

The value of Internet technologies and e-business solutions to microenterprises in Atlantic
Canada

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1. Introduction

A key contemporary business management challenge is how to create value from the networked interactivity made possible by advances in ICTs (Amit and Zott, 2001; Kim, Nam and Stmpert, 2004; Porter, 2001). The Internet and associated information and communication technologies offer unprecedented opportunities for business innovation. Firms can use the Internet and associated technologies extensively as a “global and cost-effective platform to communicate and conduct commerce” (Rao, Metts and Monge, 2003), opening up new possibilities for interacting with customers, suppliers, and partners, and making possible new value propositions and new business models. Small and medium enterprises would seem particularly apt to benefit from Internet technologies and e-business solutions, and many observers have suggested the Internet and e-business can provide major advantages to SMEs, including microenterprises, by “leveling the playing field” and allowing these firms to compete against much larger firms. The development potential of microenterprises seems to be huge, but these firms face numerous obstacles to growth. Numerous studies have demonstrated that, in the aggregate, larger firms are the most rapid adopters, and the smallest firms the slowest adopters, of Internet technologies and e-business solutions (Burke, 2005; CEBI, 2004; Charles, Icis and Leduc, 2002; Davis and Vladica, 2006).

Do Internet technologies and e-business solutions provide significant value-creation opportunities to microenterprises? This chapter is about the use of Internet technologies and e-business solutions to create business value by microenterprises (firms with fewer than five employees) in Atlantic Canada. Microenterprises make up the majority of firms in most countries. Canada has more than a half million employer microenterprises, representing 77% of all firms (Industry Canada, 2001). If firms without employees (owner-operated firms) are included, the number of microenterprises is much larger.

Atlantic Canada has a larger than average population of microenterprises, with higher than average rates of entry and exit (ACOA, 2005). Comprised of the provinces of New Brunswick, Newfoundland and Labrador, Nova Scotia, and Prince Edward Island, Atlantic Canada is a relatively poor region of Canada, and e-business promises to create new and better growth and development opportunities for the region. Atlantic Canada faces significant challenges in the knowledge-based economy. It lacks large urban centers and significant financial centers; its economy is overly specialized in low value-added resource industries; its air and road transportation system is inadequate; and it is located relatively far from major markets (Ruggieri, 2003; Desjardins, 2005). The region suffers from demographic stagnation that is exacerbated by outmigration and low attractiveness to immigrants. Atlantic Canada has an impressive number of institutions of higher education, but they are small and dispersed. On most indicators of science, technology, and innovation, Atlantic Canada lags well behind the rest of the country (Bourgeois and LeBlanc, 2003; Locke et al., 2004). Among Atlantic Canada’s strengths are its educated labour pool, energy resources, a growing capability in health sciences, marine, and bioresource innovation, and an emerging generation of export-oriented entrepreneurs (MacMillan, 2001). The Atlantic Canadian regional market of around 2.3 million people, by its size and location, imposes limits to the growth of firms. Growth-oriented Atlantic SMEs need to seize opportunities to reach new markets. Harnessing e-

business in order to catch up and overcome the disadvantages of their peripheral location may be more important to SMEs in Atlantic Canada than in other parts of the country. However, lack of awareness, lack of qualified staff, and cost of implementing e-business solutions are obstacles that prevented many Atlantic Canadian SMEs from establishing an e-business presence in the late 1990s (Innova Quest, 2000).¹

Most research on e-business activities of SMEs has focused on SMEs in general. Little has been published specifically about the technological behavior of microenterprises. Moreover, much of the research on SMEs' use of e-commerce focuses on adoption patterns and barriers to adoption, rather than on business outcomes. In the present chapter we build on these lines of research to describe and analyze microenterprises' patterns of use and value creation with Internet technologies and e-business solutions. Most research on the technological behavior of microenterprises is qualitative. We complement this work by using data from two recent online surveys of SME e-commerce users in Atlantic Canada. Since the firms were reached via e-mail and data were collected via an online survey, our sample represents 'adopter' firms, ones with at least modest online capabilities. We analyze their survey responses to respond to the following questions:

1. How do microenterprises differ from larger online SMEs regarding age, rate of growth, competitive pressure, market orientation, and perceived barriers to business expansion?
2. In what ways do microenterprises lag larger SMEs in use of Internet technologies and e-business solutions?
3. How do microenterprises differ from larger SMEs in creating value with Internet technologies and e-business solutions?
4. What are structural sources of e-business value creation in microenterprises?

The chapter is organized as follows. We first discuss microenterprises in terms of their organizational characteristics and growth challenges, showing that microenterprises form a heterogeneous group of firms with significant differences of purpose, motivation, and capabilities. We then review the small literature on e-business and IT use among microenterprises and discuss the question of value creation and strategic use of IT capabilities, focusing on a class of models that can help to explain e-business outcomes among microenterprises. After providing methodological and definitional details, we address the four questions outlined above. In the concluding section we summarize our findings and outline the theoretical and practical implications of our work.

2. Characteristics and growth challenges of microenterprises

Definitions of microenterprise vary from country to country. In Europe, microenterprises are firms with fewer than ten employees. The Association for Enterprise Opportunity, a membership-based microenterprise trade association in the United States, defines a microenterprise as a firm with five or fewer employees and less than \$35,000 in startup capital. In Canada, microenterprises are defined as firms with fewer than five employees. This is the

¹ For definitions of e-commerce, e-business, Internet technologies and e-business solutions, and microenterprises, see below.

definition we use here (for a review of definitions of microenterprises see González, 2005 and OECD, 2002).

In every case, microenterprises are owner-operated businesses with limited capital, technological, and human resources. By definition no microenterprise dominates its market segment although microenterprises are numerically preponderant in many industries. Microenterprises “typically serve as a self-employment option,” i.e. as an alternative to working for someone else (Cook and Belliveau, 2004). Microenterprises provide important sources of personal income and employment. In about three-quarters of Canadian microenterprises, the firm is the sole or most important source of income for its owner. Nearly half of Canadian microenterprises are located in homes (Papadaki and Chami, 2002). Usually startup costs are very low. In Northern countries microenterprises tend to concentrate in untraded services, while in less-developed Southern countries they are also active in manufacturing (Schreiner and Woller, 2003). Our discussion focuses on microenterprises in the Canadian and North American contexts.

The microenterprise population is heterogeneous, reflecting the variety of motivations and capabilities among entrepreneurs. In industrial Northern countries, drivers of microenterprise formation include the erosion of secure middle class jobs, corporate downsizing and the recourse to contingent and temporary workers, immigration, decline in rural and inner city communities, the need for parents (especially women) to reconcile income generation with parenting and caregiving responsibilities, and an ageing population (persons over 50 have a higher rate of self-employment) that seeks to supplement its income or engage in post-employment career activities (Edgcomb and Klein, 2005).

