved 44.9 points out of 100 on the Risk/Reward Index above the regional average of 40.4, making it the fourth most attractive pharmaceutical market in Africa, (IbnsinaPharma 2019). By 2025, experts estimate the expansion of the Egyptian market to a Compound Annual Growth Rate (CAGR) of 8.0% in local currency terms to reach a value of EGP 79.6 Billion which equals $4.9 Billion U.S. dollars, (IbnsinaPharma 2019). The Egyptian government has started a strategic transformation plan to restructure the pharmaceutical industry. It established Medicine city to renovate Egypt into a regional pharmaceutical hub, by securing local and regional markets with high-quality products. Additionally, the Egyptian state started a comprehensive health-insurance system in 2018 (Newswire 2020). Pharmaceutical sales are still based on out-of-pocket expenditures as consumers find self-medicating to be the cheapest form of treatment, (Bahlol, M.; Lagutkina 2016). Egyptian local pharmaceutical business is highly robust, with an existence of about 129 pharmaceutical firms, of which less than ten are global with local production bases. During the 1990s, the Holding Company

for Pharmaceuticals (Holdi-Pharma), was established with twelve subordinate state-owned companies. There are seventeen private sector players in the industry and nine multinational pharmaceutical companies (GAGE 2017). EIPICO is perhaps the largest private sector company in Egypt with a market share of 10-12%. Besides, Amon and Pharco are two other key players in the industry, (GAGE 2017). Based on statistics, of 213,000 registered physicians, only 82,000 are working in Egypt. This represents 0.7 per 1,000 people, (Nature Middle East 2020). Meanwhile, Egypt's pharmaceutical sales are mostly dependent on prescription sales, which comprised 82.5% of total drug sales in 2021 as compared to 17.5% of over-the-counter products, (Fitch Solution 2019). Prescription sales are comprised of two types, generic drugs and brand-name drugs (Afify 2016). Sales of patented drugs will outgrow that of generic drugs due to the domestic industry's heavy reliance on importing raw materials, which have surged in the past year. This point should be noted, however, that the market could eventually shift favor toward generics, given their cheaper price tags, and the government's willingness to maintain cost-containment measures, (Afify 2016). Physicians are core components of the Egyptian Health ecosystem.

2. Literature Review
2.1. Customer Engagement Concepts and Aspects

The customer engagement concept has high priority according to Marketing Science Institute (Ng, Sweeney, and Plewa 2020). Several studies have explained customer engagement based on multidimensional aspects cognitive, behavioral, and emotional (Brodie et al. 2011). The engagement concept can be explained by focusing on either the psychological or behavioral side, (Hollebeek, 2011; Jaakkola & Alexander, 2014) in ((Ng, Sweeney, and Plewa 2020). (Brodie et al. 2011) claimed that engagement is a psychological state occurring through virtue of interactive and co-creative customer experience. (Sundqvist et al. 2020) proposed that engagement is the psychological process that forms customer loyalty. (Abo ElHamd et al. 2021) highlighted the key elements of the psychological aspect such as involvement, occupation, and retention. On the behavioral side, (Doorn, Mittal, and Nass 2010) described engagement as behavioral manifestations beyond the purchase. There are essential behavioral components, such as co-creation, customer complaints, and Word of Mouth (WOM), (Rupik 2015).

In the organizational context, many types of research have recognized the positive impact of engagement on overall performance in terms of increasing sales and productivity, (Rupik 2015) and (Abo ElHamd et al. 2021). For example, (Sashi 2012) defined engagement as frequent interactions between customers and the brand that increases customer investment in the brand. Therefore, it will improve performance and increase profitability.

2.2. Digital Transformation

Digital media and new technologies have reshaped the marketing mix to be more interactive, and nonlinear, and to be characterized by empowered and interconnected customers, (Viswanathan, Hollebeek, and Kim 2016). Such digital transformation created a new kind of engagement, called online engagement, as was pointed out by (Srivastava, Sivaramakrishnan, and Saini 2021). They agreed that online engagement is characterized by dynamic and sustained cognitive processing that satisfies instrumental and experiential values, which in turn result in customer acquisition, retention, loyalty, and satisfaction. In light of new trends in digital activities, pharmaceutical companies should adapt their marketing mix to take advantage of new technologies to better understand and serve physicians. Unlike traditional marketing tools, digital activities enrich communication with customers using valuable information with a level of greater reach. The importance of digital tools is forming communities that collaborate to better understand and identify customers' real pressure points and satisfy their needs with minimal cost (Sashi 2012). In the pharmaceutical market, experts reported that physicians become digitally inclined (Ahmed et al. 2014). However, most of them, particularly in rural areas (e.g., Egypt) are not sufficiently aware of recent digital technologies. With the current brands' massive competition in the Egyptian pharmaceutical market, the main challenge is that many doctors find various options of products to treat the same disease due to the huge number of alternatives made by local companies. This case makes a confused state of mind for HCPs when selecting the best treatment options for their patients, (Srivastava, Sivaramakrishnan, and Saini 2021). Thus, the large number of sales force visits and offline marketing activities are no longer attractive to physicians anymore. Consequently, pharmaceutical companies realized the importance of leveraging digital tools aiming to find a new attractive way to engage HCPs in their brands. In addition, it helps in establishing and utilizing big data sets. However, these digital tools are not a substitute for the sales force, both online and offline tools can be employed to develop customer engagement strategies.

