Study on the Influence Mechanism of Knowledge Inertia on the Adoption of Innovative Medical Equipment

(Work in Progress)

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ABSTRACT
This study examines the influence mechanism of knowledge inertia on the adoption of innovative medical equipment. We develop a conceptual model of the relationship of knowledge inertia, knowledge absorptive capability and the adoption of innovative medical equipment. Our research findings show that knowledge absorptive capability has a significant positive impact on the adoption of innovative medical equipment while knowledge inertia has a negative impact. In the mean time, knowledge absorptive capability mediates the relationship between knowledge inertia and the adoption of innovative medical equipment. Moreover, perceived organizational support and knowledge potential of doctor has a moderating effect on the relationship between knowledge inertia and knowledge absorptive capability. The paper rounds off with a discussion of expected contributions.

Keywords: knowledge inertia, knowledge absorptive capability, adoption of new equipment, perceived organizational support, knowledge potential.

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INTRODUCTION
With the development of new medical technology, new medical devices and other equipment are continuously used for clinical diagnosis and treatment. The range of medical innovation devices is very wide, including multi-row CT, PET-CT, superconducting magnetic resonance, proton accelerator etc. However, while a large number of advanced medical equipment has been introduced into a hospital, a lot of new equipment has been left unused. Some of them even have never used after being purchased. This kind of phenomenon is very common in China, even in some big hospitals. For example, according to the findings of Beijing Municipal Bureau of Audit, the value of idle equipment reached 661 million Yuan in 5 municipal public hospitals and some equipment has not been put into use for nearly 3 years since has purchased (xinhuanet.com, 2016). This caused serious waste of medical resources.

In the meantime, the research of the adoption of innovation pays more attention on the whole adoption model. For example, from theory of reasoned action (Sheppard et al., 1988), theory of planned behavior (Ajzen, 1985), technology acceptance model (Davis, 1985) and innovation diffusion theory (Rogers, 2010), theses research try to explain the adoption of information system in hospital. They all carry out research on organizational level. For example, from hospital level, some studies try to do the research on the adoption of electronic medical records (Angst & Agarwal, et al., 2010; Berner, Detmer & Simborg, 2005), the relationship between the new technology adoption of public health insurance and hospital (Freedman et al., 2015), the influence mechanism of managed care on new technology (Mas & Seinfeld, 2008), which nursing homes adopted health information technology (Zhang et., al., 2016), and also comparing hospital’s adoption of advanced technologies by patient's medical record (Sugihara et al., 2016). Only a few studies focus on the individual level, for example, the influence of individual's education level on the adoption of new drugs (Lleras-Muney & Lichtenberg, 2002). So, the current research still lacks much attention on the individual level and ignores the influence of personal motivation and characters. However, in hospital context, doctors’ individual characteristic is very important. They can directly influence the adoption of new equipment.

In order to solve the research gap, the study focuses on the psychological perception of doctors and investigates the effects of knowledge inertia on their adoption of medical equipment. Specifically, the paper examines the mediation effect of knowledge absorptive capabilities and moderation effects of organizational support and knowledge potential on the relationship between knowledge inertia and knowledge absorptive capability.

THEORETICAL FRAMEWORK

Knowledge inertia
Inertia originally is a concept in physics. It means a state that “objects continue in a state of rest or uniform motion unless acted upon by forces” (Liao et al., 2008). The concept of inertia can be dated back to the year of 1985 (Sternberg, 1985). However, the concept of knowledge inertia was brought by Liao et al. in the year of 2002. By applying the concept of inertia to human behavior, Liao et al. (2002) points out that it means using of previous experience, knowledge or procedures to solve problems and seek new knowledge. Although the concept was brought into research for more than 15 years, it did raise much attention of...
scholars. Only Liao et al. (2008) further divided it into three dimensions that are experience inertia, procedure experience and learning inertia. The following researchers just use it or delete certain dimension to satisfy specific context (Xie et al., 2016). Only a few research focuses on its role on innovation (Shalikar et al., 2011), entrepreneurial behavior (Cavus et al., 2014), organizational learning (Sharifirad, 2010) and its moderating effect in some context (Fang et al., 2011). There is still lack studies on adoption of innovation.

