

# Electronic Commerce: An Alternative for Small Businesses

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## Abstract

Electronic commerce technology offers new opportunities for small and medium-sized enterprises to extend their customer base in the global marketplace. One of the major technological challenges for many of these businesses is the lack of both information technology skills and knowledge about electronic commerce. Adopting electronic commerce can be difficult and without these needed skills and appropriate knowledge, businesses cannot make sound decisions for either daily or long-term operations. The purpose of this research was to investigate the success and failure rates of small businesses that engaged in electronic commerce by evaluating their sales performance. The data used included both the revenues from total sales and the electronic commerce portion of these revenues for the period of 1998-2001. Factors investigated included the year-to-year change in revenue and the percentage of total sales related to electronic commerce.

**Keywords:** electronic commerce, business-to-business, business-to-customer, B2B, B2C

## 1. INTRODUCTION

Electronic Commerce (E-commerce) is defined as the ability to perform transactions involving the exchange of goods or services between two or more parties using electronic tools and techniques (Economist 2000). In recent years, this technology has caused significant changes in how business is conducted in many organizations. E-commerce includes the functions of information exchange and commercial transaction over telecommunication networks linking partners. The concept originated in the form of Electronic Data Interchange (EDI) on value-added networks with rigid and relatively complex specifications, and it tended to be im-

posed by large organizations upon their smaller suppliers (Raymond and Bergero 1996). This mutation in commercial relationships and transactions also happened within small and medium-sized enterprises (Bloch 1996). As Simon (1999) observed, small businesses are a special case, as they are often less structured and less formal with fewer fixed procedures. Many small businesses do not possess the technological background and information infrastructure that could enable them to operate more effectively or cost-efficiently (Poon and Swatman, 1999).

Small and medium-sized enterprises (SMEs) are large employers and their activities have had a profound impact on the economy (Bradford 2002). The

Table 1: Technology Architecture  
for Electronic Commerce

<b>E-commerce Technology Services</b>
<b>Application Services</b> <ul style="list-style-type: none"> <li>- Business to consumer</li> <li>- Business to business</li> <li>- Internal business processes</li> </ul>
<b>Data Management</b> <ul style="list-style-type: none"> <li>- Interactive order processing</li> <li>- Secure payment systems</li> <li>- Clearinghouses for virtual malls</li> </ul>
<b>Interface Services</b> <ul style="list-style-type: none"> <li>- Interactive catalogs</li> <li>- Directory support functions</li> <li>- Software agents</li> </ul>
<b>Secure Messaging</b> <ul style="list-style-type: none"> <li>- Secure hypertext transfer protocol</li> <li>- Encrypted E-mail and Electronic data interchange</li> <li>- Remote programming interface</li> </ul>
<b>Middle-ware Services</b> <ul style="list-style-type: none"> <li>- Hypermedia document management</li> <li>- Web/legacy systems interface</li> </ul>
<b>Network Infrastructure</b> <ul style="list-style-type: none"> <li>- The Internet, intranet, and extranet</li> <li>- Client/server and other networks</li> </ul>

Source: *Management Information Systems* by James A. O'Brien (4<sup>th</sup> ed. 1999)

World Wide Web offers exciting new opportunities for SMEs to extend their customer base into the global marketplace (OECD 1993). The reasons for the participation of small businesses in the electronic market are as varied as the businesses themselves (Fraser 2000). However, according to Auger and Gallagher (1997), the primary drivers appear to include an affluent customer base, lower information dissemination costs, lower transaction costs, a broader market reach, and the opportunity to provide increased service through more readily available and timely consumer and market databases.

On the negative side, small businesses must be concerned about issues such as controlling site usage, maintaining security, and gaining access to adequate and competitive business tools in order to generate return on their investments. Overall, small businesses do not seem to have a clear picture of Internet technology and its possible applications in business.

## 2. BACKGROUND

Electronic commerce is a new way to conduct business that affects not only firms' internal busi-

ness activities, but also requires new kinds of coordination with clients and other institutions. Table 1 outlines the technology service architecture for E-commerce. This architecture serves as an organizing framework for the range of services that must be provided to support a company's electronic commerce systems. In this framework, E-commerce applications involve six layers of information technology services: application services, brokerage and data management, interface services, secure messaging, middle-ware services, and network infrastructure.

