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Chia-An Chao, Aruna Chandra

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Impact of owner's knowledge of information technology (IT) on strategic alignment and IT adoption in US small firms

Chia-An Chao and Aruna Chandra

*Management, Information Systems and Business Education Department,
Indiana State University, Terre Haute, Indiana, USA*

Abstract

Purpose – This study seeks to examine the impact of owner's knowledge of information technology (IT) on business and IT strategic alignment, as well as on IT use in the small firm context, using the resource-based view as a theoretical foundation.

Design/methodology/approach – A random sample of 217 small manufacturers and financial services firms in the USA answered a two-page survey containing questions pertaining to the company's business strategies, the extent IT supported each business strategy, types of IT used, and the level of owner's IT knowledge.

Findings – Owner's knowledge of IT was found to be a significant predictor of IT strategic alignment, as well as adoption of traditional IT and internet technologies, while controlling for differences in firm attributes (size, age, industry affiliation, and strategic focus).

Practical implications – Small firm owners are well advised to seek ways of improving their knowledge of IT, integrating IT use in firm-level business planning, as well as reexamining their business strategy and IT use to detect and correct misalignments, if any.

Originality/value – From the resource-based view, the owner's IT knowledge is a critical resource that cannot be easily codified, hence less susceptible to competitive erosion, since it is embedded in the owner's tacit knowledge and expressed in the unique but complementary use of IT in support of the firm's strategic goals. This study confirmed small firm owner's knowledge of IT as an important, knowledge-based capability and a vital component of business-IT strategic alignment.

Keywords Owner's knowledge of information technology, Communications technology, User studies, Business – information technology strategic alignment, Information technology use, Resource-based view, Small enterprises, United States of America

Paper type Research paper

Introduction

Information technology (IT) plays an increasingly critical role in businesses large and small (Bergeron and Raymond, 1995; Henderson and Venkatraman, 1999; Porter and Miller, 1985). IT savvy small firms are at an advantage (Beheshti, 2004; Lin *et al.*, 1993; Schaefer, 1995) as studies have shown a positive impact of IT on small businesses, from helping small firms enhance their operational efficiency (Beheshti, 2004; Penhune, 1998) to drive business growth (Eckhouse, 1998), and to integrate their marketing operations with marketing strategies (Roge and Chakrabarty, 2002/2003). However, IT has not always delivered business value, and a key reason is the lack of synergy between a firm's business strategy and IT strategy. IT strategic alignment studies found positive effects of complementary business and IT strategy on business



performance and the contrary among firms that have misaligned strategies (Bergeron *et al.*, 2004; Chan *et al.*, 1997; Tallon, 2008).

While extant IT strategic alignment studies clearly demonstrate the importance of alignment and its performance impacts, the question is – how can businesses achieve alignment? This study examines the impact of owner's knowledge of IT on business and IT strategic alignment, as well as on IT use in the small firm context, using the resource-based view as a theoretical foundation. The resource-based view has been adopted in Information Systems (IS) research to study the relationship between IT, business strategy and firm performance based on the notion of IT as a strategic resource and a tacitly embedded knowledge capability. The resource-based view posits that a firm's resources are primary determinants of a firm's profitability (Penrose, 1959). Resources include both tangible and intangible assets that are capable of conferring competitive advantage if they are rare, valuable, inimitable, and non-substitutable (Barney, 1991). Capabilities arise when resources are embedded into organizational routines to form unique, firm-specific capabilities that are not readily susceptible to competitive erosion (Amit and Schoemaker, 1993). Hence, a firm that acquires and deploys unique and non-imitable IT resource bundles would gain competitive advantage (Melville *et al.*, 2004; Santhanam and Hartono, 2003; Wade and Hulland, 2004).

In the context of IT use in small firms, IT resources (such as accounting software and email) that are not embedded in firm level capabilities are open to competitive erosion, and hence not a sustainable source of competitive advantage. By comparison, the small firm owner's IT knowledge in terms of the resource-based view is immobile, idiosyncratic and a relatively inimitable capability that is heterogeneously spread out across SMEs. Thus, superior IT capabilities of the owner/manager that may allow the firm to use IT resources strategically, rather than just tactically, may be one of the arbiters of superior performance. Furthermore, the owner's knowledge of IT could be a vital component of business-IT strategic alignment in the firm. In the case of a small firm, firm owner capabilities/competencies are expected to be crucial in creating a firm-specific, context-sensitive hierarchy of resource integration. The central research question to be addressed in this study is: Is owner's IT knowledge related to business and IT strategic alignment and IT use in the SME?

While the resource-based view focused on the internal resources of the firm, a related stream of research, the knowledge-based view, has focused on the properties of these resources distinguishing between tangible, physical resources (such as plant and equipment) and intangible, knowledge-based resources which are inherent in the skills and processes that underlie organizational resource configurations (Conner and Prahalad, 1996; Kogut and Zander, 1992). The resource accumulation theory (Dierickx and Cool, 1989) stresses the value of complementary resource combinations to achieve strategic alignment of resource pools to support business strategy. This calls for the multitude of resource clusters in a firm to be bundled or configured in unique ways to support the specific strategies of a firm (Grant, 1996). In terms of the resource-based view, a key challenge facing small firms is how to capitalize on their resources, while aligning resources and capabilities into hard to imitate bundles to gain competitive advantage? Edelman *et al.* (2005) underscore the importance of alignment where they examined the relationship between firm resources, strategy and performance in a study of 192 small firms in traditional industries and found that neither resources nor

strategies alone explained superior performance. Instead high performing small firms were able to successfully “fit” or align their strategies to their resource profiles.

