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ORIGINAL PAPER

Technology Adoption in Small Family-Owned Businesses: Accessibility, Perceived Advantage, and Information Technology Literacy

Linda S. Niehm · Keila Tyner · Mack C. Shelley · Margaret A. Fitzgerald

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Abstract The purpose of the study was to examine the antecedents and impacts of information technology (IT) adoption by small family-owned businesses, using data from the National Family Business Survey. This research tested a model based on the Diffusion of Innovations framework and the Technology Acceptance Model (TAM). Family business managers' prior knowledge and level of IT use, business location, and community size/type were important antecedents to the decision to adopt IT. Ease of use and decision to adopt IT accounted for over 60% of the variance in usefulness of IT and implementation of internet and IT capabilities. The implementation of IT capabilities accounted for nearly 40% of the variance in actual use of IT and perceived impact of the internet.

Keywords Diffusion of innovations · Family-owned business · Information technology (IT) · Technology acceptance model (TAM)

L. S. Niehm (✉)
Department of Apparel, Educational Studies, and Hospitality Management, Iowa State University, 1066 Le Baron Hall, Ames, IA 50011-1121, USA
e-mail: niehmlin@iastate.edu

K. Tyner
Department of Family and Consumer Sciences, Texas State University-San Marcos, 601 University Drive, San Marcos, TX 78666, USA
e-mail: ktyner@txstate.edu

M. C. Shelley
Department of Statistics, Iowa State University, 539 Ross Hall, Ames, IA 50011-1204, USA
e-mail: mshelley@iastate.edu

M. C. Shelley
Department of Political Science, Iowa State University, 539 Ross Hall, Ames, IA 50011-1204, USA

M. A. Fitzgerald
Department of Child Development and Family Science, North Dakota State University, 283G EML Hall, Fargo, ND 58105-5057, USA
e-mail: Margaret.Fitzgerald@ndsu.edu

Introduction

Scholars have acknowledged the dramatic change in business efficiency and productivity due to the use of information technology (IT) (Pratt 2002). IT may be defined most broadly, following the Information Technology Association of America (ITAA; http://www.itaa.org/), as the use of computers, software, and internet-based applications that support the storage, protection, processing, transmission, and retrieval of information securely. IT is a richly multifaceted and rapidly-evolving aspect of contemporary society, with far-reaching implications across generations, business sectors, communications media, and societal groups (Cody et al. 1999; Lenhart et al. 2003; Loges and Jung 2001; National Research Council 1999; National Telecommunications and Information Administration 2002, 2000; Organization for Economic Co-operation and Development Secretariat 2000; Shah et al. 2001; UCLA internet Report 2000; Weber et al. 2003).

In the context of our research on small family-owned businesses, the operative concept is information technology literacy (ITL), which may be defined as "a self-reported ability to use computer hardware and software for self-expression, communicate with other individuals and organizations, locate and process information electronically, and engage in problem-solving activities" (Shelley et al. 2006, p. 37). ITL, as a correlate—and even as a

precondition—of the effective use of computer and internet technology, is distributed unevenly. Levels of ITL generally are higher among younger members of society, those with higher incomes and more education, more advantaged ethnic groups (white non-Hispanic and Asian), and those with IT resources that are more readily available at home, at work, or in accessible public locations (Mossberger et al. 2003; Norris 2001; Servon 2002; Shelley et al. 2004). In the case of small businesses, IT provides an opportunity to level the playing field with the competition, as well as a means to enhance their efficiency and effectiveness (Dinlersoz and Hernandez-Murillo 2004; Pratt 2002).

Decreasing costs, the growing simplicity and availability of computers and IT programs, and improved access seemingly make IT a viable resource for many firms. Yet, small businesses have been slow to adopt IT innovations, in contrast to their larger counterparts (Behind the Numbers 2004; O'Cass and Fenech 2002; Thong and Yap 1995). Understanding the antecedents and consequential impacts of IT adoption for small family firms is critically important in today's business environment. Managers of small family firms are increasingly called upon to maximize resources and meet burgeoning demands in both business and family domains (Dillworth and Kingsbury 2005; Golden 2008). Fitzgerald and Winter (2001) further suggest that home-based family businesses must find means by which to manage the complex number of overlapping and often intrusive demands in their home workplace. IT is a necessary platform needed to leverage innovation and resources that can positively impact both business and family productivity (DeLong et al. 2002).

Enhanced knowledge of preconditions that influence IT adoption for small family firms may provide insight for business consultants and academic specialists to advise these entities regarding appropriate technology strategies. Such strategies may have implications for maximizing resource use and outcomes for both the business and the family. It is critical for firms of all sizes, especially resource constrained small firms, to realize that many competitive strategies needed for success in today's marketplace cannot be implemented without IT support (Swierczek et al. 2005).

This paper provides new insight regarding the benefits of integrated IT use for small family firms by illuminating a set of preconditions associated with IT use, the mediating role of IT strategic capabilities, and the perceived impact of IT on family firm productivity and performance. IT is defined as the integrated use of computers and internet applications. Data were drawn from two waves (1997 and 2000) of the National Family Business Survey (NFBS). The NFBS utilized a household sampling frame where at least one person owned or managed a business. This contextualized approach provides a unique contrast to other studies that typically use a business-only sample. It is also important to note that over half of the businesses included in this study (55%) were home-based operations, a sector infrequently addressed in the literature but abundant among small family enterprises. The use of an integrated model allows for discussion of results from both theoretical and practical perspectives.

Although standards vary by industry, small firms are identified most often as those with 500 or fewer employees. These businesses constitute 99.7% of all United States (U.S.) employer firms, a majority of which (61%) are retail and service-related enterprises (U.S. Small Business Administration 2004). However, the SBA's definition fails to acknowledge a subset of businesses that in aggregate are major contributors to the U.S. economy. Micro businesses, those that typically employ 10 or fewer employees, comprise 94% of all firms and 84% of all employer firms (Devins 1999; U.S. Small Business Administration 2004). A majority of family-owned firms can be classified as micro and small businesses, and many of these firms are home-based operations. These smaller family firms comprise half of the total U.S. private sector employment, create the majority of new job growth, and produce more than 50% of the U.S. non-farm gross domestic product (Scarborough and Zimmerer 2006; U.S. Small Business Administration 2004). Despite their prevalence, small family firms remain an understudied entity and little is known regarding their IT and technology activities.

IT and the internet are a primary means of interface between contemporary small family businesses and their economic/market environment. IT also provides the platform to enable electronic interaction and resource exchange between these enterprises, their customers, and other constituencies. Understanding how IT adoption impacts the business capabilities and performance of this sizeable business subset can provide insight for academics, consultants, and practitioners to strengthen and sustain these sources of family income. In this paper, we present a framework for understanding the antecedents and consequences of IT adoption for small family-owned businesses. Relationships were examined between antecedents of IT adoption, the perceived ease of use and decision to adopt IT, the implementation of IT capabilities, and the consequential impacts of IT adoption on small family firms.

The purpose of this study was to establish a framework for understanding the antecedents and consequential outcomes of IT adoption for small family businesses. An integrated theoretical approach based on Rogers' (2003) Diffusion of Innovations framework and the Technology Acceptance Model (TAM) (Davis et al. 1989) guided this study. Combined, the two perspectives provide a contextualized view of IT adoption for family-owned micro enterprises. The present study explicitly tests a model

based on diffusion and TAM perspectives that explains the antecedents and the consequences of IT adoption for the performance of smaller family firms.

