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Electronic commerce development in small and medium sized enterprises

A stage model and its implications

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Abstract *The 1990s have witnessed the proliferation and hypergrowth of the Internet which, combined with traditional IT technologies, is creating a global, and cost-effective platform for businesses to communicate and conduct commerce. Because of today's shrinking world, companies must create new sources of competitive advantage almost on a daily basis. This fact becomes critical for small and medium enterprises (SMEs) because they are considered to be a major component of all economies and are generally considered to be flexible, adaptive and innovative organizations, which appears to make them a good fit for electronic (e)-commerce. The present study presents an in-depth analysis of the e-commerce development stages and the facilitators and barriers for SMEs during each stage.*

1. Introduction

The globalization of markets, growing interpenetration of economies, and increased interdependence of economic agents are reshaping the national and international competitive environments (Ghobadian and Gallear, 1996). Due to this, organizations may have to buy raw materials from one country, use finances from another country, procure human resources from yet another country, and sell the finished products wherever possible in order to achieve or sustain competitive advantage (Palvia, 1997). Until recently, companies have been able to achieve these abilities for the most part by the role that information technology (IT) has played in propelling and accelerating the globalization of business. Further, it has been pointed out that recent IT developments are changing and will continue to change the business arena in the near future (Palvia, 1997).

In reaction to this reality, businesses have invested heavily in IT, primarily to automate internal processes such as payroll, accounting, finance, human resources, and manufacturing. Also, the 1990s have witnessed the proliferation and hypergrowth of the Internet and Internet technologies, which together are creating a global and cost-effective platform for businesses to communicate and conduct commerce. Although there is no agreement in terms of a specific

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amount, there is no doubt that the growth of e-commerce will be of enormous proportions ($2.2 trillion by 2004 according to Arthur Andersen, $1.3 trillion by 2003 according to Legg Mason Wood Walker, and $2.7 trillion by 2004 according to Forester Research). This platform is providing the opportunity for large and midsize businesses to leverage past IT investments and fundamentally reengineer the way in which they do business and interact with customers, suppliers, and partners. Additionally, this is enabling smaller businesses to gain the efficiencies and cost savings that once were afforded only to larger businesses (Weller, 2000). There is evidence that shows how SMEs around the world are embracing electronic commerce and spending increasing amounts of resources on information technology. For example, the US Small Business Administration (2000) reports that SMEs in Germany, France, and the UK spent around $106 billion on IT and telecommunications in 1999. Similar studies show this trend in other regions around the globe, such as North America, Europe and Asia (USSBA, 2000; Webb and Sayer, 1998; Le and Koh, 2001). Also, research shows that SMEs that utilize the Internet to conduct business have higher revenues (USSBA, 2000).

Propelled by factors such as falling regulatory country barriers to international trade and investment, and declining telecommunications costs (Prasad, 1999), among other factors, globalization is making the role of smaller firms prominent. Ghobadian and Gallear (1996) argue that SMEs are fundamental for current economies, and their importance is both at the micro and macro levels. For example, they found that over 99 per cent of the enterprises in the EU are micro, small and medium enterprises, employing over 70 per cent of the total workforce. This is also evident in Japan, where 75 per cent of manufacturing employment is in SMEs, in contrast to the USA with 35 per cent. Chapman *et al.* (2000) also stressed the importance of SMEs, considering them as the third economy in the world, after the USA and Japan.

The important role of SMEs in the US economy can be summarized from the following quote from the USSBA report to the President in 1998:

> First, SMEs are an integral part of the renewal process that pervades and defines market economies. New and small firms play a crucial role in experimentation and innovation that leads to technological change and productivity growth. Second, small firms are the essential mechanism by which millions enter the economic and social mainstream of American society. Small businesses enable millions, including women, minorities, and immigrants, to access the dream of economic growth, equal opportunity and upward mobility.

Further, in the USA, small businesses with fewer than 500 workers employ 53 per cent of the private nonfarm work force, contribute 47 per cent of all sales in the country, and are responsible for 51 per cent of the private gross domestic product. Industries dominated by small firms contributed a major share of the 3.1 million new jobs created in 1998 (USSBA, 1999).

Small businesses are considered the fastest changing sector of e-commerce. In fact, the proliferation of electronic commerce is evidence of entrepreneurs' rush to meet growing market demands. Entrepreneurs are capitalizing on this technology (USSBA, 1999). It is estimated that SMEs earned $3.5 billion in

e-commerce sales during 1997 and this figure can grow from $25 billion to over $300 billion over the next few years (USSBA, 1999). According to USSBA (2000), it is expected that 85 per cent of the SMEs in America will be conducting e-commerce over the Internet by 2002. Small businesses in Germany, France, and the UK spent approximately $106 billion on IT and telecommunications in 1999, while other small businesses worldwide spent about $450 billion on IT and telecommunications (USSBA, 2000).

