Variations in Adoption Factors and Use of E-Commerce Among Small Businesses: Are All SMEs the Same?

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INTRODUCTION

Adoption and use of e-commerce and e-business Internet technologies (EEIT) by small and medium enterprises (SMEs) has been the focus of considerable research over the past ten years. This research study builds on the authors' prior work (Wymer *and Regan*, 2004, 2005) examining the diverse list of incentives and barriers found in the literature and consolidating them into a neutral list of factors to clarify whether they are perceived by SMEs to have a positive or negative influence on the adoption and use of EEIT.

A major question that is being asked in SME research is whether results can be applied to all SMEs as a monolithic block, or if results differ significantly for various types of SMEs. This research proposal focuses on examining factors which are perceived as incentives or barriers for adoption of by SMEs, and looking at differences in how these factors are considered in SME subgroups. In previous examinations of these factors comparing SMEs in urban and rural settings, significant differences were found in both the use of EEIT and in perceptions of barriers and incentives (Wymer and Regan, 2005). Three additional SME subgroups will be considered in this study: (1) the size of the business in terms of the number of employees, (2) the industry sector of the business (by NAIC codes), and (3) the geographic market scope of the business.

LITERATURE REVIEW AND RATIONALE

It is generally accepted that research on large businesses does not necessarily apply to SMEs. Key differences in the use of IT between small and large businesses include: resource restraints, less formalized planning, lack of internal IT resources, and lack of control over external forces (Burgess, 2002). A number of studies suggest that the variation in business enterprises within the SME classification may also limit applicability and generalizability of findings. Factors such as size, location, industry, markets, and ownership are cited in the literature (Bose, 2006; Burgess, 2002; Duxbury, 2002; Igbaria et al., 1997)

Much of the research on adoption and use of EEIT by SMEs has been exploratory in nature, employing a variety of approaches and theoretical frameworks. It also spans many types of businesses and industries around the globe. The result has been a diverse, and sometimes contradictory, collection of variables identified as barriers (inhibitors) and incentives (also referred to in the literature as drivers, determinants, motivators, accelerators, enablers) to EEIT adoption and use (Kanter, 2001, Lawrence, 2002, Nambisan *et al.*, 1999, Oden and Strover, 2002, van Slyke *et al.*, 2001). Considerable inconsistency is noted in the terminology for describing these variables and the range of variables cited by researchers (Harrison *et al.*, 1997; Huang *et al.*, 2004; Windrum and de Berranger, 2004). The findings also frequently diverge; for example, Al-Qirim (2004b) and others found that owner/manager involvement and innovativeness play an important role in shaping SME use of EEIT. However, Windrum and de Berranger (2004) found that the owner/manager role was not a significant variable. Some studies found that internal technical capability was a key to EEIT success in SMEs, while other studies found that external expertise and support were

critical (Huang *et al.*, 2004, Windrum and de Berranger, 2004). Even the literature seeking to summarize the most commonly identified barriers and incentives (*e.g.*, compare Burgess (2002) p.5, Kanter (2001) p.319, and Lawrence, (2002) p.181) is inconsistent. In addition, some studies focus on assessing barriers to adoption while others focus on incentives or predictors of adoption, but the actual variables are often similar and overlap.

Thus, it was decided to take the approach of identifying factors as neutral statements and asking respondents to indicate whether they were barriers or incentives, or not a factor, in their decisions to adopt or not adopt EEIT. A total of 26 factors were examined.

Although SMEs vary considerably, it cannot be assumed that these differences necessarily make a difference in the factors that influence adoption and use of EEIT. This research helps answer the question: When researching EEIT adoption and use by SMEs, how much can we generalize across the population? Do the findings differ significantly among SMEs depending on characteristics such as size, market, and industry, or do findings apply generally across the entire population regardless of the wide diversity of businesses?

METHODOLOGY

The data used for this analysis were gathered through the use of a mailed, survey instrument sent to approximately 6000 small and medium enterprises in Central and Eastern Kentucky, USA in two rounds in 2003 & 2004 (Wymer *et al.*, 2003, 2004). The survey instrument consisted

Table 1. Neutral Factors Assessed as Either Incentives or Barriers

Code	Factor under consideration
a	Availability of technical staff or consultants with web-skills
b	Priority relative to other projects that require existing resources and time
c	Availability or adequacy of existing technology and tools
d	Finding the right partners with whom to work
e	Readiness of suppliers for electronic business
f	Employee experience with making major changes
g	Experience of top executives with computers and the Internet
h	Government rules and regulations
i	Perceived need for change or implementation of Web and Internet Technologies
j	Resulting reduction in number of employees
k	The company's prior experience with new technology implementations
l	Perceived value or relevance to the business
m	Security issues
n	Technology for selling products or services online
o	Access to network services or infrastructure to support Web and Internet Technologies
p	Cost to setup and maintain
q	Viable market or customer base for e-commerce
r	Understanding of available opportunities and options with e-commerce
s	Projected profitability of e-commerce
t	Your company's willingness to adopt new technology
u	Access to capital for start-up
v	Trust or confidence in Web and Internet Technologies
w	Models of successful use in my industry
x	Competitive pressure from other Internet adopters within my industry
y	Reliability of Web and Internet Technologies
z	Other (Allowed Respondent to submit written response)

of 25 questions, on 4 printed pages, examining company demographics and EEIT adoption and use. No sampling was done and surveys were sent to all businesses in the Kentucky counties under investigation. A total of 285 completed surveys were returned for response rate of just under 5% for the total population.

