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APPLICATION OF EDI IN HONG KONG: SURVEY EVIDENCE ON ACCOUNTANTS

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Abstract

Electronic data interchange (EDI) is becoming popular in North America, Europe, Australia, and Singapore, but Hong Kong is nearly a decade behind in adopting EDI. Overseas research found out that the biggest obstacles to obtaining EDI benefits were audit and legal issues.

This paper evaluates the trend of EDI development in Hong Kong as compared with some neighbouring countries. To investigate into the factors that affect EDI development here, a pilot survey was conducted among Hong Kong accountants on their views on the advantages and disadvantages of EDI and reasons of using and not using EDI.

It was found that the obstacles to EDI penetration in Hong Kong may be due to lack of use of computers, especially in companies using mainly Chinese language documents, and the lack of vision of management on EDI benefits. Both the government and the private sector of Hong Kong are waiting for the other side to be the leader in using EDI.

1 INTRODUCTION

Electronic data interchange (EDI) is the movement of business documents electronically between or within firms (including their agents or intermediaries) in a structured, machine-retrievable, data format that permits data to be transferred, without rekeying, from a business application in one location to a business application in another location (Hansen and Hill, 1989).

EDI emerged in the late 1960s when the transportation industries were looking for ways to alleviate delivery delays that resulted from large volumes of paper documentation (Powers and Carver, 1990). At present, many large organisations in Europe are using EDI to support their trading activities. In particular, the motor industry, the petroleum industry and many well-known retailers provide an active and growing user base (Williams, 1992). The adoption of EDI in Australia has also progressed rapidly over the past five years, and Australia is well placed to offer leadership in the migration to open-EDI and to

interactive EDI (IEDI)¹ (Garner, 1994).

Documented benefits accruing from EDI include reduced order lead times; higher customer service level; fewer out-of-stock situations; improved communication about promotions, price changes, and product availability; lower inventory costs; better accuracy in ordering, shipping, and receiving; and reductions in labour costs (Stern and Kaufman, 1985).

Hong Kong is nearly a decade behind Europe and America in adopting EDI. Vendors of EDI software and the EDI Value-Added Networks (VANs) are mainly recruiting the subsidiaries of overseas-based multinationals.² In view of the known benefits arising from EDI, it raises a question why Hong Kong is so slow at taking advantages of this business discipline.

In March 1991, Deloitte & Touche reported in its "Computing for Executives" an alarming fact: a recent survey of Canadian business revealed that 95% of chief financial officers said audit and legal issues were their biggest obstacles to obtaining the benefits of EDI. Interestingly, the most common question asked by potential EDI users and project managers is, "How do we ensure that EDI is reliable?". Reliability, simply put, is the fulfilment of the control objectives of accuracy, completeness, security, auditability, timeliness and recoverability within the management / organizational framework of which EDI is an integral part (Chan, 1992). In view of the results of this survey, it is worthwhile to investigate into the views of the Hong Kong accountants on EDI.

The purpose of this paper is to evaluate the trend of and to investigate into the factors that affect the development of EDI in Hong Kong. The next section will discuss the development of EDI in Hong Kong. The following section will outline the regional EDI development in some Asian Pacific countries including Singapore, South Korea, Taiwan and Malaysia. A pilot survey in order to investigate the advantages of EDI, disadvantages of EDI, reasons for using

¹ IEDI is a specialised sub-set of EDI with which the enquirer can ask questions and receive answers along with other EDI messages.

² "Pockets of EDI usage in Hong Kong but It's Picking Up", *The IT Magazine*, October 194, pp. 16 - 21.

EDI and reasons for not using EDI as perceived by the Hong Kong accountants will then be discussed. Lastly, a concluding remark to the paper is presented.

2 DEVELOPMENT OF EDI IN HONG KONG^{3 4}

While EDI is a commonly-used business tool in the US and Europe, EDI is not always the top-of-mind application in Hong Kong businesses. However, pressures from overseas companies are landing on Hong Kong partners to conduct business transactions via EDI (Milburn and Tan, 1994).

