

# INTEGRATION OF E-BUSINESS INTO SMALL AND MEDIUM SIZE BUSINESSES

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## Abstract

*Small and Medium Sized Enterprises (SMEs) comprise a significant part of national economies around the globe. In the early developmental stages of e-commerce and e-business, it was expected that this technological integration would enable these SMEs to compete directly with large companies. This study identifies the types of e-commerce that SMEs are using and examines the benefits that are perceived from this use. It also researches the progress of manufacturing SMEs toward full e-business integration with technology.*

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## Keywords

E-commerce, e-business, small & medium business, organizational benefits

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## Introduction

While the dot.com bubble has burst, the long-term interest in and promise of e-commerce and e-business remain. Firms, both large and small, continue to invest in the development of the Internet based segments of their organizations. Researchers have stated that e-commerce provides many opportunities to create better business economics (Oliver, 1999) and some have gone as far as indicating that e-commerce is the “great equalizer” (Quinn, 1999). If these statements are true, then it would appear that Small and Medium Sized Enterprises (SMEs) should be moving toward full e-business integration with technology and in turn receive a measurable degree of benefit from this implementation. This research investigates the extent of their e-business transformation, or lack thereof, as SMEs strive for survival in today’s changing business environment.

## Review of Relevant Literature

In 1999 Kalakota, Robinson, and Tapscott identified e-commerce as the most significant challenge that the traditional business model will face since the introduction of information technology in general. Recent studies have looked at the reasons SMEs adopt e-commerce technologies and the factors that affect its adoption (Korchak & Rodman, 2001; Mehrtens et al., 2001; Tobias, 2002). Three major drivers behind the adoption of e-

commerce technologies were identified: perceived benefits, organizational readiness, and external pressure. Building on these studies, several studies have looked at limited segments of the business environment in an attempt to identify the benefits of e-commerce to SMEs. These efforts have generally been restricted to qualitative evaluations of specific e-commerce endeavors (Hasan & Tibbits, 2000; Kuan & Chau, 2001; Straub et al., 2002).

Recently authors have begun to delineate more explicitly a difference between e-commerce and e-business. E-commerce is the term used for the process of transacting business over the Internet. E-business, on the other hand, involves the fundamental reengineering of the business model into an Internet based networked enterprise. The difference in the two terms is the degree to which an organization transforms its business operations and practices through the use of the Internet. (Hackbarth & Kettinger, 2000; Mehrrens et al., 2001; Poon, 2000; Poon & Swatman, 1997) However, Levy and Powell (2003) question whether SMEs follow the 'stages of growth' model in integrating the Internet into their businesses. They propose that SME owners consider their perceptions of business growth and Internet business value in decisions concerning Internet adoption.

The Business Process Reengineering literature has reported that only radical transformations involving rethinking of the business model produce dramatic performance rewards. There is some evidence that this transformation process may be a significant factor in the successful expansion of business operations into the e-commerce dimension. (Huizing et al., 1997; Torkzadeh & Dhillon, 2002; Wilcocks, 2002).

Several studies have addressed the area of e-business integration in SMEs as a part of their overall study. Stockdale and Standing (2004) investigated SME participation in e-marketplaces examining the barriers to participation. Their assumption was that a certain level of integration was necessary for SMEs to benefit from e-marketplaces. The primary result of this study was the identification of barriers. Utilizing a case study approach, Kamel and Hussein (2004) examined how SMEs can institutionalize the integration of these technologies using the King Hotel as an example. Finally, Beck, Wigand and Konig (2005) examined e-commerce diffusion in SMEs in the manufacturing sector. The results identified the different drivers between countries and established best practices for SMEs.

In the past, SMEs have often been restricted from participating in revolutionary technology because of cost and personnel limitations. In the present environment, the incremental cost of evolving technology is far smaller than with past changes since most SMEs already possess an information technology (IT) infrastructure. SMEs have traditionally been noted for their ability to respond to new opportunities and innovations more quickly than large enterprises. Recent studies have shown that SMEs are moving ahead into an Internet based business environment. (Kemp, 2001; Korchak & Rodman, 2001; Rendleman, 2001; Poon, 2000) But is there evidence that manufacturing SMEs are following the Internet stage adoption model and, if so, at what stage of Internet adoption are they?

