ROLE OF ORGANIZATIONAL LEARNING IN IT ADOPTION: A REVIEW

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Abstract: A review of the literature on Organizational Learning highlights the linkages of Organizational Learning Processes to that of Individual Learning Processes. Literature on Information Technology (IT) Adoption and the popular Technology Adoption models reveals the paramount role played by Knowledge in IT Adoption decisions. Building on this analysis we explore the connection of a firm's learning and its relevance to Organizational Technology Adoption decision making process. We discuss the implications for future Information Technology Adoption research based on Organizational Knowledge Management constructs.

IndexTerms **– Information Technology Adoption, Individual Learning, Organizational Learning.**

I. INTRODUCTION

While Technology adoption remains a widely studied area in IS Research, decisions to adopt innovative and complex new technologies remain a challenge for Organizations, and there is a need to find answers to important questions in this area of research.

Review of prior research reveals that Organizational Learning and Organizational Knowledge is a significant predictor of a firm's ability to innovate, ability to adapt to changing environment and retain competitive advantage. A careful review of the popular Information Technology Adoption models reveals the quintessential role being played by Knowledge about the focal technology in such IT adoption decisions by Organizations.

Building on the above analysis, we probe the role of Prior Knowledge and a firm's Organizational Knowledge Management processes in fostering its intentions to adopt complex IT Innovations like Cloud Computing.

The purpose of this paper is to review the existing Technology Adoption literature and answer the following questions: What is the role being played by Organizational Knowledge in its Innovative Technology adoption decisions? How Organizations gain such knowledge? The role being played by Knowledge in the popular Technology Adoption Theoretical framework? Based on our above review and findings, we summarize implications for future Information Technology Adoption research.

II. ORGANIZATIONAL LEARNING

2.1 Organizational Learning Processes

The roots of Organizational Learning lie in Individual Learning. Simon (1969) posit that all learning starts at individual human brains and an organization gains knowledge only in 2 ways 1) through an individual who is a part of the organization and 2) by adding new individuals who have knowledge which the organization didn't have earlier

Reiterating Simon's (1969) definition, Levitt and March (1988) posit the key concept here as the Organizational Memory which survives even after the Individuals leave (along with their Individual memory) since Organizations record their experience and can retrieve their experience when needed.

Huber (1991) redefines Organizational Learning Processes as: Knowledge Acquisition, Information Distribution, Information Interpretation and Organizational Memory. Huber's (1991) above definition of Organizational Learning Processes and Computer-based Organizational memory has been used by researchers as a foundation to probe value of customer co-created knowledge on product innovation process (Mahr et al., 2014), impact of supply chain alignment on Organizational performance (Handfield et al 2015), Knowledge Transfer and Learning Process (Gil & Carillo 2016), Clustering-based proximity and knowledge sharing in franchise firms (Butt et al., 2018) etc.

2.2 Levels and dimensions of Organizational Learning

Learning at organizations happens through three levels using four processes: at individual level using the processes of Intuiting and Interpreting; at group level through the process of integrating; and at the organization level through the process of Institutionalizing (Crossan et al., 1999). The four contextual factors that facilitate Organizational Learning are: Culture, Strategy, Structure and Environment. (Fiol & Lyles, 1985).

Crossan et al.'s (1999) definition of levels of learning processes have been widely used by researchers to probe Organizational learning capabilities and their impact on firm performance and success (Hult et al., 2004, Vera & Crossan, 2004, Argote & Spektor, 2011, Nadolska & Barkema, 2014, Tsang, 2016, Khoury et al.,2017).

Reviewing earlier research on Organizational Learning in Management Science domain, Pawlowsky (2001) identify 4 dimensions of Organizational learning while defining the conceptual framework for the management of organizational learning: 1) Learning Levels 2) Learning Modes 3) Learning Types and 4) Learning Process.

The four possible learning levels are Individual, Group, Organizational and Inter-Organizational. Management of Organization Learning should necessarily take care of these four learning levels, their interconnectedness and their ability to deal with complexity arising out of this interconnectedness. The three learning modes are Cognitive Learning, Cultural Learning and Action Learning. The learning modes stress that learning is not only cognitive but also happens through/at emotions and behaviour and the culture of trust between the team members and that with the management plays a major role. Management of Organization learning should also account for all the three learning types: Single loop, Double loop and Deutero. Finally, the learning processes: Identification, Creation, Diffusion, Integration/Modification and Action - are the most vital for Organizational Knowledge Management. (Pawlowsky, 2001).

