

**THE ADOPTION AND USAGE OF ELECTRONIC DATA INTERCHANGE  
BY SMES IN GWERU, ZIMBABWE.**

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**ABSTRACT**

This study was undertaken to explore the adoption and usage levels of electronic data interchange (EDI) by small and medium-sized enterprises (SMEs) in Zimbabwe. The researchers looked at EDI since the technology enhances business to business communication thereby promoting business growth and development. The study revealed that the majority of SMEs have not adopted EDI and for the few that have adopted the technology, the usage level is still minimal thus negatively impacting on the growth and development of the SMEs sector. The most important determinants that were identified for EDI adoption included perceived benefits, pressure from trading partners, and financial resources. Funding problems, difficulty in getting trading partners to use EDI, and lack of awareness and benefits of EDI came out as the strongest EDI adoption barriers for the SMEs. The study followed an exploratory research design where a structured survey instrument was developed and administered to 40 SMEs.

**Keywords:** Sustainable development, Electronic Data Interchange, EDI benefits, EDI barriers, EDI adoption determinants, Small and Medium-sized Enterprises

## INTRODUCTION

The Small and medium-sized enterprise (SME) sector is key in most developing countries and there is need to adopt and nature policies that promote its growth to ensure sustainable development of the economies of the developing countries. Embracing ICTs like electronic data interchange (EDI) is one of the instruments that can be used by SMEs to enhance development. (Noor, 2003) defines electronic data interchange (EDI) as the exchange of business data between computers in an agreed format. (Itoh, 2005) explains EDI as a technology where there is direct transfer of business information between computer systems in different organizations without human intervention or with minimal human intervention using widely agreed standards. The company that intends to send documents will create electronic documents and the receiving company's computers will process the documents without the need for human intervention. Business is carried out by means of passing those electronic documents between business partners. In EDI, paper documents are replaced by electronic documents and the exchange of documents like orders, invoices or shipping contracts take place in a standardised format. The standards enable trading partners to communicate business data rapidly, accurately and efficiently irrespective of their internal hardware and software. The efficient transmission of business data implies improved lead times which foster development of the SME sector. If trading partners implement EDI, the production costs are drastically reduced and this improves the sustainability of the SMEs sector as high production costs is one of the main reasons for failure to thrive (Chivasa & Hurasha, 2016).

EDI supports inter-organisational systems and it has become a preferred platform for sharing business documents in many supply chain based transactions. (Hill & Gary, 2002) purport that using EDI increases inter-organisational co-ordination of activities and the integration between supply chain members. Both trading partners can benefit from a more efficient and cost-effective supply chain. Suppliers have a better understanding of their specific products and they can use their product knowledge and EDI to enable better product availability and reduce the inventory in retail shops. This promotes the 'Just In Time' (JIT) inventory management and reduces unnecessary storage cost, thus improving sustainability of the SME sector thereby promoting sustainable development. EDI technology enables suppliers to access the inventory status in a given store online and monitor sales and changes in demand almost in real time. This enables suppliers to better forecast demand and speed up stock replenishment cycles. EDI has enabled the information from points of sales terminals to be linked to the inventory management systems enabling the points of sale to keep up to date the status of inventory (Vogt, Pienaar & De Witt, 2002).

According to (Kanakamedala, King, & Ramsdell, 2003) more than \$2 trillion trade among various firms in 2001 was done through EDI, with 55% of all North American large and mid-size companies reporting the use of an EDI network. (Ngai & Gunasekaran, 2004) also reported that there were more than 300, 000 users of EDI worldwide and it were forecasted that the EDI market would rise considerably at the growth rate of 200% per annum. However, a number of barriers limited its adoption to a narrow user base. The barriers included the complexity of developing EDI applications, slow development of standards and high costs of EDI. While these barriers limited the adoption of EDI, the introduction of the Internet has made the technology feasible even for small businesses and medium-sized companies. The Internet has eliminated the traditional barriers to EDI. (Sanchez & Perez, 2003) in their research also indicated that the development of the Internet and the subsequent realization of its business capabilities further resulted in new technological innovations within inter-organizational systems, ranging from Web forms and extranets to Internet based EDI. The Internet has provided an

affordable platform for SMEs to implement EDI and enjoy the benefits associated with the technology. However, (Maikudi & Eta, 2012) indicated that the adoption of EDI technology by Nigerian SMEs has been extremely low even if the technology has been available for more than a decade due to failing to appreciate the developmental benefits of EDI.

