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CHANCE OR CHOICE: THE CHOOSING CAPABILITY IN THE NEBIC MODEL

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Abstract

In a world of constant technological change, how can firms identify new technologies that can create customer value from digital networks? The NeBIC model (Wheeler 2002) theorizes about the dynamic capability of net-enablement as a means for doing so. This study seeks to develop a richer understanding for the choosing capability within NeBIC by examining the organizational routines of identifying, assessing, filtering, and concluding about new technology. Using diffusion of innovation theory (Rogers 1983) and institutional theory (Scott 2000) a theoretically based survey instrument and case study methodologies are proposed for a dissertation.

Introduction

The current pace of technological developments is unprecedented in recorded history. This truism is alluded to by two well-known trends in technology. Moore's Law, as posited by Intel co-founder Gordon Moore, indicates that the number of semi-conductors on a micro processing chip doubles approximately every 18 months for the same cost. In essence, this means that digital technology performance doubles every 18 months for the same cost (Downes et al. 2000). Metcalf's Law defines the so-called "network effect," which identifies the utility of a network is equal to the number of users squared, qualified for large networks (Downes et al. 2000). These two "laws" converge to indicate that the speed of technological change and opportunities are exponential. Not only do digital networks continue improve dramatically, but their value is ever increasing as more users join the network. As technology continues to develop at rapid rates it creates both confusion and opportunities for business. Many firms attempt to identify new technologies that will lead to the development and release of profitable products and services that create customer value. This is much easier said than done. In light of the rapid acceleration of technological change, how are firms to recognize technologies that lead to products and services that produce customer value? How can firms recognize the winners (e.g. the Palm organizer) from the losers (e.g. early versions of digital organizers)?

The ability to choose technologies that lead to customer value has been described as a "choosing capability" (Wheeler 2002). The NeBIC model (Wheeler 2002 p. 7) proffers that net-enabled firms that consistently create customer value from technology have developed a "consistent pattern of choices over time that give a clear signal" about their choosing capability (emphasis original). The research question of this study is: *what organizational routines and processes comprise a strong choosing capability within firms?* For this study we are specifically interested in the technology and innovations made possible by digital networks. The technology we are concerned with is the transformation of information into digital form where it can be manipulated by computers and transmitted by networks (Downes et al. 2000; Negroponete et al. 1995).

Theoretical Background

Three theoretical perspectives inform the choosing capability. The Net-enabled Business Innovation Cycle (NeBIC) introduces the choosing capability as one capability in the dynamic capability of net-enablement. The goals of this paper are to develop a more refined understanding of the choosing capability, and to validate an instrument for measuring this capability within organizations. Although NeBIC identifies the priority of the choosing capability for firms seeking to create customer value through innovation with digital network technologies, it provides a rather limited treatment to the details of the capability itself.

Two theories that provide a valuable lens for viewing the choosing capability are the diffusion of innovation theory (Rogers 1983) and institutional theory (Scott 2000, DiMaggio and Powell 1983). These two theories provide insight into distinct elements of the choosing capability.

An Overview of NeBIC

NeBIC theorizes that the dynamic capability of net-enablement consists of four capabilities, choosing, matching, executing and assessing. These four capabilities are joined by organizational learning and communication as displayed in figure 1. The current study is only concerned with the choosing capability. The choosing capability in NeBIC is defined as the "routines for identifying, assessing, filtering, and reaching conclusions regarding the timing and viability of emerging technology" (Wheeler 2002 p 7). Consequently, this study focuses on *identifying* and *measuring* those organizational routines intended to identify, assess, filter, and reach conclusions about emerging technologies.

According to NeBIC, new technologies are of two types--emerging or enabling technologies. *Emerging technologies* are the technologies that are still in a development lab. Although these technologies have been conceptualized they are not yet commercially available. *Enabling technologies* are commercially available and may be gaining or have already established viability in the market. Collectively these two types of technologies are referred to as ET.