Tradelink is a consortium of private Hong Kong companies and trade associations which was set up in 1988 to study the feasibility of setting up a community-wide EDI service in Hong Kong. After completing an initial consultancy study on using EDI in Hong Kong, a significant step was taken: the Hong Kong Government and Tradelink jointly worked on the Shared Project for EDI (SPEDI). In November 1989, the SPEDI Report was ready and its recommendation was the setting up of a trading community EDI service known as the Community Electronic Trading Service (CETS). In September 1992, Tradelink issued a Request for Proposals to vendors to get proposals as how to set up CETS and other related parts that support the service. In November that year, the Hong Kong Government signed an agreement with Tradelink to become the biggest shareholder, taking a 30% stake at HK\$11.75 million. In November 1993, Tradelink chose an IBM-led consortium to work jointly on the implementation of CETS. However, thirteen months later they disagreed over the terms and conditions of their contract to implement the Phase I of the CETS despite the waste of time, effort and money on both sides. Now Tradelink has to spend even more time to evaluate and choose an alternative vendor to replace IBM. As a result, CETS will only be expected to be used in 1996.

Nevertheless, there are several early adopters of EDI in Hong Kong who cannot wait, and they need not wait, for Tradelink or the Government to set up an EDI service. Notably, the Hongkong International Terminal is using EDI for cargo shipping, planning and tracking; Cathay Pacific, a founder member of TRAXON, offers a global air cargo service using EDI; and Hongkong & Shanghai Banking Corp's Hexagon is an EDI-based service in which one can open Letter of Credit, check account status, or make payments. The Hong Kong retail industry is also heading towards EDI usage while many information technology (IT) vendors such as Hewlett-Packard, ICL, and IBM are users

for some of their internal operations such as components procurement.

Tradelink has been given a seven-year exclusive contract for providing EDI services to government, commencing in 1996. When Tradelink's EDI service, the CETS, is fully operational, it will act as an electronic post office between the government and the rest of the trading community. After that, the government might take the whole operation inhouse, or alternatively, put it to tender.

It is planned that the introduction of EDI by the government will commence with trade-related transactions, information and documents that the trading community have to submit as a legal requirement, especially the permission to export commodities. The three major user departments will be Trade, Customs & Excise, and Census and Statistics.

When CETS is operational, the traders will have three choices on how they use the electronic services. The first is to have a direct connection with Tradelink. The second is to use any VAN in Hong Kong to connect them. A third alternative is to use service bureaux. Tradelink intends to set up service centres known as Electronic Trading Access Service (ETAS) to help the 100,000 small to medium-sized companies which may not possess the in-house facilities to get access to EDI. Users of these service bureaux can either walk-in or fax in their paper documents. The service bureaux will then convert them into electronic format and submit to the Government departments concern for processing.

The various legal difficulties which were seen as obstacles to EDI have so far proven illusory or trivial, requiring only minor changes to the wording of ordinances, for example, to avoid demands for specific paper forms.

Proper authentication of EDI messages is essential, if only because the government may occasionally need to take users to court and use EDI messages as evidence. A paper document contains a company chop, named person and a signature. In an electronic environment, a signature is replaced by a value generated by a security key, and a company chop will be replaced by a password and sign-on code.

For accountants new to EDI, the audit trail can be a problem. They need to show what happens both within their business and with their business partners. To this end, an archive of the transactions will be produced, comprising a full record of what messages were sent and received, so traders will have both an archive and an audit trail.

The government has yet to resolve the problems associated with Chinese language EDI. A problem with Chinese language EDI has been the absence of an agreed double-byte character table necessary for the 20,000 to 30,000 characters of the Chinese character set for business. Until a standardised code set is in use, there will have to be translation between different code sets, either in VANs or in users' systems. So, the only real obstacle to EDI penetration is the lack of computer use, especially by companies using mainly Chinese language documents.

³ *Ibid.*

⁴ "Hong Kong Government First Push in EDI Starts with Trading", *The IT Magazine*, October 1994, pp. 13 - 15.

The government's objective in using EDI is largely to support commerce in the territory with the ability to handle an annual 10% increase in trade documents without increasing the manpower. The major goal of Hong Kong's EDI strategy is to convert the territory's trading companies to using EDI. In spite of the huge financial advantages offered by EDI, most local companies seem just sit back and wait for Tradelink to become operational in 1996. This is expected as international experience suggests that it always takes a push from government to get the ball rolling.