In order to clarify the strategic role of SMEs in global economies it is important to distinguish their inherent characteristics. Organizational structure in SMEs is organic compared to a more bureaucratic structure in large firms (Ghobadian and Gallear, 1996). SMEs are characterized by an absence of standardization and formal working relationships, usually have a flat organizational structure, and staff development is limited. These characteristics make SMEs more flexible to environmental changes and research has found that small firms are perceived of as being significantly more "flexible" than large firms (Storey and Cressy, 1995; Levy, 1998).

As the evidence mounts on the importance of SMEs and how they are embracing e-commerce around the world, it becomes important to understand how e-commerce affects SMEs, since SMEs are considered to be the life blood of modern economies (Ghobadian and Gallear, 1996). Although SMEs are embracing e-commerce, there is also evidence showing that they are not utilizing it to its full potential, due to several barriers mentioned in the literature (Webb and Sayer, 1998; O'Connor and O'Keefe, 1997; Davies and Garcia-Sierra, 1999; Timmers, 2000; Vlosky, 1999; Durlacher Research Ltd, 2000).

Following TechRepublic (2000) and Davies and Garcia-Sierra (1999), e-commerce can be defined as:

> The business model where transactions and interactions of information and data are primarily conducted between businesses and between customers, using electronic means in order to complete those processes more effectively and efficiently across the spectrum of a business.

There are two key issues to note from this definition. First, it emphasizes the importance of transactions and interactions between partners. It is important to understand how e-commerce ties together the various partners in the supply chain stretching from product design and demand forecasting to complex sourcing, financing, logistics, import/export, and settlement (Upin *et al.*, 2000). Second, it highlights a business model in an e-commerce context. According to Timmers (1999), a business model is an architecture for product, service and information flows, including a description of the various business actors and their roles; a description of the potential benefits for the various business actors; and a description of the sources of revenue.

The literature on e-commerce has exploded during recent years, and findings show major differences in emphasis ranging from expected growth and benefits (Arthur Andersen, 2000; Cooke, 2000; Lacerra *et al.*, 1999; Phillips and Meeker, 2000; Roland Berger Strategy, 2000; Upin *et al.*, 2000; Weller, 2000;

Westhead *et al.*, 2000; Gecowets and Bauer, 2000), to business models (Timmers, 1999; Baron *et al.*, 2000; Mahadevan, 2000; Ramsdell, 2000; Shim *et al.*, 2000; Wei and Ballou, 2000; Arthur Andersen, 2000; Griffith and Palmer, 1999; Raisch, 2001). Furthermore, little or no empirical research on model development and theory testing is reported mainly because of the nacent stage of the e-commerce field.

This paper proposes a stage model for e-commerce development and addresses the facilitators and barriers for SMEs during different stages of development. Using a published source of information on e-commerce in SMEs in EU countries a classification of the companies is made. Also, a few case studies selected from the published literature are presented to illustrate the classification per the stage model.

The remainder of the paper is structured as follows: in section 2 a stage model of e-commerce development is presented describing the characteristics of the stages as well as the facilitators and barriers for SMEs at each stage. Section 3 discusses implications of the stage model for SMEs. Section 4 presents seven short cases of SMEs in e-commerce as well a classification of 153 SMEs from EU countries applying the stage model. Finally, the last section presents discussion, conclusions and directions for future research.

2. A stage model for e-commerce development

Previous research by O'Connor and O'Keefe (1997) and Timmers (1999) describes business models of e-commerce. The first authors characterized the models by the level of transactions and the level of information content. Timmers (1999) characterizes a business model using two dimensions: level of functional integration and degree of innovation. The models describe how a company uses e-commerce to operate its business. However, these models do not classify companies nor provide help for companies to decide which model is better for them. On the other hand a model which can describe the logical evolution of e-commerce involving different stages of development, each stage being better in some sense than the previous stage, can be useful in providing a roadmap for improvement to companies. A stage model, we believe, can do this. A stage is a set of descriptors that characterize the evolutionary nature of e-commerce. Such descriptors are for example, brochureware, on-line catalogues, contact information, one-way and two-way communication, linking information, on-line financial transactions, etc. We propose that e-commerce development takes place in four stages (see Figure 1):

(1) presence;

(2) portals;

(3) transactions integration; and

(4) enterprises integration,

It is important to note that in later stages of the model cost, technological demands, and complexity increase.