In the following sections, we begin with a literature review of strategic alignment and small firms’ IT use in terms of the resource-based view. We then present our study method and results. We end this paper with a discussion of study findings and managerial implications.

Strategic alignment

Strategic alignment in the strategy literature typically refers to the harmony or fit between a firm’s strategy and the external environment. In IS literature, strategic alignment is the fit between business strategy and IT strategy (Chan *et al.*, 1997; Hussin *et al.*, 2002). According to Henderson and Venkatraman (1999), strategic alignment involves strategic fit (the interrelationships between the external and the internal components of business and IT strategies and organizational infrastructure) as well as functional integration (strategic and operational integration of business and IT domains). Chan *et al.* (1997) extended Henderson and Venkatraman’s work and developed instruments to study the relationship between a firm’s business strategic orientation (or realized business strategy), IS strategic orientation (or realized IS strategy), and alignment, and their impact on business performance (measured by market growth, profitability, product-service innovation, and company reputation) and perceived IS effectiveness. They hypothesized that IS strategic alignment was directly related to IS effectiveness and business performance, and their findings supported both hypotheses. They found that IS strategic alignment was a better predictor of business performance and IS effectiveness than either business strategic orientation or IS strategic orientation.

In addition to Chan *et al.* (1997), other studies have reported positive impacts of strategic alignment. Bergeron *et al.* (2004) studied 110 small firms and grouped them into four clusters based on the co-alignment of the firm’s business strategy, business structure, IT strategy, and IT structure. They found firms belonging to clusters that demonstrated conflicting co-alignment patterns reported lower growth and profitability rates compared to firms in the co-aligned clusters. Some strategic alignment studies reported mixed, but overall still positive, results. For example, Byrd *et al.* (2006) studied the moderating effect of strategic alignment between IT investment (measured by IT expenditure per employee) and firm performance (measured by profit and revenue per employee) of 275 manufacturing firms. They found a statistically significant leveraging effect of strategic alignment on the impact of IT investment on firm performance. The interaction effect (or the cross-product) of the two main effect variables (IT investment and strategic alignment) generated additional positive effects on firm performance, beyond those of the main effects individually. Hence, the authors contended that better firm performance could be achieved without increasing IT investment through strategic alignment.

Another focus of strategic alignment studies is the social dimension of alignment, in particular the importance of shared domain knowledge and communication between business and IT executives, connections between business and IT planning processes, and their impacts on IT implementation success (Reich and Benbasat, 2000). Kearns and Sabherwal (2007) found that organizational emphasis on knowledge management had a positive impact on top managers’ knowledge of IT, which in turn promoted

collaboration between business and IT managers who participated in the planning process of their respective counterparts. The sharing of information and creation of new knowledge thus facilitated business-IT strategic alignment. In the context of small firms, planning is often less formal, and the owner/manager often assumes responsibility for both business and IT planning. Hussin *et al.* (2002) found significant differences in small firm CEO's knowledge of computer software between firms with aligned versus not aligned business-IT strategies.

While the positive impact of strategic alignment has been studied relatively extensively in the large firm context, the topic has not been the subject of extensive study in small firms, particularly with an emphasis on the depth of the owner's/manager's IT knowledge capability and its impact on strategic alignment. Given the importance of the role played by the small firm owner in IT selection and deployment, we posited that a fine-grained view of the owner's knowledge of IT and its impact on the alignment of business and IT strategies would be an important element of firm level competitive advantage. In terms of the resource-based view, we argued the importance of the small firm owner's knowledge of IT as an important tacit, knowledge-based capability in allocating and deploying appropriate IT resources for achieving business and IT strategic alignment, while differentiating between traditional IT and internet technologies. Hence, the first hypothesis examines the relationship between owners' business knowledge of IT and business and IT strategic alignment.

H1a. Owner's knowledge of traditional IT has a positive impact on strategic alignment

H1b. Owner's knowledge of internet technologies has a positive impact on strategic alignment

In this study, measurements of the independent variable included owner's knowledge of and experience with:

- traditional IT applications – including industry specific IS (e.g. MRP for manufacturers; loans management and claims processing for financial services firms), accounting software, and customer relationship management system; and
- internet technologies – using internet technologies for communication, providing information about products/services, and for e-commerce transactions.

In addition, organizational variables – small firm's industry affiliation, size and age – were included as control variables.

IT use and owner's knowledge of IT

While most strategic alignment studies focused on firm level alignment, Tallon (2008) examined the impact of process-level alignment on IT business value. He argues that since different firms have different strategic foci and business strategy is executed as a process, alignment should be viewed as the link between IT use and business processes; hence, the locus of alignment should be contingent on a firm's strategic focus, rather than applied uniformly across the value chain. Thus, customer intimate firms should have the tightest business and IT alignment in customer relations, sales and marketing business processes; whereas firms pursuing a low cost strategy and

operational efficiency should emphasize IT excellence in areas such as supplier relationship management and production and operations support, since these processes are most critical for achieving their business goals. His study results showed a positive correlation between a company's locus of alignment and IT business value.