3 REGIONAL EDI DEVELOPMENTS ⁵

The application of EDI is fast-developing in some Asian countries, namely in Singapore, South Korea, Taiwan and Malaysia, which have at last managed to get past the "talking stage" to get an EDI service up and running.

Most of the EDI services in this region started as a means to facilitate easier trading, for example, by reducing the amount of time and paperwork needed to clear customs. Inter-Asia trading is expected to boom in the next few years, so Asian countries are closely monitoring the EDI development in each other's country and looking forward to the linking up of their EDI services.

3.1 Singapore ⁶

Singapore is the earliest country in Asia to have a nation-wide EDI service in the form of TradeNet, which started as a service to enable faster and more efficient customs clearance. TradeNet was implemented in 1989, starting with 50 pilot users, and the number has now grown to over 6,000.

In addition to TradeNet, PortNet and StarNet have been also established for the maritime and air communities respectively. These systems enable users to manifest, book port facilities, track cargo container movements and gain direct access to cargo or flight arrivals and departures.

Other established EDI-based services for non-trading sectors include MediNet for the health care sector. LawNet is for lawyers to access statutes, case histories and subsidiary legislation of Singapore from their offices. CurrencyNet is for banks to exchange EDI messages on withdrawal and deposits with the Singapore Board of Commissioners of currency.

The fast rate of EDI adoption is due to the firm push from the Singapore government, whose dream is to make the island republic into an "intelligent" nation by the year 2000.

⁵ "Regional EDI Developments", *The IT Magazine*, October 1994, p. 26.

⁶ "EDI" Services Mushroom in Singapore", *The IT Magazine*, October 1994, p. 31

3.2 South Korea ⁷

As a fast-growing dragon in Asia, coupled with high labour cost, the "paper-full" and time-consuming method of trading warranted the implementation of a paperless electronic trading system. Hence, in 1990, the Korea trade Network (KTNet), a nationwide EDI network, was given the government's go ahead signal. Set up by the Korea Foreign Trade Association, KTNet covers the entire trading procedures. KTNet is to be carried out in three development stages and about 20,000 users are expected to benefit from this project. The ultimate goal is to have KTNet linked to every business communities in Korea as well as to establish international EDI linkage.

The first stage of development was between 1990 and 1991 in which a pilot system involving about 50 organisations was set up and tested 29 EDI messages. KTNet was in the "expansion" stage from 1993 to 1994, in which all paper documents for importing and exporting were "EDI-edition". The final stage is starting now in which commercial concerns, both big and small, and government trading agencies are expected to use EDI.

3.3 Taiwan ⁸

Like Korea, Taiwan is another developing dragon facing economic boom and this is evidenced in the millions of export declarations handled annually. Although the customs were constantly improving its manual clearance system, it was still too labour-intensive and time consuming.

The EDI VAN service called Trade-VAN is for major organisations involved in international trading to link into. Implementation of Trade-VAN is divided into: Phase I, which is the Air Cargo Clearance System, implemented in 1992, and Phase II, the Sea Cargo Clearance System that is being completed this year.

There are other VAN services in Taiwan which are expected to be linked to Trade-VAN, including the Financial Information Service Centre, the largest financial/banking service VAN in Taiwan. Other large information systems that could be integrated into Trade-VAN are the Taiwan Resident Information System, Health Care Information Network System, and Judicial Information Network System.

3.4 Malaysia ⁹

⁷ "KTNet Simplifies Trading Procedures", *The IT Magazine*, October 1994, P. 27.

⁸ "Taiwan's VAN of VANs", *The IT Magazine*, October 1994, p.28.

⁹ "EDI Takes Off in Malaysia - At Last", *The IT Magazine*, October 1994, pp. 29 - 31.

Malaysia's International Trade and Industry Minister once described EDI as an integral part of the national strategy to help Malaysia total trade reach the expected M\$490 billion (HK\$1,470 billion) by the year 2000.

EDI is recognized as the vehicle that will speed up and smoothen Malaysia's internal and external trade transactions, bringing business opportunities to its shore. But it was not until 1992 when actual development began.