Unique Aspects of Small Family Firms and IT Use

Family firms can be characterized as those business organizations whose decisions are influenced by the family (Astrachan and Shanker 2003; Green and Pryde 1990; Litz 1995), with ownership or management by family members, varying degrees of family involvement, and the potential for generational transfer. Although family firms vary in the nature and extent of family involvement, there is consistent recognition that family firms are different from nonfamily firms because the owning family determines the vision for the organization and controls the creation and use of unique resources and capabilities (Chrisman et al. 2003; Habbershon et al. 2003). Family businesses were further defined for this study as those owned and managed by one or more family members (Hollander and Elman 1988). Family was defined as a household group related by blood, marriage, or adoption who share a common dwelling (Winter et al. 1998).

The family firm literature does not address the complexities of managing and sustaining small family businesses through technology. Researchers suggest that the embeddedness of the family and business systems calls for specific capabilities and strategies to manage needs, demands, and potential sources of conflict in family-owned firms (Myrie and Daly 2009; Boles 1996; Doumas et al. 2008; Haynes et al. 2008). IT integration may be a significant strategic means of extending resources for solving problems and conflicts that arise within family, business, and community contexts, furthering our understanding of how family firms adopt and accept such technologies. It also may be a means of creating and managing unique resources and developing distinctive capabilities for the family firm (Chrisman et al. 2003).

While it is generally assumed that investment in technology will result in productivity and efficiency gains for most businesses (Gordon 2000; Jorgenson and Stiroh 2000; Oliner and Sichel 2000), the literature also presents what is referred to as the "productivity paradox" (Thouin et al. 2008). This paradox suggests that while IT investment is necessary to achieve both strategic and operational benefits, it may or may not be reflected in profitability. Thus, profitability should not be used as the only measure of outcomes and productivity gained from IT use. Despite the fact that 75% of small businesses use computers (Bitler 2002; Bitler et al. 2001) and that they clearly need IT to enable appropriate competitive strategies, information concerning small family enterprises is sparse. Levenburg et al. (2006, p. 80) suggest that small, family-owned firms may be "severely lacking" in their adoption of e-business strategies and practices. Small firms will need to transform and reorganize to be technologically appealing and accessible to consumers. To be effective in restructuring, small family enterprises also will need to integrate internet-based IT that complements their traditional business formats (Dinlersoz and Hernandez-Murillo 2004).

Several researchers have addressed family business use of computers and the internet. Levenburg et al. (2006) found that, although 75% of family firms used e-mail to communicate with current customers and for customer service, those who e-mailed prospective customers, targeted challenging markets, and adopted applications such as online product demonstration, ordering delivery, and order tracking developed the greatest competitive advantage. Davis and Harveston (2000) addressed the impact of family business and manager characteristics, IT investment, and internet use on the internationalization and sales growth of family-led businesses, and found internet use, education, and firm size to be key drivers of both internationalization and sales for family firms. Of these indicators, internet use had the strongest overall effect on firm internationalization efforts. However, these studies (Davis and Harveston 2000; Levenburg et al. 2006) did not address preconditions associated with IT use by small family firms nor the mediating role of IT capabilities and their perceived impact on productivity and performance. In contrast to the adoption and use-only perspective of IT, we further address the usefulness of IT as a strategic business orientation for small family firms and its resulting impact when integrated into managerial practices. The current study is also national in scope, providing broader implications and generalizations regarding IT applications by small family firms. Focusing on how these family businesses adopt IT may further shed light on how smaller firms use technology to access information effectively, and how they identify and react to business needs and opportunities.

Integrated Theoretical Model: Diffusion of Innovations and the TAM

Several dominant theoretical bases have been used to explain the diffusion and acceptance of technological innovations such as computers and the internet. Two perspectives that are useful for understanding how new ideas, processes, and technologies diffuse within and across organizations are Rogers' (2003) Diffusion of Innovations framework and the Technology Acceptance Model (TAM) (Davis et al. 1989). We present an integrated model comprised of both

perspectives to explicate small, family-owned firms' use and acceptance of IT for business purposes.

Rogers' Diffusion of Innovations framework presents five stages of the innovation decision process: (1) knowledge of and access to the innovation, (2) persuasion of a favorable attitude toward the innovation, (3) decision to adopt, (4) implementation of the innovation, and (5) confirmation of the innovation. The Diffusion of Innovations framework posits that there will be an increased rate of diffusion and the decision to adopt an innovation if it is perceived to have a relative advantage, is compatible with existing values, needs, and experiences, is not overly complex, can be experimented with on a limited basis, and offers visible, positive results (Rogers 2003). Innovations vary in the degree of behavioral change required for their adoption. Resistance to innovations may be overcome when the innovation is perceived to provide value, involve minimal consumer learning and relatively high certainty, and be high in social relevance, legitimacy, and adaptability (Scarborough and Zimmerer 2006). In their meta-analysis of 75 diffusion articles, Tornatzky and Klein (1982) found that only relative advantage, compatibility, and complexity were related consistently to the rate of innovation adoption.

According to Rogers (2003), the internet represents IT diffusion as well as a forum for the introduction of other technology and communications. With each subsequent adoption the internet becomes more valuable (McGrath and Zell 2001), a characteristic that is distinct among innovations. Several researchers have used Rogers' (2003) framework for analyzing the process by which computers and the internet were adopted in retailing, manufacturing, and new product development (Dinlersoz and Hernandez-Murillo 2004; Innes and Simpson 1993; Jurison 2000). The internet has been found to be compatible with and enhance the efficiency of many business support functions (Hovav et al. 2004; Jurison 2000). However, the value created by internet-based applications for smaller family businesses is unknown.

The TAM (Davis et al. 1989) accounts for user acceptance of IT based on individual perceptions and intentions. It asserts that *perceived ease of use*, defined as "the degree to which a person believes that using a system would be free of effort," and *usefulness,* defined as "the degree to which a person believes that using a particular system would enhance job performance," will predict IT acceptance and adoption (Davis et al. 1989, p. 320). The TAM in this study also helps in delineating useful IT applications and capabilities that create value for smaller family firms.

Dual theoretical approaches in the marketing literature have identified technology adoption and acceptance processes in a variety of industry sectors (Chan and Lu 2004; Duval and Biere 2002; Gladwin et al. 2003; Hsu and Lu 2004; Koufaris 2002; Shih 2004). Chen et al. (2004), using the TAM with elements of Rogers' Diffusion of Innovations framework to identify variables critical to the success of e-retailing sites, found that perceived trust significantly influenced the perceived usefulness of electronic retail websites. We propose an integrated model of the Diffusion of Innovations and the TAM to assess IT acceptance and adoption by small, family-owned firms (Fig. 1). The two perspectives are complementary, with the TAM as an extension of Rogers' framework (Hu et al. 1999). Our model incorporates the TAM elements of perceived ease of use and perceived usefulness with Rogers' innovation decision stages for small, family-owned enterprises, and follows Olikowski and Iacono (2001), who cite a need to understand theories of technology use in varied organizational contexts.

Hypotheses

Antecedents of IT Adoption for Small Family Firms

Before individuals decide to adopt a new technology, they first must have exposure and access to the technology. Family business managers' knowledge and prior level of integrated IT use, together with business and community access characteristics, may comprise a set of antecedent conditions that influence IT diffusion and the decision to adopt subsequent innovations and IT applications. In the U.S., using a computer has become synonymous with use of the internet (Newburger 2001). A more recent study regarding technology use (Pew Internet and American Life Project 2006) found that about 73% of all Americans used the internet in 2006 and nearly 70% purchased goods and services online. Clearly online activities have important value creating implications for both consumers and businesses in the rapidly evolving electronic marketplace (Cai and Cude 2008).