Consistent with the resource-based view, Tallon's (2008) study emphasizes combining IT use with complementary resources such as knowledge or unique skill to create business value. Lucas (1999) theorizes that it is strategic, higher level IT use that have the potential to have performance impacts, relative to tactical IT use that may merely result in the achievement of competitive parity. Powell and Dent-Micallef (1997) in their study of retail firms found that firm performance was positively impacted when IT was used to leverage intangible business resources such as business planning and performance review compared to lower level IT resources, such as using scanners and email to gain efficiency that had no significant effect on firm performance. This could be due to the fact that basic IT resources are easily imitated and commoditized, hence no longer capable of yielding competitive advantage via uniqueness. However, when IT resources are combined with capabilities, such as tacit knowledge of IT, which in turn interact with business strategies, they could then be leveraged as a catalyst for superior performance (Brown and Hagel, 2003).

In IT literature, adoption of IT in small firms and the influences of owner characteristics and contextual factors on IT use have been examined. Kyobe (2004) compiled a list of factors inhibiting strategic utilization of IT in small firms including lack of top management vision, lack of computer experience/expertise, poor planning, and inability to identify strategic use of IT. The importance of owner/manager influence was corroborated in studies that showed owner's IT knowledge and perception of the relative advantage of IT played a critical role in IT adoption decisions (Cragg and King, 1993; Igbaria *et al.*, 1997; Lee and Runge, 2001; Thong and Yap, 1995). Thong (1999) found the likelihood of IS adoption was significantly associated with CEO knowledge and innovativeness. Owners with positive attitudes toward IT were more likely to implement IT to support strategic goals (Bergeron and Raymond, 1992) and more likely to transform how work was done to achieve business effectiveness (Julien and Raymond, 1994; King, 1996). On the other hand, owners with negative attitudes towards IT generally avoided investing in IT, partly because they did not understand the strategic impact of IT on the business (Cragg and King, 1993).

Business strategies adopted by small firms are found to affect IT use also. Lesjak and Lynn (2000) found owners who pursued a low-cost strategy and saw IS as peripheral to their businesses, due in part to their limited IS knowledge and experience, were less likely to use IS strategically but used IS mostly for efficiency savings. They found that only those SMEs that perceived IS as integral to their business strategy use, due to owner innovativeness and necessity such as in a competitive environment, placed greater emphasis on management information and obtained strategic benefits from IS. The relationship between small firms' IS investment and strategic context was also studied by Levy *et al.* (2001) who found that small firms' IS use was a reflection of their strategic focus (cost reduction vs value adding differentiation) and market positioning with regard to customer emphasis (high or low customer dominance).

Besides owner's IT knowledge and perception (the latter is often influenced by the former) and businesses strategies pursued, impacts of other organizational factors on

IT adoption were studied by Foong (1999), Igarria *et al.* (1997), and Thong and Yap (1995). They found firm size the most important determinant of IT adoption given that larger firms had more financial resources and IT talents; conversely, the lack of resources and in-house IT skills limited IT adoption. Levenburg (2005) found differences among SMEs in internet use: micro and small firms tend to use the internet in limited ways such as finding new supply sources and emailing prospective customers. On the other hand, internet use was more sophisticated in mid-sized firms where internet technologies were assimilated into their business activities such as directly selling products online. Evidence of significant impact from external factors has been documented in IT literature also. Looi (2005) and Levy *et al.* (2001) found intense competition and external pressure from customers were associated with higher IT adoption rates.

These studies underscore lack of IT sophistication and misaligned IT use in small firms that, in essence, could be traced back to the owner's facility with IT, along with influences from organizational and environmental factors. We emphasize the importance of owner's knowledge of IT, because from a resource-based view, more sophisticated use of IT, enabled by owner's higher level of knowledge of IT, generates unique firm level capabilities (Santhanam and Hartono, 2003), hence the nature and type of IT capabilities can serve as a leading indicator of a firm's ability to manage IT to support its business strategies (Ross *et al.*, 1996). Hence, it follows that the more sophisticated the owner's knowledge of IT, the greater the firm level proclivity to IT use in a more sophisticated manner.

The second hypothesis of this study examined the relationship between owner's/manager's knowledge of IT and IT use, after controlling for four key organizational factors: industry affiliation, firm size, age, and business strategic focus.

- H2a.* Owner's knowledge of traditional IT has a positive impact on the adoption of traditional IT
- H2b.* Owner's knowledge of internet technologies has a positive impact on the adoption of internet technologies

Figure 1 is a graphical representation of the study hypotheses.

By examining differences in owner's IT knowledge/experience, this study seeks to determine the impact of this critical resource/competency on business – IT strategic alignment and IT use.