Pawlowsky's (2001) dimensions of Organizational Learning has been used to investigate barriers that impede learning in petroleum and gas companies (Ranjbarfard et al., 2014), impact of trust on the relationship between organizational learning and the firm's marketing capabilities (Sanzo et al., 2012), Hoffman's (2017) work on Organizational Learning through boundary spanning processes etc.

Unlearning is an important aspect of Organizational learning. Organizations should necessarily go through the phase of unlearning, i.e. the elimination of old and obsolete organizational knowledge, thereby making room for development of new adaptive capacities (Hedberg, 1979).

2.3 Organizational Knowledge Management as a Dynamic Capability

Dynamic capabilities are key to gain competitive advantage. Firms should adopt a capability strategy i.e. choosing the right search strategy (broadening Versus deepening in the knowledge area in the right combination) for the right kind of capabilities (general purpose versus market specific knowledge in the right combination) to attain Dynamic capabilities to remain competitive (Pisano, 2017).

Organizational Knowledge Management Capabilities is key to Organizational Effectiveness. Knowledge Infrastructure Capability is derived from of Technology, Structure and Culture. Knowledge Process Capability is defined as organization's ability to Acquire, Convert, Apply and Protect Organizational knowledge. Both Knowledge Infrastructure Capability and Knowledge Process Capability result in Organizational Effectiveness (Gold et al., 2001).

Organizational Knowledge Stocks and Flows are key to competitive advantage (Tallman et al., 2004). Organizational Knowledge is the strategic asset of an Organization and plays a significant role in fostering the Organization's ability to compete and innovate (Bollinger & Smith, 2001). Intellectual Capital in an Organization significantly impacts innovation capability of an organization (Obeidat et al., 2017). Organizational Learning processes of creating, retaining and transferring of knowledge significantly impacts the technology management capabilities of a firm (Argote & Hora, 2017).

Review of prior research reveals that Organizational Learning and Organizational Knowledge is a significant predictor of a firm's ability to innovate, ability to adapt to changing environment and retain competitive advantage.

III. Individual Learning Vs Organizational Learning

While treating Individual Knowledge and Organizational Knowledge as two distinct research streams, prior research acknowledges the intrinsic linkages between the two which cannot be overseen. In this section we review how prior research have viewed the inter-linkages between the two, the importance of individual knowledge for organizational knowledge creation and the commonalities and differences between the two.

Hedberg (1979) states that "Although organizational learning occurs through individuals, it would be a mistake to conclude that organizational learning is nothing but the cumulative result of their members' learning. Organizations do not have brains, but they have cognitive systems and memories. As individuals develop their personalities, personal habits, and beliefs over time, organizations develop world views and ideologies.".

March (1991) posit that Learning happens mutually between an organization and the individuals in it. Organizational knowledge is stored in their forms, rules, procedures, norms etc. Such knowledge gets accumulated over time by learning from their individual members. (March 1991).

Extending above research, Nonaka (1994) highlight two types of Knowledge: Explicit and Tacit. Explicit Knowledge or "Codified Knowledge" refers to knowledge that can be transferred in a formal manner, express in words and numbers etc. and "that is transmittable in formal, systematic language" (Nonaka 1994). Tacit Knowledge is personal, "hard to formalize and communicate" and as expressed by Polanyi (1966), ""We can know more than we can tell".

Nonaka's (1994) pioneering research above has been cited and used by many other researchers and has led to seminal work on Organization Knowledge Management like Knowledge-based theory of the firm (Grant, 1996), Internal stickiness as a barrier to transfer of best practices within the firm (Szulanski 1996), Organizational Learning Framework (Crossan et al., 1999), organizational capability perspective of Knowledge Management (Gold et al., 2001) etc. Recent research citing Nonaka (1994) include knowledge internalization and product development (Chirico & Salvato, 2016), impact of cross functional knowledge sharing on firm performance (Nguyen et al., 2018), MNC knowledge transformation, boundary spanning and creative solution development (Tippman et al., 2017) and Knowledge Management and Organizational Strategy (Dayan et al., 2017) to name a few.

