

Opportunity Exploitation in Mobile Health Entrepreneurship

Research-in-Progress

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Abstract

Mobile health poses an entrepreneurial opportunity for healthcare providers, especially physicians who run their clinics individually or jointly. Based on entrepreneurship literature, this study examines the adoption of mobile health technologies in terms of the factors that influence the decisions of physicians to exploit the opportunity. Compared with other health information technologies, the direct users of mobile health technologies are patients rather than clinicians. Thus this study discusses the important roles that demand-side factors related to patient-centered care play in physicians' adoption of mobile health technologies. To facilitate future empirical studies, it proposes a research model of mobile health entrepreneurship with testable research propositions. The framework fills the gap in existing technology adoption studies that typically do not differentiate technology adopters and end-users. It also contributes to the entrepreneurship literature that considers mainly the characteristics of entrepreneurs in the investigation of opportunity exploitation.

Keywords: mobile health entrepreneurship, opportunity exploitation, patient-centered care

Introduction

The use of mobile technology in healthcare, or mobile health, is gaining more and more momentum due to the high population penetration of cell phones and the power of ubiquitous computing (Istepanian, Laxminarayan & Pattichis, 2006; Kahn, Yang & Kahn, 2010). The recent results of Pew Internet and American Life Project suggest that most U.S. adults (85%) are cell phone owners, and more than half of them (53%) own smartphones (Fox & Duggan, 2012). Also, the findings reveal that 31% cell phone owners have used their devices to look for health information, in comparison to 17% two years before (Fox & Duggan, 2012).

Based on new-generation wireless and handheld technologies, mobile health has recently emerged as a new opportunity for the healthcare industry (Istepanian, Laxminarayan & Pattichis, 2006). Mobile health has huge potentials to provide informational support for medical interventions and improve disease-related health outcomes (Krishna & Balas, 2009). Through wireless networks, seamless connections can be established between provider-side systems and patient-side devices anytime and anywhere.

Various mobile health applications support and deliver medical interventions via wireless devices (Ritterband et al., 2006). For instance, text messaging appointment reminder applications are designed to reduce the missing rate of medical appointments by sending automatic reminder messages to patients' cellphones. For another example, mobile body monitoring systems allows healthcare providers to keep track of the vital signs of patients beyond the traditional reach of physicians to homes and workplaces.

According to the innovation diffusion theory, the impact of a new technology on human society largely depends on the extent of usage (Rogers, 1983). As an emerging innovation in the medical industry, mobile health will not reach its full potential unless it is utilized extensively. Unlike traditional medical technologies, mobile health applications mainly target patient end users (Demiris et al., 2008). Healthcare providers make the decisions to adopt such applications, but it is mainly the patients who directly use them. The diffusion of mobile health at this early stage largely depends on how willing health care providers are to try out the “patient-side” innovation when the majority are still watching.

Willing to explore the potentials of new technologies, the innovators or early adopters are generally less risk averse and more socially forward than later adopters (Rogers, 1983). They share a lot in common with entrepreneurs who are more capable of exploiting new business opportunities than others (Venkatraman, 1997). The majority of ambulatory medical care providers in the U.S. are owned by physicians (Cherry et al., 2008). They are in the position of exploiting the new business opportunities contained in mobile health.

Take text messaging appointment reminder for example, this mobile health application is as effective as phone call reminder to reduce no-shows at healthcare appointments (compared to no reminders and postal reminders), but is more cost-effective for its automaticity (Car et al., 2012; Leong et al., 2006). On the patient-side, mobile devices like cell phones have been recognized as emerging health intervention tools, especially for behavior changes such as smoking cessation, weight control, diabetes management and depression/anxieties relief (Eysenbach, 2011). The adoption of such innovative mobile health applications presents entrepreneurial opportunities for physician owners of healthcare providers to enhance business operations, service effectiveness and customer satisfaction.