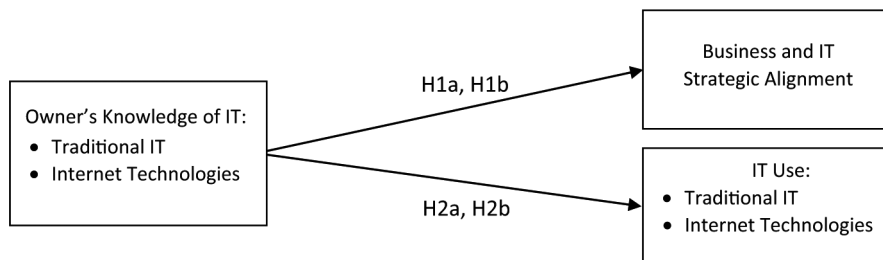


Figure 1.
Study hypotheses: owner's
knowledge of IT, strategic
alignment, and IT use

Methodology

Sample

The survey method was used to collect input from small business owners in three Midwestern states: Indiana, Illinois, and Ohio. The sample of small businesses was randomly selected from the ReferenceUSA database using two criteria:

- (1) Firm size: businesses with fewer than 500 employees.
- (2) Industry affiliations.

Two information-intensive industries, manufacturing and financial services, were selected given their use of information and communication technologies for processing relatively high volumes of information (Chan *et al.*, 1997; King and Pollalis, 2000). Small firms in the following NAICS industry classifications were randomly selected: Manufacturing – 32 and 33, and financial services – 52 (521 monetary authorities were omitted).

Survey instrument

A two-page questionnaire containing questions pertaining to the company's business strategies, the extent IT supported each business strategy, types of IT used, and level of owner's IT knowledge was mailed to the owners or managers of the randomly selected businesses. A personalized cover letter explaining the study purpose and the voluntary and anonymous nature of the survey was attached to each questionnaire. Two months after the initial mailing of the questionnaires, a reminder postcard was sent to the businesses. A total of 217 usable responses were received. The response rate was 11 percent.

In the questionnaire, business strategy was measured using a ten-item scale adapted from Hussin *et al.* (2002). Ten business strategies pertaining to operational efficiency, cost reduction, quality (product/service and customer service), product distinction, differentiation, and innovation, and marketing strategies were included. Using a five-point Likert-type scale, survey respondents indicated the extent each strategy their business used to compete in the market. In addition, they were asked to indicate the extent to which IT supported their business strategies (on a five-point Likert-type scale). The strategic alignment score was the product of the business and IT strategies.

Respondents also indicated whether their firm used the following information technologies:

- traditional IT – industry specific IS, accounting software, document management system, EDI, marketing and customer relationship management software (CRM), and business intelligence software; and
- internet technologies – basic, static web site, web self-service, and e-commerce.

The sum of the technologies adopted in each of the two IT categories became the adoption score. To measure owner's knowledge of IT, survey respondents indicated on a scale of 1 (not familiar with) to 4 (familiar with extensive hands-on knowledge) their level of knowledge of and experience with traditional IT and internet technologies. The last section of the survey included questions pertaining to the business profile: industry affiliation (financial services or manufacturing), number of years in business, and number of employees.

Study variables

The study included three dependent variables: strategic alignment, traditional IT adoption, and internet technology adoption. Independent variables included owner's knowledge of traditional IT and owner's knowledge of internet technologies, along with four control variables: firm industry affiliation, size, age, and business strategic focus. Business strategic focus was derived from a principal component analysis of the ten business strategies (see study results). While all three dependent variables, owner's knowledge of IT, and the business strategic focus were interval variables, firm industry affiliation, age, and size were categorical variables. For each level of each of these categorical variables, a dummy variable was created with a value of 1 (attribute present) or 0 (attribute absent). For firm industry affiliation, there were two dummy variables: financial services and manufacturing. Firm age was converted into five dummy variables: under five years, under ten years, under 20 years, under 30 years, and over 30 years. Finally, firm size was measured by the number of employees in three categories: under 10, under 50, and over 50 employees.

Diagnostic checking

The content validity of the survey instrument was established based on an extensive review of the literature and was refined based on feedback from colleagues. The internal consistency of the instrument was established using Cronbach's alpha which yielded an alpha of 0.894.

Several standard diagnostic procedures were used to ensure assumptions of the regression models were met. The Durbin-Watson statistics of all regression analyses were between the range of 1.5 to 2.5 indicating absence of correlation among the independent error terms; hence, the assumption of independent observations was met. In addition, the VIF of all independent variables were well below 2.0 indicating the absence of multicollinearity.

Results

Profiles of small businesses

The business profile questions indicated that of the 217 small businesses in the survey, 59.4 percent were in the financial services industry and 40.6 percent were in the manufacturing sector. Most of these small firms were fairly well established: about one third (33.6 percent) of the respondents had been in business for over 30 years. The second and third highest categories were 20 to 30 years (23 percent) and ten to 19 years (20.7 percent). Businesses established for five to nine years represented 13.4 percent of the respondents, and less than 10 percent had been in business for fewer than five years. The profiles of these businesses also indicated that the majority of the small firms (69.1 percent) had fewer than ten employees. Businesses with ten to 50 employees made up 28.6 percent of the respondents, and those with over 51 employees accounted for less than 3 percent.

Businesses and IT strategic alignment

To measure strategic alignment, the moderation method (interaction or product of business strategy and IT support for business strategy) instead of the matching method (difference score) was selected. According to Chan *et al.* (1997), the moderation method is more effective in detecting IT support for business strategies that are

important to the business versus support for less important business strategies; the matching model focuses on the matching between business strategy and IT strategy and does not differentiate between high business strategy and high IT strategy versus low business strategy and low IT strategy.

