



Training, Competence, and Business Performance: Evidence from E-business in European Small and Medium-Sized Enterprises

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ABSTRACT

This article examines the relationship between training, competence and performance of small and medium-sized enterprises (SMEs) in the context of e-business. Literature review combined with a triangulation of qualitative and quantitative methods were used to investigate these relationships. Data about e-business competences and performance in 339 SMEs in three European countries was combined with data about training supply from 116 providers of e-business related training. The empirical findings document a positive relationship between training, competence and performance and show that training explains variances in e-business competences and performance in terms of efficiency, complementarities, lock-in and novelty. The research has both theoretical and practical implications. It contributes to theoretical development by lending support to the idea that methodological issues are an important reason behind the lack of empirical support frequently reported in the literature. The study has practical implications for public policy makers, training suppliers and SME managers.

Keywords: E-business; E-commerce Evaluation; E-commerce Implementation; Firm Performance; Management Training; Small Firms

INTRODUCTION

This exploratory study investigates the relationships between training supply, e-business competence and e-business performance in SMEs. More specifically, we investigate whether the provision of training lead to more competence, and eventually, to better performance in the context of e-business. This issue has received

interest from researchers in the general field of SME research, but few studies have focused on the context of e-business. There is scarce and ambiguous evidence that training leads to better performance in SMEs (Bryan, 2006; Devins & Johanson, 2003; Patton, Marlow, & Hannon, 2000; Westhead & Storey, 1996, 1997). Small and medium sized enterprises (SMEs) generate a substantial share of the

GDP in industrial economies. The more than 20 million SMEs in Europe are an important source of new jobs and entrepreneurial activity (European Commission, 2002a, 2002b). Considerable funding has been granted to research programs targeting the development of SMEs in general and in specific areas as the diffusion of e-business. It is assumed that success with e-business in the SME segment will increase a country's competitiveness in the long run, and that successful adoption and use of e-business technology is crucial for survival in the new economy (see Debreceny, Putterill, Tung, & Gilbert, 2002 for an overview).

Several studies indicate that development of the SME segment is challenging and that SMEs for the most part are unable to successfully adopt and use e-business technology (Debreceny et al., 2002). A number of studies has emphasized the lack of e-business competence and lack of training (Fillis, Johannson, & Wagner, 2003; Ihlström & Nilsson, 2003; Ivis, 2001; Johnston, Shi, Dann, & Barcay, 2006; Kinkaide, 2000; Lewis & Cockrill, 2002) as the major cause for this problem. Such competence is seen as important for understanding the implications of e-business for the business domain, and for developing the distinctive capabilities needed to perform well in the e-business era (Grandon & Pearson, 2004). Governments in most industrialized countries have implemented various stimulation programs including training to increase e-business competence. Despite these efforts, there is only scarce knowledge of how training programs influence the creation of competence and e-business performance. SMEs are reluctant to engage in training initiatives despite the existence of incentives (Maton, 1999).

Organizational constraints seem to create barriers to SMEs. Lack of time and financial resources, along with ignorance to the supply of training have been found to represent such barriers (Marlow, 1998; Westhead & Storey, 1997).

With better understanding of the relationship between training, e-business competence and performance in the SME segment, govern-

ments would be able to better tailor stimulation programs to target SME competence needs.

THEORY

E-Business and SMEs

We have adopted a relatively broad definition of e-business as the conduct of business generally with the assistance of telecommunication and telecommunications-based tools (Clarke, 2003). E-business and the internet have opened new arenas for competing and collaborating for SMEs, but most of them are in an early stage of their e-business. There is not a common definition of Small and Medium sized organizations. The term Small Business is commonly used in the United States where measures as number of employees, total turnover, and industry are used to define a Small Business. The European Union (EU) uses a uniform definition of SMEs as independent companies with fewer than 250 employees, with either a turnover of less than 40 million € or total assets of less than 27 million € (European Commission, 2004). Independent companies are those that are not owned as to 25% or more of the capital or the voting rights by one enterprise, or jointly by several enterprises. We have adopted the EU definition.

Training and Performance in the Context of E-Business in SMEs

Governments invest substantial resources in stimulating training suppliers to develop competence programs to the SME sector. Such programs are based on the assumption that the provision of training in terms of developing existing or introducing new skills and/or knowledge to SMEs, will increase their business performance. This assumption is general and includes the context of e-business. The demand side is also stimulated. Financial incentives encourage organizations, including SMEs, to develop training programs for their employees. Yet, there is an ongoing debate about whether

a positive relationship exists between training and small business performance. We can split the debate into three components. Some studies investigate the effect of training on small business performance. Other studies divide the link into two parts: the impact of training on competence, and the impact competence on performance.

Patton, Marlow and Hannon (2000) reviewed the status of the research on training and performance in small firms. They conclude that despite the almost axiomatic proposition that training increases business performance, very few empirical studies have been able to demonstrate the significance of this relationship. A similar review by Westhead and Storey (1996, 1997) concluded in a similar vein that there was no substantial evidence for the causal link between training and performance in SMEs. A more recent study (Fuller-Love, 2006) reviewed the literature on management development in small firms and concluded that management development programs in general are effective for small firms through the development of competence. By focusing on developing new skills in management, capabilities of management systems and techniques, team building, planning, delegation and financial management, the training programs led to reduction in failure and improvement in performance.

Troshano and Rao (2007) focused on the enabling factors behind e-business competitive advantage in the Australian financial services industry. After interviewing 12 companies in an exploratory study they argue that e-business technologies enable or stimulate organizational competences which, in turn, explain higher levels of performance. The authors do not present any empirical evidence that demonstrate the existence of the link between e-business technologies and organizational performance. Bryan (2006) conducted a study of the relationship between training and performance, taking the effect of time into consideration. By studying a random sample of 114 manufacturing SMEs in 1996 and then in 2003, Bryan concludes that external management training has a greater

impact on sales growth than in-house training programs.

