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**Use of
Electronic Data Interchange
Technology in the Tennessee Valley**

Honors Program
Senior Research Project

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Spring 2006

Abstract

This Honors Senior Project will explore the historical trends and the current uses of electronic data interchange (EDI). In recent years, EDI has been described as “the electronic transmission of purchase-related data such as orders, shipping notices, invoices, credits and other adjustments, and payment notices” (Maness 681). The project will be divided into two parts. The first part will concentrate on the history and creation of EDI; in addition, it will focus on the advantages and disadvantages of using EDI. These topics will be researched through practitioners’ journals, newspapers, magazines, and books dealing with business issues and trends. The second part of the project will involve a survey of companies with headquarters in the Tennessee Valley. The survey will address issues related to the current EDI practices of the companies. The second part will also include conclusions drawn about the degree of usage and the types of usage based upon the participants’ responses.

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INTRODUCTION

In today's business world, companies are always attempting to become more competitive and to generate higher profits. Electronic data interchange (EDI) is a technology that can help businesses attain their goals by creating cost efficiencies, advanced internal processes, and superior customer service, as well as other benefits that companies need to succeed. In recent years, EDI has been described as "the electronic transmission of purchase-related data such as orders, shipping notices, invoices, credits and other adjustments, and payment notices" (Maness 681). This paper reviews relevant information about the history, types, components, advantages, and disadvantages of EDI, as well as the current usage of EDI in the Tennessee Valley area.

METHODS USED TO PERFORM THE PROJECT

The project is divided into two parts. The first part of the project concentrates on the history and creation of EDI; in addition, it focuses on the advantages and disadvantages of using EDI. These topics have been researched through practitioners' journals, newspapers, magazines, and books dealing with business issues and trends.

The second part of the project involves a survey sent to companies with headquarters in the Tennessee Valley. The survey addresses issues related to the current EDI practices of the companies. The results of the survey were collected and analyzed. The responses

were used to produce calculations in an Excel spreadsheet, a copy of which can be found in Appendix C. A summary of the results of the survey was then created and is also included in Appendix D. The second part of this paper includes conclusions drawn about the degree of usage and the types of usage based upon the participants' responses.

PART 1

DESCRIPTION OF EDI

Defining EDI has proven to be a bit of a challenge. Ian Walden and Ashley Braganza, editors of *EDI: Audit and Control*, have a very simple definition of EDI. They claim, "Electronic data interchange is the exchange of structured data" (iii). However, most experts would expand on this definition such as the following: "Electronic data interchange is the inter-organizational, computer-to-computer exchange of business documentation in a standard, machine-processable format" (Emmelhainz 4).

Regardless of the exact definition, EDI is considered to be the "first form of electronic commerce to be widely used in business" (Schneider 333). Those that use EDI to conduct business are trading partners. Trading partners have to use the same standard formats in order to be EDI-compatible (Schneider 332). The data that trading partners exchange is structured by utilizing line breaks and text delimiters (Sills 455).

Traditionally, business has been conducted by using a paper process that Gary P. Schneider, Ph.D., co-author of *Electronic Commerce*, calls “slow, inefficient, expensive, redundant, and unreliable” (333). An example of this manual, paper-based process can be seen in Figure 1.

