December 2004

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An Empirical Study of Factors that Influence the Extent of Deployment of Electronic Commerce for Small- and Medium-sized Enterprises in Australia

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Abstract

This study surveys the perceptions and experiences of Australian small- and medium-sized enterprises (SMEs) in the adoption and implementation of Internet-based Electronic Commerce (EC) as seen from the perspective of the extent of deployment. The extent of deployment is one of the major component of implementation success and one of the most important dimensions. With a sample of 115 small businesses in Australia, this paper uses regression modelling to explore and establish the factors that are related to the extent of deployment. The analysis was carried out on the 19 influencing factors of EC and 7 factors – perceived relative advantage, trialability, observability, variety of information sources, communication amount, competitive pressure, and non-trading institutional influences, were found to make a significant contribution to the extent of deployment of Internet-based EC.

Keywords

Business-to-Business Electronic Commerce, Adoption and Implementation Success, Extent of Deployment, Internet, Small- and Medium-sized Enterprises**.**

INTRODUCTION

The commercialization of the Internet and World Wide Web (WWW) has driven Electronic Commerce (EC) to become one of the most promising channels for inter-organizational business processes. Despite the economic downturn and the burst of the "dot-com" bubble, EC is expected to continue its significant growth. EC has emerged as a whole of business strategy that enables organisations to improve business processes and communication, both within the organisation and with trading partners. It is estimated that by the year 2004, the value of worldwide EC may reach US$2.7 trillion (eMarketer, 2003). In Australia it was reported that $43 billion worth of online revenues contributed 6.4 percent of Gross Domestic Product, to the Australian economy (Cisco Systems, 2002).

Research Problem

According to the report of the Information Economy (NOIE, 2000), Australia is well positioned to benefit from the emerging information economy. On a number of metrics, Australia is among the leading nations in terms of measures of Internet infrastructure, penetration and activity. However, in comparison with other countries and larger Australian businesses, small- and medium-sized enterprises (SMEs) have been relatively slow in adopting EC (Corbitt, 2000; NOIE, 2000; Poon and Swatman, 1997; Yellow Pages Business Index, 2002). Even if SMEs were able to overcome the barriers of initial adoption, they still face challenges when trying to implement the new system into their business. Most SMEs perceive the challenge of integrating EC into their business operations as risky, complex, time-consuming, and an expensive initiative (NOIE, 2000). If the EC implementation is successful, potential benefits to small businesses can include increased sales, improved profitability, increased productivity, reduced costs associated with inventories, procurement and distribution, improved quality of service, and secured competitive positions (see Campbell, 1998; Purao and Campbell, 1998; Smith, 1998; Whiteley, 2000). On the other hand, if EC implementation is unsuccessful, it will have severe repercussions on small businesses with their limited resources.

The need to adopt EC for survival in the international marketplaces, especially due to physical and economic distance faced by Australian SMEs becomes imperative. The awareness of the critical success factors of EC implementation also becomes essential for SMEs to appropriately address the relevant issues and move forward. Despite these issues, there is little empirical research that examines the success of EC deployment after the technology has been implemented. In addition to that, there is little of the prior Information Systems (IS) and Information Technology (IT) literature, and none from EC literature, has investigated the relative importance of the identified factors of extent of deployment. Without knowing the relative importance of these factors, SMEs may be expending their limited resources and energy on less important factors which have limited contribution to EC implementation success.

Focus of this Paper

In view of the above issues faced by SMEs, the purpose of the paper is to identify which factors are influencing SMEs' perceived level of EC deployment as well as quantifying their relative importance. It should be noted that *Extent of Deployment* is part of a larger study and is one of the three core indicators (*Extent of Deployment*, *Level of Usage* and *Overall Satisfaction*) which explores the factors of implementation success. Using the Extent of Deployment as the indicator of implementation success, the study aims to address the following research question:

- What factors influence of the extent of EC deployment for SMEs*?*

This paper is structured as follows: the model of EC implementation success and discussion of the Extent of Deployment as the appropriate measure for implementation success will be presented. Then, a brief description of the data collection, measurement of the variables, and instrument validation will be reported. Finally, the findings of the study will be discussed with implications to help SMEs and public policy makers in Australia achieve better understanding of EC adoption and implementation.