Patton et al (2000) propose three possible explanations for the mixed and inconclusive results and the problems of finding a causal link between training and performance: Firstly, it is possible that a causal relationship does not exist. Secondly, methodological problems associated with measuring and isolating the effects could explain the lack of evidence. Thirdly, the lack of evidence could be a result of not taking into account other possible variables that influence the relationship between training and business performance. Patton et al (2000) argue that since studies already have demonstrated that it is possible to find a significant link between training and business performance, it is less likely that a causal relationship does not exist. They find it much more likely that there are methodological explanations behind the inability to explain the lack of clear empirical findings and to identify and separate the effects of training. They suggest that improvements in research methodology could improve the ability to detect contextual factors. In addition, improved research methodology could improve the ability to generalize the results. They advise that future studies should explore the differences in business context and utilize research methods that triangulate qualitative field research with quantitative surveys. Future studies should also focus on characteristics of the providers of training along with the characteristics, needs and available resources of the small businesses themselves. Studies from UK (e.g. Westhead & Storey, 1996) have analyzed the training supply and found that the supply rarely is based on what is demanded, thereby creating a gap between the content of the supply and the needs of the business sector.

Training and Competence Development in SMEs

It is generally assumed that training leads to improved competence, and the development of appropriate competence and investments in staff training has been identified as central barriers to

successful e-business implementation and use (Fillis et al., 2003). Several EU programs have targeted the provision of e-business training for SMEs. However obvious the assumption about the relation between training and competence may be, there is scarce empirical support. In their review, Fuller-Love (2006) identified five studies from 1992-1997 that empirically identified a link between training and performance through the development of competence. These improved competences led to reduction in failure and improvement in performance. Still, Fuller-Love concludes that the empirical evidence is limited and should be complemented by more studies focusing on both single cases and on cross-sectional data from different industries and geographical areas.

Several government initiatives in Europe have targeted the need for training and management development in small firms. The EU Commission initiated a benchmarking study in order to describe and benchmark the national and regional policies and instruments promoting e-business in SMEs (European Commission, 2002b). Based on the experiences from more than 150 initiatives in 16 countries the benchmarking study concludes that the training initiatives had varying impact on awareness and competence development. The best training initiatives were characterized by being based on solid research and data, flexible, coordinated, and tailored to the needs of the SMEs in different regions and sectors.

Competence and E-Business Performance in SMEs

Several studies document the existence of a link between e-business competence and e-business performance. With data from 73 companies listed among the top 500 US Internet companies, Saeed, Grover and Hwang (2005) identified a positive relationship between e-business competence and subsequent e-business performance. Eikebrokk and Olsen (2007) found empirical evidence in support of this link for small and medium-sized companies. We base our identification of competence dimensions

on a review of several sources including the IS field and organization science.

First, there is the dimension of strategy competence. Bharadwaj et al. (2000) and Feeny and Willcocks (1998) conceptualized this dimension as "Business IT strategic thinking". Elements of this dimension are also implicitly contained in two of the dimensions of both Pappard et al. (2000) and Basselier et al. (2001), and one of the dimensions of Sambamurthy and Zmud (1994) and Feeny and Willcocks (1998). Several empirical studies have documented the important role of strategic vision for SMEs' adoption of e-business (Grandon & Pearson, 2004; Love & Irani, 2004). This dimension can be divided into two sub-dimensions. A significant part of this dimension is the company's ability to envision the strategic potential of new e-business technology in its marketplace (Bharadwaj et al., 2000; Feeny & Willcocks, 1998). It involves understanding the concept of e-business, and it will reflect the maturity of the enterprises' understanding of the e-business domain and what new possibilities and threats e-business creates in the business domain. On the other hand, this dimension also includes the ability to understand and use strategic planning methods needed to develop an e-business strategy, which describes how e-business will be put into action (Bharadwaj et al., 2000).

Second, we have the issue of competence in IT-business process integration. The IS literature offers broad support for the notion that a company's ability to realize potential benefits of new technology is influenced by the ability to organize business processes that leverage this potential (e.g. Hammer, 1990; Keen, 1991). More specifically, empirical studies in the area of IS economics have documented that among Fortune 500 companies productivity gains from utilizing new technologies are higher in companies that organize themselves in ways that leverage the potential of the new technology (e.g. Brynjolfsson & Hitt, 1998). In a European study of 441 Spanish SMEs, Dans (2001) found a similar correlation between IT-investments and productivity for SMEs that can partly be attributed to organizational

redesign. The most fundamental challenge to SMEs may lie in changing the mindset of the organization. Several authors (Lawrence, 1997; Lee, 2001; Tetteh & Burn, 2001) have argued that the adoption of e-business fundamentally alters internal procedures within SMEs. This dimension is explicitly recognized in recent articles on IT/IS competence (Bharadwaj et al., 2000; Peppard et al., 2000), and implicitly present in the other sources. New business or IT work processes can be designed or old processes can be restructured in order to leverage the opportunities of new technology (Davenport, 1993). Regardless of which strategy is chosen, the company must have the ability to identify and implement changes in business processes in order to increase process efficiency to the level required by the business and the potential of the technology (Bharadwaj et al., 2000; Davenport, 1993). Companies need competence to organize and manage work processes in new and powerful ways. Competence is needed both in developing the new business model and in the subsequent implementation of this model in the organization.

Third, there is the dimension of IT management. It is defined as activities related to the management of the IT function, such as IS planning and design, IS application delivery, IT project management, and planning for control and standards (Bharadwaj et al., 2000; DeLone, 1988). Bharadwaj et al. (2000) demonstrate the empirical significance of IT management. SMEs generally have an ad-hoc approach to IT management, and therefore seldom have a defined IT budget or an explicit IT plan or strategy, and investments in technology are often driven by the owner, rather than by any formal cost-benefit or strategic analysis (Ballantine, Levy, & Powell, 1998; Dans, 2001).