Since EDI is recognized as an essential part of the country's modern infrastructure, the Malaysian government has made amendments to various acts, including the Evidence Act, Telekom and Customs Act to legalise electronic trading.

Since EDI is expected to be big business in Malaysia, several parties fought for the right to provide EDI services and the two prominent and strongly-backed VAN service providers are EDI Malaysia (EDIM) and VADS.

Until now, VADS has launched two EDI networks, Medi*Link and Supply*Link to cater for the medical and commercial community respectively. EDIM has set up Dagang*Net for trading transactions and Ringgit*Net for the financial and commercial services.

4 OPINIONS FROM ACCOUNTANTS

4.1 The Questionnaire Design

To collect opinions from accountants in Hong Kong on EDI usage, we conducted a pilot survey by means of a questionnaire. The questionnaire consists of 2 sections: A and B. Section A asks general information about the subjects' responsibility in the company, and information about the company. 8 questions as included in section A are listed in table 1 at the end of this paper.

Section B then goes on to ask subjects' opinions on EDI. This section is divided into 4 parts: advantages of EDI, disadvantages of EDI, reasons of using EDI, and reasons of not using EDI. Several factors are listed within each of these 4 parts. These factors were based on the telephone survey conducted by Ferguson, Hill, and Hansen in U.S. in 1988 (Ferguson, Hill and Hansen, 1990). Details of these factors are listed in tables 10 to 13. Irrespective of whether subjects have previous experience with or knowledge in EDI, they are asked to indicate the relative importance of each of the factors in a Likert scale of 5; 5 stands for "very important" and 1 stands for "not important". At the end of each part, an open ended question was also added for subjects to include any missing factor.

4.2 Methodology

Subjects of this survey were students of a special conversion course offered by the Hong Kong Polytechnic University to former graduates from the Hong Kong Polytechnic holding Professional or Higher Diplomas in

Accountancy. The conversion course is a one year part time course established to upgrade graduates' qualifications from diploma level to bachelor degree level.

The subjects were chosen because of a few reasons. Firstly, all students were holders of diploma in accountancy with nearly all of them also holding professional accountancy qualifications. They have 5 to over 15 years of experience in the accounting field in various sectors of the community. The views as expressed by them would well represent the views of professional accountants in general. Secondly, one of the subjects read by students in the conversion course is an Accounting Information Systems subject known as "Accounting Systems and Models (ASM)" and the survey was conducted immediately after the study of the subject ASM has been completed. This ensures that students would have some background knowledge in EDI even if they have not had any prior experience with it. The test results are therefore more valid. Finally, the survey was conducted during a class meeting and this would normally result in a high response rate and insignificant non-response bias.

4.3 Analysis of Results

Out of the 78 questionnaires issued, 76 which represented a response rate of 97.4% were fully completed. The data collected was analyzed using SPSS for Windows. Frequency summaries for section A questions were generated and the results are listed in tables 2 to 9.

The second step of data analysis was to generate the mean values of responses of section B questions. To further test whether the opinions of subjects who have prior knowledge or experience in EDI are the same as those who do not, means of subpopulation of each section B questions were generated using the values of question 8 as independent variables. Thereafter, one-way ANOVA was conducted to test the significance of the differences in means of subpopulation. Concerning the open ended questions, since no answer was given by subjects, they are excluded from the analysis.

Tables 10 to 13 show in descending order of means of questions as included in the 4 parts of section B together with subpopulation means, F ratios and F probabilities of one-way ANOVA. For convenience, the subpopulation means are denoted by μ_1 , μ_2 , and μ_3 as follows:

- μ_1 : Mean values for subjects who have experience with EDI;
- μ_2 : Mean values for subjects who do not have experience with but have knowledge in EDI; and
- μ_3 : Mean values for subjects who have neither experience with nor knowledge in EDI.

4.3.1 Advantages of EDI

Mean values of all factors are higher than 3, the neutral point. This indicates that all factors are considered by

subjects as important advantages of EDI. The most important factor is found to be "quick response and access to information" with a mean value of 4.49 whereas the least important factor is "better inventory control" with a mean value of 3.40. The F probabilities as generated using one-way ANOVA show that the differences in subpopulation means are not significant at 5% level for all factors except two. The two exceptions are "accuracy" and "aids in billing and payment".