Scope of this Research

In this research, the scope of EC applications is limited to the utilisation of Internet as the technology infrastructure to communicate, distribute and conduct information exchange and business transactions with business partners. The overwhelming growth rate of the Internet since the commercialisation in the mid 1990s makes it the most utilised Wide Area Network platform even for business-to-business communications, and makes the further substitution of previous platforms highly likely throughout the next decade. This study has also purposely focused on organisations that use EC to carry out transactions and interactions that affect existing business relationships or pre-existing contractual relations between trading partners, i.e. business-to-business EC. For more justification see Chong and Bauer (2000).

It is anticipated that this study will provide valuable insights into the current perceptions of EC in enterprises that are engaged in business-to-business transactions with their counterparts. Answers to the research questions should prove of interest and value to SMEs owners, practising managers and those seeking to adopt and implement EC strategies. While the results may be generalisable to other countries, the data set is Australian and conclusions are restricted to that environment at this stage.

THEORY PERSPECTIVE OF THIS STUDY

It should be noted that the background theory of this study encompasses a substantial variety of previous research on adoption, implementation, and innovation diffusion theories applied to technology in general, IS, IT, EDI, IOS, and MIS. Clearly, EC is not identical with any of them. It necessarily involves IT which it shares with IS and MIS and at more sophisticated levels is likely to enable EDI. It is also undeniably 'Interorganisational'. It may therefore be argued that any factor that has been shown to influence the adoption and implementation of technology in general and any of these applications was worthy of consideration as a potential explanatory variable with respect to EC. The reader is reminded that in this regard, due to the lack of previous EC specific research in this area, this study was essentially exploratory. Thus, keeping an open mind regarding which variables (if any) will be related to a particular factor. To ensure thoroughness, wherever previous research or reasoning suggested a relationship between a factor and one of the variables, its possible influence on the focal variables will also be hypothesised. Innovation diffusion theories have been particularly useful for understanding the facilitators and inhibitors of EC, because this theory provides insight into the factors that influence the adoption of innovation. After a critical analysis of existing models, their influencing factors, stages, and process, the theoretical framework is extended to incorporate important organisational and contextual aspects of adoption and implementation in the development of a research model.

Extent of Deployment in the Context of EC Adoption and Implementation

As defined in Rogers innovation diffusion theory (1995), *adoption* is a decision to make full use of an innovation as the best course of action and *implementation* is taking the necessary actions to facilitate and execute EC into business practice or process. In this study, it is argued that EC adoption is essentially a continuum involving a range of progressive developments and a broadening variety of applications (Chong, 2004). For several reasons, there is rarely any clear separation between adoption and implementation in EC. In other words, EC is not "one simple or single innovation" that a firm either does or does not adopt, but should be considered as consisting of a number of combinations of innovations of varying complexity and sophistication on a continuum requiring lesser to greater levels of commitment. While conceptually distinct, there is no temporal dividing line between all the dependent variables in this study for they merge into one another (i.e. *State of Adoption*, *Extent of Deployment*, *Level of Usage*, and *Overall Satisfaction*). Rather their hierarchy is logical in that each is a necessary condition for the next: while one feature is becoming more utilised, another is being explored and a third is being considered or enabled. Thus, in any firm, EC is never "either adopted or not adopted" but always in one of a large number of possible 'states of adoption'.

The following section will focus on discussing the significance of the Extent of Deployment as a measure of implementation success. The other three dependent variables are beyond the scope of this paper.