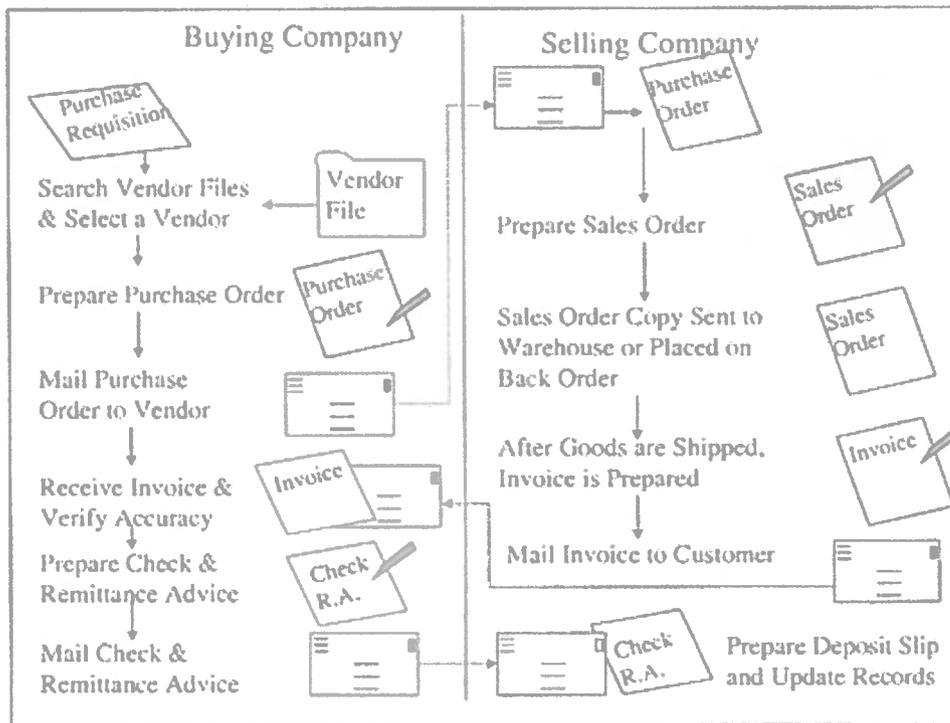


Figure 1. “Paper-based Processing.”

Source: Marilyn Greenstein, Ph.D. and Todd M. Feinman (103).

Using a paper-based process instead of EDI can create problems including low accuracy, increased time, high labor usage, lost data, and high uncertainty (Emmelhainz 8).

Fortunately, EDI eliminates these problems. However, “the purpose of EDI is not to eliminate paper, but rather to eliminate the time and the data entry associated with paper.

It is generally accepted that 70% of one computer's business data output becomes a second computer's business data input" (Emmelhainz 4). EDI is credited with bringing "order to the chaotic world of invoices, bills of lading, purchase orders, adjustments, and acknowledgements" (DeMaio 36). An example of a fully integrated EDI system can be seen in Figure 2.