2.3. Mobile Application the New Face of Engagement

Nowadays, the unprecedented rise of mobile usage has considered the principal event in the digital marketing arena. As per the latest report published by E-Marketer, on 16 November 2017, a survey has been conducted on 2000 US internet users aged 18 to 75; most of them check their phones almost 47 times per day. Moreover, younger users check it 85 times per day (Wilmer, Sherman, and Chein 2017). In Egypt, according to the updated report of the "We are Social" Institution, Jan. 2017, mobile subscribers represent 103% of the total population (104 million) - due to some people using more than one mobile. In addition, the average daily use of the internet via a mobile phone was 3 hours and 20 minutes, with a growth of 39% over last year. On the other hand, using the internet through laptops and desktops declined -by 11% compared. The percentage of mobile internet users out of the total population is 31%. Unlike most countries, the average internet speed via mobile connections in Egypt is around 8 KBPS which is four times more than the average speed by fixed connections (like desktop and laptop) that have an average speed of 2 KBPS. These trends

confirmed how deeply smartphones have penetrated Egyptians' daily lives. Therefore, it can be concluded that Egyptians became more familiar with mobiles than other devices like laptops, desktops, and even tablets. Despite this, there is no valid data about physicians' usage of smartphones in Egypt. These previous statistics represent a strong indicator of the overall usage of mobiles by Egyptians, including physicians. Hence, it is a great opportunity for marketers in pharmaceutical companies to engage HCPs using innovative ways adopted with smartphones. In the pharmaceutical field, unlike other industries, the limitations of privacy and digital compliance regulations are considered one of the main challenges that restrict pharmaceutical companies to exploit most digital tools. For example, multinational companies (MNCs) face compliance risks and strict policies such as the Foreign Corrupt Practices Act (FCPA) and its equivalent in the UK (Ahmad et al. 2020). Consequently, digital tool options for pharmaceutical companies are very limited. Among digital tools, branded websites are commonly used in pharmaceutical companies. Few pharmaceutical companies started to utilize mobile applications to engage physicians. For instance, Novartis and Pfizer created a mobile app to engage both of HCPs and patients (de Vries et al. 2018)Generally, there are several reasons beyond why customers prefer smartphones to other devices. These reasons can be summarized in the following points: 1) to make people's lives easier, as it is portable, accessible, interactive, multi-modal, and within reach anytime and anywhere. 2) to handle various activities like socializing with others, shopping, seeking certain information, getting driving directions, etc. The mobile is the last thing many people check before sleeping and the first thing they reach for in the morning, (Alshobaili and AlYousefi 2019). These significant benefits of mobile media have created a new concept of engagement named mobile engagement, which has been explained by (Viswanathan, Hollebeek, and Kim 2016) as, customers' interactive experience with their mobile devices that gives them value and satisfaction. Customer engagement in the mobile environment is researched from psychological and social research perspectives, (Tarute, Nikou, and Gatautis 2017). A branded mobile app has been defined by (B. Wang, Kim, and Malthouse 2016) as software that is downloadable on mobile devices and designed for cell phones' operating systems to extend phones' capabilities to do certain tasks. Branded apps display a brand identity via the brand app name or show the brand logo or icon. Numerous global brands such as BMW, Chanel, and Coca-Cola have released branded mobile apps to provide smart communication tools to their customers, (Palmatier and Crecelius 2019). With the exponential growth of smartphones, several corporations have adopted branded and customized apps to pursue innovative marketing communication techniques and enhance brand loyalty and purchase intention. Mobile applications are a more engaging and interactive platform for market communication than the traditional website format. One of the key essential differences between traditional websites and mobile apps is that smartphone apps are quicker and easier to connect customers to the internet. Thereby, user experience with apps can be provided more efficiently than with websites (Palmatier and Crecelius 2019). Smartphone apps provide unique customer experiences that reflect their interaction with brands being the main gate for engaging customers efficiently

(Tarute, Nikou, and Gatautis 2017). Such a high level of interaction driven by apps helps both companies and physicians to participate in value-adding and marketing mix decisions. In sum, the interaction made by apps can improve understanding of the changeable and dynamic customer needs and preferences. Therefore, companies take the right decision either to modify current products or develop new ones to accomplish better satisfaction and exceed customer expectations (Sashi 2012). Moreover, (Viswanathan, Hollebeek, and Kim 2016) confirmed that there is a consensus that mobile app adoption can affect subsequent purchases, customers' retention, and loyalty. (Plotkina and Rabeson 2022) stated that 91% of the top global 100 brands were found in at least one of the major app stores. From the marketing perspective, a branded mobile app is considered by (B. Wang, Kim, and Malthouse 2016) & (Viswanathan, Hollebeek, and Kim 2016) as a pull promotional tool because customers choose to download the app to start communicating with the brand. Furthermore, they can control how much they view as well as which kind of information they want to access, whenever they want, wherever they are. Consequently, apps allow real-time communication between firms and customers leading to more accurate feedback and customer insights. Although a branded mobile app is highly interactive and a smart digital tool, the continued usage of branded apps because of customer engagement is highly challenged. (Tarute, Nikou, and Gatautis 2017) demonstrated important statistics that elaborated on this challenge. In 2010-2011, only 1% of available mobile applications were downloaded. Further, 25% of installed mobile applications were never used, while 26% of downloaded mobile applications - were not used more than once. They added that a total of 80% of all apps are downloaded less than 1000 times (Tarute, Nikou, and Gatautis 2017). These statistics revealed a lack of intimacy and engagement with most apps. In other words, most customers get disengaged with most installed apps. Such disengagement occurs when customers decide to stop interaction with a branded app (for example discontinued logins) after they were formerly engaged. Disengagement has been justified due to technical inconvenience, poor design, usability, and quality content, (Tarute et al., 2017 & (Viswanathan, Hollebeek, and Kim 2016). The consequences of disengagement with a branded app that does not meet customers' expectations have been described by (B. Wang, Kim, and Malthouse 2016).