Entrepreneurial goals can be grouped as extrinsic (involving wealth generation), intrinsic (personal accomplishments), independence and autonomy, and family security (Kuratko, Hornsby and Naffziger, 1997). These motivations give rise to several types of microenterprise. Among the microenterprises described by Industry Canada (2001) and Papadaki and Chami (2002), around one-third are “growth-oriented.” Growth-oriented microenterprises include high-growth ventures, i.e. firms established by entrepreneurs with growth as a primary objective. High-growth microenterprise ventures are identifiable by entrepreneurial intent (growth objectives) as well by characteristics of the entrepreneurs and their business plans (Friar and Meyer, 2003). Certain characteristics of Canadian microenterprises or their owners are positively related to firm growth: educational level of the entrepreneur, entrepreneurial intensity of the firm, informal networking with customers and suppliers, business partnering activities, product innovation, adoption of e-business technologies, managerial delegation, focus on local market, age, and size (younger, smaller firms grow faster) (Papadaki and Chami, 2002; Perren, 1999).

However, in general, Canadian employer microenterprises are not noticeably growth-oriented. Two-thirds have no expansion plans. Rate of graduation to the next size category of SMEs is about one percent over ten years (Industry Canada, 2001). Firm longevity is impressive – 83% of microenterprises are over seven years old (Ibid.). The owner-manager performs most of the business operations. Surveys of Canadian employer microenterprises show that more than

three-quarters are owned by males, and over 80% of microenterprise owners are 40 years of age or older (Industry Canada, 2001; Papadaki and Chami, 2002). However, surveys that include owner-operated microenterprises (i.e. firms without employees) show a much higher degree of participation by females and younger persons (Robichaud and McGraw, 2004).

It is useful to explore the range of reasons for weak growth-orientation among microenterprises. These firms have various origins and purposes: they may be lifestyle firms, firms with few resources and weak capabilities, unregistered owner-operator firms, family firms, firms established in distressed environments as vehicles to escape from poverty, or firms operated on a part-time basis to generate supplementary income. Self-employment does not necessarily imply strongly enterprising behavior. For example, in many cultural industries, self-employment is commonplace but firm-building, growth-oriented ('enterprising') behavior is not (Baines and Robson, 2001). Lifestyle firms, such as small husband-and-wife tourism operations, seek business profitability within the larger context of lifestyle and family goals (Getz and Carlson, 2000). Many microenterprises are located in households, where they are embedded in family relationships that can extend to the use of family members' paid or unpaid labor (Bains and Wheelock, 1998). Family relationships impact on micro-businesses outside the household, as well. Marginal firms often survive by relying on the labor of family and kin. Family resources can represent assets, as when transnational kinship relationships are activated for purposes of input sourcing or product distribution, and they can represent liabilities, as when conflict occurs over decisions, distribution of rewards, or succession (Edwards and Ram, 2006).

Home-based telework is often associated with microenterprises. Home-based telework is hailed as the wave of the future by those who see it as friendly to families and the environment. Some governments, motivated by the desire to keep up with corporate employers and alleviate commuter congestion, are mandating their agencies to provide IT support services for workers who may work from home (Joice, 2002). ICT-enablement of the home for purposes of work performance makes possible a variety of telework and home-based work behaviors, including moonlighting, family members' use of infrastructure for work purposes, and freelancing in retirement. Teleworking conditions, autonomy, and degree of discretion in work tasks vary considerably from one occupation to another. Executive, management, and technical telework tends to be performed by males under conditions of greater autonomy than translation, word processing, and secretarial work, which tends to be performed by females (Tremblay, 2003). Teleworking is associated with microenterprise formation and development in a number of ways, including via precarious contractual employment relationships that may deliberately or inadvertently serve to incubate a microenterprise. However, telework does not necessarily lead to the formation of microenterprises, much less to growth-oriented microenterprises.

A large "microenterprise industry" has grown up in the past two decades to service the technical, training, and financial needs of microenterprises (Edgcomb and Klein, 2005). There are more than six hundred such programs in the U.S. alone. The effectiveness of microenterprise programs in assisting the poorest and most disadvantaged individuals to move from welfare to self-employment appears to be modest, and the micro-entrepreneurs who most successfully benefit from microenterprise development programs are the ones with "the most

assets, the most years of school, the most skills and experience, the strongest support networks, and one or more wage jobs” (Schreiner, 1999). As a poverty alleviation strategy “microenterprise is not a panacea” (Servon and Bates, 1998). It is fair to say that microenterprise promotion as a strategy to alleviate deep poverty and microenterprise promotion as a broader economic adjustment strategy are not entirely compatible since the needs and capabilities of their target clients are so dissimilar.

It is an important challenge to develop coherent and effective enterprise support programs (Henry, Hill and Leitch, 2003). In many respects, heterogeneity among microenterprises in terms of capabilities, assets, goals, and motivations trumps the commonality of firm size when it comes to requirements for externally supplied financial, educational, and technical support services. Microenterprise development programs display considerable diversity in terms of target population and type of services offered (U.S. Department of Commerce, n.d.). Microenterprise support programs usually offer credit, training, technical support, networking, and mentoring services. IT-related technical support is also occasionally offered but information technology or e-business is not a major focus of most microenterprise programs, which are not likely to have strong technological capabilities.

Only a small empirical literature is available regarding support services for e-business innovation among SMEs. The heterogeneity of the small business sector requires a differentiated approach to delivery of e-business support services, not a one-size-fits-all blanket approach (Martin and Matlay, 2001). Good practices for e-commerce awareness creation encompass general awareness activities, action via intermediaries, and focused support to SMEs (Papazafeiropoulou et al., 2002). Simpson and Docherty (2004) judge public sector e-business advisory services in the UK to be poor and potentially dangerous. Muske, Stanforth and Woods (2004) identify training and advisory roles for extension services in support of ICT use among microenterprises. Martin and Halstead (2004) show that parental interest in children and their school, rather than a concern for business performance, motivates participation in ICT training among certain micro-entrepreneurs. Davis and Vladica (2005b) analyze six possible sets of drivers of demand for nine e-business support services among SMEs in New Brunswick, finding that personalized expert services are the most highly desired support service. Problem solving, extent of prior use of e-business technologies, and strategic development of business capabilities are associated with strongest demand for services. Firm size, growth orientation, and intensity of competition are not associated with strong demand for e-business support services. Since SMEs are not a homogeneous group when it comes to adoption of e-commerce, service providers need to segment them according to motivation, desired capabilities, pain points, and so forth (Davis and Vladica, 2005b; Martin and Matlay, 2001; Stockdale and Standing, 2006).