4.3.2 Disadvantages of EDI

All factors are considered as important with the highest mean value of 3.89 for "high setup cost" and lowest mean value of 3.54 for "lack of standard document formats". Differences in subpopulation means are not significant at 5% level except for the factor "lack of visible audit trails".

4.3.3 Reasons of using EDI

Among the 9 factors listed for using EDI, all except two are viewed as important. The most important one being "reduced clerical error" carries a mean value of 3.72 and the least important one is "increased sales" which has a mean value of 3.04. "Industry standards" is being viewed as a neutral factor with a mean value of 3.00. However, the factor "requested by trading partner" which receives a mean value of 2.88 is found to be not important. Differences in subpopulation means are also not significant at 5% level except for the factor "industry standards".

4.3.4 Reasons of not using EDI

In this part, all factors listed are perceived to be important reasons of not using EDI. The most important factor which has a mean value of 4.12 is "high setup cost" while the least important factor is found to be "lack of direction from government" with a mean value of 3.01 only. Similar to the above 3 parts, differences in subpopulation means are not significant at 5% level for most questions. The exceptions are "lack of leader in the field", "existing system is good enough", and "lack of direction from government".

4.4 Findings and Discussions

The survey demonstrates that accountants do value the advantages of EDI and agree with the reasons of using EDI as listed in the questionnaire. The relatively more important advantages are "quick response and access to information", "accuracy", "speed up / reduce paperwork", and "better communications"; while the relatively more important factors of using EDI are "reduced clerical error", "improved control of data", and "improved customer service". The more serious disadvantages and stronger reasons of not using EDI perceived by accountants as found

in this survey are "high setup and running costs", "lack of visible audit trails", "incompatibility of existing data processing system", "confidentiality of information", and "lack of awareness of EDI benefits by management". These findings concur with the survey result of Ferguson, Hill and Hansen in 1988 to a large extent (Ferguson, Hill and Hansen, 1990), (Hansen and Hill, 1989).

Setup and running costs of implementing EDI with direct connection with trading partners can be high especially for small to medium-sized companies where transactions are not voluminous. However, the costs can be significantly reduced if connection is made via a Value-Added Network (VAN) or a service bureau.

The absence of visible audit trails is a typical worry to traditional accountants who have little experience in computer-based information systems (CBIS). EDI systems are special types of CBIS. Most computer assisted audit techniques (CAAT), such as software monitors, integrated test facility (ITF), and embedded audit modules, can be employed to audit EDI systems. In addition, special audit trail database may also be maintained. Another disadvantages "incompatibility of existing data processing system" can be viewed from a cost perspective. The data processing system within a company can always be changed to cater for EDI transactions if it is cost effective to do so. Specialized approaches to data encryption and authentication are also available to preserve the confidentiality of information transmitted via EDI networks (Hinge, 1988). The real obstacle to EDI implementation may be the lack of vision of management on EDI benefits.

There are 7 factors in the questionnaire that have significant differences in subpopulation means among those subjects who have experience with EDI, those who do not have experience with but knowledge in EDI, and those who have neither experience with nor knowledge in EDI. Table 14 below summarizes factors that have subpopulation mean differences significant at 5%.

The differences in subpopulation means may be explained as follows. Accountants who used EDI before have better understanding of EDI operation and know that even payment can be exchanged with EDI using Electronic Funds Transfer (EFT). Accountants who have experience with or knowledge in EDI may consider that information as processed by systems without using EDI can be as accurate as those using EDI if proper controls are implemented. Although EDI transactions themselves do not require documents, various reports or listings can be generated by the system for audit purposes. For them, factors like "lack of leader in the field", "existing system is good enough", and "lack of direction from government" should not be important reasons for not using EDI.

5 CONCLUSIONS

The development of EDI in Hong Kong is relatively slow when compared with neighbouring countries. Out of

the 76 accountants surveyed in this pilot study, only 23 (about 1/3) replied that their companies are using EDI. In general, it is agreed that the obstacle to EDI penetration is the slow pace of computerization in small to medium-sized companies, especially those using mainly Chinese language documents. Moreover, both the government and the private sectors in Hong Kong are waiting for the other party to take the lead in using EDI. International experience shows that successful development of EDI always need a push from the Government. However, the Hong Kong government is practising its laissez-faire policy and believe that the private sector would be innovative enough to apply any IT that best suit their needs.

