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Abstract

Information technology systems in healthcare have existed for several years and gained relatively widespread usage. Therefore, factors of IT adoption have largely been discussed in literatures in order to improve the efficiency and effectiveness of using systems. However, existing frameworks are failing to include an important aspect, the technostress undertaken by physicians. Our research idea is that IT adoption in a clinical environment depends on five different dimensions of technostress (e.g. work overload, techno-invasion and etc. al) of physicians through PU and PEOU based on TAM model.

This paper first made comprehensive literature review to the content about technostress and different theories related to adoption, then put forward five hypotheses based on the TAM Model, which has been widely perceived by scholars. As for the model construction and data collection, the research intends to use a 5-point Likert scale and select physicians at different levels from 7 representative hospitals' basic units located in Shaanxi province. Based on all above, we expect the research could offer a subtle theoretical understanding about the nature of technostress and their impact on adoption by physicians. On the practical front, the research has implications for managers intending to design managerial procedures or rules for the purpose of improving the adoption.

Key words: Technostress Electronic healthcare systems TAM

1 INTRODUCTION

Nowadays, with the concept of healthcare being obtained more and more concerns, IT-based healthcare systems have been invented and deployed in different levels of hospitals gradually in order to offer different kinds of patients personalized therapies scientifically and conveniently. As a result, the focus on the adoption of healthcare systems by physicians is becoming popular in terms of improving the efficiency and effectiveness of using systems. According to the prior research and TAM theory, we could get the conclusion that there are two dimensions influencing the adoption of electronic systems: perceived usefulness (PU) and perceived ease of use (PEOU).

Rapid information technology reform have led most organizations to downsize their workforce and outsource all but some core functions. Organizations, including profit and nonprofit ones, are adopting new and flat management structures that result in a downward transfer of management responsibilities and decentralized control. These rapid changes have resulted in a variety of potential technostress, such as work overload, techno-invasion, techno-uncertainty and et al. (Tarafdar et al. (2007)).And at the same time, the academic research model proposed that certain technology characteristics are related to technostress, such as work overload, role ambiguity, techno-invasion and so on(Ayyagari, R., Grover et al.(2011)). In conclusion, we define technostress as a reflection of one's fear, tenseness and anxiety when he or she is learning and using computer technology directly or indirectly, that ultimately ends in psychological and emotional repulsion and prevents him or her from further learning or using computer technology (Wang, K.,Shu,Q.,&Tu,Q.(2008)).The technostress experienced by physicians today have outpaced our understanding of their implications for work quality in the totally new environments.

Based on all above, on the one hand, there is no doubt that physicians in different hospitals are suffering technostress especially in recent years. On the other hand, we have seen substantial amount of researches on the topic about adoption of electronic systems from different perspectives. Comparing to the prior research related to technostress, it is urgent and necessary to study how the different dimensions of technostress undertaken by physicians influence the adoption of IT-based healthcare systems under this electronic era (Beaudry,A.,Pinsonneault, A. (2005)). So what we really concentrate on is how every component of technostress affects the adoptions of healthcare systems by the physicians individually through PEOU and PU based on the TAM Model?

2   LITERATURE REVIEW

Our literature review basically focused on the research of technostress and theories related to adoption. The term technostress was first raised by Brod (1984),who defined technostress as "a modern disease of adaptation caused by an inability to cope with the new computer technologies in a healthy manner." Weil and Rosen (1997) expanded the definition of technostress to "any negative impact on attitudes, thoughts, behaviors or psychology caused directly or indirectly by technology." However, the common components of technostress reported by researchers are divided into five dimensions: work overload, techno-invasion, techno-uncertainty, techno-threat and work complexity (Tarafdar et al. (2007)).Work overload means demanding employees to work a lot even more than they could do at the required time and effort. Techno-invasion describes situations where people are exposed to endless tasks even at home or other leisure time, which means office work need to be done at all kinds of hours because of the availability to communicating with each other. Techno-uncertainty is associated with the situation where people have to keep learning new knowledge and skills because of the rapid and continuing updating of the systems. Techno-threat relates to the situation where people feel threatened about losing their job and being replaced by others who are better at operating electronic systems. Work complexity shows that it is so difficult for employees to understand and use systems

because of the intrinsic properties of IT-based systems which are so complex. As a result, employees have to tackle a variety of intimidating jargons, functions and applications, consequently feel stressed.