## **Problem and Purpose**

"Small firms need to get in the e-commerce game or they are going to be shut out of a critical part of the marketplace," Jerry Jasinowski, President, National Association of Manufacturers (Wall Street Journal, 2000)

The importance of e-commerce has been well documented in reports by the U.S. government as well as independent organizations (Arthur Andersen & NSBU, 2000; Small Business Administration, 2000; Williams, 1999). Are SMEs being left behind as big business accelerates with total integration of technology throughout its complete supply chain? Realizing the criticality of e-commerce to SMEs, the purpose of this study is to determine the extent of technology integration and indeed any performance benefits for SMEs that have adopted an Internet based business strategy. This study seeks to extend the existing literature by undertaking an examination of manufacturing SMEs and their transformation into the e-business model along with any reported benefits.

## **Methodology**

The study followed several stages beginning with initial interviews of small business experts. After these discussions an initial survey was developed, based in part upon the instrument used by Korchak and Rodman (2001). This was followed by additional interviews with the experts to further refine the survey. The revised survey was then distributed to a group of 10 small businesses as a pilot sample resulting in the final refinements to the survey.

The target population was the manufacturing SMEs in the Southeast United States (AL, FL, GA, LA, MS, NC & SC). The population includes both e-commerce adopters and non-adopters. The population was stratified into those companies having 10 to 19 employees, companies having 20 to 99 employees, and companies having 100 to 400 employees. The stratification was based on strata reported in an earlier e-commerce study. Manufacturing was selected as the target industrial classification because this sector has shown the most aggressive use of e-commerce by large companies. Company selection was based upon their SIC classification (Table 1) and represents 80 percent of the total SME employment in this sector. (Korchak & Rodman, 2001).

InfoUSA provided the business information database. The population strata contained 7810 companies with 10 to 19 employees, 8606 companies with 20 to 99 employees and 2005 companies with 100 to 499 employees. A random sample of 400 companies, proportionately based upon the underlying state demographics, was drawn from each stratum. A survey packet was prepared that contained a personally addressed cover letter, the questionnaire, and a prepaid business reply envelope. The completed packet was mailed to the presidents and owners of SMEs throughout the Southeast. After three weeks, a second mailing of the survey packet was completed. Two weeks after the second mailing, a follow up postcard, signed by the Director of Small Business Administration in Louisiana, was sent.

SIC Code	Description
20	Food & Kindred Products Mfrs
23	Apparel & Other Finished Products Mfrs
24	Lumber & Wood Prods Except Furniture Mfrs
25	Furniture & Fixtures Mfrs
26	Paper & Allied Products Mfrs
27	Printing Publishing & Allied Industries
30	Rubber & Miscellaneous Plastics Mfrs
34	Fabricated Metal Products Mfrs
35	Industrial & Commercial Machinery Mfrs
36	Electronic & Other Electrical Equipment Mfr
37	Transportation Equipment Mfrs
39	Miscellaneous Manufacturing Industries Mfrs

**Table 1: SIC Classifications**

## Results & Discussion

Sixty-four usable responses were obtained from the surveys. This was a 5.33 % response rate. SME mail surveys have been traditionally problematic (Dennis 2003). The goal was to contact adopters and non-adopter; so a mail survey was appropriate and offered equal opportunities for participation. The respondents include new businesses and well-established businesses. They also cover all extremes of the definition of a SME with the smallest having 3 employees and the largest having the maximum of 500, the upper limit to be classified as an SME. Specifically, of the companies reporting size, 49.15 % had 1 to 19 employees, 32.2 % had 20 to 99 employees, and 18.64 % had 100 to 500 employees.

### *E-Commerce Activities*

Since the focus of this study is concerned with whether there is any movement toward a transformation of manufacturing SMEs into an integrated business model, a key to this question is the level of e-commerce activities (EC) in the organizations. Table 2 presents a summary of the respondents' activities transacting business over the Internet.

The top two SME e-commerce activities reported in Table 2 are for information about products and services (60.94%) and for information about the company (54.69%). This indicates that most SMEs using e-commerce activities do so for advertising purposes. The Internet simply becomes another channel in their marketing strategy. This could just be done with a static Web site, the first level of technology integration toward an e-business model.

Some movement toward the next level of integration, namely e-commerce, is seen with the activities of allowing customers to place orders online (40.63%) and to interact electronically with the company (37.50%). These are both forward integration of technology in the supply chain. This would be consistent as a next step, requiring more technology integration. A much lower percentage of SMEs (21.88%) allow the supplier to interact electronically with the company, a backward integration of technology in the

supply chain. This would also entail a greater integration of technology especially if Requests For Quote (RFQ), a reverse auction model, is used. A number of large businesses like General Electric and Eastman Chemical use an e-procurement system with suppliers. Thus, this may be one factor that is driving SMEs toward technology and the e-business model.