To summarize this section, microenterprises are heterogeneous small organizations with a range of purposes, not all of which imply growth. Microenterprises’ perceived barriers to growth and performance is influenced by the characteristics, capabilities, interests, preferences, social networks, resources, and motivations of the owner(s), who typically manage the firm and also predominate in the firm’s day to day operations (Devins et al., 2005). Because

microenterprises obey a variety of economic and social logics, management knowledge developed for and about larger firms does not scale down well to micro businesses.

3. Adoption and use of Internet technologies and e-business solutions: what are sources of business value?

Are processes of technology adoption in microenterprises similar to processes in larger firms, except on a smaller scale? The evidence suggests not. It is clear that firm size makes a significant difference in the firm's technological behavior:

[S]maller sized firms are less likely to report Internet use, website use, and non-Internet-related computer use than even incrementally larger businesses. Additionally, [...] size accounts for significantly more predictive power in [small business information system] adoption than CEO or industry factors (Burke, 2005).

Growth requires that a firm lower its operating costs, improve its productivity and quality, and "respond to the increased requirements of their customers and other business partners" (Raymond, Bergeron and Blili, 2005). Smaller firms by definition have limited internal resources and capabilities with respect to production, finance, management, marketing, and information technology. Fillis and Wagner (2005) identify three size-related differences between larger and smaller firms. First, there is a higher degree of uncertainty in their operations because of "limited customer base, product line and owner/firm's objectives." Second, small firms are more likely to introduce new products or services. Third, smaller firms are more flexible and agile, able to react, change, grow, or evolve faster. Premkumar (2003) summarizes differences between larger and smaller firms from an organizational behavior perspective: in small firms "decision making is centralized in one or two persons, bureaucracies are minimal," the firms are organizationally flat without long term planning or standard practices, and there is "greater dependence on external expertise and services for information systems (IS) operations." De Berranger, Tucker, and Jones (2001) and Fillis, Johansson, and Wagner (2004) emphasize the importance of the competencies and orientation of the microenterprise owner-manager, the perception of opportunity and value, and the implications of risk aversion for small firm engagement in e-business.

In Atlantic Canada, SMEs believe that they would improve their business performance if they could improve the quality of their products or services, deliver these products and services more effectively and efficiently to customers, attract new domestic customers, formulate and communicate their marketing messages more effectively, and develop specialized niches in the domestic market (Davis, Lin and Vladica, 2006). Firms that have more than 5 employees consider staff recruitment, retention, managing and communicating with staff, and productivity to be more significant than other barriers to growth. Once firms grow to more than 50 employees, they face a different set of growth challenges that reflect the transition to a larger organization with more formal management and business routines. Finally, older companies consider equipment costs, attracting and retaining key staff, increasing staff productivity, and managing and reporting financial and tax information as the most important barriers to growth (Ibid.).

How should the use of IT to create business value be conceptualized? Value creation from IT assets is an unsettled area in IS/IT research and is characterized by considerable conceptual and methodological diversity (Amit and Zott, 2001; Cronk and Fitzgerald, 2002; Kim, Nam and Stimpert, 2004; Kwon, Watts-Sussman, and Collopy, 2002; Pflughoeft et al., 2003; Porter, 2001). The literature contains an impressive array of models of IT adoption and value creation by firms. Stage or ‘ladder’ models are used in policy and some scholarly literature on e-commerce adoption by SMEs. Stage models refer to increments of maturity, steps of engagement in increasing technological complexity or process integration, or degrees of capability (see for example Daniel and Grimshaw, 2002; Ihlstrom and Nilsson, 2003; and Rao, Metts and Monge, 2003). Because they introduce concepts of evolution, technological trajectories, and technology packages (bundles of interconnected technologies), stage models provide a potentially valuable framework for understanding the dynamics of technological change in firms. However, the stage model seems not to accurately describe the technological behavior of small firms (Levy and Powell, 2003; Zheng et al., 2004). Empirical research suggests instead patterns of adoption in specific functional areas of the firm, often in response to perceived opportunities or threats represented by customers, suppliers, or competitors (Levy and Powell, 2003).

When asking “whether e-business delivers value to firm performance, and if so, what factors contribute to e-business value” (Zhu, Xu and Dedrick, 2004) we need to look at the firm’s competitive environment, the characteristics of the firm and of its senior management, the firm’s “pain points” or problems that it is attempting to resolve, its technological capabilities, the nature of its products or services, and its performance ambitions. Much e-commerce and IT adoption research conceptualizes adoption and business outcomes in terms of technological, organizational, and environmental variables, based on Tornatzky and Fleischer’s (1990) technology-organization-environment (TOE) framework (for a review of this literature see Windrum and de Berranger, 2002). Technological context describes both the internal and external technologies relevant to the firm, such as existing technologies inside the firm and technologies in the market. Organizational context considers firm size and scope, the centralization, formalization, and complexity of its managerial structure, the quality of its human resources, and the internal availability of resources. Finally, environmental context is the arena in which a firm conducts its business – its industry, competitors, access to resources supplied by others, and dealings with government (Zhu et al., 2004). These three groups of factors affect the capability of the firm to innovate and create value.

We will call these models TOE (Technology-Organization-Environment) models after Zhu, Xu, and Dedrick (2003). In TOE models, the dependent variable can be adoption, business performance, or business value, and many combinations of independent variables have been used (cf. Van der Veen, 2004). We assembled a composite list of possible outcomes of use of Internet technologies and e-business solutions from the scholarly literature and from statistical agency survey questionnaires, and we streamlined this list to the following fifteen business outcomes as indicators of value creation:

- increased productivity

- increased profitability
- decreased cost of production
- increased quality of goods and services
- improved rate of new product development
- development of a unique expertise or market
- increased speed of delivery
- increased adaptability
- increased domestic market share
- increased international market share
- increased customer service
- improved relationships with existing customers
- kept up with competitors
- improved coordination with partners or suppliers
- improved brand or image.

Respondents in our surveys estimated the effects of using Internet technologies and e-business solutions for each of these fifteen possible business outcomes on a five-point Likert scale from “no impact” to “very great impact.” We also posed questions regarding the sociodemographic characteristics of the firm, its connectivity, website functionality, use of various Internet technologies and e-business solutions, extent of engagement in online transactions, geographical market orientation, perceived barriers to business expansion, and perceived facilitators of adoption of e-business solutions (Davis and Vladica, 2004).