The literature also supports the conclusion that prior use of IT for business-related purposes, as well as a variety of firm and community demographics, may influence technology adoption by smaller, family-owned firms. Thong and Yap (1995) tested a model for small firms that linked IT adoption to CEO and organizational characteristics. These researchers found CEO innovativeness, attitude toward IT, prior knowledge and use of IT, and business size to be significantly related to small-firm IT adoption. In another study, Karakaya and Khalil (2004) found technology readiness variables (prior use, access) to influence internet adoption and use of e-mail, websites, marketing support, and marketing research by small- and medium-sized enterprises. Burke (2005) compared internet adoption patterns for small and large businesses across multiple

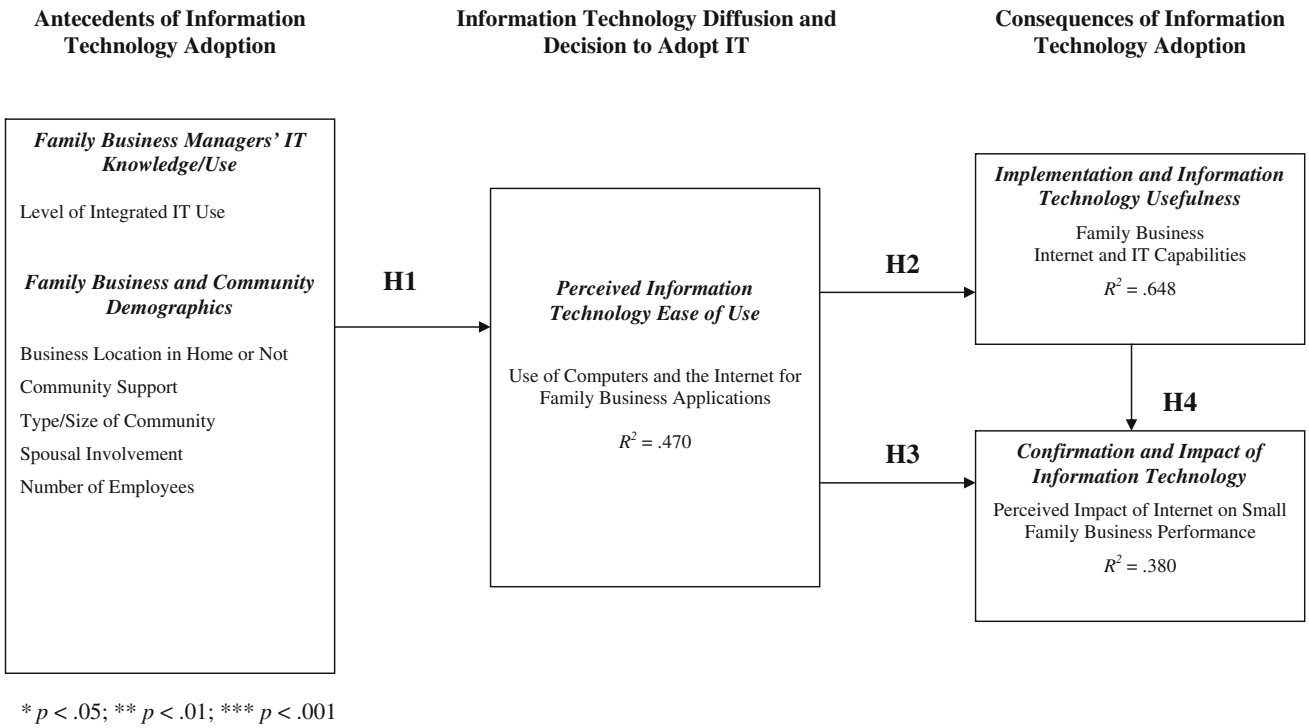

Fig. 1 Empirical model: antecedents and consequences of information technology adoption for small family-owned businesses

industry sectors, and reported a significant impact of business size as a predictor of IT adoption, in contrast to either CEO- or industry-related variables. This finding is supported further by Coleman (2005), who found firm size, firm age, organizational performance status, owner age, and educational level to be significant predictors of computer use in small U.S. firms. Similarly, Levenburg et al. (2006) found the demographics of owner/manager education, industry sector, and firm size to be influential in the adoption of e-business practices by small- and medium-sized family owned enterprises.

For owners of small family firms to be persuaded to adopt a technology, they must see a clear relative advantage for using it. Relative advantage and ease of use are significant in determining firms' acceptance of and decision to adopt a technology (Chan and Lu 2004; McGrath and Zell 2001). Easier and more affordable access to a computer and the internet for personal use also allows for enhanced market competitiveness for smaller firms. IT use may additionally aid in more effective use of time to meet personal and business demands for family business managers. Monna and Gauthier (2008) note that today's parents are in fact devoting more time to their children than in past decades due to a number of demographic, social, and community-level forces. Given the rate of IT adoption and diffusion in the general population, it may be plausible to suggest that IT integration may enhance family business managers' ability to cope with overlapping personal and business demands. Selwyn (2006) and Burke (2003) were cited in work by Cai and Cude (2008) as noting that multiple factors influence internet usage. These authors suggest that internet use is not just related to material, temporal, or intellectual characteristics of the user. Internet use is also influenced by family relationships and household structures, and is organizationally mediated. Thus, we posit in the first set of hypotheses that prior knowledge and level of integrated IT use in the work environment, together with business and community demographics, will influence small family business managers' perceived ease of use and decision to adopt IT:

H1a: Prior knowledge and level of integrated IT use will be positively and significantly related to small family business managers' perceived ease of use and decision to adopt IT for business purposes.

H1b: Family business and community demographics will be positively and significantly related to small family business managers' perceived ease of use and decision to adopt IT for business purposes.

IT Diffusion and Decision to Adopt by Small Family Firms

Following Rogers' (2003) diffusion framework, once a new technology is accessible and perceived as easy to use, an individual is more likely to increase usage and expand to

other IT applications for business purposes. From the TAM perspective (Davis et al. 1989), perceived ease of use and usefulness are also critical in the decision to implement and adopt a new technology. Perceived usefulness is also a strong indicator, and often the key variable, affecting implementation of internet and technology-based applications (Ma and Liu 2004; Pratt 2002; Teo 2001).

As managers of small family firms gain greater experience with IT, they may perceive the applications as easier and more relevant for business purposes. In turn, they may implement IT further and develop various capabilities with internet-based applications such as using computers for inventory control, accounting, payroll, ordering business supplies, or purchasing and selling products and services via the internet. This logic follows the literature regarding the development of ITL, in which over time people gain proficiency with IT applications through personal and work-related experiences that enable them to "trade-up" to more sophisticated applications for electronic communication, locating and processing information electronically, and refined problem-solving through access to electronic databases and information (Shelley et al. 2006).

Very small firms have the most to gain in competitiveness from IT use (Pratt 2002). While a relatively modest percentage (35%) currently sell online, 61% report using the internet for wholesale purchasing and 80% to gather relevant business and market information, and 83% use e-mail for communicating with suppliers, customers, and others in their business networks. The adoption and implementation of IT for such purposes help small firms overcome some of the business needs and demands that initially led them to use technology (Emmanouilides and Hammond 2000; Pratt 2002). Cai and Cude (2008) also note that actual IT usage is a multidimensional concept that includes actual use time, diverse types of IT applications, and degree of activity or engagement with IT by the user. Therefore, once computers and the internet are perceived as easy to use, and are used more regularly for management of personal and business needs, the more likely it is that potential benefits of IT are realized by the family business manager. The strategic implementation of technology applications and capabilities is thus likely to follow, providing support for the next two hypotheses:

H2: The perceived ease of use of, and decision to adopt, IT will be positively and significantly related to small family business managers' implementation of internet and technology capabilities.