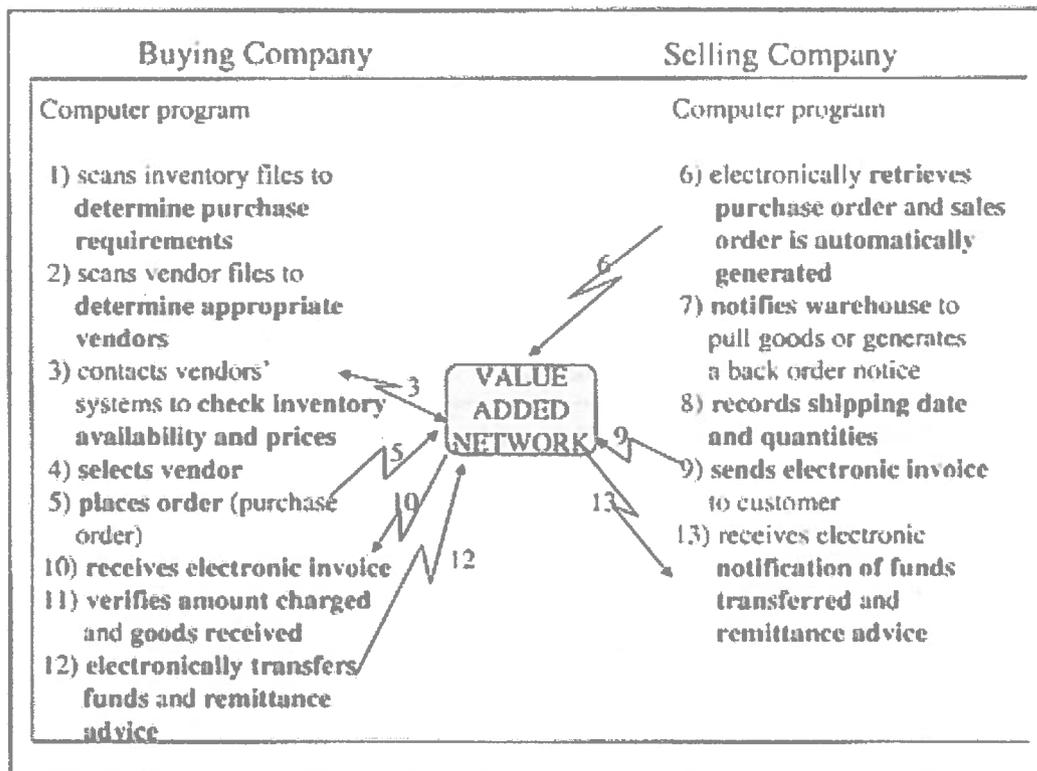


Figure 2. "Fully Integrated EDI System."

Source: Marilyn Greenstein, Ph.D. and Todd M. Feinman (107).

HISTORY OF EDI

The idea of EDI first came to Edward Guilbert in 1948 in Berlin because of the necessity to improve business transactions at the Berlin Airlift (Thierauf 4). Mr. Guilbert was serving as the director of traffic there at the time and was having a difficult time dealing with the business transactions which were conducted by a paper process; often, the paper documents that described the goods to be delivered did not arrive until after the goods had arrived (Thierauf 4). Mr. Guilbert, therefore, began implementing and improving his EDI process in order to improve business transactions at Berlin. He continued to improve the process and became adamant in his position eight years later at the Hungarian Airlift that a plane would not be allowed “to take off unless relevant information preceded it” (Thierauf 4).

Along with a few of his colleagues, Mr. Guilbert founded the Transportation Data Coordinating Committee (TDCC) in 1968 in order to “support the standardization of tariffs for overseas shipments” and with the mission of “convincing business managers that it is far better to do business via a computer than on paper” (Thierauf 4). The TDCC then made public the first EDI documentation, “Rail Transportation Industry Applications,” in 1975 (Thierauf 5).

The time was right for EDI to emerge. Schneider writes of the era the following:

By the 1960s, businesses that engaged in large volumes of transactions with each other had begun exchanging transaction information on punched cards or

magnetic tape. Advances in data communications technology eventually allowed trading partners to transfer data over telephone lines instead of shipping punched cards or magnetic tapes to each other. (333)

EDI standards that had the ability to be used in all industries came into being in the 1970s when the American National Standards Institute (ANSI) created the Accredited Standards Committee (ASC), called the “X12,” for the purpose of constructing the said standards (Emmelhainz 14). Changes came to EDI usage again in the mid-1980s when the United Nations Economic Commission for Europe and EDI specialists from both Europe and North America came together to “build a common set of EDI standards based on the successful experiences of U.S. firms in using the ASC X12 standards” (Schneider 335). *EDI for Administration, Commerce, and Transport* (EDIFACT or UN/EDIFACT) became the first set of standards presented by the United Nations in 1987 (Schneider 335).

IMPLEMENTATION OF EDI

In most business relationships, the components of EDI are standards and value-added networks (Emmelhainz 13). These are needed for EDI to be useful to trading partners. EDI can also be implemented partially or fully.

Standards

The standards for using EDI in North America are controlled and maintained by the American National Standards Institute (ANSI) X12 subcommittee (Greenstein 101). The subcommittee was created in 1979, and the ASC X12 standard now includes “specifications for several hundred transaction sets, which are the names of the formats for specific business data interchanges” (Schneider 334). Both the ASC X12 and the EDIFACT (mentioned earlier) standards contain similar transaction sets (Schneider 335).

Value-Added Networks

As mentioned earlier, value-added networks can be used to implement EDI although they are not necessary for companies using direct connection EDI as explained later in this paper. Schneider explains, “A value-added network (VAN) is a company that provides communications equipment, software, and skills needed to receive, store, and forward electronic messages that contain EDI transaction sets” (340). The purpose of a VAN is to “execute only authorized transactions with valid trading partners” (Greenstein 104).