The pilot survey found out that accountants in Hong Kong, whether they have prior experience with or knowledge in EDI or not, are able to appreciate the advantages of EDI and agree with the reasons of using EDI as listed in the questionnaire. This survey results indicate that more thorough cost-benefit analysis is required for EDI implementation. Also, audit and legal issues, which were considered as the biggest obstacle to obtaining EDI benefits as found in former research (Chan, 1992), are not real obstacles to EDI penetration in Hong Kong. The barrier to EDI development in Hong Kong may be the lack of vision of management on the EDI benefits.

A more comprehensive survey on accountants, EDP auditors, lawyers, executives and IT specialists will be carried out to investigate thoroughly into the reasons for not using EDI in Hong Kong.

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1. What is your responsibility / position in your company?
2. What is the nature of business of your company?
3. What is the size of your company (approx. no. of employees)?
4. Is your company a local or multinational firm?
5. What are the locations of trading partners of your company?
6. Is your company using EDI?
7. Whether EDI is used within group companies or between trading partners?
8. Do you have working experience with or knowledge in EDI?

Table 1. General information about subjects

| Job responsibility | No. | % |
|------------------------|----------|------------|
| Accounting and finance | 37 | 48.7 |
| Controller | 8 | 10.5 |
| Auditing | 15 | 19.7 |
| Education | 1 | 1.3 |
| Management | 6 | 7.9 |
| Company secretary | 2 | 2.6 |
| Treasurer | 1 | 1.3 |
| Tax | 5 | 6.6 |
| Unknown | <u>1</u> | <u>1.3</u> |
| | 76 | 100.0 |

Table 2. Job responsibility of subjects

| Nature of business | No. | % |
|---------------------------------|----------|-------------|
| CPA Firm | 17 | 22.4 |
| Bank / Securities / Trustee | 4 | 5.3 |
| Consultancy | 2 | 2.6 |
| Food / Catering / Hotel | 4 | 5.3 |
| Government / Quasi-government | 12 | 15.8 |
| Investment holding / Investment | 6 | 7.9 |
| Manufacturing | 5 | 6.6 |
| Retails / Wholesale | 2 | 2.6 |
| Trading | 10 | 13.2 |
| Utilities | 5 | 6.6 |
| Others | <u>9</u> | <u>11.8</u> |
| | 76 | 100.0 |

Table 3. Nature of business of company

| No. of employees | No. | % |
|------------------|-----------|-------------|
| 1 to 100 | 22 | 29.0 |
| 101 to 500 | 15 | 19.7 |
| 501 to 2,000 | 27 | 35.5 |
| over 2,000 | <u>12</u> | <u>15.8</u> |
| | 76 | 100.0 |

Table 4. Size of company

| | No. | % |
|---------------|-----------|-------------|
| Local company | 42 | 55.3 |
| Multinational | <u>34</u> | <u>44.7</u> |
| | 76 | 100.0 |

Table 5. Local or multinational company

| | No. | % |
|---------------------------------------------|----------|------------|
| All trading partners are local | 27 | 35.5 |
| Some trading partners are outside Hong Kong | 43 | 56.6 |
| Unknown | <u>6</u> | <u>7.9</u> |
| | 76 | 100.0 |

Table 6. Locations of trading partner

| | No. | % |
|--------------------------------------------------|-----------|--------------|
| Yes | 23 | 30.3 |
| No idea | 20 | 26.3 |
| No, but likely in the near future, say 2 years | 8 | 10.5 |
| No, and unlikely in the near future, say 2 years | 25 | 32.9 |
| | <u>76</u> | <u>100.0</u> |

Table 7. Whether company is using EDI

| | No. | % |
|-----------------------------------------------------|-----------|-------------|
| Within group companies only | 15 | 19.7 |
| Between trading partners only | 4 | 5.3 |
| Within group companies and between trading partners | 5 | 6.6 |
| Unknown / Not applicable | <u>52</u> | <u>68.4</u> |
| | 76 | 100.0 |