Statement of Objective

Despite the potentials of mobile health applications to improve health conditions for patients and enhance healthcare services for physicians, the percentage of mobile health usage in the U.S. still remains low (Cutler, Feldman & Horwitz, 2005). A mobile health survey by PEW in 2012 shows that less than 10% of cell phone owners receive any text updates or alerts about health or medical issues, despite the fact that 80% of them regularly send and receive text messages (Fox & Duggan, 2012).

There are both patient-side and physician-side reasons that contribute to the low adoption of mobile health by healthcare providers. Nevertheless, patients and physicians have never been readier for mobile health. As aforementioned, cell phone ownership is widespread in the U.S. and the majority of people use smart phone nowadays. Meanwhile, the cost and access issues associated with mobile health applications are no longer the major barriers to their adoption.

With the mandatory electronic health records (EHR) initiative, clinics must install and operate EHR systems to meet the meaningful use requirement by 2016 (Blumenthal & Tavenner, 2010). Most of the EHR vendors provide mobile applications such as text messaging appointment reminder as optional functionalities for their customers. The additional cost of adopting such an optional application, if there is any, is marginal compared to the overall investment in an EHR system, yet the tangible and intangible benefits can be significant. Based on the required EHR infrastructure, it is not only feasible but also profitable for healthcare providers to open up new mobile health channels to their patients.

Nowadays, many physicians and other health professionals combine their traditional roles as care providers and new roles as business entrepreneurs (McCleary, Rivers & Schneller, 2006). Most studies explore the adoption of mobile health from technology diffusion perspective, and few have investigated it from the entrepreneurship perspective. The overlook of entrepreneurial aspect in the technology adoption process may hinder our complete understanding of the low adoption rate of mobile health.

This study aims to fill in the literature gap and explore the adoption of mobile health from the entrepreneurial point of view. The healthcare industry is the midst of change, and mobile health shows the great potential of improving healthcare quality in this wave of change. Some physicians embrace the opportunity but more are on the look. Therefore, the research question of this study is: what are the factors that make differences in the entrepreneurial propensity of physicians to adopt mobile health applications during the transformation of healthcare industry?

The major assumption of the research question is that there must be something quite unique about entrepreneurs, which gives them the propensity to make entrepreneurial endeavors in the midst of the change, chaos and confusion (Schumpeter, 1976; Stevenson, 1983). Traditional entrepreneurship studies mostly focus on the characteristics of entrepreneurs themselves. In addition, this study considers demand-side factors in the examination of healthcare providers' entrepreneurial orientation and motivation that drive the adoption mobile health applications.

Entrepreneurship Literature Background

In the current entrepreneurship literature, there are a few studies related to the healthcare industry, and most of them address the characteristics of healthcare professionals who start up their own practices. For instance, Marques et al. (2013) investigated the entrepreneurial orientation and motivation to start up new practices among a group of 367 healthcare professionals. They found that entrepreneurial healthcare professionals display a profile similar to the entrepreneurs in other industries.

Much fewer articles focus on the entrepreneurial activities in established healthcare institutions. One such study was conducted by McCline, Bhat and Baj (2000). They expanded Robinson et al.'s (1991) Entrepreneurial-Attitude Orientation instrument that measures perceived control, self-esteem, achievement, and innovativeness by including two new scales to measure attitude toward risk, and opportunity recognition. They found that the updated instrument can produce a correct classification rate of 82% among healthcare professionals between those who have explored entrepreneurial opportunities and those who have not.

On the other hand, McCleary, River and Schneller (2006) took environmental influences into account. Based on Green et al.'s (1980) and Moor and Coddington's (1999) work, they proposed a comprehensive diagnostic model to examine the internal and external drivers of healthcare entrepreneurship. This conceptual model provides a list of factors worth of further empirical investigations in the healthcare context. In the framework, there are three categories of factors that contribute to healthcare entrepreneurship: predisposing factors, enabling factors, and reinforcing factors:

- Predisposing factors: individual motivation (related to both intrinsic personality and the enthusiasm for a product or service) to pursue an entrepreneurial endeavor;
- Enabling factors: skills and resources necessary to perform a given behavior;
- Reinforcing factors: appropriate safeguards, responsibilities and consequences that confirm or support the entrepreneurial actions taken.