H3: Family business managers' perceived ease of use of, and decision to adopt, IT will positively and significantly influence the impact of the internet on small family firm performance.

Consequences of IT Adoption for Small Family Firms

The usefulness of IT, particularly computers and the internet, has played an important role in reducing costs and improving efficiency for businesses (Dinlersoz and Hernandez-Murillo 2004). Research suggests that the benefits of IT use may lead to increased business capabilities, competitiveness, and performance (Hackney et al. 2002; Rangone et al. 2002). By reducing costs and improving efficiency for businesses, IT can greatly enhance business financial performance (Pratt 2002). By implementing various IT strategies, business managers free up other valuable resources. For example, through the use of computer applications such as payroll and inventory control, business managers have quicker and easier access to important business information that allows their time and energy to be used more effectively in other areas of the business and the family. Such IT applications may be considered among those that Haddock et al. (2006) call supportive practices that foster successful balancing of work and family demands. These benefits of technology may have wide-ranging impacts on family business performance (Pratt 2002), leading to the final hypothesis concerning consequential outcomes of IT adoption for small family firms:

H4: The perceived usefulness and implementation of IT capabilities by family business managers will be positively and significantly related to the impact of the internet on small family firm performance.

Methods

Data for this analysis were taken from the 2000 National Family Business Survey (NFBS), in the course of which participants in the 1997 NFBS were re-interviewed (Heck and Trent 1999). The 1997 data were used to ascertain information on the antecedents of IT adoption for small family firms. The 2000 NFBS data pertained to the business manager's use of IT and the consequential longitudinal effects of IT adoption for small, family-owned enterprises. Methods used to gather the NFBS data are discussed at length elsewhere (Winter et al. 2004; Winter et al. 1998). Therefore, only a brief review of the methodology is provided here.

Sample and Data Collection

The 1997 NFBS used a household sampling frame, in contrast to the business sampling frame used in most other studies of family businesses (Winter et al. 1998). The sample was limited to families who shared a common dwelling unit in which at least one person owned or

managed a business. The owner-operator had to have worked at least 6 h per week year-round, or a minimum of 312 h a year in the business, be involved in day-to-day business management, and reside with another family member involved in the business. Each household was screened to determine if it contained a family business. For eligible households, three other interview schedules were used for: (a) the household manager, defined as the person who takes care of most of meal preparation, laundry, cleaning, scheduling family activities, and overseeing child care, (b) the business manager, defined as the person most involved in day-to-day management of the business, and (c) cases in which the household and business manager were the same person. Details about the family and business were gathered, including items regarding the management and function of the household and the business and information about how those two systems interrelate with each other. More than 14,000 U.S. family-owned businesses were screened, resulting in 1,116 eligible family households. At the completion of the 1997 NFBS interviews, 794 family businesses had been identified, for a 71% response rate.

In 2000, an attempt was made to re-contact and re-interview the same respondents who provided data in 1997. Between surveys, respondents were contacted systematically to maintain the database for the 2000 survey. Because of the interest in tracking family businesses over time, 86 households where the business manager was not interviewed in 1997 were omitted from the 2000 sample, making the initial sample size 708. Sixty-three households could not be located in 2000, presumably due to business discontinuance, and another 93 households refused to be re-interviewed. Data were gathered from the remaining 553 households. Separate business manager and household manager surveys were completed unless the manager filled both roles, in which case a combination survey was administered. This study analyzes family business manager responses from both the 1997 and 2000 NFBS surveys. A total of 246 cases were used in the analysis, as they contained complete responses to the technology items and other variables deemed important to the statistical model employed in this study.

Variables

Variables used in the analysis included indicators of family business managers' IT acceptance—specifically previous knowledge and use of integrated IT—and demographic characteristics. *Previous knowledge and use of IT* was measured by a summed item comprised of two questions from the 1997 NFBS. The original two items were: "Are computers used in your business?" and "Is the internet used in your business?" (both coded 0 = no and 1 = yes). The new variable, named "level of integrated IT use," was thought to perform better by reflecting the duality of computer and internet use, and was coded: 0 = no use, 1 = yes to either computer or internet use; and 2 = yes to both computers and internet. This summed variable was used to test the antecedent path to IT adoption by small family firms. All other items in the analysis were obtained from the 2000 NFBS dataset.

Continuous items were measured using Likert-type scores. *Community and business demographic questions* related to family business managers' knowledge and use of integrated IT included: spousal involvement in business decisions (coded from 1 = not at all to 5 = a great deal), type/size of community (coded from 1 = farm to 6 = urban area), and satisfaction with community support (coded from 1 = very dissatisfied to 5 = very satisfied). Data also were obtained for total number of employees and whether the business was located in the home (coded 0 = no and 1 = yes). *Ease of use and decision to adopt IT* was measured by the question: "How often are computers used in day-to-day operations of your business?" (coded from 1 = never to 5 = very often). A higher rate of family business use of computers in their day-to-day operations indicates greater ease of technology use; the easier the technology is to use, the more likely it is to be used in daily family business activities. Although technology use encompasses more than just computers, it is logical that greater use of computers will be related to greater use of other forms of technology in daily business activities. Additionally, higher rates of computer and other technology use will likely occur when it is easier to use IT.

The consequences of family business managers' adoption of IT, as indicated through *perceived usefulness and IT capabilities*, was measured by a composite item comprised of four IT functions: sending and receiving e-mail ($M = 2.57$, $SD = 1.561$), selling products or services via the internet ($M = 1.32$, $SD = .834$), computer-aided design ($M = 1.97$, $SD = 1.413$), and use of a computer for business management purposes such as customer management and payroll ($M = 3.60$, $SD = 1.477$). A mean score for technology capabilities was calculated by averaging responses to questions concerning this set of IT information applications. Items regarding degree of implementation of these capabilities were measured on a 5-point Likert range (coded from 1 = not at all to 5 = a great deal). Finally, family business managers were asked to assess the *confirmation and impact of IT* by responding to the question, "Overall, has the internet affected your business"? (coded from 1 = not at all to 4 = a great deal). All items used in the analysis are detailed in the "Appendix" section. Table 1 provides an overview of the variables used in the analysis and Table 2 shows correlations between items for both the full number of cases ($N = 708$)

Table 1 Descriptive statistics: information technology diffusion and adoption for family-owned businesses

Observed variables	Full number of cases ($N = 708$)			Empirical model ($N = 246$[a])		Item measures
	N	Mean	SD	Mean	SD	
Family business managers' IT knowledge/use						
Level of Integrated IT use	708	.91	.77	1.09	.69	0 = no use; 1 = yes to either computer or internet use; 2 = yes to both computer and internet use
Family business and community demographics						
Business location	339	.59	.49	.57	.50	0 = no/1 = yes
Community support	335	3.66	.83	3.65	.81	1 = very dissatisfied/5 = very satisfied
Type/size of community	355	3.55	1.87	3.64	1.85	1 = on a farm/6 = urban area 50,000 + population
Spousal involvement	314	2.67	1.47	2.69	1.46	1 = not at all/5 = a great deal
Number of employees	339	6.29	20.99	7.69	24.24	Direct measure
Perceived IT ease of use						
Use of computers and the internet for family business applications	339	3.45	1.56	4.02	1.13	1 = never/5 = very often
Implementation and IT usefulness						
Family business internet and IT capabilities	273	2.36	.86	*2.37*	.87	1 = not at all/5 = a great deal
Confirmation and impact of IT						
Impact of internet on small family business performance	273	2.07	1.08	2.07	1.06	1 = not at all/4 = a great deal

Frequencies for level of integrated IT use ($N = 708$)

Response	*N*	Percent
0 = no to both computer and internet	242	34.2
1 = yes to either computer or internet	288	40.7
2 = yes to both computer and internet	178	25.1

[a] Number reflects cases with non-missing responses

and the subset of cases used in conducting the empirical analysis ($N = 246$).