4. Definitions and data sources

Small business Internet commerce is broadly defined as “the use of Internet technology and applications to support business activities of a small firm” (Poon and Swatman, 1999). The terms “e-business” and “e-commerce” are often used interchangeably, blurring their distinctiveness (Fillis and Wagner, 2005). We restrict the term e-commerce to “transactions carried over computer-mediated channels that comprise the transfer of ownership or the entitlement to use tangible or intangible assets” (Statistics Canada, 1999). The concept of “electronic business,” on the other hand, can be defined broadly as “the sharing of business information, maintaining business relationships, and conducting business transactions by means of Internet-based technology” (Poon and Swatman, 1999). e-Business encompasses all Internet-based business-to business and business-to-consumer transactions, as well as non-transactional electronic interactions throughout the customer transaction cycle (Davis and Vladica, 2005a). With this definition, “e-business” includes e-commerce, so that a firm can be engaged in e-business without conducting online transactions (e-commerce). For example, e-business includes non transactional steps in the customer transaction cycle, such as online marketing or post-sale service delivery. It also includes the internal use of information and communication technologies for purposes of coordination and business support, such as intranets.

We use the term Internet technologies as shorthand to refer to the internetworkable technological components or solutions that firms can deploy, including hardware and software, protocols, and ways of combining them. For example, Internet technology can refer to the Internet itself, to a specific method of connection (e.g. dial-up), application hosting, data storage, or to a website. Hardware includes computing and data storage or transfer equipment, electronic circuitry, wires and cables. Software and protocols make the hardware and circuitry function meaningfully. When Internet related technologies are assembled within organizations and deployed to support business functions, tasks, or processes, we refer to them as e-business solutions. The examples are numerous: online catalogues, shopping carts, online payment systems, order tracking, customer relationship management, e-mail, chat, and so on. Internet technologies and e-business solutions support business activities along the transaction cycle and throughout the value chain for purposes of internal process integration and coordination, coordination and integration with partners, interaction and communication with customers, and for decision support.

We also distinguish between the adoption and the use of various Internet technologies and e-business solutions. Adoption refers to whether or not a small firm has implemented particular Internet technologies or e-business solutions. Use refers to patterns of deployment, to the breadth and depth of integration into business activities of firms.

We conducted an online survey of use of Internet technologies and e-business solutions among SMEs in the four provinces of Atlantic Canada in June and July, 2005. Responses were solicited by e-mail regarding technology use, the economic and social characteristics of the firm, perceived constraints to and facilitators of adoption of Internet technologies and e-business solutions, desired support services, and perceived impacts or benefits of adoption of these technologies. Respondents could complete the questionnaire in English or in French. Invitations were e-mailed to 8,520 Atlantic SMEs that we identified from a variety of mailing lists and business directories. The survey questionnaire was available online, on a secure password controlled website, linked from the e-mail sent to participants. With 776 usable responses, the response rate was 9.1%. Although we made every attempt to ensure geographical representativeness in our mailing list, firms from Prince Edward Island are over-represented among respondents in proportion to the population of the province, firms from New Brunswick and Nova Scotia are more or less proportionately represented, and firms from Newfoundland and Labrador are under-represented among respondents. It is not possible to determine how closely our sample of firms replicates the sectoral distribution of Atlantic Canadian SMEs. Around two-thirds of the respondents are in the following sectors: professional and business services, tourism, IT and telecommunications, and commerce. For further details see Davis, Lin and Vladica (2006). Data from this survey are used in the analysis presented in Sections 5.1 through 5.3 below.

A largely identical questionnaire was used in an earlier survey of SMEs in New Brunswick in March and April, 2004. With 280 usable responses the response rate was about 12%. Around half the respondents are in tourism, arts and crafts, consulting and professional services, IT services, and other services. For further details see Davis and Vladica (2004). Data from this

survey are used in Section 5.4 to estimate a structural model of the sources of business value among New Brunswick microenterprises.

The main drawback of online surveys is that they exclude possible respondents who do not have online capabilities (Evans and Mathur, 2005). Since our research focuses only on current e-business users, exclusion of non users is not an issue. In other words, our research refers only to the users of Internet technologies and e-business solutions. It does not refer to non-users or potential users.

5. Results

5.1 How do microenterprises differ from larger SMEs in terms of age, rate of growth, market orientation, competitive pressure, online sales, online exports, and perceived barriers to business expansion?

Table 1 provides basic descriptive information, by size class, about the population of firms in our survey. Our sample consists of 483 microenterprises and 293 larger SMEs from Atlantic Canada. The firms that participated in this survey have an estimated 16,410 employees and conduct an estimated CAD\$ 1.27 billion in sales. Microenterprises represent 62.4% of the firms in the population, but only 7.4% of all employees and 2.4% of all sales. They report an annual revenue growth rate of 18.9%.

We tested for significant differences between microenterprises and all other SMEs in the respondent population.²

- Microenterprises are significantly younger than larger SMEs (average age is 11.1 years vs. 21.2 years, .000).
- Microenterprises do not grow more rapidly than larger SMEs (18.9% vs. 16.6% average annual growth over the past three years, .657)
- Microenterprises are not significantly more oriented toward the regional market or toward international markets than larger SMEs (60.9% vs. 65.7% of revenue earned in Atlantic Canada, .130; 14.9% vs. 13.7% of revenue earned in international markets, .567)
- Microenterprises report significantly lower intensity of competition in regional and national markets than larger SMEs, but similar intensity in international markets (regional: 2.15 vs. 2.3 on a three-point scale, .009; national, 2.26 vs. 2.40, .007; international, 2.23 vs. 2.30, .315).
- Microenterprises earn significantly more revenue online than larger SMEs (34.0% vs. 22.4%, .001).

² For all tests of significance involving a dichotomous variable and an ordinal or interval variable, we do not assume normal distribution of data and so use the Mann-Whitney U test for two independent samples. In the case of two dichotomous variables, statistics indicate asymptotic significance (2-tailed) of the Pearson Chi Square statistic.

- Microenterprises do not earn significantly more online revenue from international customers than larger SMEs (18.7% vs. 18.1%, .749).

Table 2 compares microenterprises' and larger SMEs' assessment of the importance of seventeen possible barriers to business expansion. Microenterprises' scores differ significantly from those of larger SMEs in eleven cases. In each of these eleven cases, microenterprises' assessment of importance of the barrier to business expansion is *lower* than the larger SMEs' assessment. This finding is congruent with microenterprises' reports of lower levels of competition in regional and national markets and with our earlier literature review indicating that growth is not always a primary goal of microenterprises.