Besides of the various definitions of technostress, there are some classical theories during the development of adoption of IT-based systems, such as Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), Innovation Diffusion Theory (IDT) and Technology Acceptance Model (TAM). All the theories above try to analyze the process of accepting IT-based systems by end users from perspective of technology and the psychological activities. The first theory is widely used in social psychology field, which mainly analyzes how the attitude influences people's behavior consciously and focuses on the attitude formation based on the cognitive information. Its basic hypothesis is almost everyone is so rational that would take all kinds of information into consideration and think of the significance and outcomes of behavior before taking measures (Shumaila Y. et al. (2010)). As TRA ignored conditions based on behaviors people have to think of and the ability of self-control, TPB added the factor named perceived behavioral control into the model, which relates to the level of complexity to perform some certain behaviors, deciding behavior intension combining with attitude and subjective norms (Lee, M. C. (2009)). IDT defined various conceptions used to research adoption of electronic systems by users (E. M. Rogers(1995)).It holds the view that there are three factors, including technical characteristics, characteristics of potential users and external environments, which influence the adoption of IT-based systems significantly. Last but not least, Davis modified TRA and put forward the TAM, which provides a theoretical basis for researching the effect of various factors on the adoption by individuals (Davis,F.D.(1985)).TAM holds the opinion that there are two core factors, including perceived usefulness (PU) and perceived ease of use (PEOU). The former one means how users feel the efficiency at works by using IT-based systems; while the latter one identifies the assessment to systems by users from perspective of ease of use. And also, all of them were influenced by external factors. That is to say, only the external environment matches the personal characteristic, can one really feel comfortable and improve the usage of systems in their routine work. We can see the theoretical model shown as below (Thong, J. Y. L.(2011)).
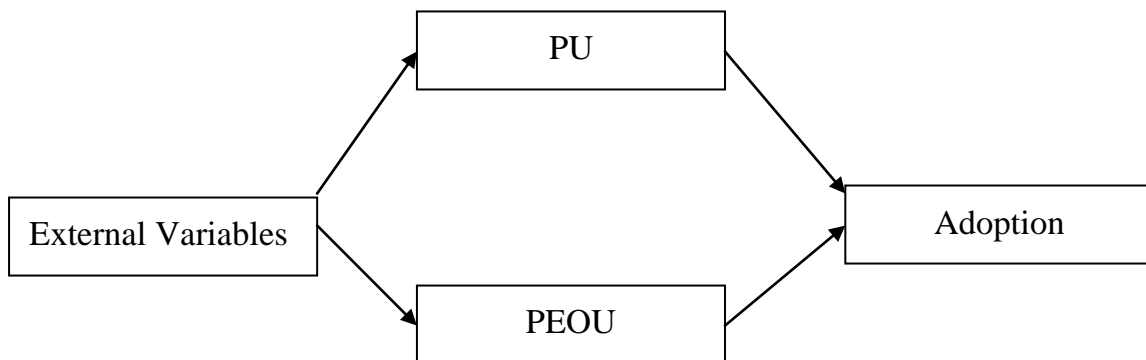

Figure 1   The Technology Acceptance Model

Nowadays, the use of IT-based healthcare systems to support management and operations in the medical industry has become popular because it provided great convenience for both physicians and patients. For example, if a patient stayed in the hospital before, the details about him could be automatically drawn from the medical systems. Every interaction between the physician and the patient is an opportunity to refine knowledge about patients and to further build a better relationship. As a result, improving the adoption by physicians is becoming more and more imperative so that providing outstanding and personalized therapy could be realized with high probability under this circumstance.