Results

Computer Use by Family-Owned Businesses

In 1997, 466 (65.8%) of the 708 survey respondents indicated that they used computers in their business, compared to 273 (80.5%) of the 339 usable survey respondents in 2000. Of the 242 "No" responses from 1997, in 2000 55 (22.7%) responded that they "never" used the computer in their business, 26 (10.7%) that they "seldom" used computers, 13 (5.4%) "sometimes" used computers, 8 (3.3%) "often" used computers, 8 (3.3%) "very often" used computers, 29 (12.0%) had missing interviews, 48 (19.8%) were not applicable ("NA"), and 55 (22.7%) were system missing. Overall, of the 110 "No" responses in 1997 who also responded in 2000, exactly half reported some level of computer use in their business in 2000.

Of the 466 "Yes" responses from 1997, in 2000 11 (2.4%) reported that computers were "never" used in their business, 14 (3.0%) reported "seldom," 28 (6.0%) "sometimes," 52 (11.2%) "often," and 124 (26.6%) "very often." In 53 (11.4%) cases the interview was missing, 84 (18.0%) were not applicable ("NA"), and 100 (21.5%) were system missing. Overall, of the 229 "Yes" respondents in 1997 who also responded in 2000, 218 (95.2%) reported some level of computer use in their business in 2000 ($M = 1.09$, $SD = .69$). In sum, our results show that in 1997, 65.8% of family-owned businesses were using computers in their business, compared to 80.5% in 2000. Of the family businesses using computers in 1997, in 2000 2.4% stopped using computers. Of the family businesses not using computers in 1997, in 2000 50% used computers.

Profile of Small Family Business Managers

Business managers in this study ranged from 26 to 84 years of age, with mean of 49.5 years. The majority of managers (70.7%) had at least some college education, and almost all

Table 2 Correlation matrix: information technology diffusion and adoption for family-owned businesses ($N = 246$)

	1	2	3	4	5	6	7	8	9
Family business managers' IT knowledge/use									
1. Level of integrated IT use	1	−.133*	−.029	.275**	−.040	.222**	.528**	.547**	.432**
Family business and community demographics									
2. Business location	−.111*	1	−.094	−.203**	.158*	−.293**	−.281**	−.136*	−.056
3. Community support	−.046	−.061	1	.037	−.054	.027	.049	−.009	.007
4. type/size of community	.288**	−.227**	.002	1	−.133*	.184**	.300**	.248**	.043
5. Spousal Involvement	−.003	.148**	−.049	−.141*	1	−.026	−.029	.089	.021
6. Number of employees	.227**	−.276**	.027	.170**	−.024	1	.202**	.249**	.110
Perceived information technology usefulness									
7. computer use	.650**	−.243**	−.002	.305**	−.004	.215**	1	.658**	.365**
Implementation and perceived information technology usefulness									
8. Internet and technology strategies	.544**	−.112	−.003	.234**	.085	.240**	.662**	1	.537**
Confirmation and impact of information technology system use									
9. Impact of the internet	.430**	−.005	.013	.055	.049	.096	.342**	.530**	1

* $P < .05$

** $P < .001$

(95%) owned their own home. Just over 62% lived in communities with populations under 10,000 residents ($M = 3.64$, $SD = 1.85$). The majority of firms (76%) were very small micro businesses, reporting four or fewer employees, and over half (55%) operated their business from home ($M = .57$, $SD = .50$). The rest of the firms also were small in size, with 14% reporting 5–10 employees, 7% with 11–20 employees, and just 3% indicating 20–50 employees ($M = 7.69$, $SD = 24.24$). Gross business income varied widely, from $0 to $30,000,000. Because of the skewness of income distribution, the natural logarithm of business income was employed. Analysis of Standard Industrial Classification codes for businesses in the sample indicated that most were engaged in service businesses (38.3%), retail operations (17.7%), and agriculture (17.0%).

Model Assessment

Measures for each stage of the theory-based model (Fig. 1) were assessed for construct validity using confirmatory factor analysis (CFA) models estimated with Analysis of Moment Structures (AMOS) statistical software. The goal of this analysis was to confirm the dimensionality of constructs and assess the fit between each set of variables and the CFA model imposed on those items. Constructs were assessed for internal consistency using Cronbach's standardized coefficient alpha reliability measure. Following validation of the underlying constructs, path analysis was conducted to ascertain structural relationships among the resulting variables in the empirical model. Covariances among items served as input for the path analysis. Model assessment (Byrne 1998) began with evaluation of absolute model fit using the chi-square statistic, which was significant ($\chi^2 = 19.908$, $17df$, $p < .001$) for the measurement model. A non-significant chi-square value is desirable in path analysis, as an indication of adequate fit of the model to the data, and may have been achievable by making major changes in the model. However, as we were interested in testing theory in the present study, all elements were retained in the model. In addition, the relatively small magnitude of χ^2, the inflation of χ^2 with larger sample size, and the fact that the ratio of χ^2/df is only slightly above 1 all suggest that the departure of the measurement model from fit with $p > .05$ likely does not have important implications for our interpretation of results (Kline 2005).

The chi-square statistic is often biased in large samples (200 observations or greater), so other measures of fit, including the Root Mean Square of Error Approximation (RMSEA) and selective fit indices—the Akaike information criterion (AIC), Browne-Cudeck criterion (BCC), and comparative fit index (CFI)—were also referenced. The RMSEA measures how well the model fits the population covariance matrix; values less than .05 generally are accepted to indicate a good fit, while those ranging from .08 to .10 are moderately acceptable (Kline 2005). The RMSEA for the measurement model in this analysis was .016, indicating excellent fit between the model and the survey data. Excellent fit indices were also obtained, with a CFI of .995 (with maximum value of 1.0) and AIC and BCC values less than those of the independence model. Constructs were assessed for internal consistency using Cronbach's coefficient alpha. The predictive validity of model constructs shown in Table 3 is supported by strong

t-values (>2.00 in absolute value) and low ($p < .05$) significance levels.

Empirical Model and Hypothesis Testing Results

Relationships hypothesized in the integrated diffusion-TAM model were tested via path analysis with AMOS 7.0 statistical analysis software (Fig. 1). Path analysis is appropriate for this study, as it focuses on the predictive ordering of variables, testing theory, and assessing causal order (Grimm and Yarnold 1995), and because the sample size is sufficiently large for the estimated models to be robust. The present study is concerned with testing two well-established models of technology diffusion and acceptance. Path analysis allows for estimating the magnitude of effects and ascertaining whether the hypothesized model of technology acceptance-diffusion is consistent with the data for small family-owned businesses. Results of the fully recursive empirical model are shown in Table 3.

Path coefficients estimate the magnitude of the direct effects among the variables linked together in the model. Coefficients for the empirical model are presented in Table 3, with commentary on the magnitudes of effects provided in the following discussion. By definition, path coefficients are standardized regression coefficients; hence interpretation of the magnitude of path coefficients must be expressed in terms of the proportion of a standard deviation change in each endogenous variable for a one standard deviation increase in the value of each predictor variable. The value of R^2 (squared multiple correlation) was used to assess the proportion of variance explained by the model for each endogenous variable. Estimated standardized path coefficients are shown in Table 3 for the empirical model, and the proportion of variance explained for each equation in the model is shown in Fig. 1.