The target population for the survey was enterprises of 500 or fewer employees (the general threshold for the U.S. Small Business Administration definition of a small business). Businesses were taken from a commercial listing of all businesses in Kentucky, and surveys were mailed directly to a single named senior executive or owner within each company. The only businesses excluded were chain restaurants and gas stations.

One of the major findings of this research was how respondents viewed various adoption factors as either an incentive or a barrier in their EEIT adoption decision (Wymer & Regan 2005.) These potential incentive or barrier factors to adoption were measured on a scale of +5 to -5 (+5 was a Significant Incentive, -5 was a Significant Barrier, and 0 indicate no affect on the adoption decision.)This data along with the participant reported adoption and use rates was used to compare findings in the overall response group with the findings for various subgroups of SMEs to examine if there are significant differences within the response group. Subgroups are defined based on the following criteria:

Size, in terms of the number of employees,

- 10 employees or less (sometimes referred to as micro businesses) (19% of surveyed businesses)
- 11-50 employees (46% of surveyed businesses)
- 51-100 employees (100 employees being the commonly cited International limit for a definition of a small business) (23% of surveyed businesses)
- 101-500 (500 is the general U.S. Small Business Administration limit for small businesses)(12% of surveyed businesses)

Industry Sectors - breaking SMEs into industry sectors based upon NAICS codes

- Service Sector (approximately 40% of businesses surveyed)
- Manufacturing/Production Sector (approximately 60% of businesses surveyed)
- Levels of participation, in terms of percent of revenue from sources, in five different geographic markets: Local, Regional, State, National, Global

FINDINGS

This section summarizes findings for each of the three subgroups of SMEs: size, industry sector, and geographic market scope. Analyses were conducted using the 26 barriers and incentive factors (lettered a-z) as the dependent variables with the various subgroup categories as the independent variables.

Size. Survey participants were classified into four size groupings based on number of employees: 0-10 (micro); 11-50 (small); 51-100 (small); 101-500 (medium) and greater than 500. Using analysis of variance comparing the five size groups together showed very little difference, in perceptions of the 26 factors studied, between groups. Only two barrier/incentive factors were shown to differ significantly between groups: (k) company's prior experience with technology implementations, and (u) access to capital for start-up.

More analysis was then done to examine these differences in finer details and try to isolate the source of these variations between groups. A second analysis of variance, using just two groups, firms with less than 100 employees (micro and small), and all those over 100 employees (medium) showed no significant differences among any of the barriers and incentives. A third analysis examining only firms with less than 50 employees (micro and small), with those over 100 employees (medium) (eliminating the middle group between 50 and 100) yielded the same result: No significant differences were found in any of the barriers and incentives between groups.

Table 2. Factors which indicate a statistically significant difference between Micro (10 or fewer employees) and all other firms (greater than 10 employees) (*p < 0.05, **p < 0.01)

Factor Code	Within Group Means		F (Between Groups)
	Micro (10 or less)	All (greater than 10)	
c	-0.26	+0.36*	6.538*
k	-0.29	+0.31*	8.124**
u	-0.90**	-0.19	7.615**
y	-0.13	+0.28*	3.943*

Table 3. Factors which indicate a statistically significant difference between Micro (10 or fewer employees) and Small (11-100 employees) (*p < 0.05, **p < 0.01)

Factor Code	Within Group Means		F (Between Groups)
	Micro (10 or less)	Small (between 11 & 100)	
c	-0.26	+0.36*	5.681*
h	-0.21	+0.20	3.969*
k	-0.29	+0.31*	6.680*
u	-0.90**	-0.24	5.481*

We then isolated out the smallest sized firms, "micro" firms of less than 10 employees and ran further analysis. We analyzed firms with less than 10 employees (micro) in comparison to all other size groups. This analysis yield significant differences in the following barrier/incentive factors:

(c)   Availability or adequacy of existing technology and tools
(k)   Company's prior experience with new technology implementations
(u)   Access to capital for start-up
(y)   Reliability of Web and Internet technologies

Lastly, we ran a fifth analysis examining micro firms with less than 10 employees (n=40) with small firms of 11-50 employees (n=110). This comparison yielded similar results to the prior comparison of micro firms with all other size groups. The barriers/incentive factors that were found to be significantly different between these groups were:

(c)   Availability or adequacy of existing technology and tools
(h)   Government rules and regulations
(k)   Company's prior experience with new technology implementations
(u)   Access to capital for start-up

Industry Sector. All firms were categorized based on primary NAICS industry codes. For purposes of analysis, any category with less than 10 respondents was eliminated (43 eliminated). An analysis of variance among the remaining 8 different NAICS groups (n=242 respondents) yielded significant differences between groups for only two of the 26 barrier/incentive factors: (j) resulting reduction in employees and (v) trust or confidence in Web and Internet technologies.