Much research regarding the adoption and use of EDI has been conducted in developed countries. Little research has been carried out in developing countries notably in Zimbabwe. This research, therefore, seeks to fill this research gap by investigating EDI adoption, usage level and usage barriers by SMEs within the context of a developing country like Zimbabwe.

## **LITERATURE REVIEW**

### **Definition of SMEs**

There is no universally agreed definition of SMEs and as a result different countries have different definitions for SMEs (Gamage, 2003). The definitions used are generally based on number of employees, turn over levels, amount of capital invested, nature of business, fixed assets and degree of formalisation (Ibid, 2003). In this research SMEs are defined as small businesses that are formally registered and with a turnover of less than US\$240 000 or asset value of less than US\$100 000 (Zimbabwe Association of SMEs, 2016).

SMEs have been identified as important contributors to the economic growth and development of national economies (Poon & Swatman, 1997). Zimbabwe is no exception and according to the Reserve Bank Zimbabwe (2007), SMEs contribute more than 50% of the gross domestic product and are also responsible for the livelihood of 80% of the country's population. This means that there is need to come up with policies that promote sustainable development for the sector so as to influence the economy at large. (Gamage, 2003) also highlighted that SMEs promote industrial and economic development; create jobs and increase wealth and incomes within their host domains. It is therefore important for SMEs to implement EDI so that they can be in a strategic position to compete in their markets. Developing countries which cannot support EDI risk losing business to companies in developing countries (Ngai & Gunasekaran, 2004).

### **EDI Benefits**

Various researches have been carried out on the benefits of EDI and a number of benefits have been cited. The benefits cited by (Maikudi & Eta, 2012) include improved trading partners business relationships, improved customers service, reductions in transaction cost and time, error-free transactions, high access to information, and increased overall competitiveness. (Bergeron & Raymond, 1997) classified EDI benefits into five groups namely administrative costs, information quality, operations management, strategic advantages and transaction speed. (Magutu, Lelei & Nanjira, 2010), identified the benefits of EDI as access to information, standardized programs and improved trading partner relationship. They also found out that EDI makes accurate sales forecasting and business planning possible due to information availability at the right place at the right time. EDI enables suppliers to have access to point of sale data and to monitor changes in demand almost in real time. The researcher can infer that the adoption and usage of EDI given its cost minimisation benefits, provides an opportunity for sustainable development.

Previous studies conducted on the benefits that accrue from the use of EDI are summarized in table 1

**Table 1: EDI Benefits**

| <b>Benefit</b>   | <b>Related literature</b>  |
|--|--|
| Access to information and the exchange of information is done faster without errors      | (Magutu, Lelei & Nanjira 2010); (Maikudi & Eta, 2012); (Gottardi & Bolisani, 1996); (Sokol, 1995); (Feinman, 2000); (Reekers, 1994); (Hill & Gary, 2002) |
| Communication costs are reduced  | (Maikudi & Eta, 2012)  |
| Greater sales volume   | (Reekers, 1994); (Banerjee & Golhar, 1994);  |
| Turnaround times are reduced   | (Feinman, 2000); (Maikudi & Eta, 2012); (Gottardi & Bolisani, 1996); (Kekre & Mukhopadhyay, 1992); (Al-bakri, 2007)                                      |
| Inventory levels and inventory costs are reduced   | (Maikudi, 2012); (Reekers, 1994);  |
| The competitive edge of an organisation is maintained and enhanced                       | (Daley, 1999); (Sokol, 1995); (Reekers, 1994); (Banerjee & Golhar, 1994)   |
| Lowers costs for coordinating and processing<br>Reducing transaction costs and paperwork | (Sohal, Power & Terziovski, 2002); (Daley, 1999); (Olson, 1989).   |
| Improve trading partner relationships  | (Magutu et al, 2010)   |
| More accurate sales forecasting and business planning                                    | (Magutu et al, 2010); (Feinman T, 2000)  |
| Make accounting and billing easier   | (Daley, 1996).   |

Source: Researcher's compilation 2016

In a research carried out by (Walton & Gupta, 1999), they analysed the benefits in terms of the phases of EDI implementation and pointed out that EDI benefits evolve over the stages. They identified three phases where during the initial phase is automation, the company will have efficiency gains like, reduced clerical errors and purchase order cost. The second phase is processes where the company links with its supply chain members. In this phase there are still efficiency gains for the company, like reduced inventory levels since the company is now focused on the process rather than automation. Lastly, the third phase is market visibility where the company is widely connected even with the smaller companies which are EDI enabled and thereby spreading the growth and developmental benefits.