5.2 In what ways do microenterprises lag larger SMEs in use of Internet technologies and e-business solutions?

We assessed Atlantic Canadian SMEs' engagement with Internet technologies and e-business solutions by measuring four groups of variables: degree of connectivity, performance of online transactions, use of e-business technologies and solutions, and extent of website functionality (for firms with own website). Table 3 compares microenterprises with larger SMEs across each group of variables. In terms of connection to the Internet, no significant differences exist between microenterprises and larger SMEs (Table 3a). Most firms of all sizes enjoy high speed access to the Internet. Regarding performance of online transactions (Table 3b), over eighty percent of respondents use the Internet for purchasing. Microenterprises are not significantly different from larger SMEs in this regard. However, more microenterprises than larger SMEs use the Internet for selling (49% vs. 40%) – a significant difference.

Regarding use of e-business solutions, Table 3c shows that the simplest solutions (e-mail, personal computers, and use of the Internet for information collection) are widespread among SMEs regardless of size. Microenterprises also use videoconferencing and solutions for secure transactions with businesses, government, and consumers as frequently as larger SMEs do. The adoption lag between microenterprises and larger SMEs occurs mainly with respect to use of network security, functional software packages, presentation of a website, wireless, shared file folders, remote data storage, hosted software solutions, intranets, extranets, remote help desks, and radio frequency ID tags. Several of these solutions serve to support coordination with staff, customers, and suppliers, and imply greater organizational complexity than is present in microenterprises. Therefore it is not surprising to find lower intensity of use among microenterprises. However, hosted software solutions, remote data storage, and especially presentation of a website are solutions that would seem to be accessible and valuable to microenterprises.

Regarding website functionality, Table 3d shows that among SMEs with a website, microenterprises do not significantly differ from larger SMEs with respect to transaction enablement, security, and privacy statements. However, microenterprises' websites are relatively less informative than larger SMEs' websites, and they are used more for synchronous and less for asynchronous communication than larger SMEs' websites.

To summarize this section, microenterprises' lower rates of adoption of Internet technologies and e-business solutions are partly explained by the fact that technologies supporting internal organizational coordination and external logistics are less relevant to microenterprises than to larger firms. Microenterprises use the Internet more intensively for selling than larger SMEs do. Furthermore, microenterprises do not lag larger SMEs in use of use technologies for transaction security. However, microenterprises do lag larger SMEs in the use of web services such as hosted software solutions or remote data storage. Microenterprises also lag larger SMEs in use of specialized or more recently available ICTs such as RFIDs or functional software packages. Finally, microenterprises lag larger SMEs in the use of websites for purposes of communicating written information. Microenterprises practically never lead larger firms in the adoption of particular Internet technologies and e-business solutions. Although certain Internet technologies and e-business solutions may be scale-neutral, none are biased in favor of adoption by the smallest firms.

5.3 How do microenterprises differ from larger SMEs in creating value with Internet technologies and e-business solutions?

Table 4 compares microenterprises' and larger SMEs' reported business outcomes of using Internet technologies and e-business solutions. Of the fifteen outcomes that we measured, microenterprises differ significantly from larger SMEs regarding only one outcome, increase in business profitability: microenterprises attribute significantly greater profitability to use of Internet technologies and e-business solutions than larger SMEs do. Although microenterprises use Internet technologies and e-business solutions less extensively than larger firms, they have experienced similar patterns of value creation as larger SMEs, with the exception of greater reported profitability gains among microenterprises.

5.4 What are structural sources of e-business value creation in microenterprises?³

Our structural model is a TOE model of technology adoption, and our measurement model uses an index of business outcomes as the dependent variable. We test a range of internal and external enabling and constraining factors as exogenous variables that respondents rated in importance on a five-point Likert scale. Since the purpose of this research is to identify sources of business value, Internet technologies and e-business solutions are exogenous variables in our model (we do not seek to identify the factors that explain their adoption).

The model contains seven composite variables (described in Table 5). Indicators measuring the use of Internet technologies and e-business solutions are grouped into four composite variables: connectivity, website functionality, e-business use, and transactions. Indicators measuring internal and external enabling and constraining factors are grouped into two composite variables: internal and external factors. The composite dependent variable, business value, is comprised of sixteen outcome indicators as described in Table 5. Most of the business value variables measure the respondent's perception of impact of ICT use on business

³ This section is a revised version of Davis and Vladica (2006).

outcomes on a five-point Likert scale, as previously discussed. We included rate of revenue growth as an objective measure among the business value variables.

This model is estimated with data from 181 microenterprises in New Brunswick collected in our 2004 survey. We modeled the data using the technique of Partial Least Squares (PLS).⁴ All of the measurement relationships between indicators and constructs in our model are specified as formative. In other words, the latent constructs are conceived as being formed by the indicators that measure them, rather than the reverse. Constructs created with formative indicators are linear composites of the indicators, and are conventionally called composite variables or indices. Reflective indicators must be unidimensional and correlated, while formative indicators need not be (Chin, 1998; Gefen, Straub, and Boudreau, 2000). The literature does not contain tested constructs or validated scales that are suitable for use as reflective indicators for measuring use or perceived impacts of Internet technologies and e-business solutions. Although formative indicators are less robust than reflective indicators, the current state of theory obliges us to use formative indicators and composite variables.

The structural model is shown in Figure 1. The composite variables External Factors and Internal Factors are hypothesized to moderate the effects of use of Internet technologies and e-business solutions on firm performance. We also hypothesize that these e-commerce technologies have direct effects on firm performance.

The significance levels of variables were measured using PLS's bootstrap re-sampling procedures. Exogenous variables with significant negative weights were eliminated from the model in several iterations, but variables with non significant weights were not removed from the model.

Significant exogenous variables in the model are shown in Table 6, along with their path weights and level of significance. Table 7 shows levels of significance of hypothesized pathways and Figure 1 shows path coefficients. As seen in Figure 2, the model has modest predictive power for two of the dependent variables (external factors and internal factors), and good predictive power for the composite variable for business value ($R^2 = .524$). All dependent variable R^2 s are significant at $p < .001$.

The meaning of the model can be summarized as follows:

- Microenterprises report greatest business value from market development, information sharing with customers, and undertaking online transactions. Market development and recruitment of distant customers are significant external moderating factors, while ICT implementation capabilities and strategic choice of products and services that lend themselves to Internet commerce are significant internal moderating factors.

⁴ We used PLS Graph 03.00 build 1126.

- Website functionality has a strong indirect effect on business value via external factors (defined by exogenous variables measuring market development) if the firm has an external website.
- E-business use (defined by the exogenous variables measuring use of shared file folders and remote data storage) has a strong direct effect on business value.
- Transactions (defined by exogenous variables measuring online presence and intensity of online commercial activity) have strong direct effects on business value as well as strong indirect effects via internal and external factors.
- Connectivity (speed, mode, or combination of connections to the Internet) has no measurable direct or indirect effects on business value. More generally, connectivity, website functionality, or interactivity per se are not important sources of business value for microenterprises.
- In microenterprises, the production of value from e-business appears to be lumpy. Increased profitability, increased productivity, increased adaptability, increased market share – improvements in one area seem to bring improvements in other areas.