Considering the advantages and disadvantages of currently existing theories, we used TAM Model as a framework in this research, which has been widely perceived in the adoption field, to explain how

the external factors influence the adoption of electronic healthcare systems by physicians. TAM Model gave the clear train of thought, which the external factor could make impact on the adoption through PU or PEOU. It was because its special angle making external factors and adoption together that made itself a more accurate theory which exposed the secret of how the adoption of IT-based system was restricted. Under the guidance of TAM Model, many investigations researched what on earth influence the adoption in different fields. And after reading a series of researches, they got some conclusions such as role ambiguity and role confliction. The research studied by Srivastava etc.(Srivastava, Chandra and Shirish(2015)) confirmed the importance of technostress, showing that the efficiency and motivation of work will sharply decrease because of technostress, and consequently gave rise to the low performance. Beyond all that, some researchers have made a thorough inquiry into the relationship between external factors and adoption (McGowan etc. (2012)), while few researchers made in-depth researches about the relationship between different dimensions of tecnostress and adoption individually under the circumstances which technostress has been put into the higher position than ever before. Therefore, after investigating the nature of technostress, we continue to study the correlation between it and adoption based on TAM and academic papers related to it (Thong, J. Y. L.(2011)).

From the literature in the field of technostress and adoption of the electronic system, we can see that research scholars' opinions on it are inconsistent. Different scholars hold different views and opinions. So what's the relationship between different technostress and adoptions of electronic healthcare systems respectively? Consequently, the question is investigated in this paper.

3   HYPOTHESES DEVELOPMENT

Reviewing the prior researches related to technostress with deep analysis of TAM Model, we found that there are mainly five dimensions, including work overload, techno-invasion, techno-uncertainty, techno-threat and work complexity, which compose the technostress. As the prior research has viewed the technostress as a whole and researched the topic on the relationship between it and other items, here, we investigate how the every single component makes impact on the adoption of the electronic systems by physicians through PEOU or PU based on TAM Model. It will be theoretically and practically interesting to understand how each of these five components of technostress, individually, influences the adoption of the electronic systems through PU and PEOU.

As more and more electronic healthcare systems have been deployed in hospitals, the physicians get access to information at a quicker speed, therefore, it leads to problems of information overload and multitasking. Work overload, the first component of technostress, occurs when patients tend to demand more tasks than the physicians can effectively deal with at the limited time. Consequently, they might feel dissatisfied as they feel their control over IT-based systems is diminishing due to information overload. As a result, physicians will feel that the level of PEOU of healthcare systems would be greatly decreased, in case of the adoption of the healthcare systems by physicians will also be decreased as well. Thus, we hypothesized,

H1: Work overload is negatively associated with PEOU by physicians;

Techno-invasion, the second component of technostress, stresses the physicians as they don't have enough free time for relaxing even going off work and out of the hospitals. For example,when the physicians are at home using computers, they probably feel stressed once receiving the medical information from patients through IT-based healrhcare information systems.Confronting this situation, almost all of the physicians would like to escape from working settings with electronic systems rather than admitting the usefulness of systems and receiving them. The physicians probably question the usefulness of the systems, for which bother their normal life and influence the leisure time to great extent. Thus, we have

H2: Techno-invasion is negatively associated with PU by physicians;

Techno-uncertainty, the third factor resulting in the technostress, stresses the physicians as they don't know what the exact job they should do and what tasks they are responsible for especially when the systems are updated, in case of their inability to cope with the requirements of the IT-based systems (Tarafdar et al. 2007; Tarafdar et al. 2010).They are threatened due to the lack of powerful learning skills, diminishing the level of PEOU and PU. Consequently, both the level of PEOU and PU will be decreased with higher uncertainty, limiting the effectiveness and efficiency of using IT-based healthcare systems. Thus, we have