According to the Assistant Administrator for Technology for the U. S. Small Business Administration (SBA 2002), many small businesses are being formed specifically to address this newfound opportunity. Earlier, the SBA Office of Advocacy noted that, "Internet sales account for less than 1% of total retail sales in the U. S. economy" but "online retail marketing is showing about 200% annual growth" (SBA 1999). However, small businesses are often less structured and formal, with fewer fixed procedures and are less likely to have their own IT departments, with resident expertise (Simon 1999).

According to a study done by the International Data Corporation (IDC, 2000), there were 7.2 million small businesses in the United States in 1997. Of these businesses, 78% owned at least one personal computer, of which 39% had access to the Internet. Significant numbers of small businesses started engaging in E-commerce in 1997, and gradually, the number of wired small businesses has more than doubled. Those that have adopted E-commerce enjoy higher revenues and faster growth than their counterparts. The average yearly revenue for all small businesses was approximately \$2.7 million, but for those engaged in electronic commerce the average was about \$3.8 million (IDC 1998).

According to the Aberdeen Group (John 2000), 850,000 new small businesses are created each year and 66% of all new jobs are created in this sector. Small businesses account for 50% to 55% of all spending on indirect materials and services, including everything from computers to cleaning supplies. The SBA estimates that there are more than 25 million small businesses in the United States (SBA, 2002). However, the opportunities available on the Internet are not accessible to all possible users. Most small businesses are flexible and adapt to changes readily, but they also suffer from a lack of resources of various kinds. Many either do not possess the appropriate technological

background or may not perceive the ways in which such an information infrastructure could enable them to operate their businesses more efficiently or cost-effectively.

Technical problems concerning connectivity and owner/operator commitment are an important, if not critical, factor for success. These technical problems can become potentially insuperable barriers for small businesses wishing to use E-commerce for business activities and operations (Fuller and Jenkins 1995). However, these constraints have lessened through the substantial increase in the business activities of Internet Service Providers (ISPs) and Internet Presence Providers (IPPs).

Recent literature on training and development indicates the adequacy of technical skills as a preliminary barrier for increasing the use of E-commerce by small businesses. One research study conducted in Queensland focused on small businesses and more than 90% of the participants were the business owners. All participants believed that electronic commerce necessitated the expenditure of large amounts of money for the hardware, software, advice and skills development. Further study indicates that there is no clear understanding of the scale of costs involved or the potential return on investment (Bradford 2002).

E-commerce innovations aim to reduce the cost of procurement before, during and after each transaction. However, search costs can be significant, relative to the value of the product, particularly for small purchases. Lehman Brothers found that a financial transaction costs \$1.27 for a teller, \$0.27 for an automated teller machine (ATM) and \$0.01 online (Economist 2000). Average online brokerage fees have been reduced to less than \$5, versus traditional discount brokerage fees exceeding \$50. Therefore there is a significant potential decrease in costs for back-office operations and brokerage transactions financial exchanges. By lowering the costs of transactions, E-commerce will change not only operating costs but also the characteristics and scope of feasible transactions (Daniel 2000).

### 3. METHODOLOGY

This study applied a data-driven approach and used the available data to identify variables for small business and E-commerce, its implementation, and factors leading to success and failure. Experts were chosen based on their knowledge and published opinions in books, academic publications, and trade or business journals. The period of the search was

from 1998 through March 2003. However, the US Department of Commerce data for the year 2002 was not yet available. The information resources included three academic databases, a government site, and five industry online web databases as indicated below:

- Dissertation Abstracts 1995 – 2003
- The ERIC Database 1995 – 2003
- Applied Science and Technology
- Proquest database
- Census.gov
- Brint.com
- Businessweek.com
- Business2.com
- Netobjects.com
- Sba.gov

The data set included the sales from traditional and electronic commerce for the same type of businesses in the same time period. A total of sixteen business types were investigated, focusing on business-to-business (B2B) and business-to-consumer (B2C) electronic commerce. The products were categorized into two main groups: durable and non-durable. Each category contained eight different types of businesses.