Our model portrays microenterprises that grow by adopting web-based commerce and developing new markets for products and services, especially products and services that lend themselves to Internet commerce. The firms create business value that includes top line and bottom line benefits. This business model does not characterize the average member of the community of New Brunswick microenterprises. It seems, instead, to characterize microenterprises that are actively exploiting Internet technologies and e-business solutions for purposes of business development and export growth. The fact that this business model emerges clearly from the survey data suggests that evolutionary pressures and learning processes are at work on some members of the microenterprise community, inducing them to use Internet technologies and e-business solutions to undertake business activities that produce value in new ways. However, many of the microenterprises in our survey are in segments of the service industry, and with the exception of tourism the market for these services is primarily local. Enablement of global reach is of little interest to these firms, but affordable and reliable Internet technologies and e-business solutions that provide local visibility, security, interactivity, data sharing, and mobility should be of interest.

6. Summary and Conclusions

This chapter focuses on creation of business value by microenterprises that are users of Internet technologies and e-business solutions. SME and, within this group, microenterprises, have a prominent role in local and national economies, but for a variety of reasons many microenterprises are actively looking for growth or are capable of growing. The chapter describes barriers to growth and reported benefits of using Internet technologies and e-business solutions by microenterprises. We compare microenterprises with larger SMEs and show how patterns of use and value creation differ between the two groups. Microenterprises practically

never lead larger firms in the adoption of particular Internet technologies and e-business solutions. Moreover, microenterprises do not use the more complex and newer Internet technologies and e-business solutions as intensively as larger SMEs do, especially the solutions and technologies that support internal and external coordination and logistics. However, microenterprises are more likely to sell online than larger SMEs. Consistent with previous findings, microenterprises also report lower levels of competition in regional and national markets. Microenterprises assess the barriers to business expansion to be *lower* than larger SMEs' assessment. Our structural model, using a TOE conceptual framework, clearly identifies a high value creation microenterprise business model involving use of advanced web-based services and export-oriented commercialization of products and services that lend themselves to Internet commerce. Although enablement of global reach is of little interest to most microenterprises, affordable and reliable Internet technologies and e-business solutions that provide local visibility, security, interactivity, data sharing, and mobility should be of interest. More research is needed on the relationships between entrepreneurial motivation, capabilities, technology use, learning, value creation, and growth in microenterprises and very small firms.

A few policy directions can be provided on the basis of the material presented. Educators, policymakers, associations, economic development agencies, and service providers can all contribute to "facilitating a community of providers" that is responsive to SMEs' development objectives and e-business targets, to their needs for reliable and affordable expert advice (Davis and Vladica, 2005b). Initiatives could promote programs that encourage hiring and matching small firms with professionals and other skilled workers, for example (Papadaki and Chami, 2002). We agree that a blanket policy orientation needs to be corrected by a consideration of the particular characteristics of the business owner. In particular, microenterprises that "want to grow" (Papadaki and Chami, 2002), and that "have a learning orientation" are better suited to adopt and exploit Internet technologies and e-business solutions than other microenterprises are (Davis and Vladica, 2005b).

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Table 1: Main characteristics of firms in survey

	Micro (<5)	Very small (5-19)	Small (20-49)	Medium (50-499)	Total
# of firms in survey	483	195	54	44	776
% of total respondents	62.24%	25.12%	6.95%	5.67%	100.0%
# of total employees	1,207.5	2,340	1,863	11,000	16,410.5
% of total employees	7.4%	14.3%	11.4%	67.0%	100.0%
Average estimated 2004 gross sales (\$000)	\$468	\$2,044	\$5,505	\$11,822	\$1,948.4
Total estimated 2004 gross sales (\$000)	\$181,925	\$357,625	\$269,725	\$461,050	\$1,270,325
% of all estimated 2004 gross sales for all respondents	2.4%	10.3%	27.7%	59.6%	100.0%
Estimated annual growth rate past 3 yrs	18.9%	15.8%	18.5%	17.6%	18.0%
Average age (years)	11.1	19.0	24.3	27.2	14.9
% of 2004 revenue earned in Atlantic Canada	60.9%	69.0%	56.6%	62.4%	62.8%
% of 2004 revenue earned internationally (US and other)	14.9%	10.7%	18.7%	20.8%	16.7%
% of 2004 revenue earned online	34.0%	24.6%	19.6%	16.2%	20.8%
Perceived intensity of competition (1=low, 2=medium, 3=high)					
regionally	2.15	2.29	2.28	2.28	2.20
in Canada	2.26	2.39	2.47	2.33	2.31
internationally	2.23	2.29	2.49	2.13	2.26

Table 2: perceived barriers to business expansion

	<5 employees	=>5 employees	Mann- Whitney asyp. 2-tailed
	Mean	Mean	
Attracting new domestic customers	4.27	4.21	0.228
Getting marketing message out	4.24	4.18	0.199
Improving the quality of products/services	4.20	4.35	0.058
Developing niche, specialized markets	4.18	4.15	0.385
Delivery of products/services to customers	4.17	4.40	0.017
Keeping overhead costs down (i.e. office space, consumable)	4.00	4.32	0.001
Managing customer information	3.85	4.11	.000
Implementing new information and communication technologies	3.76	3.91	0.224
Managing office information technology	3.66	3.98	.000
Managing and reporting financial and tax information	3.60	3.80	0.073
Equipment costs	3.50	3.99	.000
Increase staff productivity	3.23	4.27	.000
Attracting and retaining key staff	3.22	4.40	.000
Geographical distance from clients and suppliers	3.15	3.45	0.004
Finding customers abroad	3.08	2.91	0.105
Purchasing supplies and raw materials	3.00	3.52	.000
Managing and communicating with mobile staff	2.64	3.48	.000

Scale: 5 = Very Important, 4 = Important, 3 = Neutral, 2 = Little importance, 1 = No Importance. Significant differences are in bold.

Table 3: Use of Internet technologies and e-business solutions among Atlantic Canadian microenterprises and larger SMEs

Table 3a: connectivity of Atlantic Canadian SMEs

	1 N=483 <5 employees	2 N=293 =>5 employees	3 asyp. sign. (2- tail.)
Regular dial-up telephone line with a standard modem	32.3	27.6	0.172
Cable modem	20.7	21.2	0.879
High speed (ISDN/DSL line)	63.6	61.8	0.618
T1 line or greater (1.544 Mbps or greater)	7.4	5.8	0.377
Wireless connection	27.1	27.3	0.956

Columns 1 and 2 indicate the percentage of firms in each size class that use each method of connecting to the Internet. (Because of use of multiple methods of connectivity, numbers do not add to 100%). Column 3 shows results of Pearson Chi Square test of significance.