### **EDI Barriers**

Various studies done on EDI have evidently shown that there are enormous developmental benefits of EDI, but despite the many benefits, there are also challenges faced in the implementation and application of EDI. (Ngai & Gunasekaran, 2004) cited some of the challenges as lack of EDI awareness, technological resources, financial resources and EDI-capable trading partners as well as incompatibility of existing systems with EDI. If these challenges are not addressed they hinder the development of the SME sector and the economy at large. (Jun and Chai, 2003) classified various EDI barriers into six

categories namely managerial leadership, trading partner relationship, perceived costs and benefits, security, technical and human resource management issues.

Previous studies on EDI challenges encountered by organisations in the implementation and application of EDI are summarized in table 2.

**Table 2: Common EDI challenges**

| <b>EDI adoption barriers</b>                          | <b>Related literature</b>  |
|---|--|
| Lack of EDI awareness and its benefits                | (Tuunainen, 1998); (Ngai & Gunasekaran, 2004); (Bidgoli, 2002); (Daley, 1999); (Philip & Pedersen, 1997); (Jun & Chai, 2003) |
| High implementation costs                             | (Magutu et al 2010); (Tuunainen, 1998); (Bidgoli, 2002); (Daley, 1999); (Philip & Pedersen, 1997); (Jun & Chai, 2003)        |
| Low transaction volume                                | (Tuunainen, 1998); (Bidgoli, 2002); (Philip & Pedersen, 1997)  |
| Data security concerns                                | (Tuunainen, 1998); (Iacovou, Benbasat & Dexter, 1995); (Jun & Chai, 2003)  |
| Unclear guidelines for EDI transaction agreements     | (Angeles and Nath, 2000)   |
| Difficulty in getting trading partners to use EDI     | (Minjoon & Shaohan, 2003); (Jun & Chai, 2003)  |
| Lack of top management support                        | (Ngai & Gunasekaran, 2004); (Bidgoli, 2002); (Philip & Pedersen, 1997)   |
| Inadequate technical knowledge                        | (Ngai & Gunasekaran, 2004); (Bidgoli, 2002);   |
| Legal problems due to the lack of paper documentation | (Philip & Pedersen, 1997)  |

Source: Researcher's compilation 2016

### **Theoretical framework**

(Tornatzky & Fleischer, 1990) carried out a research to determine what influences the adoption of technological innovations in general. They came up with a framework they called technology-organization-environment (TOE). The TOE framework affirms that there are three factors, technological, organisational and environmental factors and these influence how an organisation adopts and accepts new technology. The technological factor regards both the available internal and external technologies that may improve the organisational productivity. Organisational factors are the resources that are available to support the adoption of innovation and these resources include size of the organisation, management structure and the availability of the necessary skills set. The environmental factor considers external pressure from example, competitors, government and trading partners.

Using TOE (Iacovou, Benbasat & Dexter, 1995) developed a model formulating three aspects that influence EDI adoption. The three aspects included technological factor (perceived benefits), organizational factor (organizational readiness), and environmental factor (external pressure) and these were considered as the main reasons for EDI adoption. (Kuan & Chau, 2001) also used the TOE framework when they investigated the factors influencing EDI adoption and acceptance. They investigated the factors within the three contexts of the TOE framework. (Gengeswari & Abu Bakar, 2010) classified EDI integration determinants into two groups which are organizational context and external environment. Organizational variables refer to IT maturity, top management support, technological and financial resources while external variables refer to imposition by large trading partners, enforcement by government and competitive pressures. The current study adopts the TOE framework to investigate the factors affecting EDI adoption and usage by SMEs in Zimbabwe with the objective of promoting sustainable development of the SME sector in Zimbabwe. The variables that are going to be used in this study will be derived from the TOE framework.