#### Research Issues Examined

Eight research issues were formulated and examined in this study:

1. What percentage of small businesses with Internet access had a Net presence, either a home page or web site?
2. What percentage of small businesses with Internet access actually engaged in E-commerce?
3. What percentage of the reviewed B2B small businesses, that sold *durable goods*, engaged in E-commerce and what was their success rate? Success is defined as an annual revenue increase.
4. What percentage of the reviewed B2B small businesses that sold *non-durable goods* was engaged in E-commerce and what was their success rate?
5. What percentage of the reviewed B2C small businesses that sold *durable goods* was engaged in E-commerce and what was their success rate?
6. What percentage of the reviewed B2C small businesses that sold *non-durable goods* was engaged in E-commerce and what was their success rate?

Product	Value of Revenue							
	1998		1999		2000		2001	
Durable goods	Total Sales	E-C	Total Sales	E-C	Total Sales	E-C	Total Sales	E-C
Motor vehicle and parts	173240	29533	196078	37046	199622	40127	203156	44124
Furniture and home furnishings	40423	N/A	42660	2575	46710	2830	44385	3910
Construction materials	63660	1432	71451	1974	70778	2187	73553	2236
Professional / commercial quip	254067	16077	274373	23994	269129	30832	249981	30904
Computer Hardware/ software	150784	8432	161489	16366	150402	18948	122458	15776
Electrical goods	186720	3728	207976	8834	240013	11087	213767	12342
Plumbing / heating Equip	60352	4326	63378	5904	67084	5977	64813	6487
Machinery equipment	242530	N/A	244509	7105	252365	7592	243327	7948
Miscellaneous	147652	2343	158988	9371	174078	12901	161584	14124
Total Retail Revenue	1319428	65871	1420902	113169	1470181	132481	1377024	137851

*Source: U.S. Census Bureau Annual Trade Survey. Sales are in millions.  
N/A: Data not available, did not meet publication standards.*

7. What percentage of all reviewed small businesses that sold both durable and non-durable goods was engaged in E-commerce?
8. What does an analysis, of all of the above, indicate about the types of businesses that are most suitable for E-commerce?

#### Method of Analysis and Presentation

A simple synthesized procedure was used to tally and evaluate the outcomes. Tables 2, 3, 6, and 7 were used to tabulate the data for the whole sale (B2B) types of businesses, while Tables 4, 5, 8, and 9 were used for the retail businesses (B2C). Tables 2, 3, 4, and 5 were used to tabulate the total sales and E-commerce sales for 1998 to 2001. Tables 6, 7, 8 and 9 were derived using data from the previous tables to compute the percentage of revenue change for each type of business on an annual basis. This data was used to identify the year-to-year percentage revenue change for each type of business both for the total sales and E-commerce.

## 4. FINDINGS

The data set related to businesses and electronic commerce was collected from the Census Bureau and the International Data Corporation web site. These facts were then synthesized and organized into tabular forms for analysis and presentation. Other information was then gathered from the Small Business Administration, in the form of white papers, and from expert academicians and industry practitioners.

#### Outcomes of Processes

Sixteen different types of businesses were investigated, focusing on business-to-business and business to consumer E-commerce types. These businesses were categorized into two main groups, based on the product or service provided: either durable or non-durable goods. Each category consisted of eight business types.

Table 2 consists of the B2B revenue data collected for durable goods, 1998 to 2001. As stated above, the 2002 data should be available at a later date and contribute to future studies. As this table shows, motor vehicles and parts, computer hardware and software, and electrical goods businesses utilized online business more than the others. Their online annual sales have been increasing steadily.

Table 3 consists of the B2B revenue data collected for non-durable goods, 1998 - 2001. There is a steady increase in revenue sales from electronic commerce for the following types of businesses: books, clothing and medicine.

Table 4 consists of Retail revenue collected for Durable goods for the years 1998 through 2001. The available data indicates that consumers patronized more of the following types of businesses: motor vehicle and parts, furniture, computer software and electronics.