Table 8. How EDI is used

| | No. | % |
|------------------------------------------|-----------|--------------|
| Yes | 22 | 28.9 |
| No, but have knowledge in EDI | 15 | 19.7 |
| No, and do not have any knowledge in EDI | 39 | 51.3 |
| | <u>76</u> | <u>100.0</u> |

Table 9. Working experience with and knowledge in EDI

| Factor | Mean | Std. Dev. | μ_1 | μ_2 | μ_3 | F Ratio | F Prob. |
|------------------------------------------|------|-----------|---------|---------|---------|---------|---------|
| Quick response and access to information | 4.49 | 1.00 | 4.4091 | 4.3333 | 4.5897 | 0.4431 | 0.6437 |
| Accuracy | 4.20 | 1.05 | 3.9545 | 3.8000 | 4.4872 | 3.3737 | 0.0397* |
| Speed up/reduce paperwork | 4.11 | 1.01 | 3.9545 | 4.0000 | 4.2308 | 0.6159 | 0.5430 |
| Better communications | 3.99 | 0.97 | 3.8636 | 4.1333 | 4.0000 | 0.3490 | 0.7066 |
| Ease of data processing | 3.96 | 0.87 | 4.0909 | 4.1333 | 3.8205 | 1.0472 | 0.3561 |
| Save storage space | 3.93 | 0.97 | 3.7273 | 3.7333 | 4.1282 | 1.6266 | 0.2036 |
| Convenience | 3.86 | 1.03 | 4.1364 | 3.8000 | 3.7179 | 1.1961 | 0.3082 |
| Cost efficiency | 3.84 | 0.94 | 4.0455 | 3.6000 | 3.8205 | 1.0258 | 0.3636 |
| Better customer service | 3.76 | 0.94 | 3.7727 | 3.8000 | 3.7436 | 0.0207 | 0.9795 |
| Remain competitive | 3.74 | 0.98 | 4.0455 | 3.6667 | 3.5897 | 1.5773 | 0.2135 |
| Increase productivity | 3.71 | 0.89 | 4.0455 | 3.4000 | 3.6410 | 2.6968 | 0.0741 |
| Reduce manpower and labour costs | 3.68 | 0.97 | 3.6818 | 3.4000 | 3.7949 | 0.8971 | 0.4122 |
| Aids in billing and payment | 3.51 | 1.01 | 3.9091 | 3.0667 | 3.4474 | 3.4868 | 0.0359* |
| Better inventory control | 3.40 | 0.98 | 3.4211 | 3.0833 | 3.5000 | 0.8011 | 0.4534 |

* Significant at 5%

Table 10. Advantages of EDI

| Factor | Mean | Std. Dev. | μ_1 | μ_2 | μ_3 | F Ratio | F Prob. |
|--------------------------------------------|------|-----------|---------|---------|---------|---------|---------|
| High setup cost | 3.89 | 0.95 | 3.7273 | 3.9333 | 3.9744 | 0.4883 | 0.6157 |
| High running cost | 3.71 | 0.89 | 3.5909 | 3.6000 | 3.8205 | 0.6034 | 0.5496 |
| Lack of visible audit trails | 3.71 | 1.02 | 3.5000 | 3.1429 | 4.0588 | 5.1064 | 0.0087* |
| Incompatibility of existing DP system | 3.68 | 1.04 | 3.3636 | 3.4667 | 3.9487 | 2.7840 | 0.0684 |
| Lack of communication links and networking | 3.54 | 0.94 | 3.4545 | 3.1333 | 3.7436 | 2.4816 | 0.0906 |
| Lack of standard document formats | 3.54 | 0.87 | 3.3636 | 3.2000 | 3.7692 | 2.2338 | 0.0505 |