Extent of Deployment

The *Extent of Deployment* in this study encompasses an externally-oriented measure while most IS adoption studies are internally oriented (due to the internal deployment of the system or software within the firm). However, it should be noted that the study of EC is not only inward-looking but has to be outward looking too. By definition in this study, the *Extent of Deployment* is the extent to which the firm is successful in linking with external partners and converting its transaction documents into electronic form. The construct borrows three concepts and definitions from diffusion and integration studies by Massetti and Zmud (1996). A weighted measure was developed to measure *Extent of Deployment* by multiplying all the three components of deployment (or the 'extent of integration' or 'diffusion' as defined by previous studies – see Massetti and Zmud, 1996; Premkumar, Ramamurthy and Nilkantan, 1994; Ramamurthy, Premkumar and Crum, 1999; Raymond and Bergeron, 1996). It is an adaptation of their concepts but this study has tailored them to the EC context. Thus, the variable, *Extent of Deployment*, combines the notions of **volume**, **diversity**, and **breadth**. As for the aspect of **depth**, this is captured in the other dependent variable not covered in this paper - the *Level of Usage*.

- **Volume** – the proportion of business the firm derives from Internet-based EC is defined as the "*Percent of Business Conducted Online*" in this study.

- **Diversity** – the variety of documents exchanged via Internet-based EC with their external partners. It is defined as "*Application Diversity*" in this study.

- **Breadth** – the extent to which a firm has developed EC connections with its trading partners. It is defined as "*Number of Linkages*" in this study.

Unlike traditional information systems, EC is an Interorganisational System (IOS), and therefore requires the organisation to expand its external electronic links to gain economies of scale and be cost effective. Previous studies have shown that there is a need for "inter-exploitation" between partners through expansion of IOS in order to sustain strategic advantage (Computerworld, 1992; Vitale, 1985).Firms could utilise the electronic links fully by including more transactions or documents. Such expansion of electronic transaction or documents exchange would enable firms the full benefits from EC and improvement of organisational effectiveness in the long run.

RESEARCH MODEL

In this study, it is proposed that several factors influence different levels of EC adoption for the organisation. In the absence of empirical studies to assist in the selection of the most significant variables for EC adoption and implementation, a number of possible relevant factors have been identified and grouped into broad categories of *internal* and *external environmental factors*. The distinction between internal and external environmental factors is made to distinguish between organisation-specific (and organisation-determined) factors and factors that are imposed (and determined) from outside the organisation. Figure 1 presents the research model and the relationship between the influencing factors and the extent of deployment was examined.
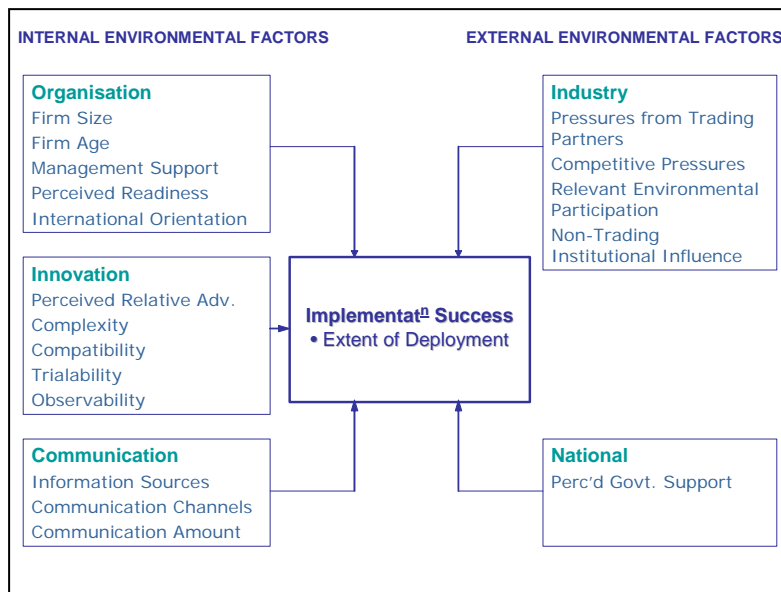
Figure 1: Conceptual Model of Factors that Influence the Extent of Deployment of EC.

The background of the conceptual model has been covered and reported in Chong (2000).