Fourth, competence in systems and infrastructure was covered in several literature sources, including the empirical study of Bharadwaj et al. (2000). We define competence in systems and infrastructure as the knowledge of the data, network, and processing architectures that support the enterprise applications and

services. Systems and infrastructure influence the gamut of business opportunities available to firms applying IT in their business strategies (Keen, 1991). Successful use of e-business technologies involves both finding technology with a strategic potential and having a technological and managerial infrastructure that can implement and support it. As a result, companies need competence on available e-business solutions as well as on the importance of having or creating internal structures that can utilize the new solutions.

Fifth, there is the issue of relationship competence. A core premise of the network economy is that business networks that effectively source and coordinate resources and capabilities will be highly competitive (Mowshowitz, 1997; Rayport & Sviokla, 1995; Timmers, 1999). Therefore effective communication and interaction internally as well as with business partners will be important to e-business performance. Our literature review identified two sub-dimensions of relationship competence: sourcing and alignment. These dimensions are present in Bharadwaj et al. (2000) where they are termed "IT-business partnerships" and "External linkages", and implicitly contained in other competence terms in all our other sources.

We define the first sub-dimension, competence in *sourcing*, as the ability to secure access to relevant competences either inside or outside of the company. MacGregor (2004) argues that electronic business has forced organizations to reassess their boundaries and focus their attention on inter-organizational issues. A study of small manufacturing firms found that inter-organizational relationships are important for performance (Golden & Dollinger, 1993). Networks, whether in the form of strategic alliances or informal linkages, are important to pool resources and talents for mutual benefit of participants (Dean, Holmes, & Smith, 1997; Premaratne, 2001; Rosenfeld, 1996). Jarrat (1998) found that competence derived through participation in networks overcame other business weaknesses. Studies

on EDI adoption and Internet adoption have also highlighted the role of relationship competence (Lee & Lim, 2005; Mehrtens, Cragg, & Mills, 2001). Also, studies of IS outsourcing success have documented the importance of the ability to form high quality partner relationships and having the capability to learn or to acquire the needed knowledge (Lee, 2001; Shi, Kunnathur, & Ragu-Nathan, 2005).

We define the other sub-dimension, competence in *alignment*, as the ability to combine and use available competences. For example, sourcing could take place through two different activities that either create access to competences through recruitment, training, or contractual arrangements, or outsource activities where competences are needed. When the need for and access to competences are defined by sourcing arrangements, competences in alignment will influence how well accessible competences are combined and activated in the use process. Normally, alignment is regarded in the literature as an intra-organizational activity (e.g. "IT-Business partnership" in (Bharadwaj et al., 2000)); but when companies cooperate and form alliances, alignment takes on an inter-organizational dimension. As a result, competence in alignment will have both an internal and an external perspective. Most studies point to the importance of flexible systems and IT infrastructure with key business partners without explicitly recognizing the importance of competences in managing these inter-organizational relationships (e.g. Bharadwaj et al., 2000). In the network economy, businesses that are able to form effective partnerships will be more agile (Sambamurthy, Bharadwaj, & Grover, 2003) and competitive. This ability is particularly important for small and medium-sized enterprises, which typically have scarce resources and limited ability to exploit business opportunities on their own. Sourcing and alignment competences will enable small businesses to take advantage of e-business opportunities and take part in business network partnerships.

E-Business Performance Dimensions

Amit and Zott (2001) conducted one of the most cited studies on e-business performance. They perform a thorough review of the entrepreneurship and strategic management literature. They conclude that no single economic theory can fully explain the sources of value creation of e-business. Johansson and Mollstedt (2006) argue that Amit and Zott's four dimensions of e-business success are not only relevant for understanding the drivers of value but could also be used as performance dimensions when evaluating the success of e-business.

Wade and Hulland (2004) argue that the researcher need to conceptualize resources as well as performance with a certain level of specificity, to identify the effects of resources on performance. They suggest that in choosing a dependent variable for understanding the importance of resources, the researcher needs to address three key attributes regarding the constructs ability to address: 1) performance, 2) competitive aspects, and 3) performance over time. The performance dimensions of Amit and Zott (2001) used as evaluative dimensions of e-business performance as suggested by Johansson and Mollstedt (2006), exhibit all three of these criteria. Consequently, we base our definition of e-business performance on the work of Amit and Zott (2001) who describe the potential of value creation in e-business in four interrelated dimensions: efficiency, complementarities, lock-in, and novelty. Efficiency describes possible reductions in transaction costs, whereas complementarities describe the value potential from combining products and services, technologies and activities in new and innovative ways. Lock-in describes the potential value in creating switching costs from arrangements that motivate customers and business partners to repeat and improve transactions and relationships. Novelty describes value creation resulting from innovations in the way business is conducted (e.g. web-based auctions, etc.).

RESEARCH MODEL AND HYPOTHESES

Our research model and hypotheses will test the influence of training and competence on performance in small and medium-sized enterprises by focusing on how these influences work in the context of e-business. We follow the advice put forward by Patton et al. (2000), Fuller-Love (2006) and Wade and Hulland (2004). They argue that further studies should narrow their focus on a specific setting involving a limited set of competences, industries or geographical regions. Moreover, following the advices from the benchmarking report of European training initiatives (European Commission, 2002a), we will base our inclusion of competence on previous research and focus on the relevance of competence supplied through the training offered.

We define e-business competence as the knowledge, skills and capability of SMEs to utilize the concept of e-business and e-business related technologies. The concept of training is included as a potential predictor of both e-business competence and e-business performance. Training is defined as the relevant training supply in the context of e-business and SMEs. Training will be measured by collecting information from the different training providers in the chosen industries and countries. The providers' interest in the SME segment and the content of the training supply are important factors in defining the training supply as it appears to the SMEs. The demand for training is formed by the

SMEs' awareness of the training supply and the ability to invest in the training offered.