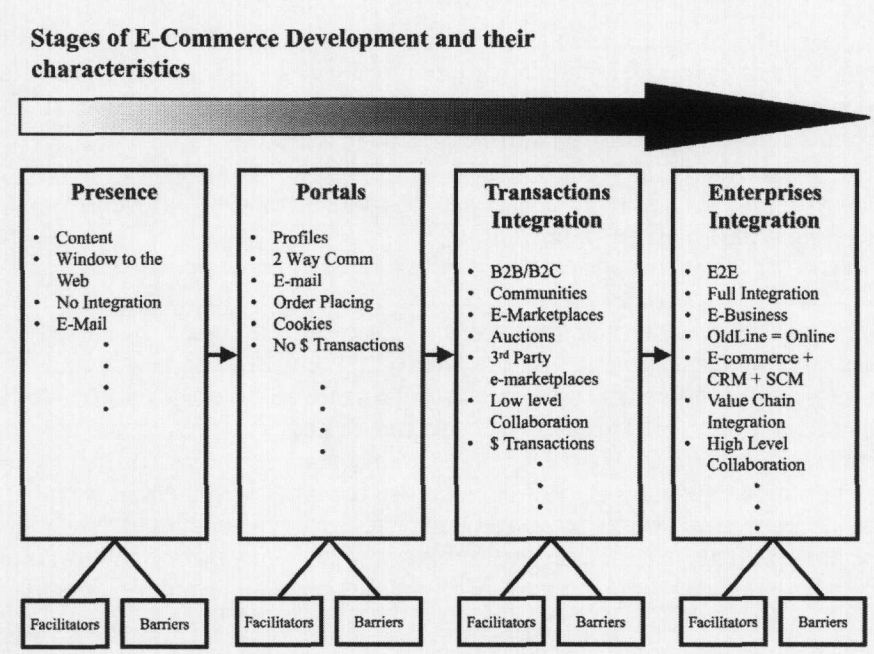

Figure 1.
A stage model for e-commerce development

Though the stage model as proposed appears sequential, it is not necessary that a company begins at the presence stage and then progresses through subsequent stages. The model allows for a company to enter at any stage. As technology and e-commerce awareness increases it can be anticipated that a given company may enter a later stage, leapfrogging earlier stages in order to accelerate its development process. When a company does this, it is anticipated that all previous stage issues must be addressed.

An interesting question is what factors promote and what factors inhibit or retard e-commerce development and implementation at a particular stage. We call these facilitators and barriers to e-commerce development and implementation. A facilitator is anything that promotes a positive impact on a particular stage of development while a barrier is anything that promotes a negative impact. In a sense, any barrier could be technically identified as an "anti-facilitator" and vice versa, so it is impossible to discuss facilitators and barriers without some overlapping of the two concepts. We have classified the facilitators and barriers according to their primary impact on a given stage of e-commerce development. If the primary impact of the factor is internal and within the control of the SME we classify it as a facilitator since the enterprise can improve its readiness for a given stage. Hoffman *et al.* (1998) argued that internal factors are likely to be more important when innovation plays a key role in success or failure since organizations can control them. On the other hand, if the primary impact of the factor is beyond the control of the enterprise we have generally classified them as barriers. Since there are few pure internal or external issues there is overlap between the two classifications. Although

this classification approach will not necessarily isolate the causes of success or failure for the e-commerce implementation, the issue of causation is clarified somewhat by classifying causes as endogenous (internal to the firm and presumably within its control) and exogenous (external to the firm and beyond its control) (Everett and Watson, 1998).

Each of the stages, their characteristics and facilitators and barriers are described in the following paragraphs.

2.1 Presence

Most companies make their first steps in electronic commerce by displaying their company brochure and product offer on a Web site (Timmers, 2000). The presence stage involves the initial steps that organizations do to get involved in a digital environment. This stage is characterized by an organization having a "window to the Web" (Barry, 2000). At this stage the Web site provides information and primarily one-way communication to any potential user. This stage is best represented by a company having a Web site that provides information about the company's products and services, contact information, and other relevant information in a static manner. Another important characteristic of this stage is that there is no integration with internal and/or external processes, and the presence is primarily used to attract new customers (O'Connor and O'Keefe, 1997).

2.1.1 Facilitators. Facilitators of this stage include not only the physical creation of the site but a number of activities and/or management level mindsets that would precede the development of the site. One of the most important facilitators at this stage is commitment. Commitment refers to strategic organizational motivation to use the Internet as a mechanism for achieving some strategic objective whether it be increasing sales, providing better service to existing customers, making information more available and/or at a cost savings (i.e. catalogue shoppers). Thus, commitment is considered to be a necessary factor for the long-term success of e-commerce development. Other important facilitators include content, price flexibility and competitive access cost for the target users. Content (Jeffcoate *et al.*, 2000) refers to the effective presentation of a product or service on a Web site. In other words, a company must have a product that presents itself well through this medium and have taken the appropriate steps to ensure that the site is attractive and user friendly. Price flexibility refers to the ability of a company to absorb the competitive environment of the Web and still achieve acceptable levels of profitability. The nature of the Web is that a regional pricing strategy can be almost immediately exposed to global competition at a level that, when transportation cost is taken into account, may make it infeasible for a given company to do business beyond their regional market. Therefore, any company contemplating such a move should do planning prior to investing in a Web channel to make sure that they can handle the competitive environment. Access cost is an external factor that refers to the relative cost of consumer access to the Web. Access cost is a governmental/technological facilitator to the extent

that government policy and regional technology availability is in place to support vibrant Web usage for the targeted users.

2.1.2 Barriers. The barriers a company may face at the presence stage include:

(1) technological resistance within their organization and in-house "know-how" or expertise;

(2) acceptance of growth by managers;

(3) financial investment; and

(4) development of telecommunication infrastructure.