They pointed out that, it may lead to negative attitudes towards brands which in turn will decrease customer purchase intention. Considering this, pharmaceutical companies need a deeper understanding of the mobile-related engagement behavior of physicians in their ever-changing context and environment to provide them with the desired features and boost their engagement with their brands. Despite several recent quantitative types of research having been done to evaluate the impact of mobile applications on customer engagement (Dovaliene, Masiulyte, and Piligrimiene 2015); (Viswanathan, Hollebeek, and Kim 2016), there is no study evaluating engagement considering geographic, cultural, and industrial differences together. Numerous types of research suggested evaluating mobile-related engagement assuming different contexts such as certain product categories, countries, and cultures (Viswanathan, Hollebeek, and Kim 2016). Furthermore, they suggested that a clear understanding of

how to maximize the impact of a mobile app will be a key subject for future research (B. Wang, Kim, and Malthouse 2016). Therefore, this research directly responds to the calls from the researchers (Dovaliene, Masiulyte, and Piligrimiene 2015); (B. Wang, Kim, and Malthouse 2016); (Viswanathan, Hollebeek, and Kim 2016); (Tarute, Nikou, and Gatautis 2017) using a holistic integrated approach to measure physicians' mobile engagement with pharmaceutical companies in Egypt. Hence, it aims to evaluate engagement with a branded mobile app in a specific industry, region, and culture.

2.4. Relationship between App Features and Engagement

Engagement in the mobile environment should be categorized based on different aims and activities related to the intended motivations of the customers to engage (B. Wang, Kim, and Malthouse 2016). As per (Dovaliene, Masiulyte, and Piligrimiene 2015), there is no consensus on what motivates engagement with mobile. However, they treated engagement with mobiles as multidimensional, relying on previous research. Numerous researchers (for instance, (Dovaliene, Masiulyte, and Piligrimiene 2015); (B. Wang, Kim, and Malthouse 2016); (Viswanathan, Hollebeek, and Kim 2016); (Tarute, Nikou, and Gatautis 2017)) defined four main motivations for engagement with apps: cognitive (utilitarian), emotional (hedonic), behavioral, and social.

2.5. Engagement Motivations

The cognitive or utilitarian aspect can be defined as the effective and efficient use of information systems in terms of convenience, accessibility, and availability of data (Tarute, Nikou, and Gatautis 2017). Therefore, engagement motivations for mobile users in cognitive behavior can be translated in the app to ease of use, facility of service delivery anywhere, and added value (usefulness) of the app to physicians (Kumar et al. 2010). In the proposed app used in this research, the main objective is not only to strengthen the existing cognitive bonds in the brand with physicians but also to create new ones that cannot be present without using this mobile app. For example, the transformation of patients' databases from manual papers to the app to facilitate communication with the patients was not efficiently possible before. Thus, customer engagement with the brand is expected to increase. Hedonic means pleasure. In some literature, it is labeled as emotional (Dovaliene, Masiulyte, and Piligrimiene 2015). It occurs when fun, excitement and an enjoyable customer experience are obtained (Tarute, Nikou, and Gatautis 2017). The emotional side can be boosted in the app context through smart design solutions and attractive interfaces (visuals). (Johnsonc, K.; Ju-Young; Kang 2015) discussed factors of the intention to interact with products/services and explored the strong relationship between emotional engagement and the intention to use mobile applications. In other words, customers who engage with brands using mobile applications are likely to be more emotionally committed and trust in brands (Vivek, Beatty, and Morgan 2012). The behavioral aspect attributes to consumer intention to take actions toward specific brands like obtaining or purchasing specific brands (Tarute, Nikou, and Gatautis 2017). Customer engagement refers to the combination of behavioral responses with an emotional context in which the behavioral responses mean actions

and result in brand loyalty (Vivek, Beatty, and Morgan 2012). For example, the brand app context behavioral engagement refers to the frequency of logging onto the app, and the number of new users logged into the app. (Dessart, Veloutsou, and Morgan-Thomas 2015) have stated that the behavioral manifestations caused by behavioral engagement can be translated into sub-dimensions like sharing, learning, endorsing behaviors, and eventually improving social aspects. So, it can be said that the behavioral motive is the main driver of the social aspect.

The social aspect is defined by (Viswanathan, Hollebeek, and Kim 2016) as the desire to construct, create, and share value-added activities with others. Using branded apps can achieve customer sociability by using it as a platform for customers with similar interests, for example, physicians with the same specialty. In such a virtual mobile app environment, mutual interactions occur among customers leading to fruitful benefits such as a) Online identities and related networks are established by a customer that helps him to obtain social support, friendship, intimacy, and exchange experiences with physicians. b) Continuous interactions lead to continuous support which in turn makes the customers feel that they are cared for and valued by others. c) Active participation of the customers due to the social help in providing constructive feedback and helpful suggestions on brands (Zhang et al. 2014) Consequently, the social aspect suggested by (Mollen & Wilson, 2010, & (Vivek, Beatty, and Morgan 2012) is very important in the mobile environment as it helps in improving interactions between customers as well as the interactions with the brand.