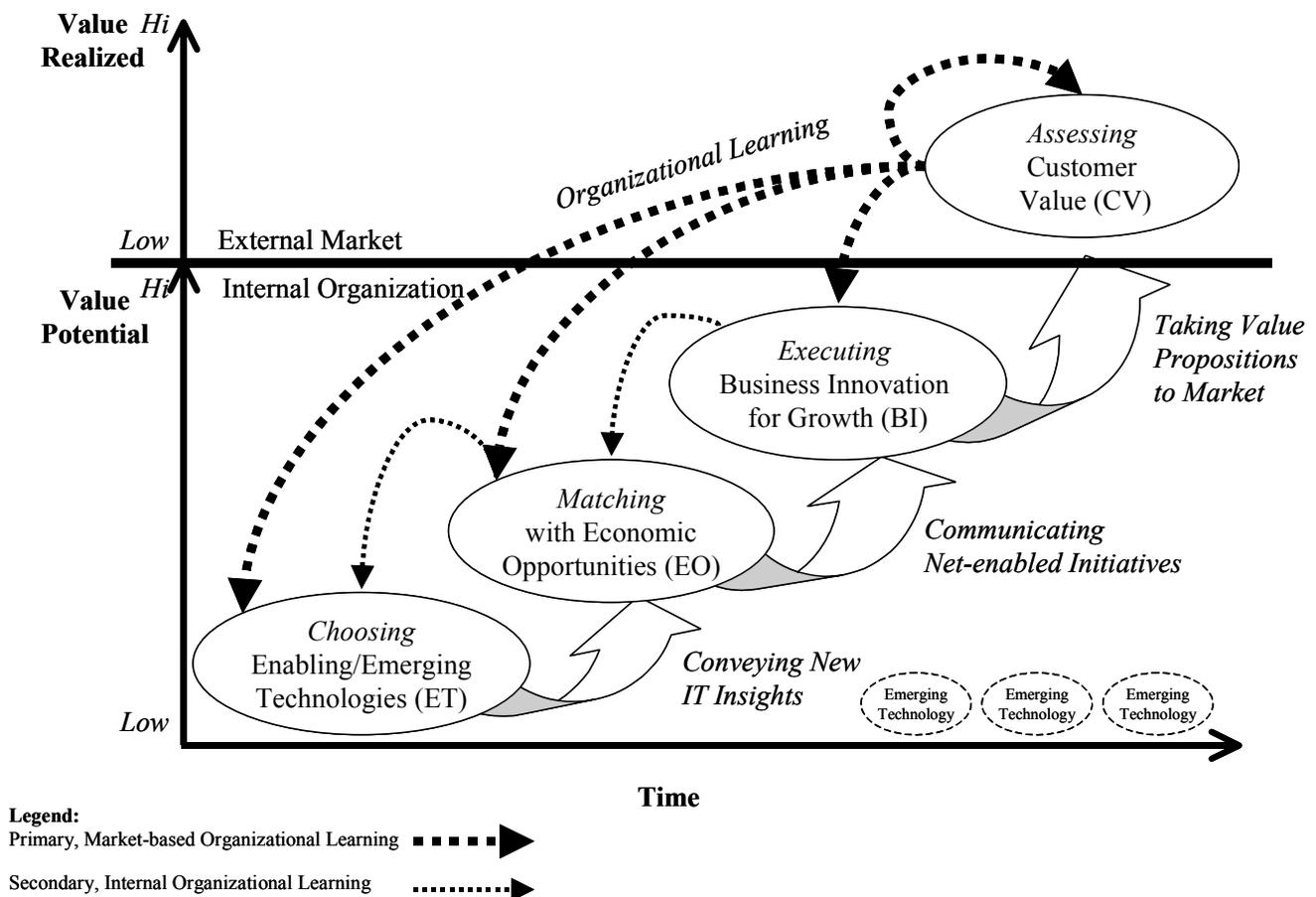


Figure 1. The NEBIC Theory (Wheeler 2002)

Throughout the NeBIC model the dependent variable is "customer value". However, the choosing construct occurs so early in the process of the net enabled business innovation cycle that "even a strong capability in choosing ET cannot be directly translated into customer value" (Wheeler 2002, page 8). Therefore, the dependent variable of the choosing construct is the "consistency in a pattern of choices over time" that indicates the strength of the organizations choosing capability. An organization that makes a few strong ET choices within a stream of poor ET choices will have a relatively weaker choosing capability. While a firm that makes a few weak ET choices within a stream of stronger ET choices will have a relatively stronger choosing capability. Consistent with the definition of the choosing construct, both the *timing* and *viability* of selected ET are important measures to demonstrate this consistent pattern.