Partially Integrated EDI

A partially integrated EDI system is exactly what its name suggests; only part of the business transaction is conducted using EDI while the rest is conducted using the traditional paper-based process. Using a partially integrated EDI system can reduce the time needed to conduct a business transaction by 3 to 7 days (Greenstein 106). For an example of a partially integrated EDI system, see Figure 3.

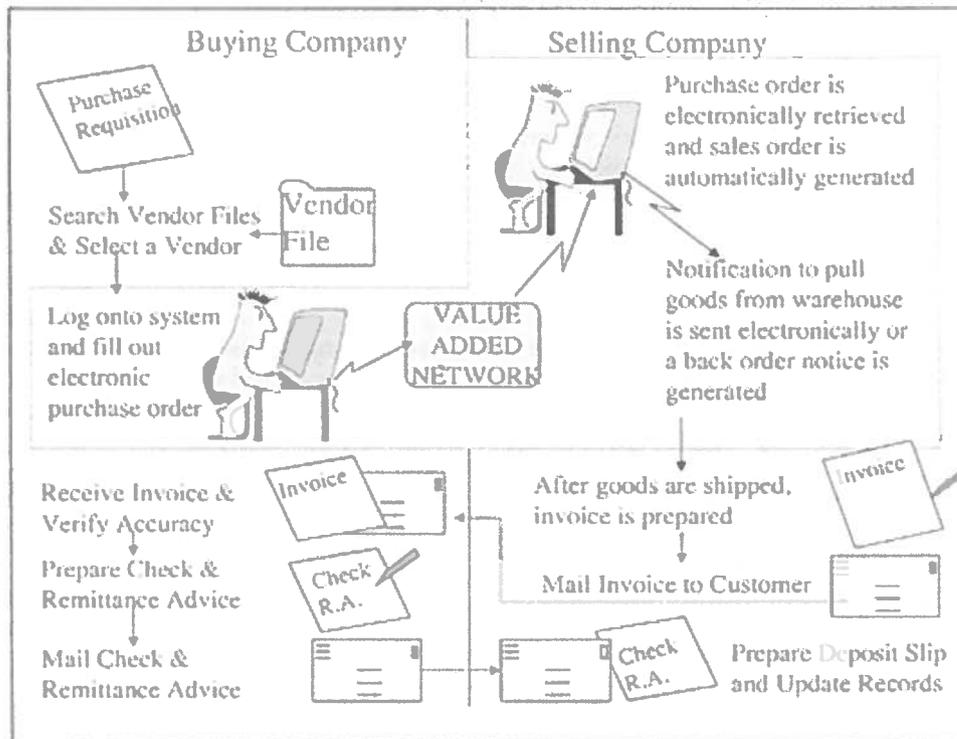


Figure 3. "Partially Integrated EDI System."

Source: Marilyn Greenstein, Ph.D. and Todd M. Feinman (105).

Fully Integrated EDI

A definition of a fully integrated EDI system would include a system that "encompasses electronic data sharing throughout all aspects of the purchasing and payments cycles" (Greenstein 106). An example of a fully integrated EDI system is Figure 2 on page 4. While fully integrated EDI systems are the most expensive, they also create the greatest amount of advantages for a firm (Greenstein 106).

TYPES OF EDI

There are various ways of enabling and using EDI. In fact, companies can use more than one way to enable EDI. The types of EDI discussed here are direct connection EDI, indirect connection EDI, open EDI, and financial EDI.

Direct Connection EDI

In direct connection EDI, every business within the network must “operate its own on-site EDI translator computer” (Schneider 340). These special computers provide direct connection among all the companies within the network through either modems and telephone lines or through dedicated leased lines; thus, value-added networks are not needed for companies using direct connection EDI. The main concern with this type of connectivity is its expense if dedicated leased lines are used (Schneider 340).

Indirect Connection EDI

Indirect connection EDI works differently than direct connection EDI. With indirect connection, the trading partners send information to each other “through the VAN instead of connecting their computer directly to each other” (Schneider 341). Well-known companies that provide this type of connection include General Electric Information Services, GPAS, Harbinger Corporation, IBM Global Services, IMS Network, Kleinschmidt, and Sterling Software (Schneider 341).