However, it can be concluded that the cognitive and emotional aspects impact the experiences and feelings of customers, and the behavioral and social aspects inspire the participation of current and potential customers. Moreover, these previously discussed motivations lead to important outcomes such as customer satisfaction, retention, loyalty, and advocacy.

2.6. Successful App Features

Despite several scholars having discussed the engagement topic, fewer academic researchers have investigated features of mobile apps that affect customer engagement (Smith and Chen 2018). App features are the second highest important factors that people consider when choosing an app (Lim et al. 2015). Relying on recent research, for example, (Dovaliene, Masiulyte, and Piligrimiene 2015), and (Tarute, Nikou, and Gatautis 2017) the researcher proposed four main features of the branded app that affect customer engagement with mobiles. These features are 1) functionality, 2) design solutions, 3) sociability or interaction, and 4) content quality. The functionality attribute refers to an action that can be done by users based on the purpose of the mobile app (Tarute, Nikou, and Gatautis 2017). This feature is clarified by (Kim, S.; Jen-Hui Wang, R.; Malthouse 2015) as appropriate feedback which indicates what actions or results have occurred. Design solution represents the customized interface of apps such as colors, styles, layout, and icons which facilitate the usability of the app and arouse emotions as well (Tarute, Nikou, and Gatautis 2017). User-friendly design helps users to feel more comfortable and controlling of

the app and results in more interactions (Ramdurai 2021). Sociability or the interaction feature aims to increase the sense of intimacy with users and permits them to contact and collaborate with other users and app providers (Tarute, Nikou, and Gatautis 2017). Such a feature evokes a high interaction state using customization and multiplatform in which users interact with app content, brand, and other app users. The last feature is the quality of content or technical convenience as per (Dovaliene, Masiulyte, and Piligrimiene 2015). This feature stresses the importance of providing timely, relevant, and/or personalized information for app users. There is a direct relationship between the quality and format of the information, as the format can impact user perception which in turn affects customer satisfaction (Tarute, Nikou, and Gatautis 2017).

Based on the previous literature, it can be concluded that there is a significant growing interest in defining customer engagement. However, there is still no agreement among researchers concerning this phenomenon. Since there is no agreement on the best way to illustrate engagement, there is no consensus on its dimensions. It is fairly said that the determination of the engagement concept depends on different customers' situations. In other words, customer engagement is a situational approach. Meanwhile, all of them agreed that customers' engagement goes beyond purchasing to establishing rapport with the customers.

3. Methodology and Research Design

The main objective of this research is the profound evaluation of the characteristics of mobile applications to enhance the physicians' engagement with pharmaceutical firms in Egypt. The study objective can be achieved by exploring how physicians get successfully engaged with pharmaceutical companies. Moreover, searching essential motives and barriers that influence physicians' usage of mobile apps is very critical to achieving the research goal. Lastly, exploring the kinds of mobile apps used by physicians and finding the relationship between mobile apps and engagement can strongly support the research to accomplish its aim. By achieving this goal, pharmaceutical companies can exploit this tool seeking more unique and efficient ways to boost physicians' engagement in such extreme competition as found in the Egyptian pharmaceutical market.

3.1. Research Questions:

Based on the literature review, The Egyptian Pharmaceutical companies require a guideline to help them to establish their communication method and applications. Therefore, the following research questions have emerged, and the researcher tried to answer:

1. What are the used communication channels with physicians?
2. What are the technical specifications of a successful mobile application?
3. What are the medical features required in the Mobile application?
4. What are expected benefits of using the medical Mobile application?
5. What are the barriers for physicians that may limit the success rate of a medical-related mobile application?

By fulfilling the answers to these research questions, the study can be used as a guideline for Egyptian pharmaceutical companies to create their mobile application.

3.2. Research Design

The literature review showed that many studies used quantitative analysis for the sake of obtaining more comprehensive data (Dovaliene, Masiulyte, and Piligrimiene 2015). However, their findings are likely to be different if they have been evaluated in a specific industry. Therefore, the researcher conducted a descriptive analysis using a quantitative approach in the pharmaceutical industry trying to obtain more specific and relevant findings. (Pawar 2021) stated that customer engagement focuses on customer needs and creates value to engage with them. The value creation concept is switching from a product or firm-centric view to a personalized customer experience with networked, informed, empowered, and active customers, increasingly co-creating value with the organization, (Prahalad and Ramaswamy 2004). This research is based on a semi-structured quantitative survey method. The survey strategy is frequently used to answer who, what, where how much, and how many questions. It tends to be used for exploratory and descriptive research. Surveys are popular because they allow the collection of a large amount of data from a sizeable population in a highly economic way. In addition, the survey strategy is perceived as authoritative by people in general and is both comparatively easy to explain and understand. The researcher designed an online questionnaire and sent it to a purposive sample of Gynecologists in different Egyptian governorates. As advised by Suskie, (1996) questions were designed to be readable and hence clearly written, asking about only one subject (e.g., the effect of mobile apps on physicians' engagement), and short. A researcher would not want "respondents to answer what they think is the 'spirit' of the question rather than the actual question itself" (Suskie 1996).