Institutional Theory

Institutional theory is helpful to examine why and how ET come to have meaning within an institutional field. This is an important question for the choosing construct because ET, by definition, entails high levels of uncertainty. This uncertainty requires a great deal of sense making from potential adopters. As adopters identify and assess new technologies they must develop shared understandings of the opportunities created by the technology. This shared understanding of new innovations has been referred to as an "organizing vision" (Swanson et al. 1997). Organizing visions are developed over time by a broad set of institutional players within a community of interest. Three aspects of this process are interpretation, legitimation, and mobilization.

Organizing visions serve to facilitate interpretation of a technology by bringing together members at the community into discourse about technology. Through this discourse the community attempts to form a common understanding that explains the innovations' existence and purpose relative to its broader social, technical, and economic context.

Institutional theory argues that potential adopters develop not only a shared interpretation, but also a shared legitimation for implementing innovations. Legitimacy for an innovation comes from two sources. First, legitimacy is usually grounded by specific business concerns and organizational issues. At first, the legitimacy of a new innovation may be primarily technical; but eventually the business case for the innovation is developed by community discourse (Swanson 1994). A second form of legitimacy comes from the reputation and authority of those who are identified with it (DiMaggio et al. 1983).

The third aspect of the institutionalization process is mobilization. Institutional forces work together to bring about the structures and resources for the material realization of the innovation (King et al. 1994). As a new innovation begins to gain inertia towards a shared interpretation and legitimation, a host of vendors, consultants, conference participants, journals, specialized publications, and business magazines coalesce to propel the innovation into the limelight.

Diffusion of Innovation Theory

Diffusion theory is a well-established theory in IS research. Rogers (1963) seminal work on the subject is in its third edition (1983) and is still cited widely. Rogers defines an innovation as any idea, practice, or object that is perceived as new by the adopter. Diffusion theory holds that innovations possess certain characteristics (i.e., relative advantage, compatibility, trialability, complexity, and observability) that determine the ultimate rate and pattern of adoption.

Additionally, individual adopters have personal characteristics that make them more or less innovative (i.e., education level). Further, diffusion theory argues that the diffusion process follows an S-shaped cumulative adoption curve by starting out slowly among pioneering adopters, then growing rapidly and eventually trailing off. This adoption process consists of several stages (i.e., knowledge of the innovation, persuasion, decision, implementation, confirmation) leading to a final adoption decision. Although classical diffusion research is focused on individual adoption decisions, several researchers have extended it to study the adoption of innovations by organizations (Kwon et al. 1987; Robertson et al. 1986; Rogers 1983; Van de Ven 1991). From this research several variables are seen to affect organizational adoption. Rogers (1983) argues that individual leader characteristics and organizational structure are potentially relevant factors. Kwon and Zmud (1987) identify five contextual factors (user community characteristics, organizational characteristics, technology characteristics, task characteristics, and environmental factors) that affect organizational adoption rates. Robertson and Gatignon (1986) argue that competitive effects in the technology consumer's industry and within the technology supplier's industry impact the rate and level of diffusion.

The Choosing Capability

Combining the broad concepts of institutional theory with the more narrow, and detailed concepts regarding both the adopters and the innovations of diffusion theory produces a theoretical lens for understanding the choosing construct within the NeBIC model. The organizational routines that lead to the choosing capability can be identified and analyzed using these theories.