With knowledge inertia, doctors may react passively to the new knowledge and hard to utilize knowledge efficiently and effectively. In this way, knowledge inertia may decrease doctors’ knowledge absorbing capability. As doctors may be quite unfamiliar with new equipment knowledge and may find it is hard to learn, they may give up to adopt it. In the mean time, knowledge potential may be act as a contingent factor that influence the relationship of knowledge inertia and knowledge absorptive capability. The difference of knowledge potential determines knowledge transition direction. If the doctors’ initial knowledge potential is high, they may satisfy with their current position and hard to absorb new knowledge. Otherwise, doctors are willing to strengthen, enlarge and renew the current knowledge structure (Zhou & Li, 2012) and are likely to adopt new medical equipment. However, perceived organizational support may be an efficient way to cultivate the use of new equipment. It may make doctors care about hospitals’ objectives and form positive emotion. So they may realize that new equipment is important for hospitals. They then will try their best accelerate the utility of new equipment to improve diagnosis efficiency to realize the hospitals’ objectives.

In this study, we try to construct the influence mechanism of knowledge inertia on adoption intention of new product under hospital context. For this context, the procedure of hospital may be fixed and can not easily change once been set. So, in this study, we focus on the two dimension of knowledge inertia that are experience inertia and learning inertia. Then we will check their influence mechanism on the doctors’ adoption intention of medical equipment. So, we build our concept model (See figure 1).

![Figure 1: The Concept Model](image)

**Propositions**

Through analysis above, we know that knowledge inertia is an important personal factor in deterring adoption intention. Combing Liao et al. (2008) research and hospital context, we divide knowledge inertia into two aspects-experience inertia and learning inertia. Experience inertia refers to responding passively when facing a new problem or situation. That is still resorting the existing knowledge, experience, sources to solve problem. Learning inertia means make no effort in learning new knowledge to solve new problems. They both limit doctors’ vision and may result in lacking of creative thinking and adoption of innovative equipment.

When hospitals adopt new equipment especially with high technology, experience inertia may break the adoption of new equipment. As during past career life of doctors, they may form fluent experience of disease diagnosis. So when solving new problem, they tend to use their former experience and don’t want to change and renew their current knowledge. Thus hard to adopt new medical equipment. In the mean time, learning inertia may make doctors use former learning method to learn. When new equipment is brought into hospital, the technology may different from the former one completely. Doctors may focus on the cost of learning and reluctant to change especially in the situation that the former method can still useful. So, they may refuse to adopt new equipment and continue use the former equipment and try to main the current situation. Hence, the study presents the following propositions:
Absorptive capability was originally defined at an organizational level (Cohen and Levinthal 1989, 1990). Now days, many scholars use it in different level (Van Wijk et al. 2008). For our study, we focus on individual level. It means that individual within an organization exploits the knowledge to make new ideas or products by bringing external knowledge into the organization (Lane, Koka, and Pathak 2006). It reflects the utility of outer knowledge. The outer knowledge can only be transferred into inner knowledge of doctors that can bring high performance. When hospitals bringing new equipment into hospital, doctors will face much new knowledge. Due to the influence of inertia, those are experience, resource and methods, doctors will face difficulty in absorbing new knowledge. Also, new knowledge may even conflict with current knowledge and doctors may need to sacrifice some benefit. Doctors may reject new knowledge’s absorbing. Thus, it very hard for doctors to integrate new knowledge into knowledge systems. So, knowledge inertia may have negative effect on knowledge absorptive capabilities. Hence, the study presents the following propositions:

P1a: Experience inertia negatively influences doctors' adoption intention of innovative equipment.
P1b: Leaning inertia negatively influences doctors' adoption intention of innovative equipment.

P3: Knowledge absorptive capabilities positively influences doctors' adoption intention of innovative equipment.

Combining the previous proposition P1a, P1b, P2a, P2b, P3, knowledge absorptive capability mediated the relationship between knowledge inertia and doctors' adoption intention is suggested. Absorptive capability reflects doctors’ learning capability. If doctors’ learning capability is strong, they can easily understand the intention of hospital as well as the complex knowledge of new equipment. However, a doctor who has fluent experience may have high knowledge inertia and may hard to absorb new knowledge, so this decrease doctors’ learning capability and they may reluctant to adopt new equipment. This decreases the utility of new equipment. Hence, the study presents the following propositions:

P4: Knowledge absorptive capability mediates the relationship between knowledge inertia and doctors' adoption intention.