RESEARCH METHODOLOGY

A positivist approach was undertaken to develop the research model rather than confirm an existing one. The research model is operationalised based on correlational hypothesis testing, rather than the determination of a definitive cause and effect relationship. The desired result in testing the model is the determination of variables **associated** with the extent of deployment. Due to the exploratory nature of this study, a cross sectional approach was undertaken to measure firms' responses regarding the adoption of EC.

Data Collection

The study was conducted in Australia in three phases: preliminary investigation, pilot study and questionnaire survey. Preliminary interviews with five Australian SMEs[1] were conducted. This provided direction to what adoption factors are imperative to SMEs and was supported by an extensive literature review, this contributed to the design of the proposed research model (see Chong, 2000). A survey instrument with questions and multiple-item scales was developed and pilot-tested to capture the information reflecting the perceptions and practice of those adopting EC, specifically what internal or external environmental factors affect the adoption of EC and the degree of influence. In order to focus on SMEs, assistance was sought from governmental and research institutions in Australia to develop a database of SMEs and contact details of target respondents. As the survey was intended to apply over a wide geographical area, the chosen method of delivery was a combination of email, web and mail survey. Four hundred and eighty five survey questionnaires were personally disseminated and addressed to the director or owner of the firms. In order to improve response rate, reminders were sent out to target respondents two weeks after the commencement of first and second-wave of mail-out. A total of 115 usable responses were collected.

Measurement of Variables

Some of the indicators were developed by the researcher, while some were adopted or modified from previous scholars. In cases where a previous measure is good, the researcher adopts or adapts the items and due credit was properly given. In other cases, new indicators were added and compared with the previous measures according to the suggestions made by Neuman (1997) in coming up with a new measure. Table 1 below shows a comprehensive list of the variables used in this study. These variables were presented with the corresponding indicators, the types of scales used, and an indication of whether they were researcher-defined or the sources from which they were adopted or adapted.

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[1] Definition of Small- and Medium-sized Enterprises (SMEs) in Australia is any business employing less than 20 people; and 20 or more but less than 200 people for medium business. For further definitions of SMEs, please refer to http://sbdc.gov.au.

DEPENDENT VARIABLES			
Variables	**Indicators**	**Measurement**	**Adopted /Adapted Sources**
Implementation Success			
Extent of Deployment	Combination of application diversity, number of linkages, & proportion of business conducted online	Ratio Scale	Massetti & Zmud, 1996

INDEPENDENT VARIABLES			
Variables	**Indicators**	**Measurement**	**Adopted /Adapted Sources**
Organisational Factors			
Management Support	Composite of perceived mgmt support items	Likert Scale	Iacouvou, Benbasat, and Dexter, 1995
Perceived Readiness	Overall perceived preparedness	Likert Scale	Iacouvou, et al., 1995
Firm Size	Number of full-time equivalent employees	Ordinal Scale	Gatignon and Robertson, 1989; Damanpour, 1991
Firm Age	Number of years the firm has been established	Ordinal Scale	Researcher Defined
International Orientation	Proportion of turnover derived from international trade	Ratio Scale	Lal, 2002
Innovation Factors			
Perceived Relative Advantage	Composite of perceived relative advantage items	Likert Scale	Rogers, 1995; Soh, Mah, Gan, Chew and Reid, 1997
Compatibility	Composite of perceived compatibility items	Likert Scale	Rogers, 1995; Soh, et al., 1997
Complexity	Composite of perceived complexity items	Likert Scale	Rogers, 1995; Soh, et al., 1997
Trialability	Composite of perceived trialability items	Likert Scale	Rogers, 1995; Soh, et al., 1997
Observability	Composite of perceived observability items	Likert Scale	Rogers, 1995; Soh, et al., 1997
Communication Factors			
Information Sources	Variety of material & organisation sources that firms used to attain information about EC	Ratio Scale	Researcher Defined
Communication Channels	Variety of channels firms used to delivery information about EC	Ratio Scale	Researcher Defined
Communication Amount	Frequency of communication between the firm & its trading partners	Ordinal Scale	Mohr, Fisher & Nevin, 1996; Cannon & Homburg, 2001
Industry Factors			
Customer Pressure	Level of perceived pressure exerted from customers to adopt EC	Likert Scale	Iacouvou, et al., 1995; Premkumar and Roberts, 1998
Supplier Pressure	Level of perceived pressure exerted from suppliers to adopt EC	Likert Scale	Iacouvou, et al., 1995; Premkumar and Roberts, 1998
Competitive Pressure	Perceived competitor influence on the adoption of EC	Likert Scale	Iacouvou, et al., 1995; Gatignon & Robertson, 1989
Relevant Environmental Participation	Composite of participation of specified related organisations in the business environment which the firm operates in	Ordinal Scale	Researcher Defined
Non-Trading Institutional Influence	Composite of perceived influence of specified non-trading institutions	Ordinal Scale	Researcher Defined
National Factors			
Level of Governmental Support	Perceived level of support provided by the government to adopt EC	Likert Scale	Researcher Defined