Hypotheses H1a and H1b were tested by the paths from antecedent conditions associated with small family business acceptance of IT (prior knowledge/and level of integrated IT use, and family business and community demographic variables) to the diffusion stage of IT (ease of use and decision to adopt IT for business purposes). Level of prior integrated IT use for business purposes ($\beta = .611$, $t = 14.467$, $p < .001$) was significantly related to ease of IT use and decision to adopt; A one-standard-deviation increase in level of prior integrated IT use for business purposes was associated with an increase of about six-tenths of a standard deviation in small family business acceptance of IT. The importance of prior IT use for subsequent adoption and application of IT innovations is underscored by the second-highest *t*-value in the analysis. Additionally, significant relationships were found between ease of use and decision to adopt IT and the family business demographics of located in the home ($\beta = -.152$, $t = -3.602$, $p < .001$), and type/size of community ($\beta = .090$, $t = 2.083$, $p = .037$). The negative coefficient for business location suggests that on balance the rate of technology diffusion is greater for small family businesses that are not home-based. Among managers without a home-based business in this study, 54.3% said they very often used a computer for business purposes, versus 22.9% of those who operate a home-based business. This may imply that family businesses located outside of the home are more formalized in their business practices and thus tend to show greater integration of IT. This finding also may suggest that IT use in the home setting is perceived as an intrusion on family time by managers of home-based business operations and as a problem (Fitzgerald and Winter 2001). It also may be linked to the shared use of computers and other resources and resulting tensions in the effort to meet both family and business demands. Thus, very small home-based businesses may benefit from advice and guidance on how to work smarter, not harder, through IT applications to maximize outcomes for both family and business.

Hypothesis H2 posited a relationship between the perceived ease of use and decision to adopt IT, and the implementation/perceived usefulness of IT capabilities. Results support this hypothesis, with the strongest *t*-value in the overall model ($\beta = .617$, $t = 12.933$, $p < .001$), suggesting that degree of receptiveness to integrated IT is strongly predictive of enhanced business capabilities for small family firms.

The relationship hypothesized in H3 between the ease of use and decision to adopt IT and its perceived impact on performance for small family-owned firms was not supported ($\beta = -.105$, $t = .193$) However, strong and significant support was yielded for the relationship posited in H4 between usefulness and implementation of IT capabilities and the perceived impact of the internet on performance for small family-owned firms ($\beta = .527$, $t = 6.553$, $p < .001$). It is important to note that prior knowledge/and level of integrated IT use and business and community demographic variables appear to be important antecedents that influence perceived ease of use and the diffusion of IT for family businesses.

In sum, these antecedent aspects account for a substantial amount ($R^2 = .47$) of the variance in the ease of use and decision to adopt IT applications. Most notable of the findings in this study is that ease of use and decision to adopt IT accounted for nearly 65% of the variance in implementation of IT capabilities and 38% of the perceived impact of IT system use on performance by small family firms. These results suggest the importance of antecedents that facilitate technology diffusion for smaller family-owned enterprises

Table 3 Hypothesis testing and model robustness test results, information technology diffusion and adoption for family-owned businesses ($N = 246/N$ for models with missing values)

Hypotheses and observed variables	Parameter estimates						
	Empirical model	Sub-model #1	Submodel #2	Sub-model #3	Sub-model#4	Sub-model #5	Sub-model #6
H1a: family business managers' IT knowledge/use → perceived information technology ease of use							
Level of integrated IT use (summed item)	.611***/.464***	–	.612***/.471***	.610***/.461***	.635***/.497***	.612***/.464**	.615***/.466**
H1b: Family business and community demographics → perceived information technology ease of use							
Business location	−.152***/−.198***	−.157***/−.217***	–	−.153***/−.201***	−.166***/−.215***	−.148/−.184	−.158***/−.202***
Community support	.017/.044	−.014/.023	.024/.059	–	.017/.048	.016/.041	.017/.044
Type/size of community	.090*/.141*	.257***/.252***	.114***/.165***	.090*/.142*	–	.085*/.130*	.091*/.142**
Spousal involvement	.034/.101	.057/.101	.019/.075	.033/.099	.021/.087	–	.034/.101
Number of employees	.021/.016	.130*/.094	.058/.067	.021/.016	.027/.029	.022/.020	–
H2: Perceived information technology ease of use → implementation and information technology usefulness							
Use of computers and the internet for family business applications	.617***/.512***	.780***/.658***	.617***/.512***	.617***/.512***	.618***/.512***	.617***/.511***	.617***/.512***
H3: Perceived information technology ease of use → confirmation and impact of information technology							
Use of computers and the internet for family business application	−.105/−.040	−.021/.022	−.105/−.040	−.105/−.040	−.105/−.040	−.105/−.040	−.105/−.040
H4: Implementation and information technology usefulness → confirmation and impact of information technology							
Family business internet and IT capabilities	.527***/.449***	.613***/.522***	.527***/.449***	.527***/.449***	.527***/.449***	.527***/.449***	.527***/.449***
Overall fit							
χ^2	19.980/19.2	20.894/19.7	15.524/15.89	16.449/15.6	15.701/13.5	16.519/15.1	13.970/14.1
df	17	15	14	10	14	12	13
p	.275/.316	.140/.183	.343/.320	.087/.111	.332/.485	.169/.233	.376/.364
R^2	.471/.353	.145/.159	.450/.320	.470/.351	.465/.336	.469/.341	.470/.353
	.648/.489	.609/.432	.648/.489	.648/.488	.649/.489	.648/.488	.648/.489
	.380/.317	.356/.288	.380/.317	.380/.316	.380/.317	.380/.316	.380/.317
RMSEA	.016/.023	.024/.036	.012/.023	.030/.048	.013/<.001	.023/.033	.010/.019
CMIN/DF	1.175/1.130	1.393/1.314	1.109/1.135	1.645/1.562	1.121/.967	1.377/1.263	1.075/1.088
AIC	93.980/93.216	78.894/77.714	75.524/75.892	84.449/83.621	75.701/73.539	80.519/79.157	75.970/76.140

Table 3 continued

Hypotheses and observed variables	Parameter estimates						
	Empirical model	Sub-model #1	Submodel #2	Sub-model #3	Sub-model#4	Sub-model #5	Sub-model #6
BCC	95.041/96.365	79.642/79.926	76.298/78.180	85.326/86.214	76.474/75.827	81.345/81.598	76.769/78.505
CFI	.995/.995	.983/.984	.997/.995	.989/.987	.997/>.999	.992/.992	.998/.997

Note: Within the cells of Table 3, results of model estimation based on the same $N = 246$ nonmissing observations are presented above the slash (/) and results based on the varying number of nonmissing observations for each specific sub-model are presented below the slash

Sub-model 1 is the main empirical model estimated without the summed variable level of integrated IT use

Sub-model 2 is the main empirical model estimated without the variable business location

Sub-model 3 is the main empirical model estimated without the variable community support

Sub-model 4 is the main empirical model estimated without the variable size/type of community

Sub-model 5 is the main empirical model estimated without the variable spousal involvement

Sub-model 6 is the main empirical model estimated without the variable number of total employees

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

and their potential to reap performance benefits from the development of IT capabilities.