Although top management may be convinced of the new direction and be committed to it, lower level managers' attitudes toward technological acceptance could be a significant obstacle to the successful implementation of e-commerce (Durlacher Research Limited, 2000). An alternative is to use an e-commerce consultant to work with and guide internal staff through this critical step. Management level acceptance can be a barrier because there are a number of issues including aggressive growth, increased competition and the potential for performance pressures that may accompany any new undertaking. The financial cost to the organization, including hardware investment, training, and adoption cost, can be very substantial for SMEs and therefore be a barrier in adopting e-commerce (Walczuch *et al.*, 2000). While the cost of software and hardware has significantly decreased in recent years, it remains significant for certain types of businesses. For example, a company with an extensive product mix may incur substantial costs related to re-producing their catalogue on the Web because of the lack of adaptability of the publishing technology they currently use. Another barrier discussed here is the development of telecommunications infrastructure (APEC, 1999). The non-availability of competitive telecommunications capability and the development of its infrastructure is an important barrier to e-commerce among SMEs (Le and Koh, 2001).

2.2 Portals

The portals stage is viewed as the introduction of two-way communication, customer or supplier order placing, the use of profiles and cookies. The main difference between this stage and the presence stage is the capability of two-way communications between the business and customers (B2C) and/or between businesses (B2B). The information provided in the presence stage can be coupled with facilities for ordering, product feedback, and product and/or quality surveys. This allows not only the attraction of new customers, but it also allows the company to engage and retain visitors, and relate them to their individual preferences for customization purposes (Le and Koh, 2001). Another advantage of this stage is the ability to link information displayed with inventory data, and search capabilities for the users (Timmers, 1999). It is

important to note that although there is two-way communication at this stage, it is not possible to process financial transactions.

2.2.1 Facilitators. There are three important facilitators that come into play at the portals stage: internal organizational changes, investment and usability. At the portals stage the Web site becomes an information gathering and disseminating tool that must be connected to more than just the marketing or sales department of the organization. Others within the organization must be connected to the system in order to handle the increased traffic of the e-commerce system. This means that additional investment in training and hardware/software could be very beneficial to the smooth implementation of the organizational strategy. Internal organizational changes at this stage can enhance the additional inter-actions taking place with customers and suppliers. For example, re-structuring the sales department to ensure that Web orders are filled with the same priority as other orders will encourage the further development of the e-commerce side of the business (Vlosky, 1999). Another facilitator at the portals stage is usability, which refers to the development of user-friendly Web site interfaces and designs. The internal users are more likely to adapt quicker if the system is easy to use. External users are also more likely to utilize the system if it is properly designed and easy to use (Chapman *et al.*, 2000).

2.2.2 Barriers. In addition to all the barriers listed for the previous stage, at the portals stage there are two important barriers, first, development of B2B interfaces and, second, cultural and/or language issues. The degree of integration at this stage is driven by the level of technological development outside the organization as well as within. If suppliers are not capable of or are not willing to utilize the system, further development can be hindered. The organization may be faced with a dual problem whereby small suppliers are technologically deficient and are not developed enough to participate while at the same time much larger suppliers may be technologically inflexible and not interested in participating. The organization faces substantial challenges in attempting to overcome these issues and may find out that an ideal structure is not obtainable with the current supply base, therefore adjustments may have to be made to the level of integration and/or the pace of the development. Culture and/or language (Zhivago, 2000; Timmers, 2000) can become more of an issue here because of the fact that the Web site is not only being used as a marketing front but is being relied on for effective business communication. The sudden move into a global marketplace with two-way communication can produce multi-lingual requirements on staff and cultural issues on Web site design and product/market strategies.

2.3 Transactions integration (TI)

The transactions integration stage (TI) is differentiated from the portals stage mainly by the presence of financial transactions between partners. This in turn will require higher technical capabilities, and IT infrastructure and, thus, SMEs will face new challenges to overcome.

An important characteristic of the TI stage is that interactions can be for selling as well as buying. This stage can include the participation in virtual communities, that allow participants to share information around an area of common interest (Timmers, 2000); electronic auctions, where sellers offer products or services to buyers through a Web site with a structured process for price setting and order fulfillment, third party e-marketplaces, where a third party provider places the catalogues of suppliers online, and offers catalogue search, ordering and payment facilities in a secure environment to purchasers.

Integration at this stage is viewed as the integration of internal processes, which allows for the optimization of all the operations of the organization. Also, the level of collaboration and sharing of information between partners is considered to be low.

2.3.1 Facilitators. We have identified five facilitators for this stage. They are:

(1) the ability to extend IT technology within the SME from a financial investment perspective;

(2) the ability to have acquired or to acquire the necessary internal IT competencies;

(3) partnerships for B2B and third party opportunities;

(4) e-commerce community development; and

(5) selection of competitive payment systems.