Table 1: Original Construct Measurement.

The issue of instrument validation was addressed in detail in the course of the study but a discussion of this area is beyond the scope of this paper.

RESULTS

Table 2 presents results of the regression analysis to determine whether a (linear) relationship exists between SMEs' extent of deployment and the factors identified in the study.

Influencing Factors	Standardised Coefficient (beta)	t-value	Significance
(Constant)		-2.369	0.023
SIZE.FIRM	0.045	0.328	0.744
AGE.FIRM	0.122	0.956	0.345
MGMT.SUPP	0.139	1.145	0.259
INTL.ORIENT	0.066	0.455	0.652
PCD.RDNS	0.151	1.161	0.253
PCD.REL.ADV	0.267	2.172	0.036
COMPLEX	-0.016	-0.127	0.899
COMPATI	0.072	0.512	0.612
TRIALAB	-0.294	-2.361	0.023
OBSERV	0.155	0.951	0.347
INFO.SRC	0.301	2.075	0.044
COMM.CHAN	-0.037	-0.245	0.807
COMM.AMT	0.225	1.789	0.081
CUST.PRES	-0.202	-1.205	0.235
SUPP.PRES	0.240	1.382	0.175
COMP.PRES	0.161	1.174	0.247
REL.ENV.PART	0.133	1.150	0.257
NON.TRD.INFL	-0.206	-1.644	0.108
PCD.GOV.SUP	-0.050	-0.407	0.686

$R^2 = 0.613$ Adjusted $R^2 = 0.429$ F-significance = 0.001 Observations = 115

Table 2: Initial Model Estimation for the Extent of Deployment.

Table 2 represents the results of regression with all hypothesised influencing factors included, while Table 3 represents the results of the stepwise-backward elimination, whereby those factors that are statistically significant in the model for the **Extent of Deployment**, are retained. For the initial model summarised in Table 2, the stepwise-backward elimination resulted in the final model shown in Table 3. It also resulted in an expected moderate reduction in R-squared and an increase in adjusted R-squared value of 0.429 to 0.470. A slight improvement in the overall significance of F-value was shown from 0.001 to 0.000.

Influencing Factors	Standardised Coefficient (beta)	t-value	Significance
(Constant)		-3.270	0.002
PCD.REL.ADV	0.301	2.947	0.005
TRIALAB	-0.240	-2.315	0.025
OBSERV	0.267	2.466	0.017
INFO.SRC	0.316	3.039	0.004
COMM.AMT	0.322	3.271	0.002
COMP.PRES	0.183	1.739	0.088
NON.TRD.INFL	-0.172	-1.737	0.088

$R^2 = 0.533$ Adjusted $R^2 = 0.470$ F-significance = 0.000 Observations = 115

Table 3: Final Model Estimation for the Extent of Deployment.