Activity	Number	Yes	%
Provide information about products or service	64	39	60.94
Provide information about company	64	35	54.69
Allow customers to place or request orders online	64	26	40.63
Allow customers to interact electronically with company	64	24	37.50
Allow suppliers to interact electronically with company	64	14	21.88
Integrate with back office systems	64	7	10.94
Other	64	1	1.56

**Table 2: SME e-Commerce Activities**

Finally, the low percentage of integration with back office systems (10.94%) such as accounting and logistics indicates that the vast majority of SME manufacturing firms have not advanced to the stage of e-business. Consequently, these SMEs have far to go in this process.

To explore the issue further, the companies were then divided into groups based on the number of e-commerce activities in which they are engaged. This summary is shown in Table 3. Specifically, 28 % engaged in no electronic commerce activities at all while 21.87 % engaged in one or two electronic commerce activities. The largest percentage at 37.5 % engaged in three or four electronic commerce activities. This is an interesting finding showing that indeed SMEs have begun to embrace technology in their business operations.

In conjunction with Table 2, this suggests that as companies progress toward the e-business model they become engaged in several e-commerce activities. This increase in number of activities would be expected as level of integration increases.

Number of Activities	Frequency	Percent
None	18	28.13
1 – 2	14	21.87
3 – 4	24	37.50
5 – 7	8	12.50
Total	64	100.00

**Table 3: SME Number of e-Commerce Activities**

Furthermore, companies were asked what percentage of their business operation benefits from electronic commerce activities. The replies of respondents are shown in Table 4. More than three-fifths of companies stated that up to 20 % of their operations experienced benefits from their electronic commerce activities. Furthermore, 11% of companies reported 21 to 40% of their business operations received benefit from their

electronic commerce activities. This suggests that manufacturing firms recognize rewards as they progress toward a full e-business model.

Response	Number	Percent
None	8	14.81
1-20%	34	62.96
21-40%	6	11.11
41-60%	4	7.41
61-80%	1	1.85
81-100%	1	1.85
Total	54	

**Table 4: Percent of SMEs Business Operations Benefiting From e-Commerce Activities**

### *Web Site Activities*

The frequencies indicating whether companies are connected to the Internet and/or have a web site are reported in Table 5. The majority at 65.6 % have both, followed by those companies with an Internet connection but no web site at 23.4 %. But it is noteworthy that Table 5 also demonstrates that 89% of the companies have an Internet connection. Overall very few companies had neither a web site nor an Internet connection. This confirms the fact that most of these manufacturing SMEs have made the initial investment in technology and thus have the capability to engage in e-commerce activities.

Web Site and Internet Connection	Number	Yes	Percent
Neither Internet Connection nor Web Site	64	5	7.8
Internet Connection but No Web Site	64	15	23.4
Both Internet Connection and Web Site	64	42	65.6
Web Site but No Internet Connection	64	2	3.1

**Table 5: SME Report of Having a Web Site and Internet Connection**

Frequencies for type of Internet connection for companies are reported in Table 6. Overall, 27.8% of companies including those with electronic commerce activities remain on dial up connections. The other 72.2% use faster access, and companies with electronic commerce activities comprise 84.6% of the faster access group. So in general, those companies engaging in electronic commerce activities tend to use higher Internet connectivity speeds than those that are not. This result would be expected to facilitate the process of e-commerce and e-business in the most effective and efficient manner for all parties.

Type of Internet Connection	Companies Engaged in Specific Electronic					
	No		Yes		Total	
	Number	Percent	Number	Percent	Number	Percent
Dial up	6	50.0	9	21.4	15	27.8
ISDN, DSL, Cable	4	33.3	17	40.5	21	38.9
T1, T3, OC3	2	16.7	16	38.1	18	33.3
Total	12	100.0	42	100.0	54	100.0

**Table 6: Type of Internet Connection Used by Companies Engaged in Electronic Commerce Activities**

There was a significant relationship between whether a company had a web site and its reported percentage of business operations that experienced benefit from electronic commerce activities. This result is in Table 7 ( $X^2 = 6.2914$ , d.f. = 1,  $p=0.01$ ).

