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Technological reflectiveness from a managerial capability perspective

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ABSTRACT

The purpose of this research is to analyze how managers reflect on technological shifts when they recognize opportunities to innovate in their organizations. We conceptualize that a deliberated reflection of technological shifts enhances the manager's disposition for promoting the use of new technological releases in the development of innovation processes. We obtain evidence supporting that reflection on technological shifts mediates the relationship between managerial perception and their subsequent intentions to accept a new technology. We test our hypotheses using the Partial Least Squares method in a sample of 161 interviewees with a technological background. Our results suggest that when managers reflect on technological shifts, they enhance the individual's capacity to sense opportunities in technological environments, such as Internet-based channels.

1. Introduction

The innovation management literature suggests that innovation processes lie in the ability to associate different resources in ingenious ways in order to generate products, sources of supply, manufacturing procedures and different forms of structure at both the organizational and individual levels (Wisse et al. 2015). The adoption of a new technology is a result of personal beliefs about the attributes conferred to a given technology, which create an attitude towards it. Managerial reflection on the benefit and threats of a new technology is highly influenced by prior experiences involving similar technologies (Schweitzer et al. 2015). Such experiences trigger reflections that form the way in which subjects understand how technology works. When subjects receive feedback from technology implementation, they can reinforce their beliefs or modify their prior understanding (Boud et al. 1985). The complexity of analyzing technology reflection lies in the fact that two people do not perceive technological phenomena equally (Hammedi et al. 2011). Two subjects could receive the same technology information but can perceive and interpret it differently because they may exhibit a limited understanding of the feedback effects (e.g., certain subjects assume linear, rather than causal, thinking) and a lack of consideration of the temporal dimensions when analyzing strategic issues (Torres et al. 2017).

Technology acceptance research explains how people accept, adopt and use new technologies (Davis 1989) and the processes of analyzing their intention to use such technologies (Hess et al. 2014). Technology acceptance research also explores the cognitive processes of people who analyze the impact of new technological releases on their communities and organizations (Schweitzer et al. 2015).

Despite the importance of the cognitive characteristics of decision makers in the technology acceptance literature, the process of how managers analyze new technology releases remains an unexplored issue in Internet research. We develop a framework, which connects the concepts of the perception of ease of use and perception of usefulness (Davis 1989) with technological reflectiveness (Schweitzer et al. 2015) to assess the impact of the intentions to promote new technological releases. We obtain evidence supporting that technological reflections mediate the relationship between managerial perception and managers' subsequent intentions of accepting a new Internet-based technology.

This research extends our knowledge of technology acceptance by showing that when managers reflect on technological shifts, they enhance the individual capacity to sense opportunities in technological environments. This managerial capability for sensing opportunities is a key issue in the innovation management and entrepreneurship literature (Biemans and Langerak 2015; Roberts et al. 2016; Teece 2007).

Another key strength of this study is the use Partial Least Squares (PLS)-Structural Equation Modeling (SEM) to validate our hypotheses in Internet research. PLS-SEM allowed us to analyze the effect of contingent variables on the technology acceptance process when managers face new technological releases on the Internet.

This paper is structured as follows: first, we develop a literature review of technological reflectiveness, managerial technological acceptance and the disposition towards promoting the use of new technological releases. Next, we explain the methodology and the validation processes of the PLS-SEM model. In this study, we evaluated PLS-SEM results based on a two-stage evaluation criterion. Stage 1 includes the

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following components for analysis: (1) indicator reliability, (2) internal consistency, (3) convergent validity and (4) discriminant validity (Sarstedt et al., 2017). To evaluate the structural model, we analyzed (1) collinearity, (2) R^2 explanation of endogenous latent variables, (3) predictive relevance Q^2, (4) significance and relevance of path coefficients and (5) f^2 and q^2 effect sizes (Sarstedt et al., 2017). We also perform a robustness check of unobserved heterogeneity and an Importance-Performance Map analysis (Ringle and Sarstedt 2016). This mapping analysis highlights the relative importance of manifest variables (Items) on specific target constructs, such as Technological Reflectiveness and Disposition, towards promoting knowledge of the use of technological innovations. Lastly, the final sections discuss results, outline implications and present concluding remarks for theory and practice.

2. Theoretical background

2.1. Technological reflectiveness in managerial decisions

Technological reflectiveness is "*the tendency of an individual to think about the impact of a technological product on its users and on society in general. Technologically reflexive individuals analyze the past effects of technological products on society, contemplate the potential effects of technological solutions in society, and can develop an advanced understanding of the socio-technical relationships involved*" (Schweitzer et al. 2015: p. 848). Technological reflectiveness is related to a cognitive, inquisitive and introspective effort using experiences and reflections for an understanding, judgment and evaluation of the impact of a novel artifact or a new technological release. Technological reflectiveness encompasses the perception of a new framework when rethinking the situation for its users or for society, extrapolating personal experiences or perceptions, and evaluating and reflecting on the pertinence and utility of its adoption, as well as the ease of use of the new technology by the members of that society.