H3a: Techno-uncertainty is negatively associated with PEOU by physicians;

H3b: Techno-uncertainty is negatively associated with PU by physicians;

Techno-threat, the forth content of technostress, threatens the physicians due to the fear of being replaced by colleagues who are better at coping with the learning requirements and understanding of new gadgets and computer devices, diminishing their control over work and technology as well as impacting the level of PEOU and PU. This makes physicians reject accepting the IT-based systems and deny the functionality of the systems, let alone admit the concept of PEOU, thus losing their willingness to use the IT-based healthcare systems (Weil & Rosen 1997). As a result, the adoption of IT-based healthcare systems by physicians would decrease as well (Chilton et al. 2005; Tarafdar et al. 2007). Thus, we have,

H4a: Techno-threat is negatively associated with PEOU by physicians;

H4b: Techno-threat is negatively associated with PU by physicians;

Work complexity, the final content of technostress, intimidates the physicians due to time and skill required to learn how to use the electronic healthcare systems. The continuously updated systems demands the users, that is physicians, not only cope with systems crashes, process data sets about patients, but also deal with all kinds of technological problems ,which threatening the physicians of lesser control over the healthcare systems and decreasing the adoption of systems by them consequently. Such a work complexity will also result in the physicians spending a lot of time learning about new skills. Because of this, physicians may reduce the level of PEOU because of the experienced confusion and frustration, leading to lesser adoption of healthcare systems, while there will not too much volatility to the level of PU. (Nelson & Kletke (1990); Tarafdar et al. (2010)) Hence, we have,

H5: Work complexity is negatively associated with PEOU by physicians;

Based on the prior and authentic research related to TAM (Shi, B. (2013)), we could get the similar conclusion. When the level of PEOU is high, the physicians prefer to using IT-based systems, that is to say, the level of adoption would increase correspondingly; by the same taken, when the physicians perceive high level of usefulness (PU), they are willing to work with the help of electronic systems. Hence, hypotheses h6 and H7 were put forward as below:

H6: PEOU is positively associated with adoption by physicians;

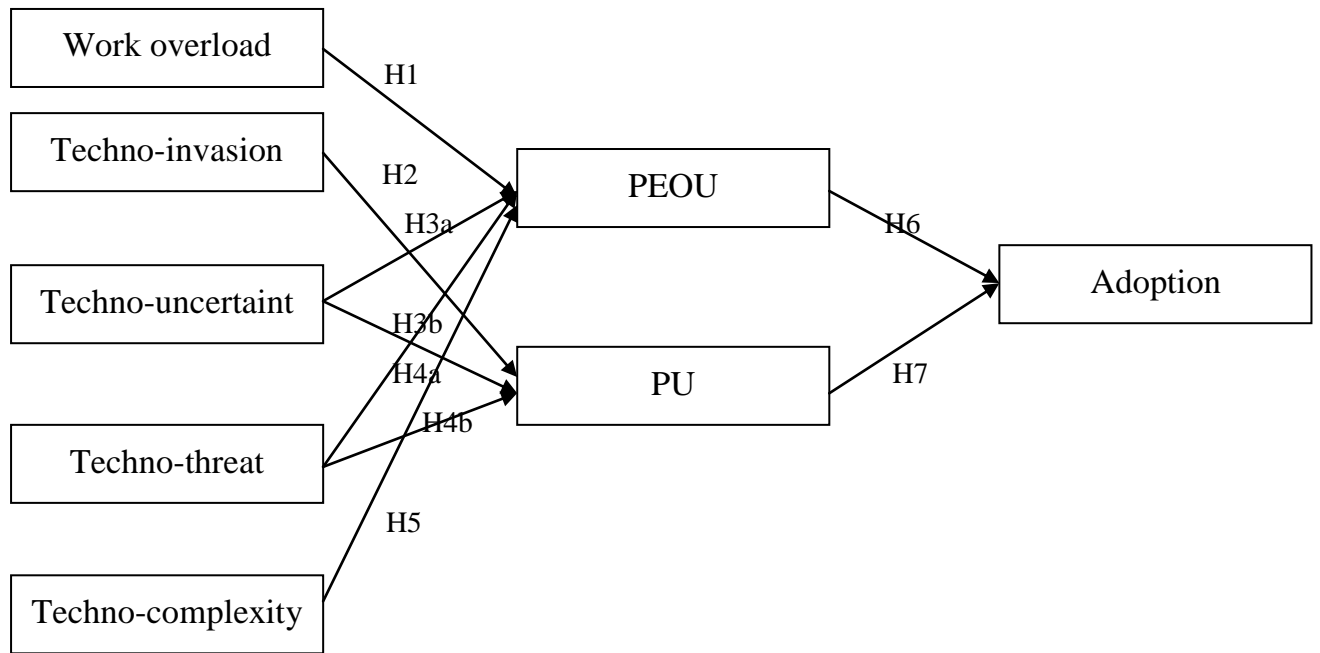H7: PU is positively associated with adoption by physicians;