Geographic Market Scope. Comparing subgroups of respondents based on geographic market scope (local, state, regional, national, global), yielded no significant differences on barrier/incentive factors between groups.

CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER RESEARCH

Size. The results of this research study showed very little difference among the five size subgroups of small businesses when looked at collectively on the significance of the 26 different barriers and incentives to EEIT adoption. Only when micro businesses were compared

against small businesses, or to all businesses over 10 employees, did significant differences appear. Micro firms saw these factors consistently as barriers; while others saw the factors as incentives. The only exception to this was factor "u" (capital) which was a perceived as a barrier for all groups – although results suggest that it is an even greater barrier for micro businesses than for others. Thus in studying small businesses, the only group where results appear to differ significantly is the micro-sized businesses under 10 employees.

Industry Sector. Results show very little significant difference among SMEs based on industry sector. The finding of significant differences by industry group for factor "j" "reduction in employees" suggests that some industries perceive greater opportunities for efficiencies from the use of EEIT. One interesting observation was that the three industry groupings (51, 52, 54) that showed the biggest separation on this factor were all knowledge-based industries and all saw the opportunity for employee reduction as a larger Incentive.

Geographic Market Scope. One interesting observation for the analysis of subgroups based on geographic market scope was that global sales were highest among firms in the size range of 51-100 employees. This result runs counter to the general assumption that larger firms tend to be more global in market scope, and provides some support for the position that EEIT helps offset the former limitations of geographic location and creates a more level playing field for small and medium businesses. This is an interesting finding that is being researched further.

BIBLIOGRAPHY

1. Al-Qirim, N. 2004. *Electronic Commerce in Small Businesses in New Zealand: A Focus Group Approach*. in *2004 IRMA International Conference*. New Orleans: Idea Group Inc.
2. Bose, R. and V. Sugumaran. 2006. Challenges for deploying Web Services-based e-business systems in SMEs. *International Journal of E-Business Research*, 2(1), 1-18, January-March 2006.
3. Burgess, S., 2002. *Information technology in small business: issues and challenges*, in *Managing Information Technology in Small Business: Challenges & Solutions*., Idea Group Publishing: Hershey PA. p. 1-17.
4. Diochon, M. and B. Wright. 2003. *Information Technology in Small Businesses: An Overlooked Opportunity?* in *2003 Information Resources Management Association International Conference*. Philadelphia, PA: Idea Group Publishing.
5. Duxbury, L., Y. Decady, and A. Tse, 2002. *Adoption and use of computer technology in Canadian small business: a comparative study*, in *Managing Information Technology in Small Business: Challenges & Solutions*, S. Burgess, Editor., Idea Group Publishing: Hershey PA. p. 19-47.
6. Harrison, D.A., P.P. Mykytyn Jr., and C.K. Riemenschneider, 1997. *Executive Decisions About Adoption of Information Technology in Small Business: Theory and Empirical Tests.*, in *Information Systems Research*., INFORMS: Institute for Operations Research. p. 171.
7. Huang, C.D., P. Hart, and M. Wiley. 2004. *Factors Characterizing IT Use in SMEs: An Exploratory Study*. in *Innovations Through Information Technology*. New Orleans: Idea Group Inc.
8. Kanter, R.M., 2001. *Evolve! Succeeding in the Digital Culture of Tomorrow*. First ed., Boston: Harvard Business School Press. 352.
9. Lawrence, K. 2002. , *Factors Inhibiting the Collaborative Adoption of Electronic Commerce Among Australian SMEs*, in *Managing Information Technology in Small Business: Challenges and Solutions*, S. Burgess, Editor. Idea Group Publishing: Hershey. p. 178-208.
10. Nambisan, S. and Y.-M. Wang, 1999. *Roadblocks to Web Technology Adoption?* Communications of the ACM, **42**(1): p. 98-101.
11. Oden, M. and S. Strover, 2002. *Links to the Future: The Role of Information and Telecommunications Technology in Appalachian Economic Development*. Appalachian Regional Commission: Washington, D.C.
12. Pflughoeft, K., et al., 2003. *Multiple Conceptualizations of Small Business Web Use and Benefit*. Decision Sciences, **34**(3): p. 467-512.
13. Van Slyke, C. and F. Belanger, 2003. *Barriers to Electronic Business*, in *E-Business Technologies*. John Wiley & Sons: New York, NY. p. 57-96.
14. Windrum, P. and P. de Berranger. 2004. *Factors Affecting the Adoption of Intranets and Extranets by SMEs: A UK Study*. in *Innovation Through Information Technology*. New Orleans: Idea Group Inc.
15. Wymer, S. and E. Regan. 2004. *Incentives and Barriers to the Use of E-Business and E-Commerce Information Technologies by Small Businesses in Rural America*. in *2004 Information Resources Management Association International Conference*. New Orleans, LA: Idea Group Publishing.
15. Wymer, S., and E. Regan, 2005. *Factors Influencing E-Commerce Adoption and Use by Small and Medium Businesses*. International Journal of Electronic Commerce & Business Media, **15**(4).

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