Tacit Knowledge and Explicit Knowledge are not mutually exclusive types of knowledge but are mutually dependent. Tacit knowledge forms the base for developing explicit knowledge. Only individuals with a certain level of shared knowledge can exchange knowledge to make it explicit: for an individual to understand the knowledge from another individual there must be a shared knowledge base between the two. (Alavi & Leidner, 2001).

A firm's capability to manage both explicit and tacit knowledge, and the mechanisms that are employed to convert explicit knowledge to tacit knowledge and vice versa is the key to firm performance. The difference in such capability vastly explains the difference in performance between firms. In other words, a firm's ability to integrate individual's knowledge determines its competitive advantage in market place (Wang et al., 2008).

The discussion above reveals that while Organizational Knowledge is not same as Individual Knowledge, Individual Knowledge plays a significant role in creating Organizational Knowledge and a firm's ability and processes in place to share and transfer the knowledge of the individuals within and across the organization fosters codifying the same in Organizational Memory.

IV. IT Adoption

4.1 Prior Research on Information Technology Adoption

Information Technology adoption is one of the most mature, widely researched streams in Information systems research have made significant theoretical advances in the past 2 decades (Venkatesh et al., 2007).

The research on importance of Technology for competitive advantage dates back to Resource Based View of the Firm (Wernerfelt, 1984). In the seminal article on Resource Based View of the Firm, Wernerfelt (1984) highlight the importance of a firm's resource endowments and their heterogeneity for its profitability. A firm's resource can be any tangible or intangible asset/s tied to the firm at any given point of time that contributes to its competitive advantage. Technological leads are one such important resource of the firm that help an organization "develop and calibrate" advanced ideas that help the firm outperform its competition.

Research indicates that Information Technology positively impacts Organizational Performance by delivering IT Business value (Melville et al., 2004). The business value delivered by Information Technology include enhanced productivity, improved profitability, reduced costs, reduced inventory and improved quality of operations (Devaraj & Kohli, 2003). Information technology enables dynamic capabilities of the firm namely "rarity, appropriability, non-reproducibility and non-substitutability" and leads to Organizational Agility by improving its responsiveness, effectiveness and efficiency in adapting to environmental changes thereby positively impacting its competitive performance (Mikalef & Pateli, 2017).

4.2 Models of Information Technology Adoption

Research on Information Technology Adoption has its roots based on the seminal work on Diffusion of Innovations by Rogers (1962). Rogers (1962) suggest that individuals can be segregated into five categories based on their individual innovativeness: innovators, early adopters, early majority, late majority and laggards. The rate of adoption of innovations is impacted by factors like advantage, compatibility, trialability, observability and complexity. The first four factors positively influence the rate of adoption and the last factor, i.e. complexity, negatively influences the rate of adoption. The adaption of a technology to individual needs changes the nature of innovation adoption over time and also a new innovation can change the adoption rate of an existing innovation (Rogers & Shoemaker, 1971, Rogers, 1995).

Building on Rogers and Shoemaker's (1971) definition of complexity as "the degree to which an innovation is perceived as relatively difficult to understand and use" which acts as an barrier to innovation adoption and Bandura's (1977) Self-efficacy Theory wherein the author states that "In any given instance, behavior would be best predicted by both self-efficacy and outcome beliefs", Davis (1989) came up with what is popularly known as Technology Acceptance Model. The various other models that are used to study Technology Adoption are given in Table 1 below:

Table 1: Technology Adoption Models

Model	Author/s
Diffusion of Innovations	Rogers (1962). Rogers and Shoemaker (1971), Rogers (1995)
Theory of Reasoned Action	Fishbein and Ajzen (1975)
The Theory of Planned Behavior	Ajzen (1985, 1991)
The Social Cognitive Theory	Bandura (1986)
Technology Acceptance Model	Davis (1989)
Technology-Organization-Environment Framework	Tornatzky and Fleischer (1990)
Unified Theory of Acceptance and Use of Technology	Venkatesh et al (2003)

Technology Acceptance Model remains the most parsimonious, robust and widely generalizable model used by most of the IS researchers who have studied Information Technology Acceptance and Adoption. Defining Perceived Usefulness as "the degree to which a person believes that using a particular system would enhance his or her job performance" and Perceived Ease of Use as "the degree to which a person believes that using a particular system would be free of effort", Davis (1989) posit that Perceived Usefulness and Perceived Ease of Use influences people to accept or reject Information Technology.