Open EDI

A company can also enable EDI through the internet, a way which is normally less expensive than other connection forms. EDI on the internet is called open EDI “because the internet is an open architecture network” (Schneider 342). According to Schneider and Perry, “The open architecture of the internet allows trading partners virtually unlimited opportunities for customizing their information interchanges” (343). However, many companies fear using the internet to enable EDI because of the potential for sensitive information to become stolen. A new standard that is being created, the Electronic Data Interchange-Internet Integration (EDIINT) standard should eliminate some of these fears in years to come (Greenstein 117).

Financial EDI

Another use of EDI, financial EDI (FEDI) is “the EDI transaction sets that provide instructions to a trading partner’s bank” (Schneider 343). EDI-capable banks are “equipped to exchange payment and remittance data through VANS” (Schneider 343). Financial EDI, which a firm can use whether it uses direct, indirect, or open EDI, includes the “processing of the actual payment and remittance advice” (Greenstein 106).

ADVANTAGES OF EDI

In her book *EDI: A Total Management Guide*, Margaret A. Emmelhainz, Ph.D. gives the following reasons for implementing EDI: business survival, cost efficiencies, improved

internal processes, enhanced customer service, better supply chain management, and improved ability to compete internationally (17). Other benefits of EDI might include increased employee productivity, more effective asset management, and more efficient cash management (Maness 655).

One chief advantage of EDI is increased competitiveness. This increased competitiveness comes from “enhanced customer services, market differentiation, reduced time to market, and lower cost of doing business with customers, banks, and vendors” (Kasturi 3).

DISADVANTAGES OF EDI

The most important disadvantage of EDI is the cost. One resource claims, “Any business thinking of deploying EDI is looking at between \$50,000 to \$250,000 in startup costs, and this is just too much for most small and medium-sized businesses” (Sills 456). In addition to large startup costs, companies could also have problems with data transmission standards, data communication security and authorization, and legal issues that might arise, or the company may come across reluctance of suppliers to renegotiate credit terms for electronic payment (Maness 656).

Another disadvantage of EDI is that trading partners must trust one another. Walden and Braganza demonstrate in their book that for EDI to work efficiently there must be both

confidence and trust between communicators in a system. They write, “Without confidence, such systems will not provide the real efficiency benefits that EDI promises. Establishing trust depends on our ability to control the operation of EDI” (iii).

PART 2

CURRENT TRENDS OF EDI USAGE IN THE TENNESSEE VALLEY

To find the current trends of EDI usage in the Tennessee Valley, a survey of companies with headquarters in the Tennessee Valley was conducted to see if they use EDI and, if so, what their experiences using EDI have been. The surveys were mailed to 37 companies in Huntsville that were listed in the 2005 Industrial Directory, 22nd Edition, Huntsville/Madison County generated by the Chamber of Commerce. The 37 companies were chosen because they employ more than 90 workers, the cutoff for this survey because of the need to question relatively large, established companies who would be in a position to use EDI. A copy of the cover letter and the survey mailed to the companies can be found in Appendixes A and B.

Twelve out of the 37 companies responded to the survey creating slightly under a 33% response rate as can be seen in Appendixes C and D. The appendixes provide the survey

responses and a summary of the survey results. Five out of the 12 companies use EDI, or nearly 42% of the companies in the Tennessee Valley currently use EDI. The companies that did not use EDI were also asked if they had used EDI in the past and why had they stopped using it if they had previously used it. The companies that were surveyed that did not use EDI had never used EDI and therefore, could not give reasons for stopping the usage of EDI. Companies in the Tennessee Valley that have started using EDI have not stopped; therefore, there must be significant advantages to using EDI which is discussed later in the paper. However, around 58% have never started using EDI so there must be some significant disadvantages for companies in the Tennessee Valley that impede the companies from using EDI.

Through the collection and analysis of the survey responses, it was found that most, 60% or more of the companies that responded and use EDI, have fully integrated EDI systems, use value-added networks, have direct connection EDI, use open EDI, and use the ASC X12 standards. Only 40% of the companies surveyed that use EDI also use financial EDI, and only half ever use the EDIFACT standard. From this information, it can be derived that companies in the Tennessee Valley have found fully integrated EDI systems to be the most advantageous (or else they would use partially integrated EDI systems), regularly do use more than one way to enable EDI (direct, indirect, open, and/or financial EDI), and have not found it absolutely necessary to use established standards to complete EDI transactions.