Table 5 shows B2C revenue for non-durable goods during 1998 - 2001. More consumers patronized

Table 3  
Small Businesses – Non-durable B2B (Total and E-commerce Sales)

Product	Value of Revenue							
	1998		1999		2000		2001	
Non-durable Goods	Total Sales	E-C	Total Sales	E-C	Total Sales	E-C	Total Sales	E-C
Paper and paper products	71217	1322	75034	2355	80054	3473	75516	3708
Drugs	124564	37705	146183	52197	168454	77790	201299	96754
Apparel	84190	3484	85677	7123	88922	10284	87362	11840
Groceries and related products	344437	N/A	360268	4856	381990	11435	395590	12101
Farm products	107993	N/A	101648	3196	107121	3228	107389	3356
Chemical and allied products	55073	N/A	55129	N/A	58976	N/A	59004	N/A
Petroleum products	116397	N/A	136352	N/A	185911	N/A	180471	N/A
Beer, wine/ alcoholic	61822	N/A	67384	N/A	71551	N/A	75274	N/A
Miscellaneous	149655	N/A	158040	4508	175589	5033	176007	5116
Total non-Durable Goods	1115348	42511	1185715	74235	1318568	111243	1357912	132875
Overall total Wholesale trade (Table 2 & 3)	2434776	108382	2606617	187404	2788749	243724	2734936	270726

*Source: U.S. Census Bureau Annual Trade Survey*

Table 4  
Small Businesses – Durable goods B2C (Total and E-commerce Sales)

Product	Value of Revenue							
	1998		1999		2000		2001	
Durable goods	Total Sales	E-C	Total Sales	E-C	Total Sales	E-C	Total Sales	E-C
Motor vehicle and parts	699552	N/A	779981	1794	816902	4296	839971	5372
Furniture and home furnish	78576	N/A	90705	288	96815	979	98052	1659
Building material	243494	N/A	264194	N/A	276533	447	288972	525
Computer Hardware	N/A	N/A	23016	4224	26462	6128	22134	5678
Computer Software	N/A	N/A	2670	768	3568	1107	3994	1208
Electronics and appliances	N/A	N/A	2611	464	3338	1080	3718	1448
Other merchandise	N/A	N/A	14776	947	15933	1863	16142	3062
Total Durable Retail Sales	1021622	N/A	1177953	8485	1239551	15900	1272983	18952

*Source: U.S. Census Bureau, Annual Retail Trade Survey*

the following type of businesses: medications, clothing and office equipment and supplies.

Table 6 illustrates the year-to-year change in B2B revenue for durable goods, 1998 to 2001. This table was generated from Table 2 by calculating the difference in revenue change in total sales and E-commerce for each business. The table reveals that a higher percentage of small businesses selling durable goods are engaged in E-commerce.

Table 7 shows the year-to-year revenue change in B2B for non-durable goods, 1998 through 2001.

This table, generated from Table 3, evaluates the revenue change between the years, both in traditional and electronic commerce. By calculating the difference in revenue percentage change in total sales and E-commerce for each business, it is revealed that a higher percentage of these businesses are engaged in E-commerce more than in traditional commerce.

Table 8 illustrates year-to-year revenue changes in B2C durable goods during 1998 - 2001. This table was generated from Table 4, by calculating the difference in revenue percentage change in total

Table 5  
Small Businesses – Non-durable B2C (Total and E-commerce Sales)

Product	Value of Revenue							
	1998		1999		2000		2001	
Non-durable Goods	Total Sales	E-C	Total Sales	E-C	Total Sales	E-C	Total Sales	E-C
Food, Beer, Wine and Beverages	421578	N/A	442771	233	461976	566	483256	447
Drugs Health and personal care	130234	N/A	156807	232	171915	673	184412	952
Gasoline stations	191750	N/A	208908	N/A	246038	N/A	244664	N/A
Clothing and accessories	149443	N/A	172548	914	182626	2313	182050	3619
Sporting goods	69459	N/A	73909	262	77673	400	79007	505
General merchandise	351799	N/A	382564	N/A	405978	N/A	429812	N/A
Books and magazines	N/A	N/A	3480	1604	4115	1833	3864	1748
Music and videos	N/A	N/A	4335	809	4393	1186	3980	1318
Office equipment and supplies	N/A	N/A	7285	610	6936	1439	6454	1987
Toys and games	N/A	N/A	2255	398	3146	842	3035	929
Total Non-durable goods	1314263	N/A	1454862	5062	1564796	9252	1620534	11505