Percent of Business operations benefit from EC activities	Presence of a Company Web Site					
	No		Yes		Total	
	Number	Percent	Number	Percent	Number	Percent
None	5	41.7	3	7.1	8	14.8
1-100 %	7	58.3	39	92.9	46	85.2
Total	12	100.0	42	100.0	54	100.0

**Table 7: Presence of a Web Site and Percent of Operations Benefit from EC Activities**

The cell sizes were too small to permit breakdown of the percentage of benefit categories. Looking at absolute numbers, however, indicated that most SMEs experienced a 1-20 % business operations benefit from EC activities. Given the global competitiveness in today's market, any benefit of this magnitude is worth pursuing for a manufacturer.

Examining the data further, there was also a significant relationship between whether a company had a web site and the number of electronic commerce activities in which the company engaged. This result is in Table 8 ( $X^2 = 19.09$ , d.f. = 2,  $p=0.0005$ ).

Number of Electronic Commerce Activities	Presence of a Company Web Site					
	No		Yes		Total	
	Number	Percent	Number	Percent	Number	Percent
None	12	66.7	6	13.0	18	28.1
1-2	3	16.7	11	23.9	14	21.9
3-5	3	16.7	29	63.0	32	50.0
Total	18	100.1	46	99.9	64	100.0

**Table 8: Presence of a Web Site and the Extent of Electronic Commerce Activities**

This outcome reinforces the value of a web site to a manufacturing company in its progression toward a fully integrated e-business supply chain. A web site can be a

window to the company if it is developed to allow customer and supplier interaction for business, for example ordering online and e-procurement activities.

### ***Business Model Integration***

Significantly linked to whether a company had a web site were six activities that shared information electronically. These are listed in Table 9 by order of their significance.

	<b>Chi Square</b>	<b>df</b>	<b>Probability</b>
Sales/Marketing	13.5877	1	0.0002
Finance/Accounting	9.3527	1	0.0022
Production/Manufacturing	5.4708	1	0.0193
Purchasing/Procurement	4.8123	1	0.0283
Personnel/Human Resources	4.266	1	0.0250
Customer Communication	4.0491	1	0.0442

**Table 9: Electronic Commerce Activities Significant to Whether a Company Had a Web Site**

An explanation of the connection between these activities and the presence of a company web site relates to the degree or level of integration as the company traverses toward a fully integrated e-business model.

Sales/Marketing, Customer Communication, and Personnel/Human Resources categories could be accomplished through solely static web sites or through a more integrated e-commerce level if business transactions are occurring over the Internet. In the latter case, movement into the e-commerce level would be occurring during transition toward the fully integrated e-business model.

Finance/Accounting, Production/Manufacturing, Purchasing/Procurement activities all function at the e-business model level, requiring a transformation of the company into an Internet based networked enterprise.

Table 10 reports the type of tools that SMEs use to share information. The highest reported percentage is 78.13 % for e-mail communication. However, e-mail is a communication channel and not a true e-business connection in the supply chain. Of course, the Internet serves as an access for sharing of information at all levels for the company. Its reported percentage for sharing information is lower at 64.06%. Possibly the issue of privacy and security of information via the Internet still is a factor of concern for companies. SMEs utilized shared databases even less at 39.06%.

Electronic Data Interchange (EDI) is an expensive technology generally not affordable for SMEs. The relatively low percentage of SMEs using EDI may be both a reflection of too high a cost for them and also may indicate use of another tool such as eXtensible Markup Language (XML) for information exchange. The global introduction and acceptance of XML language for data sharing has greatly facilitated overcoming the obstacle of costly EDI.

And lastly according to responses, Groupware, software programs that allow people to communicate through the use of networks, has a limited application with SME manufacturers.

<b>Tools—multiple answers are possible</b>	<b>Number</b>	<b>Yes</b>	<b>Percent</b>
E-Mail	64	50	78.13
Internet	64	41	64.06
Shared Databases	64	25	39.06
EDI	64	10	15.63
Groupware	64	4	6.25

**Table 10: Tools Used by SMEs to Share Information**

One way of receiving e-commerce benefit from a system is its ability to interact with the existing computer systems within the company. An example would be the integration of an online order entry capability with the invoicing/accounts receivable computer program. Table 11 presents a summary of the respondents' perceptions of their company's e-commerce applications interaction with their other company systems.

<i>Response</i>	<b>Number</b>	<b>Percent</b>
No Interaction 1	25	47.17
2	17	32.08
3	7	13.21
4	2	3.77
Extensive Interaction 5	2	3.77
Total	53	

**Table 11: How Well e-Commerce Applications Interact With Other Computer Applications**

The largest response at 47.17% is troublesome since it indicates no interaction between or among the computer applications within the manufacturing company. This confirms that most of the companies are not at the e-business level of integration. The 32.08 % response indicates that most of those companies with computer interaction are reporting little interaction at best. Another 13.21 % of manufacturers have some computer applications integration with electronic commerce activities. So SME manufacturing companies seem to have just begun to move into e-commerce but have not yet arrived at e-business integration.