We propose that e-business performance is influenced by both e-business competence and relevant training supply in this context. E-business performance is defined as the results of the e-business efforts in terms of the effects created in the four dimensions of efficiency, complementarities, lock-in and novelty. The research model is illustrated in figure 2. We propose the following research hypotheses:

H1: *There is a positive association between training and e-business performance in terms of a) efficiency, b) complementarities, c) lock-in and d) novelty.*

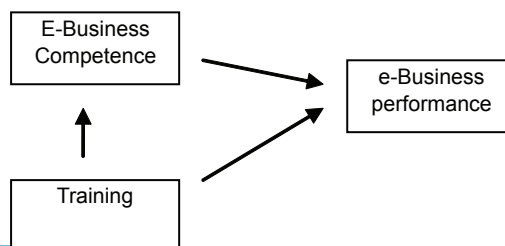
H2: *There is a positive association between training and e-business related competence.*

H3: *There is a positive association between e-business related competence and e-business performance in terms of a) efficiency, b) complementarities, c) lock-in and d) novelty.*

METHODOLOGY

We conducted a cross sectional study with a sample of 339 SMEs from three industries (tourism, transportation, and food and beverages) in three European countries (Norway, Finland and Spain). A sample of 116 training providers was also drawn randomly from the same countries.

Figure 1. Research model



Based on a random sample of SMEs, executives were phoned, and if their company used web pages, e-mail or e-commerce systems for business purposes, they were invited to take part in the survey. 339 executives accepted and were subsequently interviewed. A total sample of 130 training providers, equally shared between the countries, were phoned and invited to take part in a sample. 116 providers accepted and were then interviewed.

We based the operationalizations of e-business competence on instruments and operationalizations previously documented (Bassellier et al., 2001; Bharadwaj et al., 2000; Feeny & Willcocks, 1998; Heijden, 2000; Lee, Trauth, & Farwell, 1995; Sambamurthy & Zmud, 1994). The operationalization of e-business training was based on the work of Patton et al. (2000) who identified characteristics of both the supply side and demand side as important to understand the relevance of the training supply. As a result, training supply was operationalized in four dimensions: the attractiveness of the different SME size segments to the training provider, the financial ability of SMEs of different sizes to invest in training programs, the SMEs' awareness of existing training programs, and the content of the training offered in terms of the types of competence offered. The competence dimensions characterizing the training supply were the same as in the e-business competence variable targeting the SMEs. The final measure of training was constructed as a summed index for each country.

The supply and demand of training as a function of SME size, were added to the data set of each country. The average awareness of SMEs about the training supply in each country was coded with the average value for each SME in the respective countries. The index representing the training content in each country was coded in a similar fashion.

We constructed the final measure of training as a formative measure where training emerged as a result of the external supply and internal demand described above. The data about training represents a pooling of information from the supply side (providers) and the demand

side (SMEs as customers). Training suppliers were asked to report which competences they cover for the different SME size segments. The suppliers were also used as informants on how SMEs of different size have varying demand of training as a function of their awareness and financial ability to pay for the training supply. By combining data from the SMEs and their training providers we get richer information about how the training supply appears to the SMEs in terms of content, availability and relevance, as suggested by Patton et al. (2000).

'E-business performance' was operationalized according to the dimensions described by Amit and Zott (2001). The indicators for all constructs were measured on a seven point Likert-type scale between 'totally disagree'/'not at all' and 'totally agree'/'very large extent'. The independent variables were measured as formative indicators (for a review of construct indicators and measurement model specification, see Burke Jarvis, Mackenzie, & Podsakoff (2003). The dependent variable e-business performance was measured with reflective indicators of each of the four dimension of performance: efficiency, complementarities, lock-in and novelty. We then conducted open-ended interviews with eight SME managers and two related consultants as an additional reality check of our model and as a test of the relevance, wording and response format of the indicators. The outcome of this process led to the resulting questionnaires. The survey instruments are shown in Appendix B and C.

DATA ANALYSIS

We determined that partial least squares analysis (PLS) would be the most appropriate technique in the testing of our hypotheses along with the measurement quality of our formative and reflective indicators. PLS is a confirmatory, second-generation multivariate analysis technique (Fornell, 1982) that is well suited for highly complex predictive models (Jöreskog & Wold, 1982). PLS has several advantages that makes it well suited for this study, including the ability

to handle reflective and formative indicators and robustness in relation to departure from multivariate normality, as occurred in our data. Moreover, as with multiple regression, PLS focuses on the model's ability to predict rather than explain the variability of the dependent variables. PLS is therefore most useful in situations where the theory is still being developed (Chin, 1998) and can suggest refinements in theory by showing how substantially indicators are related to constructs and how assumed predictors are related to one or more dependent variables. In PLS, the predictive ability of constructs is optimized and the performance of the individual scale items is reported.

Descriptive Statistics

We show descriptive statistics for the two samples in Appendix A. All 339 SMEs in our sample used at least one of the eight e-business systems surveyed (Q4) in addition to e-mail. Each company had at least a web presence where individual customers or companies could find information about products and services. Appendix A shows the distribution of the dif-

ferent e-business systems (Q4a-h) in the SME sample. The second sample consisted of 116 training providers, where Norway and Finland were represented by 40 providers each and Spain by 36 suppliers. The size of the training providers varied substantially, ranging from 1 to almost 800 employees. The median size of the training providers in the sample was 37.4 employees.

