

A Review of Knowledge Inertia: How can we explain the hindrance on individual innovation

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Abstract—Knowledge, as power and a resource, has been much more important for both organizations and individuals. Therefore, one of the necessary issues for enterprises is to manage knowledge properly and efficiently. However, individuals may have their natural inertia when facing problems in the utilization of knowledge, which is termed “knowledge inertia”. This study attempts to combine the existing researches systematically from three aspects: first, the connotation of knowledge inertia; second, constructs and measurements of knowledge inertia; and third, relative researches in the era of knowledge inertia. Furthermore, this paper also reviews the relationship between knowledge inertia and individual innovation.

Keywords-knowledge; knowledge inertia;individual innovation

I. INTRODUCTION

Drucker (1985) considers knowledge as the only source of an enterprise's competitive advantage. Hence, in order to grasp the trend of economic development and meet current challenges, enterprises should seek ways to strengthen the development of knowledge and pay more attention to organization and individual innovation. However, individuals often have their natural inertia in the process of innovating depending on the knowledge. They tend to follow the original path of thinking and resort to their prior knowledge and experience for solutions when facing problems. Such routine problem-solving strategy is termed “knowledge inertia”(Shushien Liao & Wu-Chen Fei & Chih-Tang Liu, 2008).

Inertia, a concept in physics, is used to describe the trend of objects remaining stationary or uniform motion. It has gradually aroused great attention of organizational theorists since 1980s and has been applied to different areas, with emergence of many extended concepts such as Inaction inertia (Kumar, 2004; Zeelenberg & Nijstad & Van Puten & Van Dijk, 2006), outsourcing inertia (Mol & Kotabe, 2011), consumer inertia (Han. H. & Y. Kim & E. Kim, 2011), organizational inertia (Dawn Kelly & Terry L. Amburgey, 1991; James W. Dean, Jr & Scott A. Snell, 1991; Christopher Gresov & Heather A. Haveman & Terence A. Oliva, 1993). If inertia behavior occurs in the process of learning and sharing knowledge, it will hinder employees to think creatively and affect the success of organizational knowledge management (Davenport & Prusak, 1998). It is in this context knowledge inertia is proposed.

II. CONNOTATION OF KNOWLEDGE INERTIA

Although the concept of knowledge inertia has so far been put forward more than 10 years, it doesn't cause widespread concern yet. Less than 10 literatures were collected up to May 2013. Among the gathered literatures, most scholars (Cheng & Lin, 2011; Zhao & Wu & Wang, 2012) adopt the definition of knowledge inertia raised by Taiwan Scholar Liao (2002), who defines knowledge inertia as “people are used to solve problems with the routine problem solving procedures, stagnant knowledge sources, and prior experience or knowledge” in his paper “Problem solving and knowledge inertia”.

The connotation of knowledge inertia has long been explored and discussed by many scholars (Sternberg, 1985; Kolonder, 1994) though the formally propose of the concept of knowledge inertia is relatively late. Whether individual or organization, they largely develop solutions to the problems based on the past experience, and they tend to adapt to the new environment with the stored experience (Sternberg, 1985). In other words, existing experience can help us infer, predict and explain the future when encountering similar conditions (Kolonder, 1994). Although they did not propose the concept of “knowledge inertia”, the substance of their research is consistent with the meaning of knowledge inertia.

While knowledge inertia is a new concept, its substance, separated from the other concepts by scholars, is not new. The reason why it was not raised until 2002 is probably that since entering the era of knowledge economy, people come to realize the importance of human capital as an important resource for enterprises. Knowledge and knowledge management is increasingly significant to both individuals and organizations. Therefore, people isolated the concept of knowledge inertia from previous studies (organizational inertia, cognitive inertia) and formed a new starting point for further research.

III. CONSTRUCTS AND MEASUREMENTS OF KNOWLEDGE INERTIA

A. Constructs of Knowledge Inertia

Liao(2002) firstly constructs three dimensional structure of knowledge inertia through theoretical study, including procedures inertia, consulting inertia and experience inertia. However, the empirical research on the basis of theoretical

study discovers that knowledge inertia only contains experience inertia and learning inertia (Shu-hsien Liao & Wu-Chen Fei & Chih-Tang Liu, 2008), which establishes a two-dimensional model of knowledge inertia. Among them, the experience inertia refers to people's tendency of using the stored and conservative knowledge when applying knowledge to solve problems. Learning inertia refers to people's tendency of learning new knowledge to break or modify the inertia of thinking when people use existing knowledge to settle problems.