In Table I, the mean scores and standard deviations of all ten business strategies, IT strategies (IT support for business strategies), and strategic alignment are shown. Superior customer service, high quality products and services, operational efficiency, and product diversification strategies were most frequently adopted by these small businesses. This finding is consistent with prior research that showed small businesses' preference for quality and personal customer service (Hussin *et al.*, 2002). The mean scores of these four IT strategies were not as high as those of the business strategies; however, they were still the four highest IT strategies. The results of high business and IT strategy scores were high alignment scores (BS × ITS) indicating high adoption and high congruency. The remainder of the business and IT strategies adopted by small firms and congruency between business and IT strategies showed higher levels of variability.

Owner's IT knowledge and strategic alignment

To test the first hypothesis – owner's/manager's knowledge of traditional IT and internet technologies has a positive impact on strategic alignment – a hierarchical regression was used. In addition to the dependent variable (average strategic alignment score) and the two independent variables (knowledge of traditional IT and knowledge of internet technologies), there were three control variables: firm industry affiliation, age, and size.

In the hierarchical regression analysis, the three control variables were entered first (model 1), followed by owner's knowledge of IT (model 2). Table II shows the results of the regression analysis.

The adjusted R^2 of Model 1 indicated that the control variables – industry affiliation, firm size, and firm age – explained only 3 percent of the variance in small firm's strategic alignment, and the model was not statistically significant.

Model 2 explained a significantly larger portion (17 percent) of the variance in small firm's strategic alignment. The unique contribution of the predictors (owner's

| Strategies | Business Strategy (BS) | | IT Support for Bus. Strategies (ITS) | | Strategic Alignment (BS × ITS) | |
|----------------------------------|------------------------|----------|--------------------------------------|----------|--------------------------------|----------|
| | Mean | Std Dev. | Mean | Std Dev. | Mean | Std Dev. |
| Superior customer service | 4.64 | 0.71 | 3.85 | 1.06 | 17.94 | 5.89 |
| High quality products/services | 4.60 | 0.73 | 3.72 | 1.15 | 17.35 | 6.42 |
| Higher efficiency to reduce cost | 3.98 | 0.92 | 3.82 | 1.04 | 15.38 | 5.64 |
| Greater product/service variety | 3.80 | 1.09 | 3.19 | 1.25 | 12.58 | 6.72 |
| Effective cross-selling | 3.58 | 1.13 | 3.12 | 1.34 | 11.99 | 7.23 |
| Distinctive products/services | 3.47 | 1.14 | 3.08 | 1.22 | 11.15 | 6.39 |
| Continual market expansion | 3.21 | 1.08 | 2.88 | 1.21 | 9.86 | 6.01 |
| New products/services | 3.13 | 1.18 | 3.06 | 1.20 | 10.23 | 6.37 |
| Lower product/service prices | 3.08 | 1.17 | 2.94 | 1.19 | 9.42 | 5.82 |
| Aggressive marketing | 2.59 | 1.25 | 3.17 | 1.32 | 9.00 | 6.41 |

Table I.
Business strategy, IT strategy, and strategic alignment mean scores

| Independent variables | Model 1 | | Model 2 | | Impact of owner's knowledge of IT | |
|---------------------------------|---------|----------|---------|----------|-----------------------------------|--|
| | Beta | <i>t</i> | Beta | <i>t</i> | | |
| <i>Industry</i> | | | | | | |
| Financial | 0.19 | 2.66** | 0.12 | 1.81 | 123 | |
| <i>Size</i> | | | | | | |
| Under 50 | 0.12 | 1.61 | 0.00 | -0.00 | | |
| Over 50 | 0.04 | 0.59 | 0.03 | 0.45 | | |
| <i>Age</i> | | | | | | |
| Under 5 | 0.03 | 0.45 | -0.00 | -0.03 | | |
| Under 10 | 0.07 | 0.93 | 0.05 | 0.74 | | |
| Under 20 | -0.10 | -1.36 | -0.09 | -1.29 | | |
| Under 30 | 0.06 | 0.74 | 0.01 | 0.21 | | |
| <i>Knowledge</i> | | | | | | |
| Traditional IT | | | 0.28 | 3.73*** | | |
| Internet | | | 0.18 | 2.47* | | |
| <i>R</i> ² | 0.06 | | 0.20 | | | |
| Adj. <i>R</i> ² | 0.03 | | 0.17 | | | |
| <i>F</i> -statistic | | 1.86 | | 5.35*** | | |
| Change in <i>R</i> ² | | | 0.14*** | | | |
| Change in <i>F</i> | | | | 16.50 | | |

Notes: **p* < 0.05; ***p* < 0.01; ****p* < 0.001

Table II.
Owner's IT knowledge and strategic alignment

knowledge of IT) accounted for 14 percent of the variance and the overall model was significant at the 0.001 level. Significance testing of individual variables indicated owner's knowledge of traditional IT and internet technologies were important predictors of small firm's strategic alignment (at the 0.001 and 0.05 levels respectively). Hence, *H1a* and *H1b* were supported.

Owner's IT knowledge and adoption of traditional IT

To determine whether owner's knowledge of traditional IT could predict adoption of traditional IT, a hierarchical regression analysis was performed. Similar to the first hypothesis testing, firm industry affiliation, age, and size were entered first as control variables (model 1). In addition, business strategic foci of small firm were entered next (model 2), followed by owner's knowledge of traditional IT and internet technologies (model 3).