*Source: U.S. Census Bureau Annual Trade Survey*

Table 6  
Small Businesses Durable Goods B2B (Year to Year % Sales Change)

Product	1998-1999		1999-2000		2000-2001	
	Total Sales	E-C	Total Sales	E-C	Total Sales	E-C
Motor vehicle and parts	13.2	25.4	1.8	8.3	1.8	10.0
Furniture and home furnishings	5.5	N/A	9.5	9.9	(5.0)	38.2
Construction materials	12.2	37.8	(0.9)	10.8	3.9	2.2
Professional/commercial equip.	8.0	49.2	(1.9)	28.5	(7.1)	0.2
Computer equipment / software	7.1	94.1	(6.9)	15.8	(19.2)	(16.7)
Electrical goods	11.4	136.9	15.4	25.5	(10.9)	11.3
Plumbing / heating equipment	5.0	36.5	5.8	1.2	(3.5)	8.5
Machinery equipment	0.8	N/A	3.2	6.9	3.6	4.7
Miscellaneous	7.7	300	9.5	37.7	(7.2)	9.5
Total durable goods	7.7	71.8	3.5	17.1	(6.3)	4.1

sales and electronic commerce for each business. A sizeable number of consumers do business online from the comfort of their homes or offices. The percentage in revenue changes for E-commerce is much higher than that from traditional commerce, thus indicating a good success rate.

Table 9 consists of the year-to-year revenue changes in B2C non-durable goods for the years 1998 through 2001. This table was generated from Table 5, by calculating the difference in revenue percentage changes in total sales and E-commerce for each business. A high percentage of the businesses in non-durable goods engaged in E-commerce; the increase in revenue shows a high success rate in E-commerce. Only gas stations and general merchandise goods did not have available data.

## Summary of Findings

Eight research issues were formulated and examined in this research:

- The first research issue was to identify the percentage of small businesses with online access that has an Internet presence. As Figure 1 shows, about 60% of small businesses with online access have a Net presence, either a homepage or a web site.
- The second research issue was to find the percentage of small businesses with Internet access that were engaged in electronic commerce. Figure 1 shows that of the 60% of small businesses with online access, only about one-half sell goods online.

Table 7  
Small Businesses Non-durable Goods B2B (Year to Year % Sales change)

Products	1998-1999		1999-2000		2000-2001	
	Total Sales	E-C	Total Sales	E-C	Total Sales	E-C
Paper and paper products	5.4	78.1	6.7	47.5	(5.7)	6.8
Drugs	17.4	38.4	15.2	49.0	19.5	24.4
Apparel	1.8	104.4	3.8	44.4	(1.8)	15.1
Groceries and related products	4.6	N/A	6.0	135.5	3.6	5.8
Farm products	(5.9)	N/A	5.4	1.0	0.3	4.0
Chemical and allied products	0.1	N/A	7.0	N/A	0.1	N/A
Petroleum products	17.1	N/A	36.3	N/A	(2.9)	N/A
Beer, wine / alcoholic drinks	9.0	N/A	6.2	N/A	5.2	N/A
Miscellaneous non-durable goods	5.6	N/A	11.1	11.6	0.2	1.6
Total non-durable goods	6.3	74.6	11.2	49.9	3.0	19.4
Overall total Wholesale Revenue (Table 2 & 3)	7.1	72.9	7.0	30.1	(2.0)	11.1

Table 8  
Small Businesses – Durable Goods B2C (Year to Year % Sales change).