A SME at this stage must possess a higher level of technological ability in order to run the e-commerce business (Chesher and Skok, 2000). For this reason they must either have competent staff available to work on continual adaptation of the e-commerce effort or be able to obtain such services at a cost that will not erode the added value of the expected results. This is considered a facilitator because the SME can anticipate this need and plan for it, in other words it is within the strategic control of the SME. Partnering with a third party e-marketplace and/or other businesses in B2B efforts is also something that can be addressed through planning and is necessary to achieve maximum benefit from the technology. The development of relationships with other businesses/customers and groups helps develop the e-commerce community within which the SME can seek new opportunities for increased sales growth and profitability. A final facilitator is the selection of competitive payment systems (Fariselli *et al.*, 1999). Here again the SME has control over the selection process and must make certain that their e-marketplace relationships can support their choice. The transaction cost of doing business over the Web is an important strategic consideration. Therefore careful evaluation of alternative systems and negotiating for the best rates is important (Bishop, 1999). This is an important area for collaboration between SMEs. Groups of SMEs can negotiate for better rates to help alleviate some of the transaction cost disparity between large trans-national corporations and smaller enterprises (Farkas-Conn, 1999).

2.3.2 Barriers. There are a significant number of barriers at this stage because of the complexity of adding financial transactions to the e-commerce effort. With the addition of money transactions many external barriers, which are beyond the direct control of the SME come into play. We have identified five of these barriers as:

(1) financial systems;

(2) governmental tax and trade policies;

(3) security and/or privacy;

(4) governmental contractual and legal environments; and

(5) treatment of intellectual property.

Financial systems vary throughout the developed and under-developed countries and the lack of compatibility can result in enormous problems for SMEs trading across borders (Walczuch *et al.*, 2000). The lack of compatibility may result in either making financial transactions virtually impossible or making them so expensive that no added value is obtained. In this same vein are governmental tax and trade policies because taxes and/or tariffs may have to be reported and paid across borders. We do not differentiate between the governmental policies regarding tax and trade based on the fact that trade policy may also result in tax reporting and payment of tariffs and the like. Security and privacy is another major concern because of the transmission of financial data including credit card and other financial related account numbers and information (USSBA, 2000; Timmers, 2000; Bollo and Stumm, 1998). There is some discussion in the literature regarding the current concerns over security (Bowden, 1999). The regulation of encryption raises the potential for smaller enterprises being locked in to using a third party for transactions, potentially further increasing transaction cost to the SME (Timmers, 2000). Another important barrier at this stage is the development of international laws regarding the enforcement of contracts, taxation, privacy, patent, copyright, and trademark (USSBA, 2000; Timmers, 2000). The legal issues also have been discussed in the literature (Abell and Limm, 1996). Under a proposed new European law an SME would face the prospect of being sued in any state where their Web site can be accessed (Sanderson, 2000). This kind of legal exposure is beyond the financial capacity of most SMEs.

2.4 Enterprises integration (EI)

Enterprises integration (EI) refers to complete integration of business processes to the extent that old-line business is indistinguishable from online business. This level of integration involves high levels of collaboration between customers and suppliers. Enterprises integration includes full integration of B2B and B2C business including value chain integration. This level of integration utilizes the e-commerce systems to manage customer relationships (CRM) and the supply chain (SCM). This level of integration is e-commerce + CRM + SCM. This stage is somewhat of an ideal concept for the

"e-world" environment. Many of the requirements of this stage still have technology problems and over-whelming integration issues.

Successful players in the EI stage will be able to distinguish themselves if they:

(1) intimately understand their partners' current and future/strategic needs;

(2) work proactively with their partners to create solutions that address these needs;

(3) use information sharing; and

(4) have long-term contracts (Lacerra *et al.*, 1999; Krause *et al.*, 1998).

It is argued that significant opportunities for improvement often lie at the interfaces between the various supply chain member organizations (Handfield and Nichols, 1999).

2.4.1 Facilitators. As we move toward increased levels of integration and collaboration the obstacles become more current in a technological sense. The characteristics of the enterprises integration stage include all e-commerce and non e-commerce aspects of the enterprise. At this stage they become melted together to one system that serves all the needs of the enterprise. Whether an order is initiated by a Web-based customer or a mail order customer does not matter. At this stage the e-commerce departments disappear and all business processes are fully integrated across internal systems and external collaborators and customers. The critical facilitators for this stage are first, the competencies of internal staff, second, business process integration and control, and third, back office integration. At this point technological considerations (barriers) interfere with the ability of the SME to help itself. Technology gaps exist now so that completion of this stage is not even possible until further development occurs. Once the solutions are available however, the enterprise can begin the process of full integration.

2.4.2 Barriers. There are significant technological barriers at this stage based on the fact that numerous technology gaps exist for SMEs to completely integrate all business processes. The barriers here include technology availability, technology diffusion regionally and globally, international standards for trade and transaction processing, development of e-markets, and network complexity.

As we move into the future it is only a matter of time before these obstacles are successfully addressed. Most of these processes are dynamic in nature and involve very complex interactions between governments, technology based companies and the growing e-commerce world. Governments can encourage and influence technology diffusion within borders, which would increase the demand for e-commerce technology. Technology based companies, the producers of e-commerce solutions, will then have the required demand to make the appropriate investment in effective and efficient solutions to the technological issues. The need for international standards to handle financial,

trade, legal, and security issues is also a barrier to full integration as well as a current issue for financial transactions (Le and Koh, 2000).