Figure 2   The Theoretical Hypotheses Model

4   METHODOLOGY

In order to ensure the validity and reliability of measurement tools, this study will use the maturity scale which was prominent at home and abroad to formulate the questionnaire. To measure the items, we intend to use a 5-point Likert scale.

After designing the questionnaire in this study, we are willing to take experts' opinions in order to measure the items of questionnaire accurately and rationally. First, we would like to select 50 physicians for preliminary investigation before the formal investigation. In preliminary investigation, through validity and reliability analysis, the table was modified and perfected for a formal large-scale survey. In the formal research we would like to select 7 representative hospitals named The Second Affiliated Hospital of Xi'an Jiaotong University, Xijing Hospital,The fourth people's hospital and et al. in Shaanxi province with the method of stratified sampling, to which 500 questionnaires will be sent by friends working in these hospitals, some of them will be sent to physicians by E-mail.

Based on the samples collected above, we would like to analyze the samples further by means of AMOS with the method of SEM in order to search the concrete relationship between dependent variable and independent variables.

5   LIMITATION AND PROSPECT IN FUTURE

This study strived to achieve a full and accurate result which was about the relationship between different technostress and adoption to electronic healthcare system by means of reflecting on the research ideas, constructing theoretical framework and establishing the hypotheses. Due to the lack of time, experience and resources, there were still some limitations.

First, this study only investigated the five components of technostress, ignoring the demographic variables which may have some influence on the variable researched. Therefore, these demographic

variables should be added to the study in the future research; Second, it was the limitations of research conditions that influenced the samples, which based only on the limited hospitals located in Shaanxi province, effecting the universality of the research results to the extent.

In the view of the limitations in this study, future research could be further expanded from the following aspects.

First, we intend to do the detailed research which take the demographic variables into consideration, such as gender, marriage, educational degree, length of working hours and functional department of physicians, which may make different impacts on the adoption;

And at the same time, we should increase the samples of hospitals in other regions and make further analysis from more completed perspective because the current samples which only based on the hospitals located in Shaanxi province have seriously regional characteristics due to the limitations of time, capacity and other factors.

Last but not least, this research could explore the quantitative relationship between five dimensions of technostress and adoptions. Is the relationship between them linear, quadratic or other kinds of functional shape?

6   CONTRIBUTION

Although there are several limitations related to the research topic, we couldn't deny that the study also made some significant contributions, including first, comparing to the prior research related to technostress, we theorized and tested the relationship between external factors which were part of the technostress and adoption of electronic healthcare systems by physicians individually ; In addition, our research was based on the so pivotal and popular background: IT-based healthcare systems, which involved less in the prior research; On the practical front, the result of the study would be useful for managers working in the hospitals to create the appropriate external environment for the purpose of raising the level of adoption by physicians as well as improving their working satisfaction and efficiency.