Business strategic focus was derived from a principal component analysis of the ten business strategies. Three factors were extracted using Varimax Orthogonal Rotation. Table III shows the underlying dimensions of the business strategies pursued by these firms. Business strategies focusing on product and market development were loaded under the first factor (highlighted by the italic typeface), whereas quality and cost related business strategies were loaded under factors 2 and 3. These three factors explained 61 percent of the variance in business strategies. The average and standard deviation of these three strategic foci are shown in Table III.

In this study, business strategic focus was considered an organizational attribute. However, to determine the amount of variance in traditional IT adoption explained by

Table III.
Factor analysis of
business strategies

| Business strategies | Factor 1 Product and market development | Factor 2 Quality | Factor 3 Cost |
|---|--|---------------------|------------------|
| Lower product/service prices | 0.002 | -0.012 | 0.885 |
| Higher efficiency to reduce cost | 0.289 | 0.394 | 0.438 |
| High quality products/services | 0.218 | 0.821 | 0.094 |
| Greater product/service variety | 0.653 | 0.322 | 0.114 |
| Effective cross-selling | 0.627 | 0.173 | -0.039 |
| Superior customer service | 0.028 | 0.843 | -0.068 |
| Distinctive products/services | 0.507 | 0.405 | -0.406 |
| New products/services | 0.823 | 0.180 | -0.172 |
| Continual market expansion | 0.760 | 0.095 | 0.081 |
| Aggressive marketing | 0.717 | -0.111 | 0.245 |
| Percent of variance explained by factor | 35.57 | 13.42 | 12.33 |
| Mean | 3.33 | 4.63 | 3.54 |
| Std Dev. | 0.74 | 0.55 | 0.77 |

business strategic focus, it was entered separately from other organizational attributes (industry affiliation, size, and age). Table IV shows the results of the regression analysis.

The adjusted R^2 of model 1 indicated that the control variables – industry affiliation, firm size, and firm age – explained about 9 percent of the variance in small firm’s adoption of traditional IT. In particular, financial services small firms were more likely to adopt than manufacturing small firms (reference group), firms with ten to 50 employees were more likely to use traditional IT than firms with under ten employees (reference group), and young firms (those under five years old) were more likely to adopt than firms over 30 years old (reference group). The model was significant at the 0.01 level.

With the addition of business strategic focus, model 2 explained a slightly higher portion (11 percent) of the variance in small firm’s adoption of traditional IT. The unique contribution of the product/market development business strategic focus accounted for only about 2 percent of the variance; however, the change in R^2 was significant. Combining contributions from firm industry, size, and age, the overall model was significant at the 0.001 level.

Influences of organizational attributes remained significant in model 3, with the exception of the product/market strategic focus. As hypothesized, owner’s knowledge of traditional IT was a significant predictor of traditional IT adoption. Model 3 explained 19 percent of the variance in traditional IT adoption, and the overall model was highly significant at the 0.001 level. Hence, $H2a$ was supported.

Owner’s IT knowledge and adoption of internet technologies

The extent owner’s knowledge of internet technologies predicted adoption of internet technologies (dependent variable) in small firms was examined using a hierarchical regression analysis. The results of the regression analysis are shown in Table V.

About 11 percent of the variance in small firm’s adoption of internet technologies was explained by small firm’s industry affiliation, size, and age, as indicated by the adjusted R^2 of model 1. Similar to the adoption of traditional IT, younger firms (under five years old) were more likely to use internet technologies than those that have been

| Independent Variables | Model 1 | | Model 2 | | Model 3 | |
|---------------------------------|---------|----------|---------|----------|---------|----------|
| | Beta | <i>t</i> | Beta | <i>t</i> | Beta | <i>t</i> |
| <i>Industry</i> | | | | | | |
| Financial | 0.26 | 3.78*** | 0.23 | 3.32** | 0.18 | 2.63** |
| <i>Size</i> | | | | | | |
| Under 50 | 0.26 | 3.68*** | 0.24 | 3.39** | 0.19 | 2.65** |
| Over 50 | 0.06 | 0.96 | 0.07 | 1.04 | 0.05 | 0.90 |
| <i>Age</i> | | | | | | |
| Under 5 | 0.15 | 2.02* | 0.15 | 2.06* | 0.15 | 2.15* |
| Under 10 | 0.12 | 1.69 | 0.10 | 1.31 | 0.10 | 1.40 |
| Under 20 | 0.05 | 0.65 | 0.07 | 0.93 | 0.07 | 1.04 |
| Under 30 | 0.05 | 0.67 | 0.03 | 0.43 | 0.01 | 0.07 |
| <i>Strategic focus</i> | | | | | | |
| Cost | | | 0.04 | 0.66 | 0.02 | 0.36 |
| Quality | | | -0.03 | -0.51 | -0.01 | -0.22 |
| Product/market | | | 0.19 | 2.66** | 0.13 | 1.87 |
| <i>Knowledge</i> | | | | | | |
| Traditional IT | | | | | 0.33 | 4.37*** |
| Internet | | | | | -0.08 | -1.18 |
| <i>R</i> ² | 0.12 | | 0.16 | | 0.24 | |
| Adj. <i>R</i> ² | 0.09 | | 0.11 | | 0.19 | |
| <i>F</i> -Statistic | | 3.87** | | 3.59*** | | 4.89*** |
| Change in <i>R</i> ² | | | 0.03* | | 0.08*** | |
| Change in <i>F</i> | | | | 2.70 | | 9.69 |

Notes: **p* < 0.05; ***p* < 0.01; ****p* < 0.001

Table IV.
Owner's IT knowledge and traditional IT adoption

in business for over 30 years (reference group). In addition, firms with ten to 50 employees were more likely to adopt internet technologies than firms with fewer than ten employees (reference group). However, unlike the adoption of traditional IT, industry affiliation showed no significant impact on adoption. The overall model was highly significant at the 0.001 level.