Measurement and Measurement Quality

Formative items represent measures that cause the construct under study (Bollen, 1989). Changes in the construct are therefore not expected to cause any changes in the indicators (for an overview of indicator specification, see Jarvis, Mackenzie, & Podsakoff (2003). As a result, items within a formative scale are not expected to correlate. Tests of convergent and discriminant validity based on the inter-correlations between items are therefore not relevant for evaluating the psychometric properties of formative items. Instead, item weights and their significance are used to indicate how relevant

Table 1. Descriptive statistics, weights and t-statistics for formative indicators measuring competence

	<i>Mean</i>	<i>Std. dev.</i>	<i>Weight</i>	<i>t-stat.</i>
Competence (Formative)				
Q10	4.11	1.73	0.16	1.82
Q11	4.25	1.71	0.04	0.34
Q14	3.65	1.64	0.11	1.10
Q16	4.38	1.74	0.13	1.80
Q22	4.08	1.53	0.55	6.39
Q25	4.31	1.61	0.10	1.09
Q26	4.55	1.60	0.11	1.41
Q27	3.63	1.83	0.13	1.40
Training (Formative)				
V8	3.98	1.06	0.18	2.02
V9-28	4.80	0.33	0.14	5.62

each item is in measuring its latent construct. These results are reported in Table 1. After examining the indicator weights and t-statistics, several indicators in the e-business competence scale were deleted because of negative weights indicating problems with multicollinearity. A new analysis of the reduced model showed no further problems. Of the eight remaining indicators three were found to have significant t-values ($p \leq .05$). These indicators were related to competences in e-business strategy and vision, sourcing of competence, and IT business process integration. This empirically suggests that the overall e-business related competence is primarily formed by competence in IT business process integration (Q22), knowledge of the value of e-business technologies in relation to business (Q10), and knowledge of outsourcing (Q16).

We found that the two indicators measuring training, V8 (financial resources of SMEs of different size to invest in training) and the index of V9-28 (competence areas represented in the training content offered) had both both positive and significant weights ($p \leq .05$). The other two indicators included in the measurement model of training had negative weights, indicating a problem with multicollinearity and were therefore removed. The resulting measure of training consists of the SMEs' ability to invest in training, and the content of the training offered by the provider.

We assessed the reliability of the dependent variable constructs using Cronbach's alpha. Hair et al. (Hair, Anderson, Tatham, & Black, 1992) suggest that an alpha of 0.60 is acceptable for exploratory research and 0.80 for confirmatory

research. Reliability analysis for the multi-item scales showed the following coefficient alphas: e-business efficiency 0.86, e-business complementarities 0.88, e-business lock-in 0.70, and e-business novelty 0.72. These results show that all concepts had sufficient reliability for exploratory research.

The reflective items are believed to be caused by the latent constructs they intend to measure (Bollen, 1989). Inter-correlations between the items are therefore expected. The psychometric properties of the reflective items were examined by analyzing their internal consistency in terms of their convergent and discriminant validity. Convergent validity was estimated based on the item loadings, and a loading of above .70 is recommended, which indicates that at least half of the variance in each item is accounted for by the latent construct (Nunnally, 1978). For all dimensions of e-business performance the items had sufficient convergent validity in terms of their squared loadings (see table 2). In addition, average variance extracted (AVE) was calculated. AVE indicated that the set of indicators as a whole was sufficient of explaining the latent construct. All constructs with reflective items had AVE above the recommended level of 0.5 (Fornell & Larcker, 1981), as shown in table 3.

Test of Hypotheses

We tested the structural model with the estimated path coefficients and their standard errors, along with the R^2 value, which reflects the predictive ability of the model including the dependent variables' ability to explain the

Table 2. Results of the reliability test

Variable	Reliability of scale
E-business performance: efficiency (v11-13)	0.86
E-bus. performance: complementarities (v14-16)	0.88
E-business performance: lock-in (v17-18)	0.70
E-business performance: novelty (v19-20)	0.72

Table 3. Descriptive Statistics – E-business Performance, reflective indicators

E-business efficiency (Reflective)				
Composite Reliability 0.86; AVE 0.67	Mean	Std. dev.	Loading	t-stat.
Q28	3.66	1.90	0.84	49.20
Q29	3.84	1.91	0.85	62.36
Q30	4.20	1.76	0.76	22.77
E-business complementarities (Reflective)				
Composite Reliability 0.90; AVE 0.75				
Q31	3.78	1.76	0.84	35.37
Q32	3.98	1.75	0.90	81.06
Q33	3.60	1.78	0.86	59.06
E-business Lock-in (Reflective)				
Composite Reliability 0.85; AVE 0.74				
Q34	2.97	1.73	0.84	33.26
Q35	3.76	1.81	0.88	47.79
E-business Novelty (Reflective)				
Composite Reliability 0.87; AVE 0.77				
Q36	2.93	1.85	0.88	46.59
Q37	3.75	1.76	0.87	45.12

dependent variable. We used PLS-graph version 3.0 (Chin, 2001) for the structural analyses and hypotheses tests. The significance of each path in the structural model was estimated using the bootstrap re-sampling method with 200 re-samples. Our sample size of 339 exceeds the minimum recommended sample size of the greater of either 1) ten times the number of indicators in the scale with the largest number of formative indicators, or 2) ten times the largest number of structural paths directed at a particular dependent construct in the structural model (Chin, Marcolin, & Newsted, 1996).

Hypotheses H1a states a positive association between training and e-business performance in terms of efficiency, and this was not supported. Hypothesis H1b holds that training will be positively related to e-business performance in terms of complementarities, which was supported (.15, $p \leq .01$). Hypothesis H1c states a positive relationship between training and

lock-in, which was supported (.15; $p \leq .01$), and finally hypothesis H1d states that training will be positively related to e-business performance in terms of novelty, which was also supported (.20, $p \leq .01$). Hypothesis H2 states a positive relationship between training and the e-business related competence in the SMEs, which was supported (.26, $p \leq .01$, $R^2 = .07$). Finally, hypothesis H3a states a positive relationship between e-business competence and e-business performance in terms of efficiency, which received strong support (.58, $p \leq .01$). Hypothesis H3b suggest that e-business competence is positively related to e-business performance in terms of complementarities, which was strongly supported (.61, $p \leq .01$). Hypothesis H3c states that e-business competence is positively related to e-business performance in terms of lock-in, which received strong support (.49, $p \leq .01$). The last hypothesis, H3d, holds that e-business competence will be positively related to e-business performance in

terms of novelty, which was also strongly supported (.55, $p \leq .01$). As a whole the structural model explained a substantial amount of variance in e-business performance. Competence and training explained 36%, 45%, 30% and 40% of the variance in e-business efficiency, complementarities, lock-in, and novelty, respectively. Figure 2 summarizes the significant findings of the structural model.