On the basis of experience inertia and learning inertia Cheng & Lin (2011) adds the dimension of thinking inertia when taking the characteristics of elementary schools' workplace into account after the study of Shu-hsien Liao & Wu-Chen Fei & Chih-Tang Liu. She defines the thinking inertia as: when the new ideas emerge teachers always use their existing knowledge to understand them in order to maintain their own stereotype. They attempt to assimilate new knowledge to the existing ideological system. If new knowledge is not assimilated, they will instinctively reject what doesn't meet their own.

Zhao & Wu & Wang (2012) study the impact of organizational learning on employee-organization fit and the moderating effect of knowledge inertia on the relationship between organizational learning and employee-organization fit with a direct reference to the two-dimensional model of knowledge inertia proposed by Shu-hsien Liao & Wu-Chen Fei & Chih-Tang Liu (2008). The empirical results show that both experience inertia and learning inertia decrease the degree of relationship between organizational learning and supplementary fit. The moderating effect of both experience inertia and learning inertia on the relationship between organizational learning and employee-organization fit are not significant.

B. Measurement of Knowledge Inertia

Correspondingly, the widely accepted measurement scale of knowledge inertia is developed by Shu-hsien Liao & Wu-Chen Fei & Chih-Tang Liu (2008), which measures knowledge inertia from the dimensions of experience inertia and learning inertia with a 5-point Likert scale. The measurement scale of experience inertia and learning inertia both include 7 items. Their empirical tests show that the total scale's and its dimensions' reliability coefficients were greater than 0.7 respectively, indicating a high degree of the questionnaire's reliability.

Zhao & Wu & Wang (2012) conduct the study with a minor modification of the measurement scale. In their study, the measurement scale of experience inertia has 6 items while learning inertia has 7 items. The total scale's reliability coefficient was 0.845, two dimensions' reliability coefficients were 0.765 and 0.862 respectively.

Cheng & Lin (2011) use a three-dimensional model of knowledge inertia in the empirical research. They develop a measurement scale of knowledge inertia independently, which includes 5 measurement items of experience inertial, 4 measurement items of learning inertial and 3 measurement items of thinking inertia. The total scale's reliability coefficient was 0.832, three dimensions' reliability coefficients were 0.716, 0.819 and 0.659 respectively.

IV. RELATIVE RESEARCHES OF KNOWLEDGE INERTIA

A. Antecedents and Outcome Variables of Knowledge Inertias

Yuan & Yao & Zheng (2005) explore the factors that affect the size of knowledge inertia through theoretical deduction. She believes that in the personal angle, the size of knowledge inertia is relevant with individual's many aspects, including: (1) individuals' acceptable levels of "existing knowledge"; (2) individuals' willingness of accepting the "new things"; (3) the number of "outline" that exists in the memory of individuals; (4) possibility and cost of verifying the new knowledge's correctness.

Parviz Kafchehi & Arash Zamani & Farhad Ebrahimabadi (2012) conduct a validated questionnaire survey to 200 employees working at the private and public banks in the Kurdistan Province of Iran in order to develop a model of influential factors on knowledge inertia. Results show that individual factor has a direct impact on the learning inertia and experience inertia. Moreover factors of organizational and IT are correlated and eventually they affect individual factor. Although these two factors have no direct effect on inertia, they affect it indirectly. Meanwhile, there is no significant difference between private and public banks. Finally, on the basis of these findings, they propose a model of factors that influence on "knowledge inertia" in an organizational context.