* Significant at 5%

Table 11. Disadvantages of EDI

| Factor | Mean | Std. Dev. | μ_1 | μ_2 | μ_3 | F Ratio | F Prob. |
|-------------------------------|------|-----------|---------|---------|---------|---------|---------|
| Reduced clerical error | 3.73 | 0.92 | 3.8636 | 3.6000 | 3.6944 | 0.4041 | 0.6691 |
| Improved control of data | 3.68 | 0.92 | 3.5909 | 3.6000 | 3.7568 | 0.2802 | 0.7565 |
| Improved customer service | 3.66 | 1.02 | 3.8182 | 3.6667 | 3.5676 | 0.4066 | 0.6674 |
| Decreased administration cost | 3.58 | 0.86 | 3.7273 | 3.5333 | 3.5135 | 0.4481 | 0.6406 |
| Decreased inventory cost | 3.27 | 0.82 | 3.1818 | 2.9333 | 3.4595 | 2.5020 | 0.0891 |
| Decreased manufacturing cost | 3.11 | 0.88 | 3.0000 | 3.1333 | 3.1622 | 0.2344 | 0.7917 |
| Increased sales | 3.04 | 0.91 | 3.0000 | 2.8667 | 3.1351 | 0.4851 | 0.6176 |
| Industry standards | 3.00 | 1.02 | 2.6316 | 2.7500 | 3.3030 | 3.2521 | 0.0455* |
| Requested by trading partner | 2.88 | 1.08 | 2.5238 | 3.2667 | 2.9189 | 2.2005 | 0.1184 |

* Significant at 5%

Table 12. Reasons of using EDI

| Factor | Mean | Std. Dev. | μ_1 | μ_2 | μ_3 | F Ratio | F Prob. |
|----------------------------------------------------|------|-----------|---------|---------|---------|---------|---------|
| High setup cost | 4.12 | 0.87 | 4.0909 | 3.9333 | 4.2286 | 0.6206 | 0.5406 |
| Incompatible data processing system | 3.85 | 0.97 | 3.7273 | 3.7333 | 3.9714 | 0.5472 | 0.5811 |
| Confidentiality of information | 3.81 | 0.87 | 3.5000 | 3.8667 | 3.9714 | 2.1117 | 0.1288 |
| Lack of awareness of EDI benefits by management | 3.78 | 0.89 | 3.6364 | 3.6667 | 3.9143 | 0.7988 | 0.4540 |
| Limited availability of suitable end-user software | 3.63 | 0.94 | 3.3636 | 3.4667 | 3.8824 | 2.4036 | 0.0980 |
| Absence of source document | 3.62 | 0.83 | 3.4091 | 3.4667 | 3.8286 | 2.1380 | 0.1256 |
| Confusions over document standards | 3.53 | 0.84 | 3.4545 | 3.4000 | 3.6286 | 0.5035 | 0.6066 |
| Non-automated/non-sophisticated trading partners | 3.48 | 0.86 | 3.3636 | 3.5333 | 3.5294 | 0.2807 | 0.7561 |
| Trading partner acceptance | 3.46 | 0.88 | 3.4091 | 3.6429 | 3.4118 | 0.3832 | 0.6831 |
| Lack of leader in the field | 3.43 | 0.95 | 2.9545 | 3.4000 | 3.7429 | 5.2540 | 0.0075* |
| Existing system is good enough | 3.26 | 0.86 | 3.0000 | 3.0000 | 3.5429 | 3.9169 | 0.0245* |
| Lack of direction from government | 3.01 | 1.09 | 2.7143 | 2.5000 | 3.3714 | 4.4584 | 0.0153* |

* Significant at %5

Table 13. Reasons of not using EDI

| Factor | μ_1 | μ_2 | μ_3 | F Ratio | F Prob. |
|--------------------------------------|---------|---------|---------|---------|---------|
| Part 1: Accuracy | 3.9545 | 3.8000 | 4.4872 | 3.3737 | 0.0397 |
| Aids in billing and payment | 3.9091 | 3.0667 | 3.4474 | 3.4868 | 0.0359 |
| Part 2: Lack of visible audit trails | 3.5000 | 3.1429 | 4.0588 | 5.1064 | 0.0087 |
| Part 3: Industry standards | 2.6316 | 2.7500 | 3.3030 | 3.2521 | 0.0455 |
| Part 4: Lack of leader in the field | 2.9545 | 3.4000 | 3.7429 | 5.2540 | 0.0075 |
| Existing system is good enough | 3.0000 | 3.0000 | 3.5429 | 3.9169 | 0.0245 |
| Lack of direction from government | 2.7143 | 2.5000 | 3.3714 | 4.4584 | 0.0153 |

Table 14. Differences in subpopulation means are significant at 5%