3.3. Sampling Technique

Regarding the online survey, a sample was purposively chosen of 300 Egyptian Gynecology physicians of different types (e.g., educational background, work levels, work locations, income, and gender). The target group was selected from different regions in Egypt (e.g., Cairo, Alexandria, Tanta, etc.). The online survey was divided into seven sections; every part was employed to answer one of the research questions. The quantitative data was collected and analyzed via SPSS. Qualitative data results from this survey were limited (e.g., questions 15, 16, and 17), and were investigated to provide final recommendations and comments. The survey quantitative responses were analyzed to provide a descriptive interpretation; hence the research provided a prototype for the mobile application that needed a descriptive analysis for the components of the applications, benefits, degree of acceptance, successful factors, and the barriers that could hinder the usage of this application. The below sample photos illustrated the prototype demonstrated to physicians before answering the questionnaire.

Figure 1: Proposed Mobile App Prototype

It was highly important to use a prototype, not an active app to avoid the disengagement which has occurred with most apps as mentioned in the literature. On the pharmaceutical side, there was a clear example of 160 health and pharmaceutical Indian companies that failed to engage actively with people though they used twelve key digital parameters among them apps (FICCI 2021). Therefore, using a prototype will help the researcher avoid disengagement due to inappropriate app features besides considering essential suggestions obtained by physicians in the active form of the app. The survey is divided into seven parts. The first is to provide demographic information to allow the classification of the physicians. The second is to illustrate the communication channels between a physician and a pharmaceutical company. The third is to know the ability of the physician to use a mobile application. The fourth is to illustrate the mobile application's technical components and characteristics. The fifth is to define the benefits expected from using the intended mobile application. The sixth is to identify the barriers that hinder the usage of mobile applications. The seventh is to provide recommendations and methods to improve the suggested mobile application.

3.4. Reliability and Validity

The researcher modified a questionnaire developed for measuring the technical characteristics of a mobile application because it also tackled the specifications of a mobile application. However, this research as illustrated earlier focused on creating a new innovative mobile application prototype to enhance engagement with physicians. The advantage of utilizing such parts of previously conducted questionnaires from previous research rather than a new one designed from scratch- is that it largely tackles the same core topic as this research, but from a different perspective. Despite the reliability of questions taken from the questionnaires of previous research, the researcher tried to confirm the appropriateness of the questions to the research by

testing them with Cronbach's alpha. Statistics confirmed the reliability of all questions as per the following table:

Table 1: Reliability Statistics

Questions	Cronbach Alpha
Q5	8.33
Q6	8.54
Q7	7.88
Q8	8.82
Q9	8.87
Q10	9.12
Q11	8.58
Q12	8.43
Q13	8.99
Q14	8.43

Similarly, the validity of the measurement model was tested using SPSS that mainly tested Q9, Q10, Q13 in which the Likert scale was used the analysis revealed the cumulative % was 58.429 as per the following table

Table 2: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% Of Variance	Cumulative %	Total	% Of Variance	Cumulative %
1	1.753	58.429	58.429	1.753	58.429	58.429
2	.750	24.989	83.418			
3	.497	16.582	100.000			

Additionally, for the rest of the questions used in the survey, the researcher used face validity to measure and ensures that the questionnaire was answering the research questions. Face validity is established when an individual (and or researcher) who is an expert on the research subject reviewing the questionnaire (instrument) concludes that it measures the characteristic or trait of interest. Face validity has been conducted by three experts to ensure the validity of the questions to achieve the research goals.

4. Data Analysis and Findings

To answer the research questions, the researcher used a semi-structured questionnaire that covered all research questions. The findings are presented in the following part.

4.1. Demographic Classification

In the selected sample, the number of male respondents was 67%, while females were 33%. And this nearly matched the percentage of male-to-female gynecologists in

Egypt. As per Abbott's (2017) updated CRM report, the total number of gynecologists in Egypt in 2017 was about 8000 doctors divided into 4850 males with a percentage of 61%, and 3150 females with a percentage of 39%. Another reason that justified a higher response rate in males than females was that male doctors showed relatively more acceptance towards new technological tools than females, so most of the non-respondents were females. Geographic locations of all respondents 174 out of 300 responded with a response rate of 58%. (Figure 2) illustrates all the geographical details.
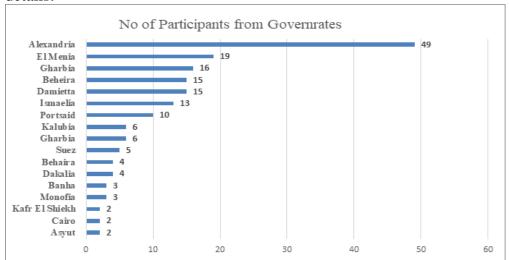

Figure 2: Number of Respondents and Their Locations

The geographical areas covered as per (Figure 2**Error! Reference source not found.**) were 23 territories and 15 governorates representing a high coverage rate. Nevertheless, a higher response rate was from the big cities such as Alexandria, El Menia, Damietta, and Ismailia; whereas in the peripheral and rural areas for instance Kafr El Shiekh, Etay El Baroud, Aga, etc, the response rate was relatively low, may be due to the poor technological access that they have there. Concerning the ages of physicians involved in this survey, Figure 3 shows the different ages of participants in the survey.
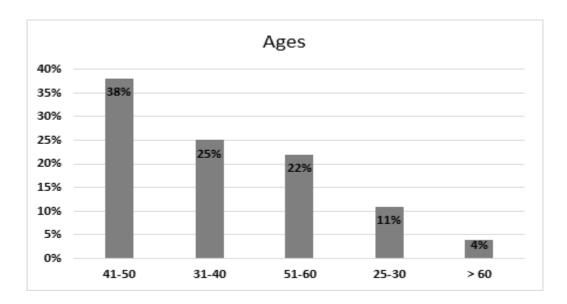
Figure 3: Different Ages of the Respondents in the Survey

The previous figure indicated that all different ages were involved in the survey. However, the highest response rate of 63% was from 31 to 50 years of age, which is the average age of most physicians in Egypt. Such a high response rate denoted the urgent need of all physicians of different ages for the important features provided by the app.

