Actor–Network Theory and Adoption of E–Commerce in SMEs

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INTRODUCTION

Just because e-commerce technologies seems like useful tools that may assist a small to medium enterprise (SME) in doing its business better, it does not necessarily follow that these technologies will be *adopted* by this business. The implementation of an e-commerce system in an SME necessitates change in the way the business operates, and so should be considered as an innovation and studied using innovation theory.

Electronic commerce (e-commerce) is concerned with how computers, information systems and communications technologies can be used by people to improve the ways in which they do business. As e-commerce necessarily involves interactions of people and technology, any study of how it is used by a small business[1] must be considered in a socio-technical context. Although there is no universal consensus on what constitutes e-commerce, we believe that it contains elements of information systems, business processes and communications technologies. The complexity of studies in e-commerce is due, to a considerable degree, to the interconnected parts played by human actors and by the multitude of non-human entities involved. Small business managers, sales people, staff involved in procurement and warehouse operations, computers, software, Web browsers, Internet service providers (ISP), modems and Web portals are only some of the many heterogeneous components of an e-commerce system.

BACKGROUND

Adoption of E-Commerce by SMEs

In this article we will argue that the decision to adopt, or not to adopt a new technology, has more to do with the interactions and associations of both human and non-human actors involved in the project than with the characteristics of the technology. Information systems are complex socio-technical entities and research into their implementation needs to take account of this complexity, which will only be seen if it is reported in all its "messy reality" (Hughes, 1983). Research into the implementation and operation of these systems needs to take this heterogeneity into account and to find a way to give due regard to both their human and non-human aspects.

One view of the adoption of an electronic commerce innovation by a small business suggests that decisions are made primarily based on their perceptions of the characteristics of the technology concerned. Innovation diffusion (Rogers, 1995) uses this approach, and is based on the following elements: characteristics of the innovation itself, the nature of the communications channels, the passage of time, and the social system. Using this sort of approach, the researcher would probably begin by looking for characteristics of the specific e-commerce technology to be adopted, and the advantages and problems associated with its use. The next step would be to suggest that the adoption, or rejection, of this technology by the small business was due largely to these characteristics. We contend that while there may be some validity in such an approach, it is unlikely to provide the complete explanation, as it would miss other influences due to interpersonal and inter-business interactions, and to the backgrounds of the people involved.

Innovation Translation

We argue that actor-network theory (ANT) has much to offer in a situation like this. A researcher using an actor-network approach to study innovation would concentrate on issues of network formation, investigating the human and non-human actors and the alliances and networks they build up. They would investigate how the strength of these alliances may have enticed the small business to make the adoption or, on the other hand, to have deterred them from doing so (Tatnall, 2000, 2002; Tatnall & Gilding, 1999). While some research approaches to technological innovation treat the social and the technical in entirely

different ways, actor-network theory proposes instead a socio-technical account in which neither social nor technical positions are privileged.

Actor-network theory argues that interactions between actors are heterogeneous and denies that purely technical or purely social relations are possible. It considers the world to be full of hybrid entities (Latour, 1993) containing both human and non-human elements. Change, in the ANT view, results from decisions made by actors, and involves the exercise of power. Latour (1986) argues that the mere possession of power by an actor does not automatically lead to change unless other actors can also be *persuaded* to perform the appropriate actions for this to occur.

In our experience it is often the case that when a small business is considering a technological innovation it is interested in *only some aspects* of this innovation and not others (Tatnall, 2002; Tatnall & Burgess, 2002). In actor-network terms it needs to *translate* (Callon, 1986) this piece of technology into a form where it can be adopted, which may mean choosing some elements of the technology and leaving out others. What results is that the innovation finally adopted is not the innovation in its original form, but a translation of it into a form that is suitable for use by the recipient small business (Tatnall, 2002).

In many instances a small business proprietor will adopt e-commerce because a friend is using it, or because they know a competitor is using it, or because a son or daughter learned about it at school (Burgess, 2002; Tatnall, 2002). The nature and size of each small business, the inter-business interactions in which they engage, and the backgrounds and interests of particular individuals in each are also likely to have had an important effect that would, most likely, have been ignored by the essentialist approach offered by innovation diffusion. Actor-network theory, in examining alliances and networks of human and non-human actors, provides a good foundation from which small business adoption and use of e-commerce can be researched. The ANT approach will be further amplified in the case studies that follow, particularly in respect of the identification of actors and networks.

FUTURE TRENDS

Actor-Network Theory and E-Commerce Innovation

The theory of innovation diffusion (Rogers, 1995) is well established and has been used as the framework of many studies. In most cases, however, the success of the diffusion model has been in explanation of innovation "in

the large," when the statistical effects of big numbers of organisations and individuals involved come into play. It has, typically, been less successful in explaining how particular individuals or specific organisations make their adoption decisions, and it is in situations like this that an innovation translation approach, using actor-network theory, is especially useful.

In offering a socio-technical approach to theorising innovation, ANT provides a particularly useful tool to the study of innovations in which people and machines are intimately involved with each other. The adoption of e-commerce technologies certainly involves a consideration of the technologies themselves, but also of business organisations, business processes, and the needs and likes of individual humans. ANT, we suggest, is especially useful in researching innovations like these, and in particular, when considering individual adoption decisions.

The main use made of any research approach such as ANT is in the study of past events, and ANT makes no claim to be able to predict what may happen in the future. We suggest, however, that ANT analysis can identify some pointers towards the successful introduction of an innovation, and the change management associated with this. ANT argues that it is not the characteristics of either the innovation itself or the potential adopter acting alone that are important, but rather the interactions of many actors. The key to successful change management, it would thus seem, involves allowing for these interactions and for the socio-technical nature of the process.

Case Studies

This article now offers several brief case studies in which actor-network theory has provided a means by which adoption (or non-adoption) of technology can be explained. In each case, data for the study were obtained through semi-structured interviews with the proprietors and personnel of the businesses involved, between September 2001 and August 2002.

1. *Adoption of a Portal by a Storage and Transport Company*

The business to be considered in this study is a medium-sized Melbourne company, with about 50 employees, that stores frozen food and transports it to supermarkets and other locations around the country. It became clear from the study that the transport company had "not really been into computers," and had only recently started coming to grips with this technology.

Although the manager had some idea of the benefits to his company of using the portal, he had no clear plan for using it. It was just "a really good idea". The reasons

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