As companies move into new markets and with an increased emphasis on outsourcing non-core competencies (everything from manufacturing to applications management), companies are conducting business with greater numbers of partners than ever before and are looking to information technology for better tools to manage these relationships (Upin *et al.*, 2000). This in turn will undoubtedly create network complexities among the players in a supply chain.

3. Implications of the stage model for SMEs

There are several implications that can be drawn from the proposed stage model for SMEs. The model could be utilized by an SME to classify itself for comparison purposes with other SMEs involved in e-commerce within its own industry. It is strategically valuable for a company to compare itself to competitors within their own industry and within the e-commerce community. The model can assist a company to determine whether or not it makes sense to move to a later stage. A company could do this by following a few simple steps:

- *Look at the barriers of the stage to be entered.* Most barriers in the stage model are external threats to development, which are to a large extent beyond the influence or control of the company. Such factors as governmental policies, legal environment and presence or lack of telecommunications technology are examples of barriers that may exist at a particular stage. On the other hand, if the barriers are significant and/or the probable timing for their development is unknown, a company would not choose to proceed since any investment in e-commerce would be hampered by factors that are beyond the company's strategic planning and control and therefore would be of unknown benefit to the company. If the barriers of the next stage were either already overcome by external development or are very likely to be overcome within a reasonable period of time then the company would proceed to the next stage.
- *Look at the facilitators of the stage to be entered.* Facilitators are factors that are primarily within the control of the company and are generally responsive to the strategic planning process. The analysis of the facilitators of the stage to enter would involve three steps. First, the company must take an inventory of the factors that are in-place and note what is missing; second, the company develops cost and time estimates to put the missing factors in place, and third, the company does a strategic/financial analysis to justify the move. The first defines the planning environment, the second defines the resources and the last defines the future strategy.

Whether or not it is good business practice for a company to move to more advanced stages of the e-commerce is determined by a set of dynamic factors of

which the facilitators and barriers of the succeeding stage only represent the e-commerce factors involved. Other factors like the operating environment of the firm need be included in the strategic/financial analysis. For instance, if a company's major competitors have already moved to a later stage, it may be forced to move or be shut out of certain market segments within their industry. On the other hand it would probably not be a good move if the company is a small manufacturing concern with a restricted regional market and prohibitive freight costs; a company with a small supply base that is not ready to trade using e-commerce; or a company with few customers who are very large and dictate trade through dominant bargaining power. Under such circumstances the company has little to gain from the investment in e-commerce technology to advance to the next stage and would be better off using the scarce resources elsewhere.

4. Case studies

In an attempt to evaluate the current status of e-commerce development, case studies from the KITE project were classified according to the stage model (Figure 1). The data in Table I is the result of analyzing the entire inventory of the KITE project (KITE, 1998). KITE stands for the Knowledge and Information Transfer on E-commerce and represents a good cross-section of European companies engaged in e-commerce. The KITE data is collected via a self-selection process whereby companies engaged in e-commerce can log on and register their particular e-commerce use by filling out a survey form. Therefore, the number of companies in the database is changing as more companies register. Our analysis and categorization was based on the companies in the inventory as of March 2001.

Of particular interest in our classification were certain categories of the KITE survey. The categories that were used for classification include:

(1) vertical market sector;

(2) short description of the initiative;

(3) future plans of the initiative;

(4) business purpose;

(5) e-commerce applications used;

(6) reach of e-commerce activity;

(7) payment types; and

(8) benefits and barriers.

A short description of these categories and the examples of the type of information found in each follows.

The first three and the sixth of these categories are narrative responses that are filled in by the participating companies. In the fourth, fifth, seventh and eighth categories the responses are limited to selections provided or a rating scale of 1 (least important) to ten (most important) with "0" for "not applicable".

The vertical market sector includes a self-selection of one of eight categories listed in the left most column of Table I. These categories can be related to SIC codes used in the USA and other business classifications schemes used in other countries. The "short description of the initiative" section is a narrative explanation, which provides background information on the companies' experience and entrance into the e-commerce application. This category is useful in the classification scheme below because some companies highlight past experience with EDI or may indicate that they are just beginning to explore e-commerce. In the third category, "future plans of the initiative", we find hints as to where they are now based on their stated plans for the future. For example the company may talk about the future development of B2B transactions with suppliers or an attempt to go international with their e-commerce application. The last of the narrative categories, "reach of e-commerce activity" includes specific information indicating the extent of e-commerce development. An example of the type of information found here is the number of trading partners (B2B and/or B2C) as well as hints to the types of transactions that are currently handled by their system (i.e. "electronic").

In the fourth, fifth and seventh categories the companies are to select, from a list, a standard response to the category. The "business purpose" category options include selections like "processing of business transactions". "E-commerce application used" allows for the selection of more than one application such as "marketing", "sales" or "promotion". The seventh category "Payment types" provides multiple selections of payment types that are currently being processed by the company. This category provides direct information as to the transaction processing capability of the firm. For instance if the company only selects "offline" we can conclude that they are not processing financial transactions.