As mentioned above, NeBIC defines the choosing capability as the "routines for identifying, assessing, filtering, and reaching conclusions regarding the timing and viability of ET" (2002 p. 7). As an organization demonstrates an ability to select well-timed and viable ET they create a "consistent pattern of choices over time" which indicates a strong choosing capability. Figure 2 is a graphical representation of the choosing construct. It should be noted that the choosing capability is a relative measure. Because it represents a collection of organizational routines, there are no objective measures of the choosing capability. It can only be measured in comparison with other firms' performance.

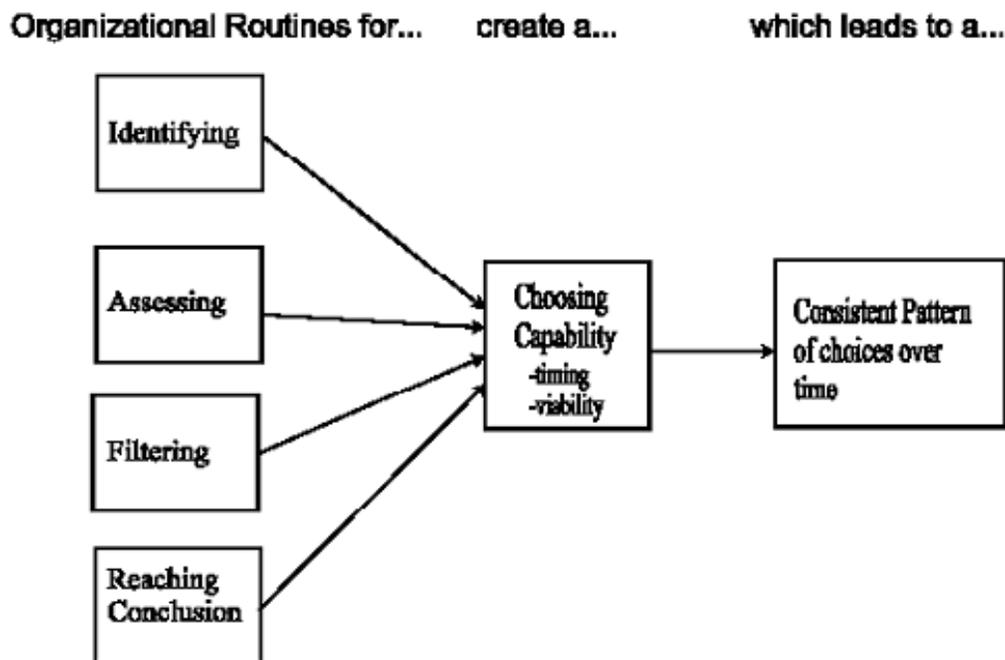


Figure 2. A Graphical Representation of the Choosing Construct

The ET inputs of the choosing capability are processed through organizational routines of identifying, assessing, filtering, and reaching conclusions regarding their timing and viability. Diffusion of innovation and institutional theories provide insights into the organizational routines that compose the choosing capability.

The Dependent Variable

The output of the choosing capability is a "consistent pattern of choices over time" regarding the timing and viability of ET. A consistent pattern of choices signals the relative strength of the choosing capability much more than a single well-timed and viable ET choice. Because the choosing construct is measure relative to other firms' performance, the dependent variable is a perceptual measure. Individuals within an organization should be able to provide their perceptions about the relative strength of the organizations pattern of ET choices over time. Although a perceptual dependent variable is less desirable than an objective one, it is the only possible measure for this construct. Any objective measure of choosing ET such as first to market, market share of ET innovations, or patents held, would include "noise" from other constructs within NeBIC (e.g., matching, executing, assessing) that describe how a firm takes an ET to market to create customer value.