Since the F-value is significant at the 1 percent level, this shows that there is strong evidence to support that the overall model is significant and the independent variables retained are related to the Extent of Deployment. As shown in Table 3, the adjusted R-squared value indicates that 47 percent of the variation in Extent of Deployment by Australian SMEs is explained by the variation of *Perceived Relative Advantage, Observability, Trialability, Variety of Information Sources, Communication Amount, Competitive Pressure*, and *Non-Trading Institutional Influences*. All variables are significant at the 0.05 level or better. The figure below shows factors that are supported by significant evidence.
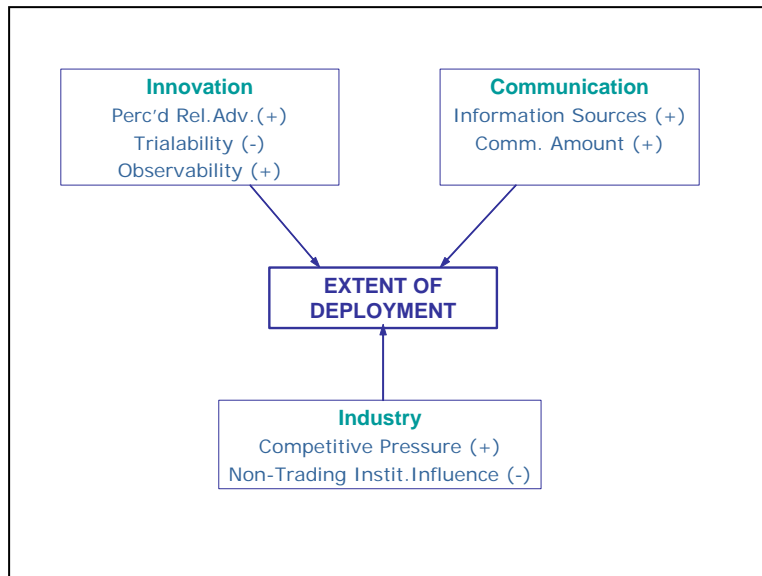
Figure 2: Factors related to the Extent of Deployment in the Australian Context.

DISCUSSION

Perceived Relative Advantage

Perceived Relative Advantage appears to be significantly related to the Extent of Deployment. This contradicts the results of a study by Premkumar, Ramamurthy and Nilkantan (1994) where they found perceived relative advantage only to influence adoption decision and not implementation success of EDI. The high relative importance of this variable indicates that the benefits of EC perceived by SMEs have led to high extent of deployment. This can be logically explained as it is akin to the benefits and costs of adopting an innovation. It can be seen that SMEs are most motivated by the prospects of gaining a relative advantage over competitors, or that EC can assist them in gaining a relative advantage over the current "status quo" or existing business practice (such as opening up markets for them and lowering their business costs). On the other hand, it could be suggested that if companies do not believe EC can provide them with relative advantage after they have adopted EC, it is likely that the implementation would be discontinued.

Although one cannot forcibly increase ones' perception of relative advantage where it does not genuinely exist it is nevertheless possible to be more proactive in investigating and exploring possible advantages leading to increased success (Chong and Pervan, 2001). SMEs should evaluate the implementation of EC on a regular basis in order to integrate and expand its application to other business functions effectively. After making the decision to adopt EC, it also needs to be perceived by SMEs as a better alternative to existing practices in the business. However, very often the lack of knowledge in the advantages that EC offers can cause impatient firms to give up and discontinue the adoption and implementation. Therefore, the use of promotional efforts and non-coercive influence tactics is suggested for increasing the levels of awareness for EC benefits. Perhaps government and industry associations alike can also play a more active role raising participation within the industry, pointing SMEs to the opportunities and benefits of EC, giving support and working with them to overcome their doubts regarding implementing EC.

Trialability

It was interesting to note that *Trialability* appears to be negatively related the Extent of Deployment. It is possible to suggest that when adopting firms perceived EC to be less trialable, they are more likely to push for higher level of commitment. Such firms would thus apply more urgency in learning and experimenting with the new system, which normally lead to greater preparedness as most firms want to ensure that their investment will not be wasted. This also indicates that such firms would have a higher ability to deploy extensively. Another possible explanation is that the perception of trialability may be a sign of lack of commitment. Because deployment requires some degree of commitment, true deploying can only start when the trialing mentality stops. This serves as a reminder to would-be or hesitant adopters that even though preparation and keen attitude in experimenting may be essential, SMEs should not take too long to deploy EC. For a start, rather than purchasing more expensive, custom-developed EC software or applications, well-tested dedicated packages may well suit the needs of the company.