DISCUSSION

The literature on the relationship between training and performance in SMEs is ambiguous. The same is true for the relationships between e-business related training, e-business competence and business performance, and between e-business training and competence. This confusion is most likely a result of the partial focus in most of these studies where few have included both the effect of training and competence in understanding how e-business applications can influence e-business performance. This exploratory study examined the factors that affect e-business performance in SMEs by combining a research model developed from a review of the IT competence literature and the small business literature, with interviews and survey data from both SMEs and training providers. We have three contributions.

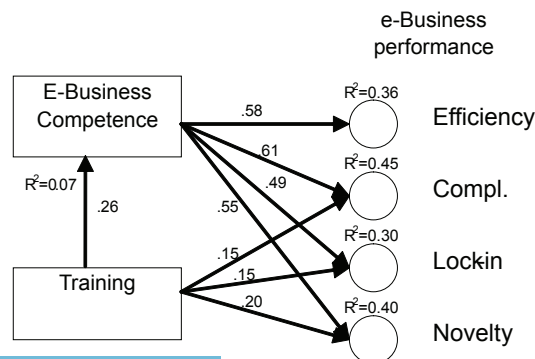
First, we have developed a conceptualization of e-business related training that both

include the supply side as well as the demand side of training as suggested by Patton et al. (2000). This conceptualization combines factors identified in the IS literature with factors identified in the small business literature.

Second, our empirical results from the context of e-business demonstrate a relationship between training, competence, and performance in SMEs. In addition to the direct relationship between e-business competence and performance, training was found both to influence competence levels and performance both direct and indirectly. These findings add to and support the small business literature which suggests that a positive relationship exists between SME training and performance (e.g. Cosh, Duncan, & Hughes, 1998). The findings also support the proposition of Patton et al. (2000) that empirical studies should focus more on specific contexts when investigating the relationship between training and performance. Indeed, after implementing methodological improvements suggested by several authors our findings support the views that the ambiguities in the literature to a large extent are caused by methodological weaknesses in many empirical studies, thus hindering or obscuring the documentation of these relationships (e.g. Fuller-Love, 2006; Patton et al., 2000; Wade & Hulland, 2004).

Third, we have demonstrated that value creation in e-business can be explained by a limited set of e-business related competences as

Figure 2. Structural model with significant paths and path coefficients



well as the demand and supply side of training. The competences which explained a substantial amount of e-business performance were competence in e-business strategy and vision, competence in sourcing, and competence in process integration between IT and business. These competences explain a substantial amount of the variance in performance and should be considered by the SMEs in evaluating their e-business related competence level.

Public stimulation programs targeting SMEs would benefit from these results. Training providers should evaluate whether the content of their training programs sufficiently cover the competences identified in this study. Both public programs and training suppliers should be aware of the fact that the SMEs' lack of awareness and inability to invest in these training programs could represent significant barriers to developing e-business related competence and hence e-business performance.

Lacking financial ability can be a significant factor in explaining difference in survival rates between SMEs of different size. Our data includes training supply and ability to invest in training in three countries in Europe. Of these countries, Spain had public arrangements that helped the smallest SMEs in particular, since they have the lowest ability to pay for training and the greatest need for competence. Our data suggest that such public arrangements that increase the ability to pay for training for the smallest of the SMEs, could increase e-business performance as well as survival of these SMEs. The impact of this policy could be positive for the economy, since small SMEs dominate the SME segment through their numbers as well as are the ones with the lowest survival rates.

There is need for more studies on the issue of training and e-business competence, particularly in the context of SMEs. The lack of theoretical and empirical work on this topic and the results from our exploratory study, suggest that future research should devote more resources to further explore the importance of training, competence and performance in SMEs and investigate how improvements could influence the economy. Our findings suggest that specificity

regarding context is necessary to document effects of training and competence. Future studies should explore other contexts and investigate whether it is possible to generalize findings to other contexts or to SMEs in general.

This exploratory study has several limitations. Our data consist of subjective evaluations of e-business managers and training providers and are not necessarily reflecting objective facts. Future studies should include less subjective information about e-business performance and its antecedents. An interesting approach would be to follow e-business training programs over time with more in depth research methods focusing on how several characteristics of the training offered could influence the competence build up and the SME performance over time. Such studies should be followed by quantitative research methods that could test the hypotheses developed with the ability to generalize the results.