Table 3b: use of online transactions by Atlantic Canadian SMEs

	1 N=483 <5 employees	2 N=293 =>5 employees	3 asyp. sign. (2- tail.)
uses the Internet for purchasing	84.8	88.5	0.154
uses the Internet for selling	48.9	40.0	0.016

Columns 1 and 2 indicate the percentage of firms in each size class that use the Internet for purchasing or selling. Column 3 shows results of Pearson Chi Square test of significance. Significant differences are in bold.

Table 3c: use of e-business solutions among Atlantic Canadian SMEs

	N=483	N=293	
	<5	=>5	asymp.
	employees	employees	sign. (2-
			tail.)
E-mail (electronic mail)	93.3	93.0	0.876
Personal computer, workstation or terminals	92.3	92.7	0.837
Internet; surfing the Internet, visiting websites, etc.	91.6	92.0	0.863
Network/information security technology (e.g. firewall, anti-virus software, access control)	77.8	82.9	0.091
Functional software packages (e.g. accounting, human resources, marketing).	69.1	85.3	.000
Presenting own website (on the Internet)	61.8	70.8	0.012
Wireless communications	56.5	68.8	0.001
Conducting secure business transactions with other businesses or government.	42.2	44.7	0.502
Shared file folders	39.7	75.4	.000
Conducting secure transactions with consumers	30.7	34.2	0.325
Remote data storage	18.4	26.1	0.013
Hosted software solutions	16.9	22.7	0.053
Internal company website and communications (intranet)	16.3	31.8	.000
Meeting over the network (e.g. videoconferencing)	15.8	18.7	0.312
Remote help desk assistance for your employees	7.9	15.8	0.001
Extranet	7.4	13.7	0.005
Radio Frequency Identification (RFID)	2.0	6.9	0.001
Biometrics	0.7	1.4	0.296

Columns 1 and 2 indicate the percentage of firms in each size class that use the various e-business solutions. Column 3 shows results of Pearson Chi Square test of significance. Significant differences are in bold.

Table 3d: website functionality among Atlantic Canadian SMEs

	N=320	N=244	
	<5 employees	=>5 employees	asympt. sign. (2- tail.)
On-line payment (complete transaction and payment online)	14.1	12.5	0.599
Two way communication (e.g. feedback forms)	34.4	40.6	0.081
Interactivity (two way communication in real time, like online chat)	8.1	1.8	0.001
Digital products or services (e.g. music, software, business services)	13.4	12.5	0.749
Secure web site	20.6	23.2	0.471
Privacy policy statement	20.6	17.9	0.422
Access via wireless mobile devices	7.2	5.8	0.523
Information about product or services	77.8	86.2	0.014
Information about the business	78.4	86.2	0.022

Columns 1 and 2 indicate the percentage of firms in each size class with a website with the various functions. Column 3 shows results of Pearson Chi Square test of significance. Significant differences are in bold.

Table 4: business impacts of using Internet technologies and e-business solutions

	1 <5 employees	2 =>5 employees	3 Mann- Whitney asyp. sig. (2 tail.)
Increased the business productivity	Mean 2.97	Mean 2.92	0.562
Increased the business profitability	2.94	2.68	0.015
Increased the speed of supplying and/or delivering services or goods	3.00	2.90	0.366
Increased the ability to adapt to different client demands	2.97	2.94	0.739
Increased the business domestic market share	2.48	2.45	0.997
Increased the business international market share	2.11	2.03	0.679
Increased level of customer service and satisfaction	3.12	3.10	0.703
Building and enhancing relationships with existing customers	3.19	3.05	0.139
Allowed business to keep up with its competitors	3.14	3.17	0.947
Decreased the cost of producing goods or services	2.25	2.20	0.885
Improved the quality of goods or services	2.73	2.57	0.164
Improved co-ordination with partners or suppliers	2.78	2.93	0.206
Improved rate of development and introduction of new products/services	2.62	2.58	0.885
Developing unique expertise or a unique market	2.66	2.50	0.194
Improved the brand and image of the business and its product/service	3.22	3.19	0.652

Columns 1 and 2 show the average score for each business outcome and size class of firm. Business outcomes were estimated on a five-point Likert scale as follows: 1 = No Impact; 2 = Low Impact; 3 = Medium Impact; 4 = High Impact; 5 = Very High Impact. Significance of differences in scores was measured using the Mann-Whitney U statistic.

Table 5: variables originally in the structural model

Business value: increased productivity, increased profitability, decreased cost of production, increased quality of goods and services, improved rate of new product development, developed unique expertise or market, increased speed of delivery, increased adaptability, increased domestic market share, increased international market share, increased customer service, improved relationships with existing customers, kept up with competitors, improved coordination with partners or suppliers, improved brand or image, average annual rate of growth in past three years.

Internal factors: nature of goods or services sold, skillful employees, business processes that support learning, capability of managing technological change, management effectiveness, management commitment, leadership quality, strategic objectives, internal business culture, attitude toward risk, entrepreneurship, focus, keeping overhead costs down, improving the quality of products and services, improving staff productivity, attracting and retaining staff, managing customer information, managing and communicating with mobile staff, managing office information technology, implementing new information and communication technologies, managing and reporting financial and tax information.

External factors: purchasing supplies and raw materials, costs of equipment, developing niche or specialized markets, delivery of product and services to customers, attracting new domestic customers, find customers abroad, getting marketing message out, geographical distance from customers and suppliers, possibility to access new markets, competitive threats, demanding customers or suppliers, access to specialized suppliers, access to financial resources, favorable regulatory environment, intensity of competition.

Index of connectivity: use of dialup, cable modem, high speed, T1 or greater, wireless.

Index of e-business use: use of e-mail; personal computer, workstation or terminals; Internet, surfing the Internet, visiting websites, etc.; network/information security technology (e.g. firewall, anti-virus software, access control); functional software packages (e.g. accounting, HR, marketing); presenting own website (on the Internet); wireless communications; shared file folders; conducting secure business transactions with other businesses or government; conducting secure transactions with consumers; internal company website and communications (intranet); remote data storage; hosted software solutions; meeting over the network (e.g. videoconferencing); remote help desk assistance for your employees; extranet; Radio Frequency Identification (RFID).

Index of transactions: use of Internet to buy, to sell; percent of gross sales conducted over the Internet.