Finally, a company's commitment to e-commerce will be driven by its belief that e-commerce is important to the overall business. Table 12 presents the respondents' perceptions of the importance of e-commerce to their overall businesses.

<b>Response</b>	<b>Number</b>	<b>Percent</b>
Not At All Important 1	11	18.64
2	22	37.29
3	16	27.12
4	6	10.17
Very Important 5	4	6.78
Total	59	

**Table 12: How important e-commerce is to the overall business**

Even if SME manufacturers have not extensively integrated electronic commerce applications with their other computer applications (Table 11), more of them recognize the importance to e-commerce to their overall business. Overall, 64.41 % indicate that e-commerce has some importance to their business. And furthermore, 16.95 % indicate a more intense level of importance. Over time this vision should be followed by the action of more e-commerce and ultimately e-business activities within the company as technology becomes easier and less costly to implement.

Four categories of computer applications used by the company, as listed in Table 13, and four categories of types of information available electronically at the company, as listed in Table 14, were significantly linked to the importance of electronic commerce to the overall business. Again, cell sizes were too small to permit breakdown of the degree of importance. Nonetheless, any level of importance that is significant for the manufacturing SME is noteworthy.

	<b>Chi-Square</b>	<b>df</b>	<b>Probability</b>
Customer Profile Information	4.48	1	0.0250
Order Entry/POS	5.21	1	0.0250
Purchasing	3.83	1	0.0250
Product/Materials Inventory	6.04	1	0.0100

**Table 13: Computer Application Categories Significant to Electronic Commerce Importance to Overall Business**

An explanation of the connection between these categories and the importance of electronic commerce to the overall business relates to the nature of the category itself. Customer Profile Information and Order Entry/POS both deal directly with the customer while Purchasing and Product/Materials Inventory both relate to suppliers and efficiency of operations.

<b>Category of Information Available Electronically</b>	<b>Chi-Square</b>	<b>df</b>	<b>Probability</b>
Accounts Receivable	4.31	1	0.0250
Inventory Status	7.31	1	0.0050
Bid/Quotes	5.79	1	0.0100

**Table 14: Categories of Information Available Electronically Significant to Electronic Commerce Importance to Overall Business**

An explanation of the connection between the categories in Table 14 and the importance of electronic commerce to the overall business again relates to the nature of the category itself. Accounts receivable and inventory both primarily affect the demand chain created by customers while bid/quotes impact the supply chain created by vendors. This further increases their importance as these are the two terminals of a company's value chain.

Building on the quantitative data that has been received is the qualitative data that indicates the state of e-business in SMEs as well as the frustrations with which some are dealing. The following quotes are directly from the respondents and add additional insights.

“I wish I had devoted more time and money to Ecommerce. If I continue operating the company, Ecommerce will be a major part of marketing ordering and account receivable.”

“Allowing customers to interact and place orders on line can be very important to us, but we aren't there yet.”

“Bidding for business we've had for 30 years, with on-line bidding is the worst thing I've ever seen!”

These quotes further emphasize the point that e-business is a disruptive technology and remains an issue that SMEs need to address and update continually. The last quote is particularly interesting because it highlights the impact that e-commerce is having on entire industries and recognizes the fact that SMEs can not avoid or ignore this impact.

### **Limitations, Conclusions and Directions for Future Research**

Due to the nature of SMEs and their low response rates, the low response rate is a concern and might impact the generalizability of the study. However, each strata of the population was addressed. In addition the choice of a single reason and single business industry also decreases the generalizability of the study.

Clearly this study provides a good foundation and provides some interesting insights into the state of e-business for manufacturing SMEs. E-business has effectively shifted the paradigm and defined a new business model that changes the dynamics of business, and SMEs are not immune to its impacts. The respondent companies are a diverse group and are at different stages in implementation of e-commerce applications within their organizations. Yet, they are receiving some benefit from e-commerce, and they recognize the importance of e-commerce to their organization's survival.

Building on this foundation, future research should include a greater variety and number of SMEs. It should also address in depth the specific benefits of e-commerce adoption for SMEs. Much of the e-business research that has been conducted on large businesses should also be conducted on SMEs, not only because SMEs can be more responsive to changing market conditions but also because they can suffer a greater level of harm from disruptive technology.

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