

Technology Assimilation Across the Value Chain: An Empirical Study of Small and Medium-Sized Enterprises

Pratyush Bharati, University of Massachusetts, USA

Abhijit Chaudhury, Bryant University, USA

ABSTRACT

In this paper, the authors study technology assimilation, aggregating technologies and assimilation stages for SMEs. The authors employ the twin lenses of organizational innovation and elements of institutional theory. The research validates some institutional actors and most firm characteristics as important determinants. The relative weaknesses of the institutional actors provide evidence of structural isolation in the SME environment that is inhibiting information flow from intermediaries like government support agencies and vendors. The authors recommend a proactive role on the part of technology and enterprise intermediaries to design SME-appropriate solutions.

Keywords: Adoption, Assimilation, Clusters, Innovation, Institutional Theory, Intermediaries, Small and Medium-Sized Enterprises (SMEs), Value Chain

INTRODUCTION

Small and medium-sized enterprises (SMEs) play a very important role in the US economy and should be an important subject of study for IS academic researchers for several reasons. First, the employment scope of SMEs is significant in the US and EU countries (Harindranath, Dyerson, & Barnes, 2007); second, the innovation potential of SMEs in many high-tech areas is the primary growth driver of the industry; and finally, this sector drives the renewal process of the economy through birth, death, and restructuring. It is

well known that SMEs are different from large firms where information systems are concerned, and organizational theories applicable to large firms may not be applicable to them (Bharati & Chaudhury, 2006). A small firm is “not a little big business,” and there is a need to take off the big organization glasses when studying technology issues in small firms (Thong, 1999). However, few IS researchers in the US focus on the SME sector. This is evidenced by the fact that only a few papers on the subject have been published (Bharati & Chaudhury, 2009) in the last six years in the top IS journals.

This paper focuses on the question, “What institutional actors and what firm-level characteristics affect the full assimilation cycle of

DOI: 10.4018/irmj.2012010103

technologies spanning the full value chain of small and medium-sized enterprises (SMEs)?" It investigates SMEs in the high-technology manufacturing cluster based in Greater Boston and studies the influences of cluster of competitors, vendors, and others on the direction and pace of innovation. The paper draws on institutional theory (Powell & DiMaggio, 1991) and organization learning theory (Attewell, 1992) to build a model of technology assimilation over the whole technology life cycle. The major contribution of this paper to technology assimilation research is that it seeks to fill the void in research on the determinants of technology adoption and assimilation (i) across the entire value chain of a firm, that is, technologies that support both primary activities such as manufacturing and logistics and secondary activities such as purchase and accounting, and (ii) across the full assimilation life cycle.

IT research on SMEs has mainly been focused on motivators and inhibitors (Caldeira & Ward, 2002; Cragg & King, 1993), acceptance and impact (Iacovou, Benbasat, & Dexter, 1995), factors relating to satisfaction and success (Zhang, Sarker, & Sarker, 2008; DeLone, 1988), and implementation issues (Thong, Yap, & Raman, 1994, 1996). Thong (1999) provided an integrated model of IS adoption in small businesses where factors relevant to the firm, such as CEO characteristics and organizational characteristics, and a single environmental factor of competition were used. The paper extends Thong's (1999) model of IT adoption in SMEs by looking into a much wider set of institutional actors that play a role in the full assimilation life cycle and across multiple technologies; it extends the model developed by Liang, Saraf, Hu, and Xue (2007), which researches a single technology, into technology aggregates that cover the entire value chain; and it adds and relates to the institutional-theory based models in IS research (Chatterjee, Grewal, & Sambhamurthy, 2002; Teo, Wei, & Benbasat, 2003) to investigate the full assimilation life cycle.

This research adopts a unique approach with respect to the current state of IS research in technology assimilation. First, it adopts

a firm-level approach. Firm-level learning capabilities are becoming increasingly more prevalent as antecedents to technology assimilation (Liang et al., 2007), and this approach has been adopted in the paper. Second, this paper uses an institutional perspective based on firm-level analysis. Concern has been raised about the lack of institutional perspective in IS research (Chiasson & Davidson, 2005), and this paper also attempts to address that lacuna. The technology-organization-environment (TOE) model (Tornatzky & Fleischer, 1990), an institutional-theory-inspired model, has motivated a stream of research investigating the impact of environmental factors such as competitive pressures, trading partners, and environmental uncertainty on IT adoption (Kuan & Chau, 2001). Compared to large firms, SMEs are price-takers in the market, and as a result of their low asset base, are more vulnerable to competitive and business pressures emanating from the institutional environment (Liang et al., 2007). The environment is likely to be an important factor in technology assimilation by SMEs. There is a serious dearth of research that studies the impact of environment on SMEs in the context of IT adoption, with a few exceptions (Thong, 1999). Third, while much of the literature in technology assimilation is based on a single technology, this paper models antecedents to technology assimilation where aggregates of technologies are involved. While this aggregation may hide the differences between the impacts of different technologies, a confirmation also provides evidence of model robustness at the aggregate level and makes policy recommendations more meaningful (Fichman, 2001). This paper focuses on multiple technologies, such as supply chain management (SCM), customer relationship management (CRM), enterprise resource planning (ERP), and similar technologies that make a firm-wide impact, in contrast to studying an individual technology. The paper also addresses some relevant question for SMEs: How much are SMEs impacted by the environment and how much by factors within the organization? Which approach—the institutional approach or the organization learning approach—provides

21 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: www.igi-global.com/article/technology-assimilation-across-value-chain/61420

Related Content

User Developed Applications and Information Systems Success: A Test of DeLone and McLean's Model

Tanya McGill, Valerie Hobbs and Jane Klobas (2003). *Information Resources Management Journal* (pp. 24-45).

www.irma-international.org/article/user-developed-applications-information-systems/1235

An Outsourcing Acceptance Model: An Application of TAM to Application Development Outsourcing Decisions

John Benamati and T.M. Rajkumar (2008). *Information Resources Management Journal* (pp. 80-102).

www.irma-international.org/article/outsourcing-acceptance-model/1340

The Use of Electronic Banking and New Technologies in Cash Management

Leire San Jose Ruiz de Aguirre (2009). *Encyclopedia of Information Science and Technology, Second Edition* (pp. 3914-3920).

www.irma-international.org/chapter/use-electronic-banking-new-technologies/14161

E Bario Project: In Search of a Methodology to Provide Access to Information Communications Technologies for Rural Communities in Malaysia

Poline Bala, Roger W. Harris and Peter Songan (2008). *Information Communication Technologies: Concepts, Methodologies, Tools, and Applications* (pp. 826-839).

www.irma-international.org/chapter/bario-project-search-methodology-provide/22703

Predicting Software Aging With a Hybrid Weight-Based Method

Yongquan Yan, Yanjun Li and Bin Cheng (2021). *Journal of Information Technology Research* (pp. 58-69).

www.irma-international.org/article/predicting-software-aging-with-a-hybrid-weight-based-method/289857