Index of website functionality: organization has a website, online payment, asynchronous two-way communication, synchronous two-way communication, digital products or services delivered

via the website, secure website, privacy policy statement, wireless access, information about products, information about the business.

Table 6: significant indicators in the structural model

construct	Code	explanation	Metric	weight	sig.
connectivity	Q35_4	T1 line or greater	don't use/plan to use/use now	0.461	**
e-Business	Q40	shared file folders	don't use/plan to use/use now	0.515	***
	Q47	remote data storage	don't use/plan to use/use now	0.46	**
website	Q42	external website	don't use/plan to use/use now	0.67	***
transaction	Q56	goods or services sold via Internet	don't use/plan to use/use now	0.842	****
	Q57i	percent of gross sales conducted on the Internet	Continuous	0.505	***
external factors	Q26r	find customers abroad	5 point scale	0.326	**
	Q76r	possibility to access new markets	5 point scale	0.445	***
internal factors	Q32r	implementing new ICTs	5 point scale	0.261	*
	Q75r	nature of goods or services sold	5 point scale	0.586	***
business value	Q59r	increased productivity	5 point scale	0.086	****
	Q60r	increased profitability	5 point scale	0.084	****
	Q61r	increased speed of delivery	5 point scale	0.081	****
	Q62r	increased adaptability	5 point scale	0.088	****
	Q63r	increased domestic market share	5 point scale	0.09	****
	Q64r	increased international market share	5 point scale	0.091	****
	Q65r	increased customer service	5 point scale	0.086	****
	Q66r	improved relationships with existing customers	5 point scale	0.086	****
	Q67r	kept up with competitors	5 point scale	0.092	****
	Q68r	decreased cost of production	5 point scale	0.076	****
	Q69r	increased quality of goods and services	5 point scale	0.084	****
	Q70r	improved coordination with partners or suppliers	5 point scale	0.075	****
	Q71r	improved rate of new product development	5 point scale	0.084	****
	Q72r	developed unique expertise or market	5 point scale	0.088	****
	Q73r	improved brand image	5 point scale	0.1	****
	growth	average annual rate of growth, past three years	continuous	0.042	****

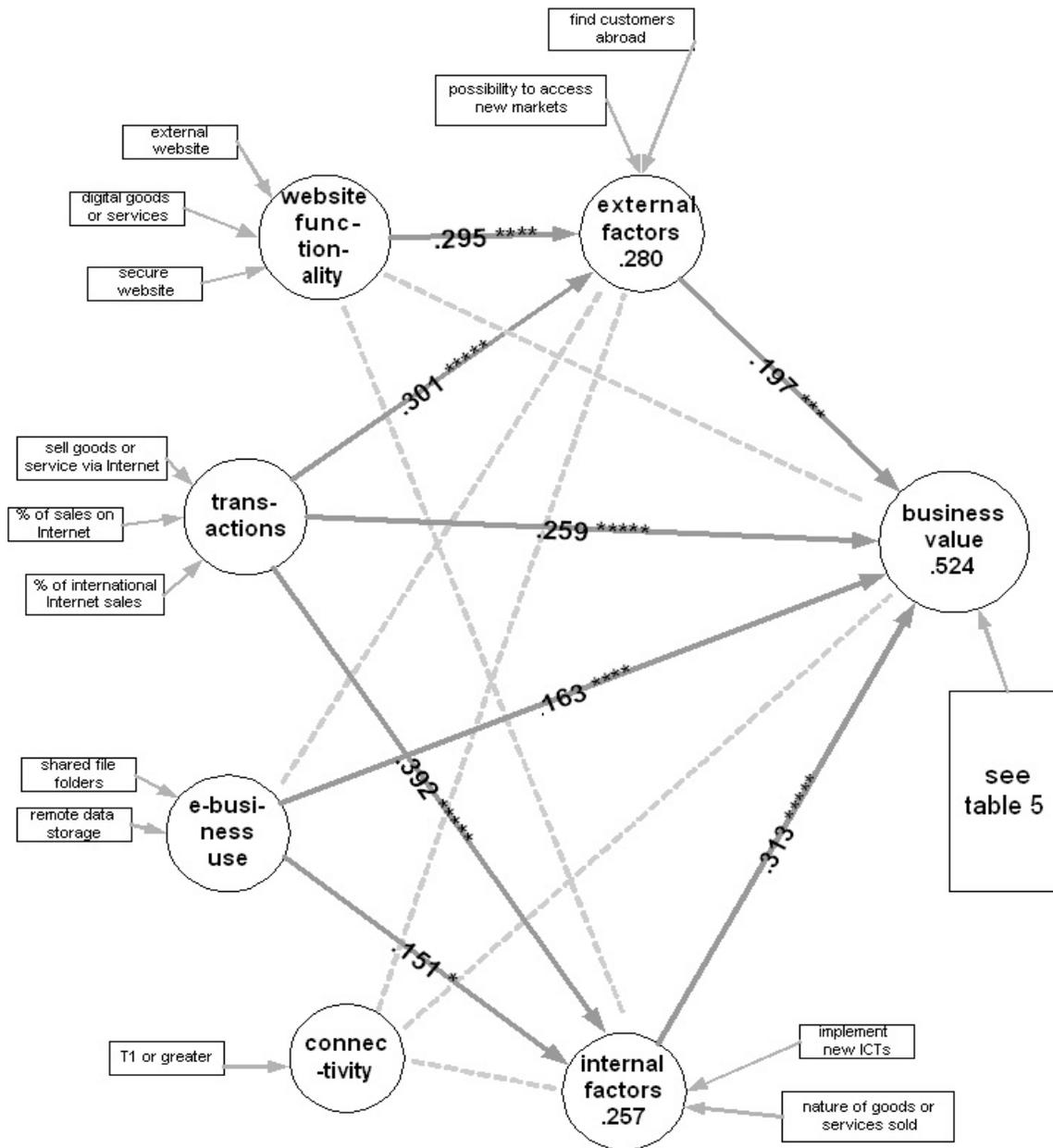
**** p<.001; *** p<.01; ** p<.05; * p<.1. Non significant variables are not shown.

Table 7: significance of pathways in the structural model

	external factors	internal factors	connectivity	transactions	e-business use	website functionality
external factors			n.s.	*****	n.s.	****
internal factors			n.s.	*****	*	n.s.
business value	***	*****	n.s.	*****	****	n.s.

***** p<.001; *** p<.01; ** p<.05; * p<.1

Figure 1: structural model of sources of business value among 181 New Brunswick microenterprise users of Internet technologies and e-business solutions, 2004



**** p<.001; *** p<.01; ** p<.05; * p<.1. Non significant pathways are in dotted lines. Non significant variables are not shown. Source: adapted from Davis and Vladica (2006).