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APPENDIX A. DESCRIPTIVE STATISTICS

Figure 1. SME sample

Item	n	Mean	Std. Deviation
Q1	339	29,52	34,84
Q2	339	1,00	,00
Q3	339	2,06	,80
Q5	321	4,38	1,74
Q6	327	4,43	1,42
Q7	309	4,72	1,55
Q8	299	4,34	1,72
Q9	330	4,74	1,45
Q10	325	4,32	1,42
Q11	261	3,66	1,90
Q12	258	3,84	1,91
Q13	303	4,20	1,76
Q14	274	3,78	1,76
Q15	283	3,98	1,75
Q16	286	3,60	1,78
Q17	287	2,97	1,73
Q18	299	3,76	1,81
Q19	309	2,93	1,85
Q20	307	3,75	1,76
E-bus. Efficiency	234	3,89	1,64
E-bus. Complem.	255	3,79	1,59
E-bus. Lock-in	276	3,34	1,55
E-bus. Novelty	299	3,36	1,59
Valid N (listwise)	172		

Figure 2. E-business systems used in the SME sample

E-business systems	# SMEs	Percent
Web pages with information to individual customers about products and services (Q4a)	256	75,5
Web pages where individual customers can make orders (Q4b)	134	39,5
Web pages where companies can find information about products and services (Q4c)	270	79,6
Systems for electronic sales of products and services to other companies (Q4d)	51	15

EDI solutions on the Internet (V4e)	73	21,5
Systems where suppliers can find information about our demand and supply (V4f)	62	18,3
Systems that integrate supply chains (V4g)	36	10,6
Other (V4h)	102	30,1

APPENDIX B. THE SURVEY INSTRUMENT FOR SMES

Country Finland Norway Spain

Introduction to Respondent

This interview is part of a project that investigates the use of e-commerce or e-business in small and medium-sized companies in Europe. In this interview you will be presented with questions about e-business, which can be defined as utilizing technologies for conducting business over the Internet. This implies all types of business interactions over the Internet with suppliers, customers and other business partners.

We ask you to answer as correct as possible based on the knowledge you have of your company. This survey is anonymous and we guarantee that it will not be possible to trace any of the answers back to you and your company.

Background Information

- Q1. Approximately, how many employees are there in your company? _____ **employees**
- Q2. In what type of industry is your company? **Tourism**, **Transport** **Food & Beverages**
- Q3. Does your company use web pages, e-mail or e-commerce systems for business purposes?
 Yes **No**
- Q4. What types of e-business systems does your company use? (multiple responses possible)
- web pages with information to individual customers about products or services
 - web pages where individual customers can make orders
 - web pages where companies can find information about products or services
 - systems for electronic sales of products and services to other companies
 - EDI solutions on the Internet
 - systems that enables your suppliers to see information about your demand or production
 - systems that integrates supply chains
 - other

a very low extent 1 2 3 4 5 6 7 *a very high extent*

- Q5. To what extent are IT activities in your company outsourced to external providers?

Q6. To what extent is your company informed about commercially available e-business systems?

Q7. To what extent is your company informed about providers of e-business related training?

Q8. To what extent has your company implemented its e-business intentions?

In the next section we would like you to assess your company's level of competence in various topics related to e-business. The questions are in the form of propositions. We ask you to give your evaluation of how accurately you feel that these propositions describe the situation in your company. If you find that any of the propositions are irrelevant, please indicate so by answering "not applicable". Please indicate how well you agree with the proposition by answering a number between 1: totally disagree and up to 7: totally agree.

Strategy and Vision

The Concept of E-Business

Q10. Our company has a high level of knowledge of how e-business technologies can be of value to our business

totally disagree 1 2 3 4 5 6 7 *totally agree*
N/A

Q11. Our company has a high level of knowledge of how our main competitor(s) use IT to support similar business areas

totally disagree 1 2 3 4 5 6 7 *totally agree*
N/A

Q12. In general, e-business is well understood by my company Strategic planning

totally disagree 1 2 3 4 5 6 7 *totally agree*
N/A

Q13. Our company has a high level of knowledge of strategic planning

totally disagree 1 2 3 4 5 6 7 *totally agree*
N/A

Q14. Our company has a well developed set of strategic planning techniques

totally disagree 1 2 3 4 5 6 7 *totally agree*
N/A

Q15. In general, strategic planning is well understood by our company

totally disagree 1 2 3 4 5 6 7 *totally agree*
N/A

Sourcing and Alignment

Sourcing Competencies

Q16. Our company has a high level of knowledge on outsourcing of activities to other companies

totally disagree 1 2 3 4 5 6 7 *totally agree*
N/A

Q17. Our company has a high level of knowledge on how to use competencies in our business partners

totally disagree 1 2 3 4 5 6 7 *totally agree*
N/A

Alignment Competencies

Q18. In my company business and IT managers very much agree on how IT contributes to business value

totally disagree 1 2 3 4 5 6 7 *totally agree*
N/A

Q19. In my company there is effective exchange of ideas between business people and IT people

totally disagree 1 2 3 4 5 6 7 *totally agree*
N/A

Q20. In general, my company is good at using the competencies it already has

totally disagree 1 2 3 4 5 6 7 *totally agree*
N/A

Q21. In general, my company is good at using competencies represented in our business partners

totally disagree 1 2 3 4 5 6 7 *totally agree*
N/A

IT-Business Process Integration

Competence in Process Integration

Q22. My company is actively working with the impact of e-business on its business processes

totally disagree 1 2 3 4 5 6 7 *totally agree*
N/A

Q23. In general, my company is good at reorganizing work to utilize new information technology

totally disagree 1 2 3 4 5 6 7 *totally agree*
N/A

Management of IT

Q24. My company's IT resources are effectively managed

totally disagree 1 2 3 4 5 6 7 *totally agree*
N/A

Q25. My company is good at achieving the anticipated benefits from IT investments

totally disagree 1 2 3 4 5 6 7 *totally agree*
N/A

Systems and Infrastructure

Q26. The systems infrastructure is very flexible in relation to my company's future needs

totally disagree 1 2 3 4 5 6 7 *totally agree*
N/A

Q27. The IT systems make it possible for my company to effectively cooperate electronically with business partners

totally disagree 1 2 3 4 5 6 7 *totally agree*
N/A

In the last section we would like you to assess your company's experiences with the effects of its e-business efforts. We ask you to give your evaluation of what you feel has come out of your company's e-business efforts.