Eighty percent use EDI to conduct business in different states, and 40% use EDI to conduct business with other countries. The companies were asked to specify which countries if possible, and the responses received included Germany, Italy, China, and Ireland. Firms in the Tennessee Valley which use EDI typically have extensive national and international trade. EDI must simplify trading for these firms. It is possible that the firms which do not use EDI already have simple trading because they are not trading in other states or nations.

Eighty percent of the respondents using EDI found cost efficiencies, improved internal processes, and enhanced customer service to be the most important advantages for their companies. Twenty percent claimed better supply chain management to be a chief advantage, and 40% have seen improved employee productivity. All of these advantages should have led to increased ability to compete for the companies and may be the reasons that EDI is used regularly in the Tennessee Valley. Surprisingly, none of the companies surveyed that use EDI have found improved ability to compete internationally to be as an important advantage of EDI as the other advantages they have encountered.

Fewer disadvantages were identified by the respondents; in fact, one company responded that it had not seen any main disadvantages with its EDI system. Only 40% of the companies believed startup costs to be a main disadvantage of EDI. Twenty percent claim trepidation over security and authorization, and 20% have found legal issues involving liabilities resulting from malfunctions of parts of their EDI systems to be main disadvantages of EDI. None of the companies have found difficulty in trusting trading

partners or unwillingness of suppliers to issue new credit terms to be important disadvantages of EDI for their companies. Suppliers, therefore, must be offering better credit terms for EDI using customers. It is important to note that none of these disadvantages have been severe enough for companies in the Tennessee Valley to stop using EDI after they implement it.

All of the respondents that use EDI said that they use EDI to conduct at least 10% of their business transactions. Eighty percent use it for at least a quarter of business transactions, 40% use it for at least half of all business transactions, and 20% use it for between 75% and 100% of all business transactions.

Most of the companies in the Tennessee Valley that use EDI have used it for many years according to the survey. Sixty percent of the companies surveyed that use EDI have used it for between 5 and 10 years and 20% have used it for more than 10 years. However, there is new usage growth with EDI in the Tennessee Valley as 20% are just now beginning EDI implying that EDI usage will continue to expand in the Tennessee Valley in the future.

CONCLUSION

EDI is used regularly in the Tennessee Valley with the majority having benefited from it for several years and having utilized it for a significant amount of their business transactions. The companies using EDI in the Tennessee Valley have found no reasons

to stop using it; therefore, the companies must continue to see advantages of EDI now and in the future. These companies have found that the benefits of implementing EDI outweigh the costs associated with EDI.

ACKNOWLEDGEMENT

I would like to thank Dr. Dorla Evans for being my project advisor. I very much appreciate her guidance and support on both this project and inside the classroom. In addition to thanking Dr. Evans, I would like to thank Martha O'Connell of the Department of Economics and Finance for helping me complete this project by aiding with the sending out of the surveys and the collection of the survey responses. Also, of course, I could not have completed this project had the companies that I asked not have participated in the survey. Although the survey was anonymous and I do not know exactly which companies to thank, I appreciate each of the companies for taking the time to respond to my survey. Also, thanks to Dr. Mebane and the rest of the Honors Program at UAH for allowing me to do this project.

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Appendix A



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Department of Economics
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Fax: (256) 824-6328
URL: <http://cas.uah.edu/>

March 7, 2006

Company Name

Contact Person's Name, Job Title

Address

Huntsville, AL Zip Code

Dear Mr. / Ms. Contact Person:

I am writing you to request your response to a survey of current electronic data interchange (EDI) practices in the Tennessee Valley area. Your company was selected for this survey from the 2005 Industrial Directory for Huntsville/Madison County because of its relatively large number of employees and prominence in our area. Hopefully, your company will be able to benefit from the information collected through this survey.