The last category, "benefits and barriers", includes two sub-categories "benefits expected/achieved" and "barriers faced/overcome". These categories utilize the "0" and "1 to ten" rankings explained above. The "benefits expected/achieved" group contains items such as lower costs, improvements in reaction time, flexibility, processing time, customer relationships, payment processing etc. The "barriers faced/overcome" include items such as investment cost, political, cultural, security and consumer cost of access.

Table I.
Company profiles from the KITE inventory by industry type and employment

Industry	Per cent	Employees	Per cent
Bus services	25	<3	36
Financial	12	4-5	13
Government	1	6-10	12
Manufacturing	8	11-20	12
Other services	16	21-50	11
Retail/wholesale	33	51-100	6
Transport/travel	3	>100	10
Utilities	2		

While the KITE inventory information does not represent formal survey data and is difficult to analyze using conventional academic methodology, it is useful for classification purposes. The self-selection format limits the sample to "participating companies" and the surveys are filled out at various times so there are also timing issues. Since the KITE inventory is surveying only EU companies such classification is not generalizable to other countries. However, we believe that the information is adequate for our stage model classification, and that opportunities exist for expanding the classification scheme to international data. Table I provides the distribution of the companies by industry sector and size (number of employees).

The data in Table I come from 153 companies representing a broad range of industries and companies of various sizes involved in e-commerce from 17 different countries (Chappell *et al.*, 1999). It is interesting to note that most of the companies in the KITE inventory are in the services sector, with manufacturing companies comprising only 8 per cent. Also a great majority of the companies employ less than 20 people, with 36 per cent of the companies employing three or less.

We classified the companies in the KITE inventory into the different stages of e-commerce development and this is shown in Table II. The first four examples discussed in section 4.1 illustrate how the classification was done.

The "per cent CCT" column represents the percentage of the number of companies that are in the transactions integration stage that use credit card companies as payment facilitators. As can be seen from Table II, 86.9 per cent of these companies use credit card companies for processing financial transactions, supporting the argument that credit card companies are in the best position to serve the SME market. They have the financial infrastructure in place and have international, if not global capabilities for payment processing. Although they dominate this market at the present time other financial solutions are growing in acceptance (Bishop, 1999). As has previously been discussed, one of the critical factors in the future development of SME e-commerce is the ability of SMEs to control financial transaction costs.

Two observations are made from an examination of the KITE inventory of cases. The first has to do with the number of items under the "benefits and barriers" section that a company responded to. As our classification of the companies moved from presence stage to portals and then to transactions integration, the number of items that were marked with other than "0" (not applicable) decreased. This indicates increased level of awareness of the issues that can be benefits or barriers to e-commerce among companies as they move to a higher level of e-commerce development. A second observation is that the mean scores of the items marked other than "0" increased. As the classification moved from presence to the later stages as a result of the companies rating items as more important to their e-commerce effort in the later stages based on higher levels of experience.

Industry	Stage of development				Totals	Per cent CCT
	Presence	Portals	Transactions integration	Enterprises integration		
Bus services	5	17	17	0	39	82.4
Financial	6	2	10	0	18	80.0
Government	1	0	0	0	1	
Manufacturing	2	5	6	0	13	66.7
Other services	5	9	11	0	25	81.8
Retail/wholesale	2	8	40	0	50	95.0
Transport/travel	1	3	0	0	4	
Utilities	2	1	0	0	3	
Totals	24	45	84			86.9

Table II.
Classification of 153 companies from the KITE inventory

4.1 Examples of companies and their stages

We have selected seven companies, four from the EU and three from the USA to illustrate the classification of companies using the stage model. The first is an example of a company in the presence stage. ABS Transportbahnen is an Austrian manufacturing company of 11-20 employees whose stated initiative is B2B and B2C development. Their business purpose is to promote their products and services but they currently only provide messaging and information access including e-mail via their Web site. They report no trading partners and no transaction processing of any kind. Of the 32 items in the "benefits and barriers" section they only responded to five items with a mean score of 4.17 on items they believe apply to their initiative. This profile fits very well with the presence stage of development in the stage model.

Another manufacturing company, Christopher Cooper Roof Lanterns (CCRL), is a good example of a company in the portals stage of development. CCRL reports their initiative as B2B and their purpose as promotion of products and services. They currently use e-commerce to provide messaging and information access as well as post sales delivery confirmation and customer monitoring and relationship development. They report 11-20 trading partners but do not conduct any financial transactions online. They responded to 28 of the 32 items in the "benefits and barriers" section yielding a mean score of 3.85. This company is representative of a company in the portals stage since they have developed two-way communication other than e-mail but are not doing financial transactions.

An example from the KITE inventory for transactions integration stage is Ideal Shop, a company in Spain that is engaged in providing SMEs with e-commerce transaction software that is easily adaptable to their systems. Ideal Shop software can handle six languages and cross border transactions. Their "e-commerce applications" list is very broad, ranging from messaging and information processing to post sales customer monitoring. They support six languages and report having between 41 and 50 B2B partners and between 101 and 500 B2C partners. They accept credit card transactions and responded to 30 of the 32 "benefits and barriers" items with a mean score of 6.53.