In model 2, firm age, size and business strategic focus were significant predictors of internet adoption. Product/market development focus alone explained an additional 7 percent of the variance in the dependent variable. In Model 3, the dramatic increase in the adjusted *R*² (from 18 to 38 percent) resulting from the addition of owner's IT knowledge indicated owner's knowledge of internet technologies was a highly significant predictor of internet adoption. Firm age (younger firms) and product/market development strategic focus continued to be significant predictors of internet adoption. The overall model was highly significant at the 0.001 level. Hence, *H2b* was supported.

Discussion

The study findings indicated a strong positive relationship between owner's knowledge of IT, strategic alignment, and IT use. As described earlier, strategic

| Independent Variables | Model 1 | | Model 2 | | Model 3 | |
|---------------------------------|---------|----------|---------|----------|---------|----------|
| | Beta | <i>t</i> | Beta | <i>T</i> | Beta | <i>t</i> |
| <i>Industry</i> | | | | | | |
| Financial | -0.02 | -0.41 | -0.07 | -1.04 | -0.08 | -1.41 |
| <i>Size</i> | | | | | | |
| Under 50 | 0.26 | 3.66*** | 0.23 | 3.30** | 0.11 | 1.85 |
| Over 50 | 0.01 | 0.17 | 0.01 | 0.27 | 0.01 | 0.13 |
| <i>Age</i> | | | | | | |
| Under 5 | 0.28 | 3.85*** | 0.28 | 3.99*** | 0.21 | 3.41** |
| Under 10 | 0.10 | 1.40 | 0.06 | 0.88 | 0.05 | 0.92 |
| Under 20 | -0.07 | -0.96 | -0.04 | -0.60 | -0.03 | -0.55 |
| Under 30 | 0.01 | 0.24 | -0.01 | -0.11 | -0.03 | -0.46 |
| <i>Strategic focus</i> | | | | | | |
| Cost | | | 0.08 | 1.29 | 0.07 | 1.25 |
| Quality | | | -0.05 | -0.74 | -0.04 | -0.69 |
| Product/market | | | 0.26 | 3.74*** | 0.12 | 1.98* |
| <i>Knowledge</i> | | | | | | |
| Traditional IT | | | | | 0.08 | 1.22 |
| Internet | | | | | 0.44 | 6.73*** |
| <i>R</i> ² | 0.14 | | 0.21 | | 0.41 | |
| Adj. <i>R</i> ² | 0.11 | | 0.18 | | 0.38 | |
| <i>F</i> -Statistic | | 4.58*** | | 5.16*** | | 10.83*** |
| Change in <i>R</i> ² | | | 0.07** | | 0.20*** | |
| Change in <i>F</i> | | | | 5.71 | | 30.86 |

Table V.
Owner's IT knowledge
and internet adoption

Notes: **p* < 0.05; ***p* < 0.01; ****p* < 0.001

alignment has been linked in previous studies to enhanced business performance, and results from this study showed that IT knowledgeable owners were better able to acquire context-sensitive IT, and deploy it in ways that leveraged that investment to achieve their business strategic goals. With differences in firm size, age, and industry affiliation controlled, owner's knowledge of traditional IT and internet technologies accounted for a statistically significant portion of the variance in strategic alignment among small firms, and the positive sign of beta indicated the more IT knowledgeable the owner, the more strategically aligned the business.

As expected, owner's knowledge of traditional IT had a positive impact on the firm's adoption of traditional IT. Granted that organizational attributes contributed to traditional IT use, owner's knowledge of traditional IT accounted for a significant amount of variance in the use of traditional IT in small firms. These results were consistent with previous findings (Foong, 1999; Igarria *et al.*, 1997; Thong and Yap, 1995), where young firms and those with moderate size were more likely to adopt IT than older and very small firms. In addition, results from this study indicated that small firms in the financial services industry were more likely to adopt traditional IT. This could be because financial services firms are subjected to numerous compliance and enforcement rules, which may, in turn, affect their IT use. Also contributing to higher IT adoption in financial services small firms is the standardization of such IS as

loans and mortgages management, claims processing, statutory reporting, and compliance tracking and reporting found in the banking, insurance and investment firms.