In addition, it was very important to categorize the participants based on their positions to develop a more meaningful analysis of the data. Therefore, the following figure illustrates the categories of respondents and their contributions.

Figure 4: Categories of Respondents Based on Their Positions

The previous figures demonstrate that the highest contributors were from the specialists with 41%, followed by the consultants with 36%. The university staff doctors' contribution was relatively low, 18%, and this was justified by the limited time they had. The lowest contribution, 5%, was for others who were neither specialists nor consultants, but junior doctors in the governmental hospitals. It is fair to say that the response rate in specialists and consultants was higher than university staff doctors due to their relatively higher number. However, this significantly high

percentage indicates that specialists and consultants were more in need to have an app than others.

4.2. Communication Channels with Pharmaceutical Companies

The different channels of communication with pharmaceutical companies are summarized in the table below.

Table 3: Communication Channels with Pharmaceutical Companies

Communication Channels	%
Medical Reps	37%
Emails	3%
Websites	8%
Telephone	2%
Conferences	10%
SMS	1%
Combination	39%

As per the previous table, the main communication channel between pharmaceutical companies and doctors is still the medical representatives, with the highest percentage of 37%. Some other channels can be used mainly by junior doctors who are not frequently covered by medical reps, like conferences 10% and websites 8%. Nevertheless, most doctors nowadays in Egypt rely on a combination of various channels, 39%, to improve and accelerate their communication with pharmaceutical companies.

4.3. Mobile Application Usage

The findings detected that most respondents used mobile applications with a percentage of 86%. Even those who did not use apps, 64% of them accepted to use applications would be professional ones. Most of the participants, 64%, reported that they used several kinds of apps on their smartphones, such as social, shopping, and reading apps. Fewer numbers of them use one kind of app, like a social media app, 25%, and a reading app, 11%. Hence, all previous statistics provided evidence for the general acceptance of the usage of an app for many physicians.

4.4. Technical and Medical Specifications of the App

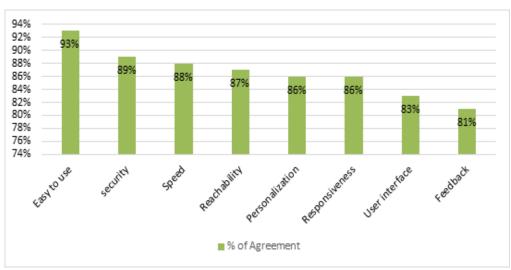The following figures put the technical features of the app recommended by physicians in descending order.

Figure 5: Technical Specifications of the App

By reviewing Figure 4, the ease of app usage was recommended by many participants, 93%. The security of data and confidentiality came in second with 89%. The speed of the app was endorsed by 88% of physicians, followed by reachability with 87%. Moreover, personalization and responsiveness had the same percentage 86%. Surprisingly, all mentioned technical features are highly recommended by most of the respondents (not less than 81%). However, unlike findings obtained from other research user interface was among the lowest features recommended with 83%. Moving to the medical features recommended by participants, they can be reviewed by the following figure
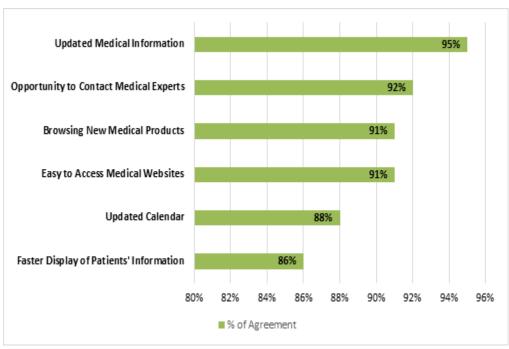

Figure 6: Medical Features of the Mobile Application

Based on the features in Figure 6, the most crucial feature triggering most doctors (95%) to get attracted to the app, was the availability of updated medical information. Similarly, the opportunity to contact medical experts was considered one of the highest recommended medical features with 92%. Additionally, some other medical features, such as easy-to-access medical websites and browsing new medical products, were perceived as important as other features. On the other hand, features such as an updated calendar and faster display of patient information were the lowest ones recommended by the physicians.

Once again, the acceptance rate toward all features was very high without any further suggestions, and this translated to the extent of the appropriateness of these features to the physicians' needs.