References

Ayyagari, R., Grover, V., & Purvis, R. (2011). Technostress: technological antecedents and implications. MIS quarterly, 35(4), 831-858.

Beaudry, A., and Pinsonneault, A.(2005). Understanding user responses to information technology: A coping model of user adaption.MIS Quarterly, 29(3),494-524.

Brod, C. (1984). Technostress: the human cost of the computer revolution. Readings, MA: Addison-Wesley.

Caplan, R. P. (1994). Stress, anxiety and depression in hospital consultants, general practitioners, and senior health service managers. Bmj, 309(6964), 1261-1263.

Chilton, M. A., Hardgrave, B. C. and Armstrong, D. J.(2005). Person-job cognitive style fit for software developers: The effect on strain and performance. Journal of Management Information Systems, 22, 193-226.

Davis, F. D. (1985). A technology acceptance model for empirically testing new end-user information systems : theory and results. Mit Sloan School of Management.

E. M. Rogers. Diffusion of Innovations [M]. New York:The Free Press, 1995

Hendrix, W. H., Summers, T. P., Leap, T. L., & Steel, R. P. (1995). Antecedents and organizational effectiveness outcomes of employee stress and health. Occupational stress: A handbook, 73, 92.

Lazarus, F., Coquillart, S., & Jancene, P. (1993). Interactive axial deformations (pp. 241-254). Springer Berlin Heidelberg.

Lee, M. C. (2009). Factors influencing the adoption of internet banking: an integration of tam and tpb with perceived risk and perceived benefit. Electronic Commerce Research & Applications, 8(3), 130-141.

McGowan, B. S., Wasko, M., Vartabedian,B.S., Miller, R. S., Freiherr,D. D., & Abdolrasulnia, M. (2012). Understanding the factors that influence the adoption and meaningful use of social media by physicians to share medical information. Journal of medical Internet research, 14(5), e117.

Nelson, D. L., & Kletke, M. G. (1990). Individual adjustment during technological innovation: A research framework. Behaviour & Information Technology, 9(4), 257-271.

Ragu-Nathan, T. S., Tarafdar, M., Ragu-Nathan, B. S., & Tu, Q. (2008). The consequences of technostress for end users in organizations: Conceptual development and empirical validation. Information Systems Research, 19(4), 417-433.

Shi, B. (2013). An empirical study on small enterprises e-commerce adoption decision based on tam model & toe framework. Advanced Materials Research, 712-715, 2521-2524.

Srivastava, S.C., Chandra,S., and Shirish,A.(2015).Technostress creators and job outcomes: theorizing the moderating influence of personality traits. Information Systems Journal.

Tarafdar, M., Ragu-Nathan, T.S., Ragu-Nathan, B.,and Tu, Q. (2007).The impact of technostress on role stress and productivity. Journal of Management Information Systems, 24(1), 307-334.

Tarafdar, M., Tu,Q. and Ragu-Nathan, T. S. (2010). Impact of technostress on end-user satisfaction and performance. Journal of Management Information Systems, 27(3),303-334.

Thong, J. Y. L., Hong, S. J., & Tam, K. Y. (2011). The effects of post-adoption beliefs on the expectation-confirmation model for information technology continuance. international journal of human computer studies, 64(9), 799-810.International Journal of Human-Computer Studies, 64(9), 799-810.

Wang, K., Shu, Q., & Tu, Q. (2008).Technostress under different organizational environments: an empirical investigation. Computers in Human Behavior,24(6), 3002-3013.

Weil, M.M., and Rosen, L.D. (1997).Technostress: Coping with technology @ Work @Home @Play. Wiley, New York, NY.

Yousafzai, Foxall, G. R., & Pallister, J. G. (2010). Explaining internet banking behavior: theory of reasoned action, theory of planned behavior, or technology acceptance model?. Journal of Applied Social Psychology, 40(5), 1172–1202.