An interesting finding from this study was that small firm's strategic focus – cost, quality, product/ market development – had no influence on its use of traditional IT. This could be an indication of a disconnection between strategic intent and its implementation with the support of IT. For example, small firms that emphasize cost savings and operational efficiency could resort to a variety of traditional IT such as accounting packages to manage their finances, EDI to improve supply chain efficiency, and industry specific IS to boost operational productivity. Similarly, small firms that compete by offering quality products and services and those that focus on product innovation and market growth could adopt CRM and business intelligence software to better understand customer preferences, anticipate market changes, and direct future marketing efforts. In spite of these benefits, only product/market development strategic focus was significant in this study, and the effect failed to give a significant contribution once the direct effect of owner's knowledge of IT was added. A possible explanation could be the adoption of traditional, basic IT such as accounting software and industry specific IS were so commonplace in many small firms that they were considered standard business software, regardless of a firm's strategic focus. On the other hand, advanced technologies such as CRM and business intelligence are rather costly and therefore beyond the reach of small firms.

In internet technology adoption, the difference between financial services and manufacturing small firms was not observed, and firm size ceased to be a significant predictor, while young firms were still more likely to adopt such technologies. These findings reflected the broad appeal and affordability of internet technologies. On the other hand, the significant contribution of the product/market development strategic focus in internet adoption indicated a high correlation between small firms that pursued this strategy and internet adoption. As indicated in Table III, the product/market development strategic focus had the lowest average score (as compared to quality and cost strategic foci) indicating product innovation, and market growth strategies were not commonly pursued by small firms in this study. These findings suggested the importance of internet technologies for innovative and growth oriented small firms that rely on these technologies to help them understand market trends, research competitors' product/service offerings, attract new customers, and expand into new markets. Finally, another noteworthy finding is the sizable amount of variance (20 percent) uniquely explained by owner's knowledge of internet technologies in adoption of such technologies.

Conclusions and recommendations

Focusing on small firm owner's/manager's knowledge of IT, this study found strong evidence supporting positive impact of owner's IT knowledge capability on strategic alignment and IT adoption. Both hypotheses – the first one testing the relationship between owner's knowledge of traditional and internet IT and business and IT strategic alignment, and the second the relationship between owner's knowledge of traditional and internet IT and the firm's adoption of respective IT – were supported. From the resource-based view, and a related variant – the knowledge-based view, the positive impact of owner's IT knowledge confirms that IT capability in small firms,

embodied in the owner's IT knowledge, is a critical resource and capability that differentiated one small firm from another; hence, the owner that had a fine-grained, in-depth knowledge of IT would help place his or her organization at a competitive advantage relative to peer firms in their industry. In other words, in terms of the knowledge-based view, the owner's IT knowledge is a critical capability that cannot be easily codified and communicated to others, since it is embedded in the owner's tacit knowledge and expressed in the unique but complementary use of IT in support of the firm's strategic goals. Secondly, the study argued the importance of alignment or fit between owner's IT knowledge and business strategies, since this too, in terms of the resource-based view, serves to create resource bundles that are valuable, rare, and not vulnerable to competitive imitation. In light of this, it is recommended that small firm owners seek ways of improving their knowledge of IT and integrating IT use in firm-level business planning. More importantly, it may behoove them to re-examine their business strategy and IT use to detect and correct misalignments, if any. Small business owners can take advantage of low cost or free workshops on topics such as business management using IT and internet marketing offered by the Small Business Administration and other entrepreneur development agencies.

This study found a relatively low adoption rate of more advanced IT, such as customer relationship management systems and business intelligence planning tools among smaller firms, which points to under exploitation of a critical resource as well as failure to use advanced IT strategically, perhaps due to resource constraints inherent in small firms. A way for small businesses to overcome their resource constraints is to consider the on-demand or application service provider (ASP) model of acquiring IT capabilities. ASP, also known as software as a service, is a recent development in IT usage model that allows small businesses to rent web-based software, such as web conferencing and CRM solutions, hosted at the provider's site. In addition to reducing their cost burden, small firms with limited in-house IT resources can have access to more advanced IT functions such as CRM and relegate IT maintenance tasks such as data backup, security control and ensuring service availability to the service provider.

Empirical evidence confirming the importance of small firm owner's knowledge of IT in acquiring and deploying appropriate IT to support its business goals, and in achieving strategic alignment is a contribution of this study. Strategic alignment is a top priority of and a constant challenge for business leaders. This study demonstrated one critical factor – owner's knowledge of IT – in achieving synergy between business and IT strategy in the context of small firm. While this study focused specifically on owner's IT knowledge and its relationship to strategic alignment and IT use, the inclusion of business performance measures would have been an important improvement, hence a recommendation for future studies. Future studies of strategic alignment and IT use in small firms should also consider process-level alignment as suggested by Tallon (2008) and compare the findings to firm-level strategic alignment. Finally, studies examining the impact of emerging IT usage models, such as ASP and cloud computing, on small businesses' IT use and strategic alignment should shed more light on small business computing and competitiveness.

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About the authors

Chia-An Chao is an Associate Professor of Business Education, Information, and Technology at the Scott College of Business, Indiana State University. She received her PhD from Indiana University. Her research interests include information technology adoption and strategic alignment, organizational studies of health information systems, and information systems education. Chia-An Chao is the corresponding author and can be contacted at: cchao@indstate.edu

Aruna Chandra is a Professor of Management at the Scott College of Business, Indiana State University. She holds doctoral degrees in Strategy/International Business and in English/Linguistics from Kent State University. Her research interests are in the areas of international management and entrepreneurship in emerging market contexts.