4.5. Satisfaction Level with the App

After demonstrating a prototype form of the app and asking about the drawn features in Figures 5 and 6, it was very important to ask physicians about the expected benefits obtained from using this app to measure the magnitude of satisfaction with these features. Satisfaction with app features directly impacts physicians' engagement as per the definition of mobile engagement in the literature. The following figure elaborates on these benefits.
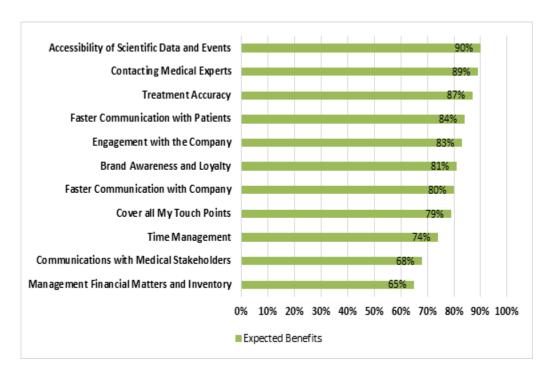

Figure 7: Expected Benefits of Using This App.

Based on the data in Figure 6, it can be noticed that the expected benefits were like the medical features recommended earlier by doctors. For example, the benefits of obtaining good access to medical websites and events matched with the recommended feature to deliver this benefit. The top five promising benefits that were expected to be obtained from the app by respondents were the following 1) Good accessibility to medical scientific data and events 90%. 2) Contacting medical experts 89%. 3)
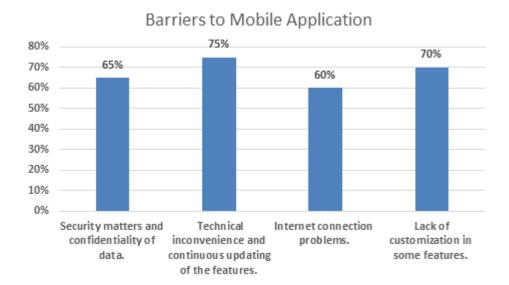
Treatment accuracy is 87%. 4) Faster communication with the patient 84%. 5) Increased engagement with the company by 83%. Generally, the perceived value for the rest of the other benefits was still relatively high (not less than 65%), which reflected the magnitude of acceptance of this app. To strictly verify the extent of satisfaction with the app, the researcher used various questions with the same meaning to make sure of the consistency of the answers. Interestingly, 44% of respondents answered that this app is exactly what they needed, and 61% described their first reaction to the app as very interesting. Afterward, the researcher directly asked about the overall satisfaction with the app the answers showed that 88% were satisfied with the proposed app. The participants were asked whether they recommend this app to another colleague. 66% of participants answered "yes" and provided several reasons for recommendations. here are samples of these answers: "It offers huge benefits for HCPs", "Very Interactive and very easy to use", "a new medical innovative tool", and "Facilitate accessibility on medical data". All these answers gave a very strong indicator of the level of satisfaction and interaction of the respondents with the survey. Unexpectedly, fewer answers have been obtained concerning barriers that might limit the success rate of apps with physicians. This could be justified by several reasons:

a. A prototype app was used for this survey, not an active one, this made it hard for the physicians to explore barriers. Most of them said that they cannot expect barriers before a real trial of an active app.
b. The recent advent and the novelty of mobile health apps with physicians resulted in a lack of experience with their usage as well as barriers that might prevent using them effectively.
c. The question asked about barriers was qualitative, not quantitative so most of the respondents skipped the answer to this question and the other qualitative questions asked in the survey.

4.6. Mobil Application Barriers

However, based on the survey, barriers to a medical mobile app mentioned by respondents were summarized as follows:

a. Security matters and confidentiality of data.
b. Technical inconvenience and continuous updating of the features.
c. Internet connection problems.
d. Lack of customization in some features.

Barriers to Mobile Application

Some suggestions have been added by respondents to enhance and improve the features of the app. Here are some samples of these suggestions; "It is better to add guidelines of reputable institutions in the medical data", "Please add links for the most important medical textbook", and "Add a report for patient's adverse events". Lastly, most of them said that they were very interested in this prototype and so enthusiastic to have the active one.

5. Discussion and Results

This study proposed five questions to understand the relationship between mobile apps and physician engagement, which leads to continuous intention to use the mobile application in the pharmaceutical field in the future. Based on the research findings, there was a significant acceptance of using a mobile health application from the physicians' side. These findings confirmed that physicians are digitally inclined. Results matched the recent statistical "We Are Social" report that pointed out how Egyptians were highly interactive with digital tools (We Are Social, 2017). A high response rate, despite considering the different demographic aspects (gender, age, positions, and locations), indicated the significance of the perceived value provided in the prototype app. The survey tried to rigorously investigate and quantify the successful characteristics of a mobile app that is likely to cause physician satisfaction and engagement with pharmaceutical companies. The researcher attempted to propose all app features that could cover different engagement aspects to empirically test the preferences and priorities of physicians with these features. Indeed, physicians' answers provided vital insights into which aspect of engagement might be affected by a mobile health app. Findings showed that the most affected attribute of engagement was the cognitive aspect (in terms of the ease of use of the app,93%), which was congruous with the online engagement definition mentioned earlier in the literature review. However, precise evaluation of each aspect of engagement can be done using an active app and a lengthy trial, however, in this study, a prototype had been used because of limited time. A high level of satisfaction with the app features expressed in various answers to the questionnaire encouraged leveraging this smart tool to enhance the engagement of the physicians and increase their satisfaction. These findings were matched with the valuable findings of (Kim, S.; Jen-Hui Wang, R.; Malthouse 2015).