Observability

For Australian SMEs, *Observability* appears to be significantly related to the Extent of EC Deployment. A two-way causation is likely in this instance. Firstly, there is a logical relationship between confidence and Extent of Deployment. When a firm could observe the benefits that EC has brought to the business, it is very likely that the firm will increase the depth and breadth of EC implementation. In the case of doing business online, effects such as quicker access and dissemination of information, and savings in costs (e.g. printing, advertising, communication and overhead costs) are more immediate and easier to acknowledge. The implication for SMEs is therefore to highlight easily and quickly demonstrated benefits and usage first so that their short term, visible effects can help promote continued adoption of the long-term goals of EC. It is sometimes not enough to assume that people will realise the impact of an innovation. Asking them to reflect on and describe the impact can increase their awareness and observability. This could include the requirement of review by the owner/manager and the employees, to elicit the user's observations of how well the application of the EC systems works for the company and business. During the course of implementing EC where pessimism towards EC may be justified, it has to be accepted and investigated. Every effort must be made to counter unjustified and groundless pessimism because this could be a needless inhibitor in the deployment of EC. Alternatively, the result may also mean that in order to achieve observable benefits, SMEs would need to take the courage to simply deploy the business practice and system, even before they could see the tangible benefits. SMEs may have to take more proactive steps in their awareness of results through external sources.

Another possible explanation could be that the higher the extent of deployment, the higher the observability of the EC advantages. It is logical to expect that the more extensive the deployment of EC is in terms of its application in the firm's business, the more benefits the firm is going to reap from fully utilising EC. The benefits will in turn, become more observable to the adopting firms and generate its own confidence. To improve the extent of EC deployment, firms should not only increase the variety of documents exchanged via the Internet, but also seek to increase external links with trading partners. This can be done by providing incentives and assistance to encourage trading partners to get involved in the electronic network. Incentives may include bulk discounts or special rates when trading online.

Variety of Information Sources

The *Variety of Information Sources* used to attain information pertaining to EC, is found to be positively related to the Extent of Deployment. This suggests that the larger the variety of sources a firm used in acquiring information about EC, the higher the Extent of Deployment. This can be explained that when firms are getting ready to implement EC, they seek advice and information from a large variety of sources to familiarize themselves with the different functions, application, or benefits of EC. The larger the variety of the sources the firm consults, the higher possibility of the firm seeking diversification of applications and external participants for higher level of deployment. It may also be suggested that due to the diligence on the part of the firm seeking information from a greater variety of sources, they tend to be more well-informed than those relying on a smaller sample of sources. Since they have more knowledge in the areas of EC, they are more likely to apply their knowledge into practical functions and applications, which lead to a higher ability to trade with a variety of participants in the market, thus attaining a higher proportion of business online.

Communication Amount

Communication Amount is the most significant factor related to the Extent of Deployment, suggesting that when the firm increases the intensity of communication with other organisations, the extent of deployment is more likely to be higher. It can also be rationalised that the greater the amount of information a small firm shares with its trading partners, the greater the diversity and depth of integration of EC between the firms. Since EC can be regarded as another interorganisational system, more frequent communication helps trading partners to coordinate policies, providing technical information, and answering questions. Such collaborative approaches may assist, in a fairly unobtrusive manner, in bringing the trading partners "on-board" to the EC network and helping them to uptake the new systems, which eventually motivates the adopting firm to improve the extent of their EC deployment.