Few studies have examined mobile health entrepreneurship, and the current literature on general healthcare entrepreneurship does not provide appropriate frameworks for the investigation. First, there is a lack of demand/patient-side studies in healthcare entrepreneurship research. For better understanding of the relationship between potential value creation and entrepreneurial decisions, Priem, Li and Carr (2012) advocated that researchers take a systematic view that consider not only focal firms but also downstream product markets and consumers. Due to the unique potentials for advancing knowledge in entrepreneurship research, they called for more demand-side empirical studies.

The healthcare industry in the U.S. is in the transition to patient-centered care in which patients are no longer passive recipients of medical services (Stewart et al., 2003). Rather, healthcare consumerism continues to grow as better-informed and savvy patients become more active in dealing with service providers (Fottler & Ford, 2002). In particular, patient consumers want to have a say in how they are treated and cared for, and believe that their time and perspective should be valued as well (Hacker, 1997).

Mobile health applications have the potential for wide diffusion in the era of patient-centered care due to their capabilities to cater for personal needs anywhere and anytime (Demiris et al., 2008). Though healthcare providers make the adoption decisions on such applications, it is the patients who are primary end users. The diffusion of mobile health at this early stage largely depends on how willing health care providers are to try out this "patient-side" innovation. Nevertheless, many mobile health applications are not totally standalone systems, but based on electronic health records (EHR). For instance, most of EHR vendors provide the text messaging appointment reminder application as an optional functionality (Car et

al., 2012). The national policies regarding healthcare service delivery are undergoing major changes, especially the adoption of electronic health records (Shi & Singh, 2009).

More entrepreneurial opportunities emerge when there are dramatic changes in market and industry structure and customer perceptions and mood (Moore & Coddington, 1999). In the healthcare industry, information technology advances, patient-centered care movement, and governmental policy changes all contribute to the environment conducive to entrepreneurial opportunities in mobile health. However, there are few studies that investigate how environmental factors influence healthcare practitioners' decisions to exploit such opportunities.

Meanwhile, healthcare industry enjoys a relatively high level of customer loyalty compared with other industries. Unlike the shoppers of regular products and services, patients are generally unlikely to frequently change from one provider to another, unless they are referred to specialist for a particular health condition or unsatisfied with the services provided. Therefore, it is particularly necessary to take patient perspective into account in the investigation of mobile health adoption.

To fill in the literature gap, this study focus on demand-side factors associated with mobile health entrepreneurship. In particular, it will address the patient-related factors pertinent to the decisions of healthcare providers regarding the adoption of mobile health applications. There are two levels of factors related to the macro environment in terms of general healthcare industry movement and micro environment in terms of specific service population respectively. The multilevel conceptualization may provide yield a framework to understand mobile health entrepreneurship beyond the characteristics of healthcare providers themselves.

Research Propositions

According to Priem, Li and Carr (2012), there are two schools of thoughts in entrepreneurship literature on demand-side view: Kirzner's theory and Penrose's theory. Kirzner (1973; 1979; 1982) developed the concept of "entrepreneurial alertness" based on the assumption that entrepreneurship involves the discovery of both opportunities and the resources to exploit. In particular, the "unthought-of knowledge" about the market that an entrepreneur discovers gives him/her the advantages over others. On the other hand, Edith Penrose (1959) argued that demand discovery is a product of "imagination" rather than something obvious for everyone to see as it depends on both past knowledge/experiences and the resources available. In this sense, market demands cannot be directly discovered but they offer the opportunities for entrepreneurial imagination (Kor, Mahoney & Michael, 2007).