To provide a final rigorous testing of the empirical model, path analysis was conducted on a series of sub-models, each one containing all but one of the exogenous variables. In Table 3, these results are reported two different ways: (a) using all nonmissing observations for the subset of variables included in that sub-model, and (b) using listwise deletion, with a fixed sample size of $N = 246$ observations that were nonmissing for all variables used in any of the sub-models. The purpose of this series of tests was to assess the robustness of the results of the empirical model across different sample sizes because of the presence of different amounts of missing values for each sub-model, and to confirm the need to include all independent variables that were used in the model as suggested by theory and the literature. Within the cells of Table 3, results of model estimation based on the same $N = 246$ nonmissing observations are presented above a slash (/) and results based on the number of nonmissing observations for each specific sub-model are presented below the slash. It can be seen from comparing the numerical values above and below the slash that model results generally are not markedly different with or without missing values, thereby establishing the robustness of our findings. For the sake of clarity and consistency, our interpretations of model results are based on the findings for $N = 246$ nonmissing observations.

Each run of the model was conducted by removing one antecedent variable, in each sub-model analysis, with six resulting sub-models estimated. Results of path analyses for the six sub-models are shown in Table 3 and compared with the main empirical model. Our results show that the empirical model fits the data well and that only minor variations are noted for some fit statistics across the six sub-models. The only substantive change is that number of employees is statistically significant in the first sub-model based on 246 listwise observations, but not for any of the sub-models nor for the main empirical model; this is a less meaningful change than might be apparent, however, because number of employees had a somewhat marginal p-value to begin with in the first sub-model ($p = .014$). Thus, it can be concluded that our theory-driven model is robust and that the reported results hold up well under this series of rigorous tests. All items therefore were retained in the empirical model, as supported by theory and by excellent fit statistics across our series of analyses.

Discussion

This study used a dual theoretical approach based on the Diffusion of Innovations perspective (Rogers 2003) and the

Technology Acceptance Model (TAM) (Davis et al. 1989). A model was developed and tested to assess the antecedents and performance consequences of IT adoption for small family firms. Findings support prior research that links adoption of IT applications with knowledge and access, and with perceived ease of use and usefulness of the internet (Dinlersoz and Hernandez-Murillo 2004). A distinct set of antecedent acceptance variables explained over 40% of the variance in family business managers' perceived ease of use of and decision to adopt IT in their businesses. This adoption in turn fueled the development and implementation of a range of IT capabilities, attesting to the usefulness of IT to smaller family firms. IT capabilities also demonstrated a significant impact on business performance, suggesting that integrating IT has consequences for the success of even very small family firms.

Results for H1 highlight the important role of prior knowledge and level of integrated IT use as antecedent drivers of technology acceptance by smaller family businesses. Prior integrated IT use was the strongest indicator of all antecedents in our analysis, followed closely by size of community. This study also showed that size of community is significantly associated with ease of use and adoption of IT for small family businesses. The relationships among these variables also suggest that there is a proclivity toward greater IT use by small family firms in medium to larger communities (see Table 2). Our findings are consistent with other studies on e-business in small firms, which suggest that a community size advantage is positively associated with IT adoption (Karakaya and Khalil 2004; Levenburg et al. 2006; Thong and Yap 1995). Results of this study suggest that family firms in greatest need of IT assistance and training may be those from the smallest communities, and home-based operations. Ogbonna and Harris (2005) similarly suggest that the adoption of IT in family businesses is linked to such variables as the culture and history of the company or community and relationships with customers. Significant relationships for size/type of community also suggest that smaller family firms may benchmark their technology adoption by what they see implemented by local businesses and technology role models. Further, differences in the diffusion of IT by small family firms may be related to community access and the affordability of internet and related technologies.

Findings for H1 related to antecedent conditions of technology adoption are further supported by Rogers' (2003) perceived attributes of innovations (trialability and observability). Our results suggest that the more family business managers are able to experience IT and observe its potential applications, the greater the likelihood of perceived relative advantage and compatibility with their business systems, needs, and demands. Complexity likely also will be reduced through prior use, which should support perceptions of ease of use and adoption of IT to benefit the family business. As shown in the results for H2, the perceived ease of technology use and decision to adopt the computer and internet were strongly linked to the development and strategic implementation of IT capabilities.

As noted in the results for H3, the adoption of computers and the internet alone is not enough to have an impact on family firm performance. In contrast to our hypothesis, small family enterprises in this study were able to implement successfully and gain advantages from IT only after perceiving its usefulness and developing technology capabilities. This finding follows an assertion by Fairlie (2006) that much has been written about IT investments and firm productivity, but relatively little is known about how personal computers and the internet are useful for smaller businesses. Our findings add substantially to this knowledge base, showing that the perceived ease of use and diffusion of IT for business purposes explained 65% of the variance in implementation of internet and technology capabilities. This observation follows the TAM perspective, which maintains that perceived usefulness is critical in the decision to implement new technology. Other research also supports the strong TAM linkage between perceived usefulness and implementation of technology (Ma and Liu 2004; Pratt 2002; Teo 2001). Thus, adoption alone is not enough to have an impact on performance; small family firms also need to develop a set of useful and value-creating technology capabilities to sustain competitive advantage over time. Further, consumers are placing ever-growing importance on the ease of information search and the quality of their on-line experience with firms of all sizes. As IT applications begin to level the playing field between large and small firms, even small family-owned operations will need to address consumer expectations in the on-line environment (Bei et al. 2004).

Findings for H4 highlight the importance of the family business manager as a chief technology decision maker and key source of competitive advantage. In this analysis, no significant link was found with adoption of IT until the family business managers developed capabilities within the business and put them into action. Implementing IT strategies was found to have a significant and substantial impact ($R^2 = .38$) on the use and impact of the internet on business performance. This finding emphasizes the importance of technology-related decisions and strategies to family business success. These results also support the idea that technology implementation decisions for small family businesses must account for a variety of context, customer, and market variables in determining appropriate strategies to maximize performance. Similar findings are shown by Kim and Galliers (2005), who state that the diffusion of internet systems is influenced by external market and

technical variables as well as by internal organization and systems. This suggests that most small family businesses in this study are realizing greatest advantages from communication technologies (primarily e-mail), which may be the most versatile technology strategy across a range of industry sectors. Some family businesses also are seeing performance benefits from marketing, on-line sourcing, and other computer and internet-based business processes such as payroll, customer, and employee database management. This finding is consistent with Dinlersoz and Hernandez-Murillo (2004), Pratt (2002), and Reda (2004), who cite the important role of internet-based technologies in reducing costs, which leads in turn to increased competitiveness and performance.

Conclusion

Sharma (2004, p. 23) states that the aim of family business studies is to improve the functioning of family firms. To do so requires a deeper understanding of the forces that underlie these firms. This study provides theoretical understanding of how smaller family businesses adopt integrated IT and use it to manage business needs and demands over time. It also provides understanding of the potential benefits of IT usage for small family firms and the antecedent conditions which help or hinder its adoption. Our findings also demonstrate the key role of the business manager in small family enterprises in regard to technology adoption. Prior computer and internet use by the primary business decision maker were key antecedents to technology adoption and implementation for these very small firms. The stages of technology adoption presented in our model provide an overview of theory-supported diffusion processes that are guided by the family business manager and influenced by family- and community-based variables. The model blends two well-established theories of technology diffusion and acceptance to show how various antecedent conditions and subsequent IT adoption can lead to enhanced capabilities, useful applications, and enhanced performance for small family-influenced firms.