## **RESEARCH METHODOLOGY**

### **Research design**

In this study, an exploratory research design was adopted because of the nature of the problem under investigation. A questionnaire was the main instrument that was used for collecting data. The instrument was pilot-tested with a sample of four SMEs in order to clarify any vague questions. The questionnaire had three major sections. The first section collected demographic information such as company details like number of employees (size of the organisation), the business age and the business sector as these characteristics can have a bearing on adoption and usage of EDI. The second section measured the EDI technology adoption, the current status of EDI implementation and usage levels of the technology. The last section focussed on barriers to EDI adoption.

### **Data collection and analysis**

The sample used for the study was selected from SMEs from Gweru. The information about the SMEs was obtained from the databases of Ministry of Small and Medium Enterprise Development and Small Enterprises Development Corporation (SEDCO). The SMEs were selected using the purposive sampling technique and forty SMEs were selected from the target population. The respondents of the study included the SMEs managers, owners and the employees responsible for the SMEs operations, adoption and implementation of EDI.

Qualitative data was edited to eliminate inconsistencies, summarized and coded for easy classification in order to facilitate tabulation and interpretation. Descriptive statistics was used in describing the sample data in such a way as to portray the typical respondents and to reveal the general response pattern. These statistics were generated with an aid of the computer software, Statistical Package for Social Sciences (SPSS) which offers extensive data handling capability and numerous statistical analysis routines that can analyze small to very large data statistics.

## PRESENTATION AND DISCUSSION OF RESULTS

The profiles of SMEs were investigated and the responses are shown in table 3 below. The profiles were investigated in terms of size, age and sector because these characteristics can have a bearing on adoption and usage of EDI.

### Profile of SMEs

**Table 3: SME profile by number of employees**

| No. Of employees | Code | Frequency(N) | %   | Cum % |
|------------------|------|--------------|-----|-------|
| 1 - 10           | 1    | 21           | 53  | 53    |
| 11 - 25          | 2    | 12           | 30  | 83    |
| 26 - 35          | 3    | 5            | 12  | 95    |
| 36 - 50          | 4    | 2            | 5   | 100   |
| Total            |      | 40           | 100 |       |

Source: Own calculations from the research

**Table 4: SME profile by business age**

| Age         | Code | Frequency | %   | Cum % |
|-------------|------|-----------|-----|-------|
| Less than 1 | 1    | 3         | 7   | 7     |
| 1-2         | 2    | 12        | 30  | 37    |
| 3- 5        | 3    | 15        | 38  | 75    |
| More than 5 | 4    | 10        | 25  | 100   |
| Total       |      | 40        | 100 |       |

Source: Own calculations from the research

**Table 5: SME profile by business sector**

| Sector                   | Code | Frequency | %   | Cum % |
|--------------------------|------|-----------|-----|-------|
| Industrial/manufacturing | 1    | 9         | 22  | 22    |
| Retail/wholesale         | 2    | 15        | 38  | 60    |
| Financial                | 3    | 4         | 10  | 70    |
| Other services           | 4    | 12        | 30  | 100   |
| Total                    |      | 40        | 100 |       |

Source: Own calculation from the research

Research findings suggest that the majority of the respondents had between one to ten employees while 38% of the SMEs had been in business for a period ranging from three to five years. Most of the SMEs have been in business for three or more years and only 37% have been in business for less than three years. The majority of the SMEs are in the retail/wholesale sector and other services like transport and tourism.

### Adoption and usage of EDI

Of the 40 SMEs, only 11 (27.5%) organisations had adopted EDI. This was evidenced by their use of at least one EDI transaction, for example, payments or funds transfer. Most of the SMEs were not using EDI for all their business

transactions. 45.5% of the SMEs indicated that they used less than ten percent of service capacity while only 18.2 % of the SMEs use more than seventy percent (see table 4 below). The low adoption and usage of EDI could explain the low growth and development of the economy.