Synthesizing these two views, Priem, Li and Carr (2012) proposed the concept of opportunity signals, defined as "the general process whereby overt or latent consumer or market demands indicate to entrepreneurs' prospects for opportunity creation or discovery." (p. 354). The literature suggests two sources of opportunity signals. First, changing customer preferences may signal new demands that indicate potential opportunities for entrepreneurial actions (Yli-Renko et al., 2001; Yli-Renko & Janakiraman, 2008). In addition, a new customer-supplier relationship may be a sign for entrepreneurs to adjust their services (Coviello, Brodie & Munro, 2000; Kor et al., 2007).

Currently, healthcare reform in the United States calls for patient-centered care. Patient-centered care means "providing care that is respectful of and responsive to individual patient preferences, needs, and values, and ensuring that patient values guide all clinical decisions (IOM, 2001). It is a new service approach that empowers patients and their families to become active participants in the decision-making about their options for treatment (Reynolds, 2009). Researchers agree that patient-centered care can improve disease outcomes and patients' quality-of-life (Edgman-Levitan, Daley & Delbanco, 1993; Oates, Weston & Jordan, 2000).

Enabled by the advances of personal information and communication technologies (ICT), mobile health applications may greatly facilitate patient-centered care through allowing remote data capture and widespread access to relevant information (as users do not need to be physically linked to a network or restricted to a specific geographic location), and enhancing the communication and interaction between healthcare professionals and patients (Demiris et al., 2008). In this way, practitioners, patients, and their families can work in a partnership for the consideration of patients' needs and preferences in the decision-making regarding medical procedures.

If healthcare providers are open to patient-centered care and encourage patients to get actively involved in medical decision-making, they are more likely to explore new mobile health applications that support patient-centered care. Hence the first research proposition:

P1: Healthcare professionals' openness to patient-centered care is positively related to the decision to exploit the mobile health opportunity.

The radical shift in the way that health care services are delivered also causes the changes in patients' specific needs related to the use of mobile health applications. That is, the patient-centered care trend in the macro environment of healthcare industry inevitably has an impact on the individual preferences of patients in the micro environment of particular clinics. In particular, patients prefer to know more about their health conditions and medical treatments so as to have a say in intervention process. This translates to patient demand for mobile health applications as they cater to informational and communicative needs.

Entrepreneurs differ from others because they are sensitive to market signals (Kirzner, 1997). An empirical study by Choi and Shepherd (2004) shows that there is a positive relationship between entrepreneurs perceived knowledge of market demand and their decision to exploit opportunities. The knowledge of market demand builds upon the alertness of changing customer preferences as well as the close relationship with customers (Priem, Li & Carr, 2012). Therefore, entrepreneurial physicians who embrace patient-centered care are in a better position to understand patient needs for mobile health applications than traditional physicians.

Unlike traditional health information technologies used by physicians, mobile health applications directly target the needs of patients and make them better informed and better cared. In the transition of patient-physician relationship, some physicians are more aware of patient needs than others. To those physicians who are ready to embrace the changes, they are more likely to spot and exploit the mobile health opportunity than those who are not. Therefore, the second research proposition is as follows:

P2: Healthcare professionals' alertness to patient mobile health needs has a positive effect on the decision to exploit the mobile health opportunity.

Healthcare professionals who have a closer relationship with patients are also likely to have a better understanding of their patients' limitations. Unlike traditional health IT applications, mobile health applications target patients as end users rather than physicians. It is one thing for physicians to appreciate the advantages of mobile health applications over the traditional methods, and it is another to predict how well their patients will accept and use such applications. An application will not do anything good if it is not utilized.

Meanwhile, entrepreneurs inevitably face a lot of uncertainties in the process of new opportunity exploitation. Many healthcare providers do not have the luxury to experiment mobile health applications due to the sunk costs associated with hardware, software, training and so on. The success of an entrepreneurial endeavor largely depends on whether it is the right time to exploit an opportunity (Schoonhoven, Eisenhardt & Lyman, 1990).