Competitive Pressure

Competitive Pressure was positively related to the Extent of Deployment, suggesting the higher the level of pressure experienced by the firm from its competitors, the greater the extent of its EC deployment. This means the competitiveness of the environment has been found to provide the "push" for SMEs to deploy their existing capabilities. Firms that fear of losing customers or market share may expedite their learning process or expand the use of new systems in order to keep up with what their competitors are doing. The emergence of competitive pressure as a key variable also underscores the need to electronically integrate business operations both internally and externally with trading partners. Formalisation of these functions and trading process is essentially a matter of deployment. SMEs are advised that early formalisation of a system between the firm and its trading partners may decrease the likelihood of the trading partners finding a competitive relationship more attractive. By being

more efficient in business transactions with trading partners through faster and more accurate processing, the competitiveness of the firm would naturally be strengthened, and better links with its customers would be formed.

Non-Trading Institutional Influence

Non-Trading Institutional Influence was found to have a negative relationship with the Extent of Deployment. It shows that those early adopters that are less likely to be under the influence of publicity and persuasions by institutions (such as governments, banks, telecommunication corporations, media, consulting firms or universities), may tend to explore the possibilities more widely with greater initiative. Alternatively, those that follow what others prescribed (e.g. laggards or non-initiators) tend to lack characteristics or incentives to explore, take risks, adapt to new change, and to venture into different avenues to maximise the potential of new business practices (in this case, adopting EC). It may also be true that when firms react to pressure from the external environment, it is more likely that they are limiting their deployment in the direction from which the pressure is arising instead of exploring the fuller extent of possibilities that the innovation (EC) offers. This can impede wider deployment as some firms may see it as a chore to keep following others, while some may be discouraged to further the adoption due to unreadiness or unclear objectives. Thus, SMEs are strongly encouraged not to restrict their exploration of possibilities due to the dominance of narrow influencing sources. Despite its significance, it should be noted that this relationship is a weak one.

CONCLUSION, LIMITATION & FURTHER RESEARCH

This paper has developed and tested a proposed model of EC implementation success for SMEs. Apart from conceptualising the theoretical framework of adoption, innovation, implementation and diffusion from established IS research, the study has also helped clarified the definition and measurement of the concept of Extent of Deployment. The Extent of Deployment is used as a multi-dimensional measure of implementation success combining the notions of volume, diversity, and breadth, and encompassing an external and internal orientation.

To achieve greater extent of EC deployment, it is imperative for SMEs to possess enduring perception of EC being advantageous over its current system and that EC give them advantage over their competitors. Apart from encouraging hesitant firms to stop procrastinating and start making a commitment, it is also essential for SMEs to possess optimism and confidence so as to attain continued deployment with any future adoptions of such kind. When obtaining information about EC, SMEs should consult more than one source of information to better its knowledge about EC applications and its benefits. However, whilst external information sources are valuable, thorough assessment of its own business needs may still be required to prevent unfounded influence which commonly leads to limited deployment or discontinuity in implementation. It was also found to be beneficial for SMEs to increase the frequency of communication with their trading partners. This often enhances collaboration between the firms, establishes trust and integrates future online business more extensively. The study also suggests SMEs should take more initiative in their deployment strategies as reaction to pressures coming directly from competitors and non-trading institutions tend to limit the fuller potential of what EC has to offer.

This study focuses on theory development rather than theory confirmation. This, with the cross sectional nature of data also limits the ability of this study to draw causal implications in the findings. Here the technique of Structural Equation Modelling may be usefully applied. It would also be insightful to conduct longitudinal studies to confirm the direction and to help clarify causality and test for feedback effects of adoption and implementation. In this study, no attempt was made to control for industry type. The models may be tested more intensively in a chosen or a specific industry. In making generalisation from the research sample, one has to take into consideration the context of Australia. The findings may not be universally true, but they are likely to be applicable in similar cultural contexts. Comparison of the research model can be conducted over several countries, particularly from different geographic regions. The contrasting contexts may provide some interesting results. Lastly and most importantly, having established the soundness of the theoretical framework of extent of deployment for SMEs, other researchers may investigate its applicability to a wider range of business communication technologies and further innovations in the future.

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