**Table 6: Average use and adoption of EDI**

| Usage levels of EDI | Frequency | %    | Cum % |
|---------------------|-----------|------|-------|
| <10%                | 5         | 45.5 | 45.5  |
| 10 - 40             | 3         | 27.2 | 72.7  |
| 41 - 70             | 1         | 9.1  | 81.8  |
| >70%                | 2         | 18.2 | 100   |
| Total               | 11        | 100  |       |

Source: Researcher's compilation 2016

This supports the findings by (Iacovou et al., 1995) who argued that small firms resisted becoming EDI-capable because of the limited impact that IT had on small firms due to underutilization and lack of integration, low levels of IT sophistication, weak market positions of small firms and the network nature of the technology.

#### **Basic EDI adoption determinants**

The respondents were asked questions relating to their perceived reasons for adopting the EDI technology. They were asked to rate the determinants for EDI adoption that influence their decision to adopt the technology using a Likert scale ranging from 1 (not important) to 5 (very important). The determinants were derived from the TOE framework as outlined by (Tornatzky & Fleischer, 1990) and from other literature review (Magutu et al, 2010, Maikudi et al, 2012, Gengeswari et al, 2010). From the review, the research identified 10 determinants as indicated in table 5 below. The percentage of respondents who considered the determinant important or very important was calculated and the rank order of the determinants was established through the calculation of the mean for each determinant. A determinant with a mean larger than three was regarded as important.

**Table 7: Rank order of determinants for EDI adoption**

| Rank | Determinant  | N  | %  | Mean | SD   | Var  |
|------|--|----|----|------|------|------|
| 1    | Perceived benefits of EDI                                | 40 | 86 | 4.5  | 0.77 | 0.61 |
| 2    | Pressure from trading partners                           | 40 | 85 | 4.5  | 0.95 | 0.89 |
| 3    | Financial resources required                             | 40 | 83 | 4.4  | 0.79 | 0.65 |
| 4    | Technological resources required                         | 40 | 82 | 4.4  | 1.21 | 1.54 |
| 5    | Government support                                       | 40 | 82 | 4.3  | 0.85 | 0.73 |
| 6    | Lower costs for coordinating and processing transactions | 40 | 77 | 4.3  | 0.93 | 0.83 |
| 7    | More accurate sales forecasting and planning             | 40 | 72 | 3.8  | 1.23 | 1.60 |
| 8    | Reduced inventory levels and costs                       | 40 | 51 | 3.0  | 1.19 | 1.30 |
| 9    | Faster exchange of information without errors            | 40 | 62 | 3.1  | 1.49 | 2.15 |
| 10   | Leadership issues  | 40 | 64 | 2.9  | 1.29 | 1.67 |

Source: Researcher's compilation 2016

From the information in table 5, most respondents identified perceived benefits (86%) as the most important determinant for SMEs to adopt EDI. The respondents indicated that if the benefits are not adequate enough, they might not adopt the technology. This study supports the previous research by (Chwelos & Dexter, 2001) and (Maikudi and Eta, 2012) where perceived benefits were the most important determinant to adopting and using the technology. Pressure from trading partners was also an important determinant towards the adoption of EDI by SMEs. This means that if EDI is to be adopted for sustainable development, there is need to educate the SME sector on the potential benefits. The respondents indicated that if their trading partners (suppliers and customers) use the technology then they would have to embrace the technology to avoid loss of business which would then promote sustainable development. This is in support of (Neo, Khoo & Ang, 1994) who found out that an organisation may adopt a technology due to the pressure exerted by its business partners or competitors.

Other factors that also had a positive influence on the adoption of EDI by Zimbabwean SMEs included financial resources required, technological resources required, lower costs for coordinating and processing transactions and more accurate sales forecasting and planning. There was also evidence that the government has not done enough to help SMEs to adopt EDI which has resulted in a low SME survival rate. This as a result has negatively impacted on the development of the economy. However, all the other determinants can have some impact towards the adoption of the technology since each one of them has a mean which is significantly larger than three although they were not considered very important by the respondents.