E-Business Success

Efficiency

Q28. Our e-business efforts have reduced costs by electronic order taking over the Internet

totally disagree 1 2 3 4 5 6 7 *totally agree*
N/A

Q29. Our e-business efforts have made us able to deliver faster

totally disagree 1 2 3 4 5 6 7 *totally agree*
N/A

Q30. Our e-business efforts have reduced costs in communication with suppliers and customers

totally disagree 1 2 3 4 5 6 7 *totally agree*
N/A

Complementarities

Q31. As a result of our e-business efforts our products or services complement products or services from other suppliers

totally disagree 1 2 3 4 5 6 7 *totally agree*
N/A

Q32. Our business efforts make it possible for other suppliers to complement our products or services

totally disagree 1 2 3 4 5 6 7 *totally agree*
N/A

Q33. Our e-business efforts have made our supply chain strongly integrated to our partners' supply chains

totally disagree 1 2 3 4 5 6 7 *totally agree*
N/A

Lock-in

Our e-business efforts make it more expensive for our customers or suppliers to replace us Our e-business efforts have made our products and services more tailored to our customers' needs

totally disagree 1 2 3 4 5 6 7 *totally agree*
N/A

Novelty

Q34. Our e-business efforts have made our company a pioneer in utilizing e-commerce solutions

totally disagree 1 2 3 4 5 6 7 *totally agree*
N/A

Q35. Our e-business efforts have made us cooperating with our customers or suppliers in new and innovative ways

totally disagree 1 2 3 4 5 6 7 *totally agree*
N/A

General

Q36. In general, my company has experienced very positive effects from its e-business efforts

totally disagree 1 2 3 4 5 6 7 *totally agree*
N/A

Other/Control

Leader vs. Follower

Q37. There is a dominating customer or supplier who dictates our e-business efforts

totally disagree 1 2 3 4 5 6 7 *totally agree*
N/A

Q38. Our company is good at implementing changes in its organization

totally disagree 1 2 3 4 5 6 7 *totally agree*
N/A

Q39. Overall, my company has a high level of competence for utilizing e-business technology

totally disagree 1 2 3 4 5 6 7 *totally agree*
N/A

APPENDIX 3. THE SURVEY INSTRUMENT FOR TRAINING SUPPLIERS

V1. Approximately, how many employees are there in your company? _____ employees

V2. Does your company off e-business-related training and courses?:

Yes, No

V3. Does your company off software related to e-business solutions to SMEs?:

Yes, No

V4. Does your company offer training and courses, which assist SMEs in utilizing web pages or e-commerce systems?

Yes, No

V5. To what extent do you supply training and courses to these categories of SMEs

1-5 employees

not at all 1 2 3 4 5 6 7 *very large extent*

6-10 employees

not at all 1 2 3 4 5 6 7 *very large extent*

11-30 employees

not at all 1 2 3 4 5 6 7 *very large extent*

31-100 employees

not at all 1 2 3 4 5 6 7 *very large extent*

101-250 employees

not at all 1 2 3 4 5 6 7 *very large extent*

V6. To what extent are SMEs informed about providers of e-business related training?

a very low extent 1 2 3 4 5 6 7 *a very high extent*

V7. In your view, to what extent are SMEs successfully implementing e-business efforts?

a very low extent 1 2 3 4 5 6 7 *a very high extent*

V8. In your view, to what extent do the following types of SMEs have sufficient financial resources to invest in training programs?

1-5 employees

not at all 1 2 3 4 5 6 7 *very large extent*

6-10 employees

not at all 1 2 3 4 5 6 7 *very large extent*

11-30 employees

not at all 1 2 3 4 5 6 7 *very large extent*

31-100 employees

not at all 1 2 3 4 5 6 7 *very large extent*

101-250 employees

not at all 1 2 3 4 5 6 7 *very large extent*

In this section we would like you to focus on the building of competencies in SMEs. As a provider of training and courses, to what extent do you stimulate building of competence in the following areas?

V9. The value of e-business solutions for SMEs

a very low extent 1 2 3 4 5 6 7 *a very high extent*

V10. The utilization of e-business solutions in the customer's industry

a very low extent 1 2 3 4 5 6 7 *a very high extent*

V11. General understanding of e-business

a very low extent 1 2 3 4 5 6 7 *a very high extent*

V12. Strategic planning in general

a very low extent 1 2 3 4 5 6 7 *a very high extent*

- V13. The use of strategic planning techniques
a very low extent 1 2 3 4 5 6 7 *a very high extent*
- V14. Outsourcing in general
a very low extent 1 2 3 4 5 6 7 *a very high extent*
- V15. Sourcing of e-business related competencies
a very low extent 1 2 3 4 5 6 7 *a very high extent*
- V16. Alignment of IT and business
a very low extent 1 2 3 4 5 6 7 *a very high extent*
- V17. Consensus building between IT and business people
a very low extent 1 2 3 4 5 6 7 *a very high extent*
- V18. Utilizing competencies in the organization
a very low extent 1 2 3 4 5 6 7 *a very high extent*
- V19. Utilizing competencies in business partners
a very low extent 1 2 3 4 5 6 7 *a very high extent*
- V20. The improvement of business processes
a very low extent 1 2 3 4 5 6 7 *a very high extent*
- V21. Process integration between IT and business
a very low extent 1 2 3 4 5 6 7 *a very high extent*
- V22. Reengineering work to utilize new information technology
a very low extent 1 2 3 4 5 6 7 *a very high extent*
- V23. Change management in general
a very low extent 1 2 3 4 5 6 7 *a very high extent*
- V24. Change management in relation to IT-investments
a very low extent 1 2 3 4 5 6 7 *a very high extent*
- V25. IT management
a very low extent 1 2 3 4 5 6 7 *a very high extent*
- V26. The ability to realize benefits of IT-investments
a very low extent 1 2 3 4 5 6 7 *a very high extent*
- V27. IT systems infrastructure
a very low extent 1 2 3 4 5 6 7 *a very high extent*
- V28. Effective electronic cooperation between business partners
a very low extent 1 2 3 4 5 6 7 *a very high extent*

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