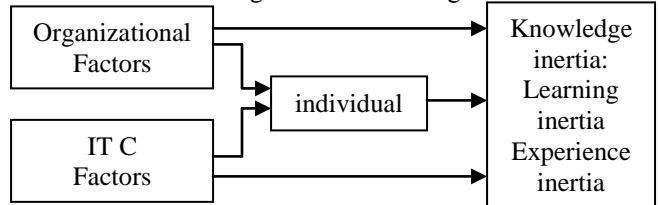


Figure 1. Proposed model of knowledge inertia

Shu-hsien Liao & Wu-Chen Fei & Chih-Tang Liu(2008) investigate the relationships between knowledge inertia, organizational learning and organization innovation through a questionnaire survey conducted to 485 government organizations as well as state-run and private enterprises. The results reveal that (1) knowledge inertia comprises both learning inertia and experience inertia; (2) knowledge inertia exerts a mediating effect on organizational innovation through organizational learning; (3) when a firm's members have either less learning inertia or more experience inertia, the performance of the organizational learning will be better; (4) organization type does not have any moderating effect on the impact of knowledge inertia on organizational learning. Moreover, in this research, Shu-hsien Liao & Wu-Chen Fei & Chih-Tang Liu develop a new set of knowledge inertial measurement scale which has been generally recognized and widely utilized by later researchers.

Cheng & Lin (2011) choose 558 elementary school teachers in Kaohsiung as research sample to study the teachers' level of knowledge inertia. The results show that the elementary school teachers have low levels of knowledge inertia, while experience inertia is more highlighted; organizational learning is in the upper levels of score, especially the score of "team learning"; school effectiveness is in the middle levels of evaluation, especially the "teaching quality". Furthermore, teachers' knowledge inertia has low correlation with

organizational learning and school's effectiveness. The better the situation of organizational learning is, the more it can improve school's effectiveness. Teachers' knowledge inertia and organizational learning can predict school's performance, during which "knowledge expansion and shift" is the most important predictors.

Summing up these empirical research findings, the influential factors of knowledge inertia can be generalized as organizational factors and personal factors. Organizational factors include the centralization of the organization, information technology and so on while personal factors include the individuals' acceptable level of "existing knowledge", the individuals' willingness of accepting the "new thing" and so on. The outcome variables of knowledge inertia can be summarized as behavioral variables and performance variables. Behavioral variables mainly refer to organizational learning while performance variables include organizational innovation, school effectiveness and so on.

B. Knowledge Inertia as Moderating Variable

Zhao & Wu & Wang (2012) use a questionnaire survey to test their proposed research hypotheses and the results showed that commitment to learning, sharing the vision and open mind have positive effects on supplementary fit and complementary fit. In addition, both experience inertia and learning inertia decrease the degree of relationship between organizational learning and supplementary fit. The higher experience inertia/learning inertia is, the more it will weaken the positive impact of the commitment to learning, shared vision and open mind on supplementary fit. Thus, experience inertia/learning inertia's negative moderating effect is more obvious.

V. PREVIOUS RESEARCH ON RELATIONSHIP BETWEEN KNOWLEDGE INERTIA AND INDIVIDUAL INNOVATION

Innovation is an activity of utilizing known information, breaking through the convention constantly, generating unique and valued things and ideas in order to obtain firm's growth and individual's development. In the era of knowledge economy, sustainable development of enterprises relies on constantly updated knowledge and technology. The fundamental source of enabling knowledge and technology advanced with the times is continuous innovation. Among existing studies, most scholars focused on the organizational innovation rather than individual innovation (Hou Er-xiu, 2012). But organization innovation's source and starting point is employee's creativity and innovative behavior. The achievements of organization innovation are accumulated and extended by individual innovation behavior (Amabile, 1988; Woodman & Sawyer & Griffin, 1993; Shalley, 1995). When individual innovation behavior embodies employee's creativity, it also becomes the basis for organizational innovation capability.

Though immense amounts of research have studied the connotation(Kleynen & Street, 2001; Zhou & George, 2001;), the process(Scott & Bruce, 1994; Kanter,1988)and influential factors of individual innovation(Xing, 2009; Zhao, 2011; Zhou & Zhong, 2011; Monique & Katharina & Dodo, 2012), almost no research directly investigate the relationship between knowledge inertia and individual innovation behavior, there has been many studies about the relationship between knowledge

inertia and organization innovation, organizational inertia and organization innovation, path dependence of knowledge and individual innovation, goal-oriented and individual innovation, which has similarity with knowledge inertia or individual innovation.