Technology Acceptance Model has been used to study the role of user participation in Information Systems use (Hartwick & Barki, 1994), Software evaluation and choice (Szajna, 1994), E-commerce adoption (Gefen & Straub, 2000), consumer behavior in online shopping (Gefen et al., 2003), IS Innovations for environmental sustainability (Melville, 2010), Social Media adoption in B2B organizations (Siamagka et al., 2015) and understanding usage of Internet of Things (Dong et al., 2017) to name a few.

4.3 Organizational Knowledge and Innovative Technology Adoption

Organizational Knowledge plays an important role in radical and complex innovation adoption in Organizations. Dewar and Dutton (1986) posit that the distribution of Knowledge in the Organization, the more different types of knowledge that are present in the organization, the more the depth of the Organizational knowledge resources, the more complex and specialized the organizational knowledge is, the higher will be the rate of radical innovation adoption. Damanpour (1987) posit that greater availability of specialized knowledge in individual specialists in an organization will result in broader technological knowledge base of the organization fostering exchange of ideas, techniques and procedures in the organization thereby positively impacting adoption of complex technological innovations.

Extending this argument, recent studies have found technological maturity positively influencing manufacturing process innovation performance (Lee et al., 2017), Organizational Intellectual Capital driving product and managerial innovations in Organizations (Elberdin et al., 2017), Organizational Intellectual Capital components positively influencing Organizational Radical Innovation Performance (Agostini & Nosella, 2017) etc.

4.4 Role of Knowledge in Technology Adoption Theoretical Framework

A careful review of the various models employed by researchers to probe Information Technology Adoption in Organizations reveal the paramount role that is played by Knowledge in such adoption decisions.

The five factors of relative advantage, compatibility, trialability, observability and complexity impacting the rate of innovation adoption in Diffusion of Innovation Theory (Rogers 1962, Rogers & Shoemaker, 1971, Rogers, 1995) are bound to be significantly impacted by the knowledge on the focal innovation. Especially, the complexity factor which is defined as "the degree to which an innovation is perceived as relatively difficult to understand and use" is a direct resultant of and limited to the knowledge on the innovation to be adopted.

The perceived ease of use and perceived usefulness predicting the intention to use Technology in the Technology Acceptance Model (Davis, 1989) is a consequence and limited to the knowledge on the Technology in question.

The attitude towards the act or behavior predicting behavioral intention in Theory of Reasoned Action (Fishbein & Ajzen, 1975) is defined as the individual's positive or negative feelings about performing a behavior and when looked from Information Technology adoption perspective, such positive or negative feeling about a Information Technology can only emerge from the individuals exposure and knowledge about the focal Technology.

The Theory of Planned Behavior (Ajzen, 1985, 1991) is an extension of the Theory of Reasoned Action and the variable "attitude towards the act or behavior" is bound to have the knowledge of the individual as an origin.

The Social Cognitive Theory (Bandura, 1986) posits human behavior as an interaction between personal factors, behavior and environment and the interaction between the person and the environment involves human beliefs and cognitive competencies that are developed and modified by social influences and structures within the environment. From an Information Technology context, the human beliefs and cognitive competencies about the focal technology tend to be rooted in the individual's knowledge about the same.

The Technology-Organization-Environment Framework (Tornatzky & Fleischer, 1990) posits that the Availability and Characteristics of the Technology Influences Technological Innovation Decision making which again is seeded in the knowledge on the focal technology to ascertain its availability and characteristics.

Finally, the Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003) posits that performance expectancy, effort expectancy, social influence and facilitating conditions as determinants of behavioral intention to use. Performance expectancy and Effort expectancy can possibly be perceived only through prior exposure and relevant knowledge about the focal technology in question.

V. CONCLUSION

Our literature review reveals the continuing complexity highlighted by prior IS research in understanding how Organizations adopt Innovative Technology. We also reviewed the predominant role being played by Organizational Knowledge in IT Adoption decisions as highlighted by the Information Technology Adoption theoretical framework and models. However, the antecedents of such knowledge dimension have not been empirically validated in the popular IT Adoption models. Therefore, there is a need for future research to empirically probe these knowledge antecedents. This will enable us to empirically assess the impact of Organizational Knowledge Management processes on innovative/creative IT artefacts adoption.

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