Table 1. Comparison of NeBIC, Diffusion of Innovation and Institutional Theories

NeBIC (organizational routines for...)	Diffusion of Innovation (stages of the adoption decision)	Institutional forces and concerns
Identifying	Knowledge stage - Initial exposure to the innovation and gaining understanding of how it functions	Institutional discourse (conferences, expos, trade journals, newsletters...) exposes firms to ET.
Assessing	Persuasion stage - Potential adopter actively seeks information about the new innovation and forms an affective orientation towards it. Cultivates an understanding of its relative advantage, compatibility and complexity.	Institutional interpretation of ET creates a shared understanding of what an ET is and what it can do. The institutional question at this stage is; <i>what is it?</i>
Filtering	Decision stage – organizational processes that lead to a decision for active rejection, passive rejection or adoption. This stage often involves a “trial” use period.	Institutional legitimation of ET creates a shared justification for adoption. ET are matched with particular business problems, organizational strategies, and social systems. The institutional question is; <i>why do it?</i>
Concluding	Implementation stage – organization puts an innovation to use.	Institutional mobilization provides essential resources (hardware, software, personnel) for implementing ET. Formal adoption or active rejection of ET by firm.

Although the choosing capability consists of organizational routines that can be viewed as four phases, it is not a direct linear process. Path dependencies exist between previous decisions about ET and the potential of current and future ET. Additionally, it should be clearly stated that an ET might either stall, or fail during any phase of the choosing process.

Methodology

To conduct this study I will integrate both case study research methods and instrument development/survey research methods into a single study. At each site I will interview individuals within the IS function regarding the institutional and organizational routines for identifying, assessing, filtering, and concluding regarding ET. The advantage of the case study approach is that it provides rich insight into the choosing capability construct. Additionally, I will develop an instrument to identify and measure the choosing capability and the four types of organizational routines that constitute it. These methods will be particularly useful because the survey instrument can be used to measure the choosing capability in a large number of firms. In the ongoing work to empirically test the NeBIC model, this is an important step. Combining these methods reduces common method bias, and the results of the case study can be used to further refine the survey instrument. This multi-method approach has the potential of leading to multiple publishable outputs after the dissertation is finished. The drawback to this approach is the extensive financial resources and time required.

Discussion

This study has two potential outcomes. If the study is able to correctly identify organizational routines that strengthen the choosing capability it will be a success. However, if the survey results are ambiguous or meaningless it could be a total failure. I have three strategies in mind for mitigating these risks. By using multiple methods (case study and survey) I should gain insight into the choosing capability that will strengthen the survey instrument. Second, by grounding the survey in established measures and well-established theory I can reduce the potential for meaningless or ambiguous results. Third, to help mitigate the return rate problem a market research company will be used to conduct the survey. Additionally, by surveying a large number of personnel within a firm, we have the opportunity to add value back to the organization. When the survey is concluded I could present firm specific results to the participants describing their organizational capability for choosing ET.

A deeper understanding of the choosing capability is important theoretically and practically. Theoretically, the NeBIC model is offered as a subjective understanding of the organizational capabilities that distinguish successful NEO's (Net-enabled organizations) from less successful ones. The model lacks empirical support and validated instruments for measurement. In answering this research question, I will create, validate and apply an instrument for measuring the choosing capability of organizations. This instrument can be used in future research on the NeBIC model. Additionally, this research responds to Swanson and Ramiller's (1997) call for a deeper understanding of how individual organizations monitor and relate to the development of organizing visions. Finally, by integrating two well-established and often used theories I expect to contribute to the theoretical development of the choosing capability.

For practitioners, this research question has immediate applications for the IS function within organizations. How are firms to select technologies in which to invest? With myriad choices before them, how are they to distinguish opportunities from distractions? Developing this instrument will help firms identify the routines and processes that are essential for producing a "well-vetted flow of [emerging and enabling technology] choices" to the firm (Wheeler 2002).

Conclusion

The choosing capability is an increasingly important organizational capability. The increasing rate of change and the velocity of market competition stimulated by ET constantly challenge organizations. ET offers such destructive competitive power that even a company with the vast marketing and financial resources of Microsoft argues that they could be out of business as soon as some person in a garage thinks of the next big thing.

With the enormous potential of ET, organizations must develop a deeper understanding of the practices and routines that lead to a strong choosing capability. This research will provide that understanding. By creating a theoretically grounded instrument I should be able to measure the choosing capability within firms relatively quickly and easily and provide an answer to *what organizational routines and processes comprise a strong choosing capability within firms?*

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