A final company from KITE inventory, H&R Johnson Tiles, is representative of the transactions integration stage. H&R Johnson Tiles is medium-size manufacturing and the largest tile manufacturer in the UK with over 100 employees. H&R describes their initiative as one of providing smaller customers a low-cost alternative to EDI, which they have used for years with larger trading partners. Although H&R does not yet process payments with smaller customers online, they would still be classified in the transactions integration stage because of the use of EDI. H&R responded to only 11 of the 32 items as applicable to their initiative, but all responses were very high with eight of the 11 responses marked as a ten. The mean score for H&R on items they considered applicable to their business was 9.18.

Our first example from US companies is Nine Lives Clothing, a small company that sells used high quality name brand clothing in California. Nine

Lives has a Web site where customers can enter their personal profile using agent technology (O'Keefe, 1995). The store will then query their inventory and notify the customer by e-mail to let them know if they have any of their items of interest. If the store does not currently have anything for a particular customer, Nine Lives will notify the customer by e-mail when a database match occurs. This saves the customer travel time and builds loyalty. Nine Lives is a good example of a company that is at the portals stage of development. Even though no financial transactions are taking place, the company has developed a very effective strategy for building customer loyalty with low-level technology.

A second example from the USA is Harley-Davidson of Stanford. H-D Stanford is a Connecticut-based company that uses its Web site to sell motorcycle parts beyond their geographical market (Net.Value, 1996). The Web site features order forms and look-up information on parts but is not connected to the company's inventory database. Customer orders are processed online and shipped as far away as Russia and Singapore. H-D Stanford is an example of transactions integration stage as they provide online ordering and financial transactions.

A final example from the USA is Software.Net, a company that provides online software ordering and downloads. Software.Net's strategy is to pass transaction cost savings along to customers from the reduction in packaging and shipping costs as compared to traditional delivery channels. Besides the potential for cost savings, Software.Net hopes to build customer loyalty by providing the time and travel efficiencies of online purchasing. Software.Net is also at the transactions integration stage of development utilizing online selling as a strategic advantage in a highly competitive market.

5. Discussion and conclusions

In the previous sections we proposed a four-stage model for the e-commerce development and its implications for SMEs. Also we analyzed the data from the KITE study to classify the companies in different stages of the model. Of the 153 companies in our analysis of the KITE inventory, 24 (16 per cent) are at the presence stage, 45 (29 per cent) are at the portals stage, 84 (55 per cent) are at the transactions integration stage, and none are at the enterprises integration stage. The fact that few companies are in the presence stage may indicate that, given today's technology, companies do not remain in this stage very long. This makes sense in that it is difficult for a company to garner any benefits from e-commerce at the presence stage. It may also indicate that companies are entering e-commerce at the portals or transactions integration stages without ever just having a "window to Web" only site. Again, the current status of technology and the relatively inexpensive cost of implementing transaction level processing using a credit card company system may explain the high number that have achieved this stage. The 55 per cent of KITE companies in the transactions integration stage compare to 40 per cent of companies reporting online transaction processing in a sample of Malaysian companies (Le and Koh, 2001).

A few of the limitations of the present study are the following. One of the limitations of the stage model classification scheme is that a company is

considered to belong to the class if certain key benchmarks have been attained. Sometimes this may have to be relaxed. For example, if a company is conducting financial transactions online it is put into the transactions integration stage although it may not have any B2B activities. In the KITE inventory there is a company that has more than 500 online customers ordering products and conducting financial transactions online but does not have any B2B relationships. A second limitation of the study is that the stage model is descriptive, not prescriptive. A third limitation is about the generalizability of the results given that the sample of 153 companies covers eight industry sectors in 17 countries and the self-reporting nature of the survey. Finally, the instrument used in the KITE survey may need additional measurement items to develop and test relationships as the following discussion indicates.

A set of questions that arise in any stage model are first, to know what is the current stage for a company, second, to decide whether the company should move to the next stage, and third, what is to be done to move to the next stage, if that is what is decided upon. We outlined an approach for doing the same in section 3. This approach needs to be fine-tuned and future research should address this. The research should include the development of items for each stage of the model, and a survey instrument, which can be put on a Web page, similar to the KITE survey instrument. The instrument should also have questions on the current and expected company performance, which can be correlated with the stage classification. Obviously, this line of research requires developing appropriate theory, developing models that relate stages to outcomes, and testing relationships. Future work should therefore aim at a properly developed and tested instrument. Such an instrument can be useful for setting benchmarks and making inter company and international comparisons.

In this paper we have reviewed the current literature on e-commerce and have proposed a model for classification based on various stages of development. The four proposed stages are presence; portals; transactions integration; and enterprises integration. Each stage was further discussed in terms of facilitators and barriers to development within each stage. It was further pointed out that the model is not proposed as a progression that requires a company to successfully complete each stage but allows for leapfrogging into a later stage. The KITE project was then discussed and the entire project inventory of 153 companies were classified and summarized (Tables I and II). Four cases from EU and three from the USA were then reviewed to demonstrate the classification process used. Future research should further explore the items describing each stage, develop models, develop and test an instrument and empirically test the model.

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