Products	1998-1999		1999-2000		2000-2001	
	Total Sales	E-C	Total Sales	E-C	Total Sales	E-C
Motor vehicle and parts	11.5	N/A	4.7	139.5	2.8	25.0
Furniture and home furnishings	15.4	N/A	6.7	240	1.3	69.5
Construction materials	8.5	N/A	4.7	N/A	4.5	17.4
Computer hardware	N/A	N/A	15.0	45.1	(16.4)	(7.3)
Computer software	N/A	N/A	33.6	44.1	11.9	9.1
Electronics and appliances	N/A	N/A	27.8	132.8	11.4	34.1
Miscellaneous	N/A	N/A	7.8	96.7	1.3	64.4
Total Durable goods Revenue	15.3	N/A	5.2	87.4	2.7	19.2

- The third research issue was to find what percentage of B2B dealing with durable goods was engaged in E-commerce. Review of the available data (in Table 2) indicates that *all* the selected B2B types selling durable goods engage in E-commerce. The annual changes in total and E-commerce sales of this type of business shows Table 6.
- The fourth issue was to identify what percentage of B2Bs, selling non-durable goods, was engaged in E-commerce. As Table 3 shows, about 67% of these types of businesses were using E-commerce. Table 7 depicts the annual changes in total and E-commerce portion of these types of businesses.
- The fifth issue was to identify what percentage of B2C type businesses, selling durable goods, engaged in E-commerce. As Table 4 shows, the selected B2C types selling durable goods are more involved in E-commerce as Table 8 illustrates this through the annual sales changes.
- The sixth issue was to identify the percentage of B2C type businesses, selling non-durable goods, were engaged in E-commerce. As Table 5 shows, only two of these business types were not involved in E-commerce during 1998-2001. Table 9 shows the annual changes of these type of businesses.
- The seventh issue was to identify what percentage of all reviewed businesses was engaged in E-commerce. Of the 32 businesses reviewed, 27 or 84% had E-commerce revenue (Tables 2, 3, 4 and 5.)
- The eighth issue was to synthesize all of the above to identify the businesses with the best E-commerce potential. The analysis revealed that not all businesses can readily adapt to E-commerce. The potentially successful E-commerce businesses are those with a steady annual increase in revenue with respect to the total sales changes. These businesses include all of those in the B2B and B2C types businesses that are selling non-durable goods.

Table 9  
Small Businesses – Non-durable Goods B2C (Year to Year % Sales change)

Products	1998-1999		1999-2000		2000-2001	
	Total Sales	E-C	Total Sales	E-C	Total Sales	E-C
Food, Beer, Wine and beverages	5.0	N/A	4.3	143	4.6	(21.0)
Drugs, Health and Professional care	20.4	N/A	9.6	190	7.3	41.5
Gasoline stations	8.9	N/A	17.8	N/A	(0.6)	N/A
Clothing and accessories	15.5	N/A	5.8	153	0.3	56.5
Sporting goods	6.4	N/A	5.1	52.7	1.7	26.3
General merchandise stores	8.7	N/A	6.1	N/A	5.9	N/A
Books and magazines	N/A	N/A	18.2	14.3	(6.1)	(4.6)
Music and videos	N/A	N/A	1.3	46.6	(9.4)	11.1
Office equipment and supplies	N/A	N/A	(4.8)	135.9	(6.9)	38.1
Toys and games	N/A	N/A	39.5	111.6	(3.5)	10.3
Total Non-durable goods Revenue	10.6	N/A	7.6	82.8	3.6	24.4

Finally, this study investigated the overall annual percentage changes in total and in E-commerce for B2B and B2C types. This includes the selling of both durable and non-durable goods. The results were presented in Figures 2 and 3 using the following acronyms:

percentage changes in total sales. Even during the 2000-01 period when there was a serious decline in total sales, the E-commerce portion managed to stay on the positive side. Figure 3 confirms the same results for B2C businesses.