Further support for our multi-stage model can be found in the Van Dijk (2003) model of successive access to digital technologies, as cited by Cai and Cude (2008, p. 144). This model suggests that use of digital information technologies is impacted by various forms of access: motivational, material, skill (strategic, informational, and instrumental skills), and usage. It could be that small family firms experience access barriers at various stages of the IT adoption process. For example, business location in the home and type/size of community were found in this study to be significantly related to perceived ease of use of IT. This suggests that family encouragement together with facilitating community and business support for small firms may aid in reducing barriers of motivational access. Material access may likely be a common issue for small family firms due to their size, scope, and limited resources. However, assuming the family business manager has material access to IT, skill access seems to be a primary area of needed assistance for small family firms. This stage of IT implementation was found to be of greatest impact in the present study. When family business managers perceived IT as easy to use and demonstrated greater use, they also appeared to have the skills to strategically select, integrate, and apply IT to attain business goals, resulting in technology usefulness.

More research is needed to examine specific forms of needed motivational, material, and skill access related to IT use as a resource for small family firms. These recommendations follow research by Haynes et al. (2008), who state that it is the interaction of family and business resources that ultimately impacts family firm performance. In this sense, IT may be a chief business resource, a facilitating process for business and family systems, and a support tool for managerial adjustment strategies during hectic times (Miller et al. 1999). Thus, development of IT skills and capabilities may help family firms to effectively manage the overlap or interface between business and family (Campione 2008), communicate more effectively within and between business networks, better serve customers, and be more competitive in the marketplace. In the long term such capabilities and skills may lead to the enhanced sustainability of family firms.

The U.S. Small Business Administration (2002) notes that one of the biggest value-creating aspects of the internet is that it stimulates business owners to rethink their overall business strategy. This clearly is borne out in results of this study; significant impacts on implementation and performance were not realized until IT capabilities were integrated into the business strategies of small family firms. Even the smallest businesses can gain advantages through gathering and tracking customer and market information, wholesale purchasing, and on-line interaction with customers. As noted by McCarthy (2006), continuously evolving technologies pose fewer resource limitations for small firms, allowing them to be more competitive versus larger counterparts. Technology is not the only basis on which small businesses compete, but the National Federation of Independent Business Research Foundation (2005) forecasts that small firms that do not upgrade and/or do not have a meaningful competitive advantage through non-technical resources will face increasing difficulties in the marketplace.

Data for this paper were collected from a national study of family businesses (NFBS 1997 and 2000), but there are a few limitations. The data set contained a limited number of

antecedent personal and family business demographic variables and those concerning IT diffusion and adoption by small family owned firms. Other environmental variables (both internal and external to the firm) may influence persuasion/ease of use of IT for family-owned businesses, and other capabilities may impact performance. Although we provide a unique view of IT use in small family firms, the data were collected in 1997 and 2000. Additional data collection is needed to provide a more expansive view of IT adoption by small family firms.

Our findings regarding IT use by a sizeable small family business segment answer Olikowski and Iacono's (2001) call for the testing and application of technology theories in unaddressed organizational contexts. Future research should address additional individual, family, community, and business/industry drivers of family business' persuasion to use IT, as well as further development of items and scales. IT access factors, the facilitating nature of IT over the lifecycle of small family firms, and the impact of IT on managing the overlap of work and family demands are additional areas of needed research. The impact of technology resource use on social capital and other elements of intangible value for family firms is yet another needed area of investigation. This broad-based research agenda will allow for greater understanding of the role of technology in the smaller family firm, its strategic applications, and its relevance for family business sustainability.

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Appendix: Information Technology Diffusion and Adoption for Family-Owned Businesses

Antecedents of IT Adoption

Family Business Managers' IT Knowledge/Use (Derived from 1997 Data)

Summed Item = Level of Integrated IT Use

Are computers used in your business? (B22)
Is the internet or World Wide Web used in your business? (B23)

Response options to these questions included 0 = no use; 1 = yes to either computer or internet use; 2 = yes to both computer and internet use. The indicators were summed.

Family Business and Community Demographics

Is [BUSINESS NAME] based in or from your home? (BZA5a. HomeBase)

Businesses were classified as home-based (0 = no and 1 = yes) if the business manager reported that the business was based in or from the home and also reported that there was no other business office outside the home.

How satisfied are you with the amount of support your business gets from your community? (BZH7. CommSupp)

The business manager's perception of community support was assessed based on this question with response options ranging from 1 = very dissatisfied to 5 = very satisfied.

Do you currently live in what type of community (HZH 247–248 LiveWhere)

The response options for this question were: 1. On a farm, 2. In a rural area but not on a farm, 3. In a small town of less than 2,500, 4. In a town or city from 2,500 up to 10,000, 5. In a city from 10,000 up to 50,000, 6. In a city or urban are of 50,000 or more.

To what extent is your spouse involved in decision-making in your business? On a scale of 1 to 5, where 1 is not at all and 5 is a great deal, what number would you choose? (BZB1. SpousDec)

Business managers indicated the extent to which their spouses were involved in business decision-making with response options ranging from 1 = not at all to 5 = a great deal.

How many employees, other than yourself, work for [BUSINESS NAME]? (BZA2a. TotEmpl)

Number of employees was used as a proxy for business size in this analysis.

IT Diffusion and Decision to Adopt

Perceived IT Ease of Use

How often are computers used in the day-to-day operations of your business? (BZB4. Computer)

Response options to this question ranged from 1 = never to 5 = very often.

Consequences of IT Adoption

Implementation and IT Usefulness

Summed Item = Family Business internet and IT Strategies

To what extent does your business use computers for each of the following purposes:

Sending or receiving E-mail? (BZB5a. Email)
Selling products or services over the internet? (BZB5b. SellInte)
Using the computer for design? (BZB5c. CompDesi)
Using the computer for other business purposes such as inventory control, accounting, payroll, or ordering supplies? (BZB5d. CompOthe)
Respondents who used the computer and the internet for business purposes were asked this question with response options that ranged from 1 = not at all to 5 = a great deal. The four indicators were summed and then an average score was calculated.

Confirmation and Impact of IT

Overall, has the internet affected your business? (BZB6a. Impact)

Respondents who used the computer and the internet for business purposes were asked this question with response options 1 = not at all to 4 = a great deal.

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Author Biographies

Linda S. Niehm is an Associate Professor at Iowa State University in the Department of Apparel, Educational Studies and Hospitality Management. Her research areas include retailing, entrepreneurship, and family business. Linda is a member of the NC 1030 Family Business Research Group and is lead investigator for a USDA grant on the retail sector and rural community resiliency. Dr. Niehm's Ph.D. is from Michigan State University.

Keila Tyner is an Assistant Professor at Texas State University-San Marcos in the Department of Family and Consumer Sciences. Her research areas include entrepreneurship, consumer behavior, and social, behavioral, and theoretical aspects of consumption. Dr. Tyner's Ph.D. is from Iowa State University.

Mack C. Shelley is University Professor of Statistics, Political Science, and Educational Leadership and Policy Studies at Iowa State University. His research broadly addresses applications of statistical methods in the social sciences and other disciplines. Recent projects include work on electronic government aspects of the Aging and Disability Resource Center program funded by the U.S. Administration on Aging and Centers for Medicare and Medicaid Services, and an Institute of Education Sciences-funded research study of the science writing heuristic approach to science education in elementary grades. He earned the Ph.D. in Political Science from the University of Wisconsin-Madison.

Margaret A. Fitzgerald is an Associate Professor in the Department of Child Development and Family Science at North Dakota State University. Her research focuses on co-preneurial couples, resource exchange in family-owned firms, and rural transitions. Margaret is currently the chair of the NC 1030 technical committee on Family Firms and Policy. Dr. Fitzgerald's Ph.D. is from Iowa State University.