I am currently a senior finance major finishing my last semester at UAH. While at UAH, I have been working to complete the requirements for the Honors Program diploma. This survey is a major part of my Honors Program senior research project which is the last step in achieving the Honors Program diploma. Therefore, it is necessary that I receive enough responses to the survey to complete my project. Your response will be greatly appreciated.

With the help of my project advisor, Dorla A. Evans, Ph.D., I hope to survey nearly 40 companies, review the responses, and draw conclusions about the current EDI practices in our area. All responses to this short survey will be anonymous. Also, if you would like, I will email the conclusions of the survey to your company. If you are not the appropriate person to fill out this survey, please pass it along to someone who is. A prepaid reply envelope is enclosed for your convenience. Please respond by Wednesday, March 22. Thank you very much for your time and attention.

Sincerely,

Christy Davis

Encl.: Use of Electronic Data Interchange (EDI) Technology in the Tennessee Valley Survey

Appendix B

Use of Electronic Data Interchange (EDI) Technology in the Tennessee Valley Survey

Please place a check mark beside the appropriate answer to each question.

1. Does your company currently use EDI technology?
 Yes. Go to question #4.
 No. Go to question #2.
 Not sure. Go to question #2.

2. Has your company ever used EDI technology?
 Yes. Go to question #3.
 No. Go to question #17.
 Not sure. Go to question #17.

3. What was your company's reason to stop using EDI technology?
 Newer technology. Example: XML.
 Costs exceeded benefits.
 Other. Please specify if possible. _____

4. Is/was your company's EDI system partially or fully integrated?
 Partially integrated EDI system.
 Fully integrated EDI system.

5. Does/did your company use a value-added network (VAN)?
 Yes.
 No.

6. Does/did your company use either direct or indirect connection EDI?
 Direct connection EDI.
 Indirect connection EDI.
 Neither.

7. Does/did your company use open EDI (EDI enabled over the internet)?
 Yes.
 No.

8. Does/did your company use financial EDI (FEDI)?
 Yes.
 No.

9. Does/did your company use the standards created by ASC X12?
 Yes.
 No.

10. Does/did your company ever use the EDIFACT standard?
 Yes.
 No.

--Continued on back--

Use of Electronic Data Interchange (EDI) Technology in the Tennessee Valley Survey Results

# Asked to Participate in Survey	37
# of Responses	12
% Responding to Survey	32.43%
# of Respondents that use EDI	5
% Responding to Survey that use EDI	41.67%

Participant #	Question #		
	1	2	17
1	0	0	0
2	0	0	0
3	0	0	1
4	1		1
5	0	0	0
6	1		1
7	0	0	0
8	1		1
9	1		1
10	1		1
11	0	0	1
12	0	0	0
Total Yeses	5	0	7
% of Yeses	41.67%	0.00%	58.33%

0=no; 1=yes

Participant #	Question #										
	4	5	6	7	8	9	10	11	12*	15	16
4	2	2	1	1	1	1	2	1	2	3	5
6	2	2	1	1	1	1	2	1	1	5	4
8	1	1	1	1	2	2	1	1	2	4	4
9	2	1	4	1	2	1	1	1	1	3	4
10	1	1	2	2	2			2	2	2	2
# of 1	2	3	3	4	2	3	2	4	2	0	0
# of 2	3	2	1	1	3	1	2	1	3	1	1
# of 3			0							2	0
# of 4			1							1	3
# of 5										1	1
% of 1	40%	60%	60%	80%	40%	75%	50%	80%	40%	0%	0%
% of 2	60%	40%	20%	20%	60%	25%	50%	20%	60%	20%	20%
% of 3			0%							40%	0%
% of 4			20%							20%	60%
% of 5										20%	20%

Appendix C

Participant #	Question #13						
	1	2	3	4	5	6	7*
4	1	1	1	0	0	0	0
6	1	1	1	1	0	1	0
8	1	1	1	0	0	1	0
9	1	1	1	0	0	0	0
10	0	0	0	0	0	0	1
# of Yeses	4	4	4	1	0	2	1
% of Yeses	80%	80%	80%	20%	0%	40%	20%

Participant #	Question #14					
	1	2	3	4	5	6
4	0	0	0	0	0	1
6	1	0	0	0	0	0
8	1	0	1	0	0	0
9	0	0	0	1	0	0
10	0	0	0	0	0	0
# of Yeses	2	0	1	1	0	1
% of Yeses	40%	0%	20%	20%	0%	20%

#1=yes to 1st response item, #2=yes to 2nd response item, etc.