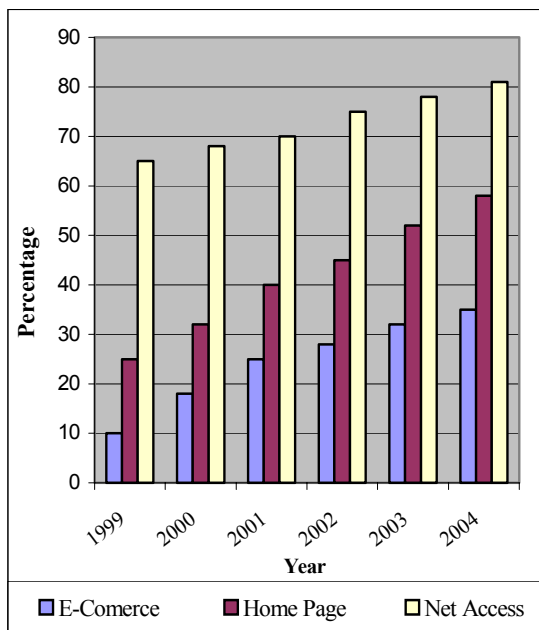


Figure 1: Access and Online Activities

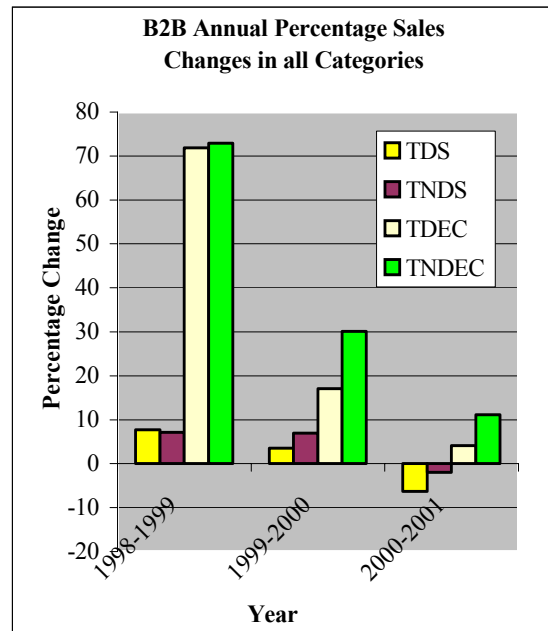


Figure 2: Annual Changes in B2B Businesses

- TDS - Total Durable Sales
- TNDS - Total Non-Durable Sales
- TDEC - Total E-Commerce Sales
- TNDEC - Total Non-Durable E-Commerce Sales

However, the lack of data in 1998-99 indicates that B2C businesses are more cautious in adopting this new approach.

As Figure 2 shows, the percentage of the changes in annual sales in E-commerce is much higher than



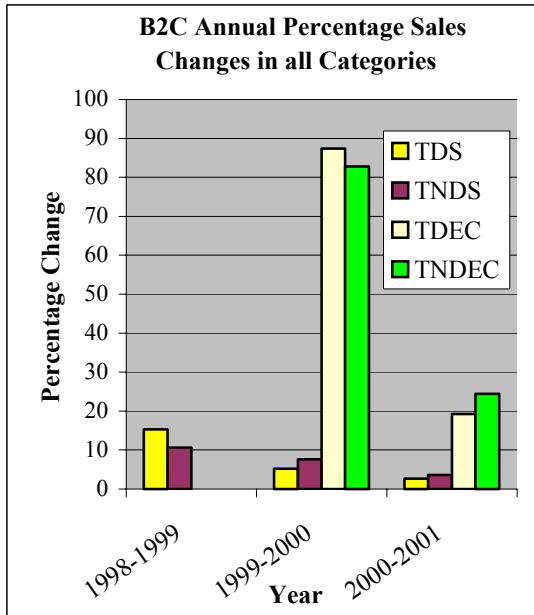


Figure 3: Annual Changes in B2C Businesses

## 5. CONCLUSIONS

The purpose of this research was to investigate the success and failure rates of small businesses that engaged in electronic commerce by evaluating their sales performance. Based on the results reported, the study found that more businesses are adopting E-commerce each year and actively using the Internet to reach new markets. However, further analysis revealed that not all businesses can readily adapt to E-commerce environment and discover ways that it could enhance their businesses. The potentially successful E-commerce businesses are those with steady annual increase in revenue with respect to the total sales changes. These businesses include those in B2B type selling durable goods and the B2C type selling selective non-durable goods.

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