Caniëls et al., (2015) suggest that managerial capabilities and managers' perception of the strategic value of Internet technologies affect the adoption of those technologies within companies. Certain elements related to reframing managerial activities have been significant predictors of the acceptance of Internet technologies, such as management commitment/support and managers' perceived benefits (Ifinedo 2011), managerial skills and concerns about the competitive position of the firm (Slade and Van Akkeren 2002), and the perceived relative advantage of Internet technology adoption (Lee 2004). In this sense, technological reflectiveness is a path-dependent managerial cognitive capability that contributes to heterogeneity in organizational performance because of the potential advantages of the superior detection of emerging opportunities and threats and the proper, suitable and even profitable use of new technologies within a given social context (Martin 2011).

2.2. Technological reflectiveness, perception and disposition

The technological reflectiveness concept involves three main facets in a unidimensional construct: (1) the individual's motivation for reasoning about technology-society associations and his/her enjoyment of it when thinking about its potential implications; (2) the ability to be included in the individual's thinking about personal product usage and its applicability to other publics; and (3) the individual's capabilities required to produce inferences regarding a technology's potential implications (Schweitzer et al. 2015: 851–853). To infer conclusions on the use of any technological product in a community for economic exploitation, a manager develops beliefs about the technological product's convenience and the advantageousness of its use in two processes: a perceptual process and a reflective process. The perceptual process has been investigated within the framework of the technology acceptance model (Davis 1989; Karahanna et al. 1999; Venkatesh and Davis 2000). The technology acceptance model suggests that individuals are actors who accept, adopt and use technological innovations. Hence, one of the key issues within the perceptual process is people's ability to identify the attributes of technological products and to create an attitude towards using it. Conversely, the reflective process refers to a cognitive, inquisitive and introspective endeavor to understand, judge, and evaluate the impact of novel, specific artifacts.

Perceptions of and reflections on new technologies trigger motivations for the cognitive adaptations of decision makers, and they have an influence on the dispositions towards their use in new technological releases. Managerial perception serves as a guide that inclines managers to act or to believe in one specific way or another (Caniëls et al. 2015). The interpretation of the term 'dispositions' suggests that new experiences, information and knowledge modify the cognitive structures created by the technological reflective process. Dispositions differ in strength and stability, depending in part on the regularity with which those mental structures are actualized in different contexts and circumstances (Lahire 2003). Hence, the perception of a new technology and its consequent reflective thinking has an impact on the dispositions towards the use of new technologies in new product releases for economic exploitation.

2.3. Hypothesis development

The acceptance and adoption of technological innovations on the Internet are procedures of exploration, perception and learning that lead to a decision of approval or rejection of the technological object under scrutiny (Venkatesh and Davis 2000). The innovation diffusion literature highlights that the attitude towards adopting a new developed technology is primarily generated by the individual's beliefs about the consequences of adopting that technology and the cost of these consequences at different levels (Karahanna et al. 1999). The adoption of a new technology is a consequence of personal beliefs, and it creates an attitude towards the given technology (Ajzen and Fishbein 1977). Karahanna et al. (1999) state that adoption can be disaggregated into the following attributes: perceived usefulness, image, compatibility and perceived ease of use, trialability, visibility and result demonstrability. Nonetheless, perceived ease of use and perceived usefulness were conclusive for the adoption of technologies in several meta-analyses (King and He 2006; Ma and Liu 2004) and, more recently, in the meta-analysis of e-learning technologies conducted by Šumak et al., (2011).

Davis (1989: 25) defines "Perceived ease of use" as "*the degree to which a person believes that using a particular system would be free of physical and mental effort*". Two different factors affect the perceptions of ease of use of a system: knowledge/self-efficacy and the environment (Venkatesh 2000). The knowledge/self-efficacy control type refers to personal beliefs regarding the ability to perform a specific task using a particular technology (Venkatesh and Davis 1996). The environment control type refers to the perception of the resources available that might be helpful in overcoming any given situation that could represent a barrier to the use of a new system, such as consultant support or user guides (Bhattacherjee and Premkumar 2004). The knowledge/self-efficacy control type is related to a reframing situation, where the evaluation of the 'effort-free' nature of a system is associated with the perception that the manager has of his/her own abilities and capacities compared to those that people in any given community might have. Another facet in the technological reflectiveness construct is environmental control. A technologically reflective manager has the ability to adapt a new technology to the community, assuming potential supports to help new users overcome the barriers and hurdles that arise in the