### **EDI adoption barriers**

EDI non-adopters were asked to state the extent they agreed to the barriers influencing their decisions not to adopt the technology using a Likert scale. The percentage of respondents who considered the determinant to a great extent or to a

very great extent was calculated. A rank order of the barriers, the mean, standard deviation and variance were established. The feedback from the respondents is presented in table 8 below:-

**Table 8: Rank order of EDI adoption barriers**

| Rank | EDI adoption barriers  | N  | %  | Mean | SD   | Var  |
|------|--|----|----|------|------|------|
| 1    | Funding problems   | 29 | 69 | 4.1  | 1.45 | 2.13 |
| 2    | Difficulty in getting trading partners to use EDI                    | 29 | 62 | 3.9  | 1.43 | 2.08 |
| 3    | Lack of EDI awareness and benefits of EDI                            | 29 | 50 | 3.6  | 1.35 | 1.75 |
| 4    | Lack of government support   | 29 | 50 | 3.5  | 1.31 | 1.49 |
| 5    | Low transaction volume   | 29 | 47 | 3.2  | 1.47 | 2.15 |
| 6    | More requirements of changes in business processes than expected     | 29 | 53 | 3.0  | 1.61 | 2.59 |
| 7    | Data security concerns   | 29 | 42 | 2.8  | 1.52 | 2.28 |
| 8    | Lack of top management support                                       | 29 | 39 | 2.5  | 1.43 | 2.10 |
| 9    | Lack of legal framework to handle legal disputes associated with EDI | 29 | 37 | 2.3  | 1.25 | 1.58 |

Source: Researcher's compilation 2016

There are six barriers with a mean of three or greater that were considered by respondents as the significant barriers of EDI adoption and usage. However, most respondents identified funding problems (69%), difficulty in getting trading partners (62%), lack of EDI awareness and benefits of EDI (50%) and more requirements of changes in business processes than expected (53%) as the most important barriers. Funding could be a result of the poor economic conditions in Zimbabwe resulting in the government failing to channel resources towards sustainable development programmes. The results of this study confirmed the findings of (Daley, 1999) and (Tuunainen, 1998) who also found out that lack of EDI awareness and high setup costs as barriers of EDI adoption. (Minjoon & Shaohan, 2003) identified difficulty in getting trading partners as a serious obstacle to EDI adoption and usage. However, their finding on security concerns as one of the important barriers reveals a contrasting view to the researcher's findings. (Magutu et al, 2010) also identified lack of awareness of benefits of EDI and more requirements of changes in business as important barriers of EDI adoption and usage.

There are also relatively significant adoption barriers like lack of government support, and low transaction volume. In this research, lack of top management support and lack of legal framework to handle legal disputes associated with EDI were found not to be important barriers of EDI adoption. However, this conflicts with findings from (Ngai & Gunasekaran, 2004) who found lack of top management support as being an important barrier to the adoption and usage of EDI. Management are meant to have a good understanding of EDI and strongly support the implementation and application of the technology. The inability by the management to perceive the EDI benefits has stalled the development of the SME.

## CONCLUSION

Research findings suggest that most SMEs have not adopted EDI. Those SMEs that have adopted the technology are not using the technology to full capacity. This could explain the slow growth and low development levels in the SMEs sector.

The most important determinants to EDI adoption are perceived benefits, pressure from trading partners, financial resources and technological resources required. Development in the SME sector can be achieved if business linkages are established especially with big corporates. The other strong determinants include lower costs for coordinating and processing transactions, more accurate sales forecasting and government support. The other determinants discussed in the paper were considered not very significant and these include leadership issues and reduced inventory levels and costs.

Research results also show that there are only five strong barriers to EDI adoption and these include funding problems, difficulty in getting trading partners to use EDI, lack of awareness and benefits of EDI, and lack of government support. The other remaining barriers were considered as not very important and these include low transaction volume, data security concerns, lack of top management support and lack of a legal framework to handle legal disputes associated with EDI.

## **RECOMMENDATIONS**

If the country is to achieve sustainable development, given that SMEs are making an important contribution towards the economic development of Zimbabwe there is need to consider conditions that will assist the development of this sector. The integration of EDI technology in the SMEs day-to-day activities will enable them to enjoy the benefits associated with EDI and will in the long run contribute to the growth of SMEs. The SMEs must therefore intensify their efforts in creating an EDI enabled environment.

The Zimbabwean government must invest in the SMEs sector and put in place a framework that supports SMEs in terms of finance and EDI adoption. It must increase IT awareness to SMEs and promote the use of IT in that sector. Adoption of EDI is possible if SMEs are made aware of the benefits of using the technology and get the necessary support from government.

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