A STUDY OF INNOVATION DIFFUSION OF ELECTRONIC PATIENT RECORDS FOR SUPPORTING MEDICAL PRACTICE

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Abstract: This paper proposes a study on the underlying factors affecting the adoption, routinization and infusion of electronic patient record in the clinics of Hong Kong. We suggest using a focus group to identify the potential antecedents for the three stages of innovation diffusion (adoption, routinization and infusion). Then a theoretical framework based on the antecedents and their impact on innovation diffusion will be layout. It will be verified upon a survey sending to the medical practitioners in Hong Kong.

1 INTRODUCTION

We are well into the digital information age. Digital communications and information resources affect almost every aspect of our lives – business, finance, education, government and entertainment. Clinical practice is highly information intensive, but it is one of the few areas of our society where computer access to information has had only limited success.

Most IT practices in health care by physicians have been applied to office management in areas related to accounting of the business, and the scheduling on patients' booking. The adoption of Electronic Patient Records (EPRs) - medical computerized systems that organize the information on a patient's treatment, diagnosis and results from laboratory and other testing – appears limited. The possibility of instant, universal access to up-to-the-minute, accurate patient information is a goal that is actively sought throughout health services organizations. It is increasingly recognized that EPRs bring along the quality benefits of electronic documentation and viewing, prescription and test ordering, care management reminders, and messaging, among other medical systems. Thus, EPRs are important tools for improving patient safety and quality of care, especially by promoting the practice of evidence-based medicine.

Despite this potential for quality improvement, however, few physician practices use EPRs. Nevertheless, interest in EPRs is substantial. A recent survey in 2005 indicated that among 1061 respondents to a random sampling of members of the Medical Group Management Association in US, one in five said they were using an EPR and 40 percent of those without one told they plan to acquire the technology within the next two year. Clearly, the EPR is of growing importance for many physician practices.

In face of adoption barriers, there has been much research outlining the healthcare system's move towards EPRs for example (Ross and Lin, 2003; Tachinardi et al. 2001; Van't Riet et al., 2001). However, most of these studies are US based. This study attempts to investigate the facilitating and inhibiting factors that affect health care practitioners to adopt EPRs in Hong Kong; to understand the health care practitioners on their attitude and knowledge towards EPRs in health care practice and to explore the existing utilization and future intention on EPRs in private sector of the health care industry.

2 THEORETICAL FRAMEWORK

To predict acceptance of technology, a number of intention-based theories have evolved, i.e. the theory of planned behavior (Ajzen, 1991), theory of reasoned action (Fishbein and Ajzen, 1975) and the technology acceptance model (Davis, 1989; Davis et al. 1989). According to these theories, user beliefs and attitudes about IT influence adoption and usage behaviours. With few exceptions, however, most studies using these theories have ignored the temporal dimension and the antecedent variables

that may affect beliefs and attitudes at different stages of the adoption process. Those that have, stress its importance and the need for further study. For example, Venkatesh and Davis (2000) report that the same variables had different effects at different stages of the adoption process, and Fichman and Kemerer (1999) emphasize the need to capture the time of deployment instead of, or in addition to, time of acquisition as the bases for diffusion modeling, driven the observed pattern of cumulative adoptions varies depending on which event in the assimilation process (i.e. acquisition or deployment) is treated as the adoption event. Further, Agarwal and Prasad (1997) support this view that intention-based models may not explain user adoption behavior at the different stages of the adoption process.

Based on this evidence, the current study considers the Rogers' (1995) stage-based diffusion of innovation model to be the most appropriate to guide its investigation of the formation and change over time of user attitudes and subsequent acquisition and deployment decisions.

Everett Rogers defines diffusion as "the process by which an innovation is communicated through certain channels over time among the members of a social system" (Rogers, 1983, p.5) where innovation has been described as an idea, material, or artifact perceived to be new by the relevant unit of adoption (Zaltman, Duncan, and Holbek, 1973). There are two types of communication channels have been influential in diffusing technology – mass media channels and interpersonal channels. Mass media are radio, television, newspapers, and so on, which enable a source of one or a few individuals to reach an audience of many. And interpersonal channels are face to face, telephone, and personal networks. In his review of innovation diffusion, Rogers (1995) reported mass media channels were most influential in introducing potential adopters to an innovation, whereas interpersonal channels were more influential in subsequent stages.