From the demand-side view, decision makers need to know whether their target customers are ready for the new products and/or services. First of all, whether the patients in a target population are ready for mobile health or not depends on whether they have the access to mobile devices and wireless networks. For example, a patient must at least have a cell phone in order to receive a text message reminder sent by his/her healthcare provider. More advance mobile health applications may require patients to use other devices in addition to smart phones with high-speed Internet access. For example, a mobile body monitor is needed for monitoring a patient's health condition, such as heart beat rate and blood pressure.

In addition, patients need to be psychologically ready for the changes. Readiness for change has been defined as "the cognitive precursor to the behaviors of either resistance to or support for change efforts" (Armenakis, Harris & Mossholder 1993, pp. 681-682). Mobile health is still at the early stage of its development. Whether a patient is open to a mobile health application is a big uncertainty that the healthcare provider faces. For example, some senior patients may stick to a traditional method even when physicians told them that there is a better way. Whereas some patients do not want to try new things, others may be willing to use mobile health applications for convenience.

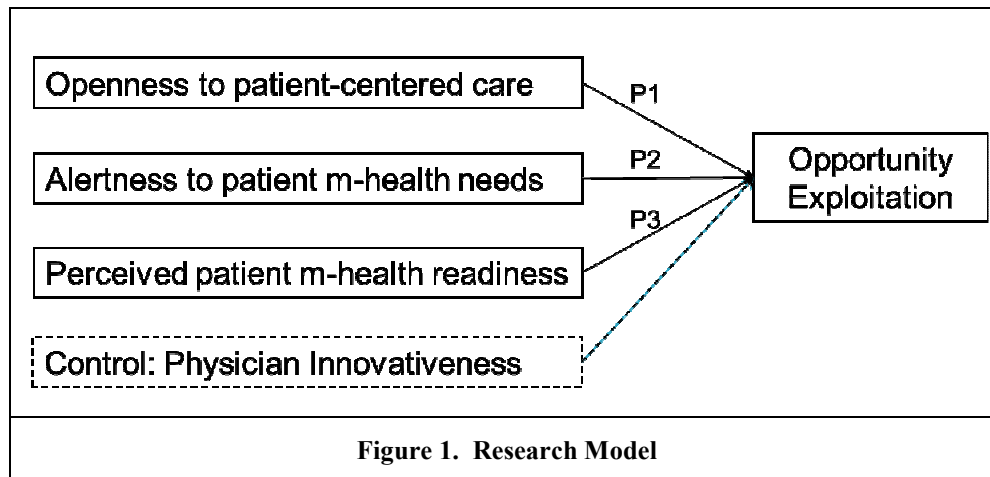
An entrepreneurial healthcare provider will evaluate the readiness of his/her patients' readiness before adopting mobile health technology. Therefore, the perceived readiness of the patients to use mobile health applications largely determine how likely healthcare providers are to explore the entrepreneurial opportunity. Here is the third research proposition:

P3: A healthcare provider's perceived patient mobile health readiness has a positive effect on the decision to exploit the entrepreneurial opportunity.

Demand-side factors are important, but it is the healthcare providers who will make the final adoption decisions of mobile health applications. Innovativeness is a critical personal trait of entrepreneurs. In his seminar work, Schumpeter (1934) described entrepreneurs as the individuals who attempted to "...reform or revolutionize the pattern of production by exploiting an invention...or untried technical possibility for producing a new commodity or producing an old one in a new way..." (p. 132).