Perceived organizational support refers to an employee perceives the extent that how organizations value their contribution and care about their happiness (Chiaburu et al., 2015). According to organizational support theory, employees tend to personify an organization and believe that the intent of organization may either hostile or malicious to them (Bosset and Bourgeois, 2015). So this may illustrate that individual may perceived differently to an organization. If doctors perceived high organizational support, they will collect new knowledge actively and change new work method or process to improve their value. So they may tend to accelerate knowledge absorbing and overcome the negative effect of knowledge inertia. In low organizational support, they may feel upset, lacking of capability to carry out knowledge absorbing. Hence, the study presents the following propositions:

P5: Perceived organizational support negatively moderates the relationship between knowledge inertia and doctors' knowledge absorptive capability

Knowledge potential reflects the degree of knowledge that doctors possess. The difference of knowledge potential forms a natural pressure that represents a capability (Monteiro et al., 2008). It determines knowledge flowing direction often transfers and diffuses knowledge from high to low. Doctors may have different potentials because of their different kinds of knowledge. So, doctors with high knowledge potential are likely to have more knowledge and experience, and may be confident about their knowledge. They tend to use current knowledge and ignore new situation. Thus this may lead to their rejection of new knowledge. On the contrary, doctors with low knowledge potential want to change their knowledge potential by learning. Due to their limited knowledge and experience, they may be more active with new method and technology. They usually try to access, absorb and integrate new knowledge into their knowledge system. So, doctors with low potential tend to focus on learning and experiencing more to enrich their knowledge structures. Thereby promoting knowledge absorption. Hence, the study presents the following propositions:

P6: Knowledge potential positively moderates the relationship between knowledge inertia and doctors' knowledge absorptive capability.

STUDY DESIGN AND METHODOLOGY
Our target populations are current Chinese public hospitals. Potential respondents comprise of doctors from different departments. For the survey, we will develop a questionnaire with measurement items adapted from extant literature. The questionnaire may be first developed in Chinese, translated into English, and then back-translated to Chinese to ensure construct equivalence. A professional translator and two research assistants independently will conduct the translations, and will come to an agreement on the final version for the questionnaire. The questionnaire will be pilot tested among 20 doctors who work in our target hospitals. Their responses provided preliminary evidence about the face validity of the measurement items and will be dropped from the dataset.

Our proposed model and propositioned relationships among constructs will be evaluated by using SEM-PLS modeling in Smart PLS 3.0M. PLS-PM has become popular in modern quantitative research, particularly because it has notable advantages, such as minimal demands on measurement scales, sample distribution, and sample size. It excels at causal-predictive analysis in which hypothesized relationships are complex and few bases have been established.

**EXPECTED CONTRIBUTIONS**

This study focuses on knowledge inertia and tries to build a theoretical framework of its relationships with knowledge absorptive capability and doctors’ adoption intention of new equipment. Our study expects to make contributions in three aspects. First, this study may contribute to the adoption of innovation. Prior studies have been considering factors of organizational that influence adoption of innovation but neglect individual’s characteristics. Even few studies pay attention to individual level. There is no research focuses on negative part of knowledge. This study brings knowledge inertia that belongs to individual level into hospital context. This may help uncover the influence mechanisms of knowledge inertia on adoption of innovation to some extent. Second, we divide knowledge inertia into two dimensions (i.e. experience inertia and learning inertia) and test their influence respectively on knowledge absorptive capability. This may enrich knowledge absorptive capability literature. Third, we view knowledge absorptive capability as a direct antecedent of doctors’ adoption intention of innovative medical equipment. This may contribute to our understanding of knowledge absorptive mechanisms through which knowledge inertia dimensions influence adoption intention of innovative medical equipment. Moreover, the process of knowledge absorptive capability requires some contingency factors (Chen, 2004). Two moderating variables, knowledge potential and perceived organizational support will be examined. Organizational support is indispensable in the process of adoption of innovative product. In addition, doctors in hospital who have high knowledge potential should try to change their mind to accept new knowledge. Only this way can help improve their knowledge structures. Then this can accelerate the adoption of new equipment in hospitals.

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