A. Organizational Inertia and Organization Innovation

Liu (2003) believes that organization's inertia of thinking, personal's maladaptation of knowledge and skill and individual inertia will become obstacles on innovation in her study of organization innovation. Yao (2005) points out that organization innovation has three obstructive factors: incumbent firm's core rigidity, path dependence and organizational inertia when studying the internal reasons of enterprise into "Alexander dilemma". And also, Luo (2005) considers that knowledge has the property of path dependence, mainly reflected in that the development of knowledge is based on the stock knowledge which determines the future direction and speed of the knowledge's development.

B. Knowledge Inertia and Organization Innovation

Shu-hsien Liao & Wu-Chen Fei & Chih-Tang Liu (2008) put knowledge inertia, organizational learning and organization innovation together to investigate the relationship between knowledge inertia, organizational learning and organization innovation. Results show that knowledge inertia exerts a mediating effect on organizational innovation through organizational learning.

C. Knowledge Conversion Capabilities and Individual Innovation

Xue & Xie (2006) analyze the relationship between knowledge conversion capabilities and individual innovation behavior. Results illustrate that individual knowledge conversion capabilities and innovation behavior are positively related to individual innovation behavior. Employees' knowledge conversion capabilities directly influence their innovation behavior. The higher employees' knowledge conversion capabilities are, the better performance of employees' innovation behavior is. In their study, knowledge conversion capability refers to the ability of team members' conversing tacit knowledge into explicit knowledge. It is the opposite of experience inertia's connotation which refers to people's fixed thinking mode and absence of converting and renewing stored knowledge.

D. Goal-orientation and Individual Innovation

Based on goal orientation theory, Lu and Chang's paper (2007) focuses on the effects of goal orientation on people's innovation behaviors. It makes a survey of 248 questionnaires collected from managers, which verifies the negative relation between performance goal and learning goal as well as the effect of goal orientation on innovation behaviors. Results illustrate that learning orientation has a positive impact on individual innovation behavior and performance orientation has no significant impact on it. Namely, learning oriented employees tend to show more innovative behavior than performance oriented employees. Learning orientation refers to individuals commit to develop personal skills by acquiring new skills and learning new methods (Dweck C. S. & Leggett E. L., 1988), which has a similar connotation with learning inertia.

Both have “new”, “breakthrough” features. Performance orientation refers to individuals’ tendency of maintaining stability and avoiding possible errors and failures (Dweck C. S. & Leggett E. L., 1988), which has a similar connotation with experience inertia. Both has “old”, “stable” characteristics.

Although above researchers doesn’t directly point out the relationship between knowledge inertia and individual innovation behavior, the partly definition of organizational inertia and path dependence of knowledge are similar with the connotation of knowledge inertia. Meanwhile, organization innovation is the integration of individual innovation. Enterprises’ success and failure has great relevance with organization innovation and individual innovation behavior in some extent. Furthermore, individuals’ knowledge conversion capabilities (Xue & Xie, 2006) and learning orientation (Lu & Chang, 2007) also has impacts on innovation while knowledge conversion capabilities and learning orientation has opposite or similar relevance with the connotation of knowledge inertia. Therefore, it can be inferred that knowledge inertia has certain relationship with individual innovation behavior.

VI. CONCLUSION

Knowledge inertia is a newly developed theory and existing research about it is really rare. However, people has concerned about this content for a long time, which can date back to 1985. Limited studies before 2005 mainly discussed the connotation of knowledge inertia and the relationships between knowledge inertia and other variables theoretically. People began to investigate knowledge inertia with empirical methods since 2008. And more researches are focused on the relationships between knowledge inertia and organizational learning, knowledge creation and other variables. Entering the era of knowledge economy, organization’s constant development needs the support of update knowledge and technology, which requires the organization and its employees to keep innovating. However, the role of knowledge inertia in this process is unclear. Since the inertia in physics is a constant phenomenon of objects, knowledge inertia as an inertia in the field of knowledge will also have constancy, performing the unchangeability of existing knowledge and learning patterns. Therefore, it is much more necessary to explore the connotation and influential factors of knowledge inertia and its impact on individuals’ learning and innovating.

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