As a personal characteristic, Innovativeness has been intensively examined in the entrepreneurship study (Marcati, Guido & Peluso, 2008). It is related to the cognitive style of individuals that largely determines how open they are to new ideas as well as how creative they are to make their own original decisions (Foxall, 1995; Hurt et al., 1977; Midgley & Dowling, 1978). The results of empirical studies strongly support the claim that innovative entrepreneurs who are more likely to be successful at growing businesses (Sexton & Bowman-Upton, 1986; Buttner & Gryskiewicz, 1993; Tuunanen & Hyrsky, 1997).

In a specific domain, innovative individuals have the tendency to be the early adopters of innovations (Goldsmith & Hofacker, 1991). Though demand-side factors are the main interest of this study, innovativeness as a salient personal characteristic needs to be taken into account to control for its effect on the decisions to adopt mobile health applications. Figure 1 shows the research model that indicates the relationships between demand-side factors and mobile health opportunity exploitation, controlled for the effect of physician innovativeness.



The demand-side variables in the model correspond to the predisposing, enabling and reinforcing factors aforementioned in McCleary, River and Schneller's (2006) framework, which concern the motivation, capability and potential consequence associated with opportunity exploitation respectively. Alertness to patient mobile health needs can be viewed as the predisposing factor that motivates physician entrepreneurs to adopt mobile health applications for the benefits of patient end-users. Perceived patient mobile health readiness is the enabling factor that gives physician entrepreneurs the assurance that patient end-users are capable of using mobile health applications once they are adopted. Finally, openness to patient-centered care is the reinforcing factor that encourages physician entrepreneurs to endorse mobile health as the adoption of relevant applications may enhance customer satisfaction and retention. In the era of patient-centered care, many patients seek more power and control, and health care providers who provide them the technological options for this sake will obtain competitive advantages over those who do not.

Discussions and Conclusion

Mobile health poses an entrepreneurial opportunity for healthcare providers, especially physicians who run their clinics individually or jointly. Based on entrepreneurship literature, this study examines the adoption of mobile health technologies in terms of the factors that influence the decisions of physicians to exploit the opportunity. Compared with other health information technologies, the direct users of mobile health technologies are patients rather than clinicians. Thus this study discusses the important roles that demand-side factors related to patient-centered care play in physicians' adoption of mobile health technologies.

To facilitate future empirical research, this study proposes a research model of mobile health entrepreneurship with testable research propositions. The conceptualization takes factors at different levels into account. Physician innovativeness is the personal characteristic that affects opportunity exploitation at the level of individual entrepreneurs. Alertness to patient mobile health needs and perceived patient mobile health readiness address the demand-side factors related to the target patient population that each clinic serves. Openness to patient-centered care concerns the new trend in the health care industry. The inclusion of various factors from the aspects of service providers, technology end-users and industrial environment provides a multi-facet lens to understand mobile health entrepreneurship.

The research model proposed fills the gap in existing technology adoption studies that typically do not differentiate technology adopters and end-users. It also contributes to the entrepreneurship literature that considers mainly the characteristics of entrepreneurs in the investigation of opportunity exploitation. Reflecting the nature of mobile health opportunity exploitation, the framework provides useful guidance on the design of empirical studies to investigate the phenomenon.

In theory, the entrepreneurial, demand-side and industry factors are at different levels in terms of medical practitioner, patient population, and practice environment respectively. In an empirical study, however, they can all be operationalized as the perceptions of individual entrepreneurs. In the end, it is mostly up to the owners of clinics to make the decision on whether to exploit the mobile health opportunity based on such perceptions. Thus, measurement items of the constructs in the research model can be adapted from existing survey-based studies on entrepreneurial opportunity exploitation and technology adoption.

In conclusion, this study discusses mobile health entrepreneurship and examines the factors that may influence the opportunity exploitation in question. For the adoption of mobile health technologies, physicians as entrepreneurs are the decision-makers but the real demand is from patients as end-users. Compared with most existing technology adoption and entrepreneurial studies, this study emphasizes the importance of demand-side factors in the conceptualization of a research model. The framework provides an abstraction of mobile health entrepreneurship as well as some guidelines for future empirical research.

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