Innovation diffusion research postulates that many different outcomes are of interest in technology adoption, including the initial adoption, the subsequent routinization and infusion of the innovation. This view is consistent with the stage model as proposed and empirically validated by Cooper and Zmud (1990). These stages of implementation (as shown below) are not necessarily sequential, and should be considered activities that may occur in parallel (Cooper & Zmud 1990):

- Initiation – Analyzing organizational needs and potential IT solutions
- Adoption – Negotiating to get organizational backing for IT implementation
- Adaptation – Developing, installing and maintaining the IT application, revising/developing organizational procedures, training of end-users
- Acceptance – Inducing the organizational members to use the technology
- Routinization – Encouraging the use of the IT application as a normal activity
- Infusion – Effective use of the technology results in the intended benefits (increased organizational effectiveness) of the IT being obtained.

Initiation, adoption and adaptation require both managerial and end-user input and buy-in, and the remaining three stages require necessary dialogues between organizational members for progression through each stage to occur. Additionally, it is widely recognized that successful implementation depends upon gaining organizational members', targeted as end-users of the innovation, appropriate and committed use of an innovation (Leonard-Barton and Deschamps 1988; Klein and Sorra 1996). It is through the development of a critical mass of individual routinization and infusion that eventual organizational infusion of an innovation is achieved (Tornatzky and Fleischer 1990; Klein and Sorra 1996), and organizational benefits might then be obtained.

Based on the situation in Hong Kong's clinical practices, most private clinics are either solo practices or partnerships of a few medical doctors that are small in size. Thus the respective process on EPR initiation, adaptation and acceptance are rather straight forward. In this regard, we would like to focus our study on the other three different stages: adoption, routinization and infusion on EPRs in supporting medical practice.

The measure on adoption is based on whether the organization has implemented any EPR. Routinization is measured by the usage of the EPR according to the daily tasks of a clinic. Infusion is measured by the extent of the EPR being integrated with other internal systems within the clinic or external systems outside the clinic. Moreover, the antecedents on these three essential stages will be identified.

3   DATA COLLECTION

A trivial approach to study different stages of a clinic would be longitudinal tracing, but this takes years on the data collection. Nevertheless, we assume different clinics have different extents on the diffusion stages. Some earlier adopters would be more focused on infusion at current moment while some late adopters are still struggling with the routinization of the EPR practice. Thus a cross sectional approach would be adequate for understanding on the diffusion situation of EPRs in Hong Kong. Moreover, we suppose most clinics are not purely on a single stage of the EPR diffusion, they would be 70% adopting on the EPR, with 50% routinizing the EPR practice and 5% infusing the EPR with their daily tasks. In this regard, cross-sectional approach would make more sense to have the overall picture.

Data for this study will be firstly gathered in a focus group interview from which the possible antecedents and measurements on adoption, routinization, and infusion will be determined. A structured questionnaire will be constructed based on the literature with amendments from the focus group to fit the Hong Kong medical practice. The questionnaire will be pilot tested, revised if necessary, and then sent extensively by mail to private sector doctors. From the survey, the respondent (the principle doctor who hosts the clinic) will be asked about the current usage on EPR which consists of the three dimensions on the extent of adoption, routinization, and infusion. The respondent will then evaluate the importance of some pre-defined antecedents on the three respective dimensions of usage. Some open-ended questions will be supplemented any other antecedents not to be included.

The Hong Kong Medical Association (HKMA) has available to the public on the Internet a directory of its members by clinical specialty and geographic location. This list includes essentially all registered private practice doctors in Hong Kong, estimated at about 4,000 in total.

As the data collection instrument will be a mailed questionnaire, we will randomly sample 2,000 doctors listed in the HKMA directory. For the replied respondent, we will mail a $50 Park'N shop couple (for the first 400 respondents) and a summary of our finding as a reward.

4   METHODOLOGY

We shall obtain the means, standard deviations, and bivariate correlations for all data used to analyze predictions of all variables. We intend to perform a factor analysis on the reasons for adopting new technologies as well as those for not adopting these technologies. A multiple ordinary least squares (OLS) regression analysis will be the primary statistical technique to be employed in our study. We shall control for complementarities in the variables and also check whether control variables will have any significant influence on the data.

5   CONCLUSIONS

With our results on the survey, we will understand the facilitating and inhibiting factors as well as the existing practice of EPRs in Hong Kong private clinic. This study will establish a theoretical examination on the diffusion model and inject the managerial insight on how to utilize the EPRs to a greater extent.

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