Interestingly, the findings obtained from this survey matched and confirmed the findings from previous quantitative research in mobile applications. For example, based on the results of questionnaires, the most important item that triggered physicians to interact with the app was the presence of updated medical information, and this was consistent with the finding of (Lim et al. 2015), who confirmed that the need to know something is the most popular situation that triggered users to look for apps. Among the technical features of a mobile app, friendly usage and technical convenience were the highest attributes recommended by physicians to get engaged with the app. As concluded by the results of (Dovaliene, Masiulyte, and Piligrimiene 2015), technical convenience had a significant impact on cognitive engagement. In addition to fewer answers and justifications provided for the question asked about the barriers that might hinder the usage of the app, there was a possible explanation for that point based on the premise claimed by the researcher earlier in the literature. This premise was that most physicians, especially in rural areas, are not sufficiently aware of recent digital technologies like mobile applications. This premise was supported by two points in the findings of this research. First, most physicians who did not respond to the questionnaire as per feedback taken from the team who collected the results, justified their response rejection of the questionnaires as they were not interested in technology. Similarly, 6 HCPs out of 174 respondents stopped the questionnaire at

question 7 for the same reason. Second, most of the relatively low response rate was due to rural and peripheral, areas where respondents suffered from a lack of good technological accessibility as illustrated in Table 1. Conversely, most respondents who accepted to answer the questionnaire had at least the initial motive of previous knowledge of mobile applications. Thus, the premise of technological barriers claimed by the researcher was supported by the research findings. Of particular interest in this study, was the importance of physicians' feedback, why they recommended it to another colleague, as well as if they have additional suggestions to improve the features of the proposed app. Indeed, there were many important comments and suggestions provided by the physicians that indicated the huge magnitude of interaction with the novelty of the app. For example, some of them emphasized the multiple expected benefits that could be obtained by this app in terms of facilitating patient communication, treatment accuracy, and free access to medical data. They appreciated the novelty and interaction as well in the app, unlike other traditional tools. On the other hand, there were meaningful suggestions obtained that should be considered. These comments and suggestions affirmed the importance of understanding the essential features of the app required by the target segment before developing an active one.

Finally, based on the analysis, the researcher suggested a framework for understanding the relation between app features and engagement motivations aiming to leverage this innovative tool in the pharmaceutical field with physicians. The following figure illustrates the relationship between engagement and branded mobile apps.
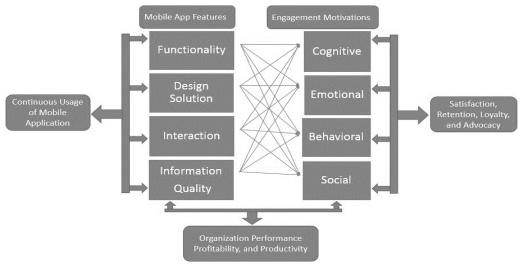

Figure 8: The Relationship between Mobile App Features and Engagement Motivations (Authors' work)

6. Contributions and Implications

While many pharmaceutical companies tried to engage their customers with specific digital tools including websites and some informational mobile apps. Little is known about the effectiveness of using more holistic approaches to the mobile app. The main contribution of this study was that it was the first study that responded to the observed

challenges in the Egyptian pharmaceutical field. Also, it provided initial insights about the technical and medical characteristics of a successful medical app to enhance the engagement of physicians, not only by providing them with brand updates but also by solving their pressure points. Given the features and benefits recommended by physicians, the findings of this research can be exploited by pharmaceutical companies to develop an innovative mobile health application. However, firms need to have a profound understanding of specific customers' perceived engaging and disengaging attributes of a specific mobile app before launching it, as well as close monitoring concerning the performance and feedback of the app. In addition, this research also can offer managerial implications that help in making a paradigm shift in the way of spending and promotion of brands. First, the findings of this research suggest a new way of thinking for pharmaceutical decision-makers. In terms of return-on-investment (ROI), if the proposed app will make a significant change in sales figures due to customer engagement, managers can invest in it and vice versa. Second, the app can help in reducing spending on traditional promotional tools like advertising which is not only costly but also lacks personalization and interaction with physicians. Thus, it represents a new strategy, especially for multinational companies trying to cope with the turbulence in the Egyptian economy.

Conclusion

There is strong evidence for the positive impact of a mobile application on physicians' engagement, particularly in cognitive aspects. The usage of a branded mobile health application in the pharmaceutical field represents a game changer for marketing communication. Physicians' engagement is an important concept that goes beyond purchase to gain customer satisfaction and loyalty. The engagement has a positive impact on overall organizational performance in terms of productivity and profitability and has four main aspects: cognitive, emotional, behavioral, and social. Mobile application among digital tools is the advanced face of engagement in the pharmaceutical field, and strongly affects the cognitive aspect of physicians. However, more attention should be given to the characteristics and design of mobile applications that impact physician engagement. In brief, a good perception of the application's usability leads to a positive effect on mobile app-related engagement. Moreover, it is highly essential to increase the perceived value of the app by providing appropriate and valuable content to keep the continuous usage and engagement with the app. Meanwhile, many barriers may limit the success rate of the app and should be effectively mitigated. Additionally, the results confirm the high level of familiarity that physicians have with mobile apps and recommend developing features of a medical app like those in social media and reading apps to facilitate familiarity with this app. Finally, a strong framework is developed by the researcher to elaborate the characteristics, benefits, barriers and required medical information to a mobile application to enhance physician engagement. There is a consensus that the usage of an innovative mobile app can improve engagement in terms of subsequent purchases, customer retention, loyalty, and satisfaction.

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