*Respondents could also provide write-in answers.

Appendix D

Summary of the Use of Electronic Data Interchange (EDI) Technology in the Tennessee Valley Survey and Results

There were 37 different companies asked to participate in this survey. There were 12 responses to the survey which equaled to over a 32% response ratio. Five of the respondent companies currently use EDI. The percentage of respondent companies that use EDI is nearly 42%. The following is the list of questions respondents were asked to answer with the percentage of responses for each item in the option list for each question.

1. Does your company currently use EDI technology?

41.67% Yes. Go to question #4.
58.33% No. Go to question #2.
0.00% Not sure. Go to question #2.

2. Has your company ever used EDI technology?

0% Yes. Go to question #3.
100% No. Go to question #17.
0% Not sure. Go to question #17.

3. What was your company's reason to stop using EDI technology?

0% Newer technology. Example: XML.
0% Costs exceeded benefits.
0% Other. Please specify if possible. _____

*The following questions (except for #17) were answered only by those companies which currently use EDI as the companies that do not currently use EDI have also never implemented EDI systems. (See question #2).

4. Is/was your company's EDI system partially or fully integrated?

40% Partially integrated EDI system.
60% Fully integrated EDI system.

5. Does/did your company use a value-added network (VAN)?

60% Yes.
40% No.

6. Does/did your company use either direct or indirect connection EDI?

60% Direct connection EDI.
20% Indirect connection EDI.
0% Neither.
20% Both.

7. Does/did your company use open EDI (EDI enabled over the internet)?

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80% Yes.
20% No.

8. Does/did your company use financial EDI (FEDI)?

40% Yes.
60% No.

9. Does/did your company use the standards created by ASC X12?

75% Yes.
25% No.

*There were only 4 responses to this question.

10. Does/did your company ever use the EDIFACT standard?

50% Yes.
50% No.

*There were only 4 responses to this question.

11. Does/did your company use EDI to conduct business in other states?

80% Yes.
20% No.

12. Does/did your company use EDI to conduct business in other countries?

40% Yes. Where? _____
60% No.

*Write-in responses to the "Where?" part of question #12 included the following:
Germany, Italy, China, and Ireland.

13. Which of the following have been/were the biggest advantages of EDI for your company?

80% Cost efficiencies.
80% Improved internal processes.
80% Enhanced customer service.
20% Better supply chain management.
0% Improved ability to compete internationally.
40% Improved employee productivity.
20% Other. _____

*Respondents could choose more than one option. Write-in responses to the "Other" answer option of question #13 included the following response: "just beginning EDI, not sure of benefits at this time."

14. Which of the following have been/were the biggest disadvantages of EDI for your company?

40% Startup costs.
0% Difficulty in trusting trading partners.
20% Trepidation over security and authorization.
20% Legal issues involving liabilities resulting from failures of parts of

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the system.

0% Unwillingness of suppliers to issue new credit terms.

20% Other. _____

*Respondents could choose more than one option. Write-in responses to the "Other" answer option of question #14 included the following response: "None."

15. What is your company's estimate of business transactions that are/were conducted using EDI technology?

0% Less than 10%.

20% Between 10% and 25%.

40% Between 25% and 50%.

20% Between 50% and 75%.

20% Between 75% and 100%.

16. How long has your company been using EDI technology? Or, how long did your company use EDI technology?

0% Less than 1 year.

20% Between 1 and 3 years.

0% Between 3 and 5 years.

60% Between 5 and 10 years.

20% More than 10 years.

17. Thank you very much for completing this survey. Your time and attention are greatly appreciated. Would you like the results of this survey emailed to your company?

58.33% Yes. Company email address: _____

41.67% No.