

Influence of Contextual Factors on e-Business Diffusion in the Small-to-Medium Enterprise Sector in Zimbabwe

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Abstract – This study, as a component of the researcher's PhD thesis, explores the influence of contextual factors on e-business diffusion in the small-to-medium enterprise (SME) sector in Zimbabwe. Contextual factors define the context or the environment in which a firm conducts its business operations. The study focuses on the ICT infrastructure, legal context and economic environment of the market. The positivist philosophy was adopted, using a quantitative research design and a survey strategy, based on a five point Likert scale questionnaire. Survey monkey online data collection platform was engaged to reach out to SMEs registered with the Zimbabwe Revenue Authority (ZIMRA). The research focussed on the owners and managers of the sampled firms as the key personnel responsible for strategic decisions and the information and knowledge repositories of their respective organisations. Descriptive statistics, exploratory factor analysis, confirmatory factor analysis and structural equation modelling were used for data analysis. The results showed that two, out of the three analysed contextual factors, are significant in influencing e-business diffusion in the Zimbabwean market. The major recommendations were for Central Government to establish a fully equipped national ICT infrastructure in partnership with the private sector in order to develop a seamless national infrastructural backbone and a harmonised legal system to facilitate the development and diffusion of e-business. ICT should be made a compulsory subject in schools in order to develop future techno-literate generations that can steer the ICT programmes in any sector of the economy.

Keywords – information and communications technology (ICT), technological infrastructure, economic factors, legal factors, e-business, diffusion, survey monkey, Zimbabwe Revenue Authority (ZIMRA)

I. INTRODUCTION

This study investigates the significance of contextual factors in the diffusion of e-business in the small-to-medium enterprise (SME) sector in Zimbabwe. Various researchers have affirmed the pivotal role played by SMEs in driving the sustainable development of economies the world over ([1], [2], [3], [4], [5]). Several studies cover a whole spectrum of variables that limit or enhance the SMEs' ability to adopt technology as their central business model. The current study is anchored on Tornatzky and Fleischer's technology-organisation-environment (TOE) framework [6]. The framework asserts that these three contextual factors drive the process of an organisation's adoption of new innovations/ideas. This study, however, makes some adaptations to this model. The 'technology' in the framework is taken as 'technological infrastructure' which relates to the hardware and software of ICT infrastructure rather than the technological characteristics of innovations. The second element – organisation – is not considered for this study. The third aspect – the 'environment' is broken down into two specific factors, namely, the 'legal context' and the 'economic context'. These three reconfigured factors, technology infrastructure, legal context and the economic context, constitute the contextual construct of the study. They are analysed to ascertain their significance in driving e-business diffusion in SMEs in the context of Zimbabwe. The 'technology infrastructure' is considered as the vital cog in the development and usage of information and communications technology (ICT) in business. It encompasses the national ICT infrastructure and the firms' internal

technological systems, skills and resources. The ‘legal context’ is also envisaged as pivotal in facilitating e-business diffusion through the creation of an enabling business environment. The ‘economic context’, on the other hand, offers the essential resource base required for developing the internal technological systems of the firms and the external national ICT infrastructure which links with the international ICT networks. Despite the fact that e-business has become critical in global business operations, the diffusion level in the small-to-medium firms in Zimbabwe is still lagging behind. This places them in a very precarious competitive position in the world markets, hence the need to identify their contextual limitations and come up with ways to turn them around to leverage their ability to adopt the current business models for sustainability and growth.

II. RESEARCH PROBLEM

E-business diffusion has become the main global business model of transacting within and outside national boundaries in the 21st century. From the plethora of definitions given by different authors in literature, the essence of e-business is the adoption of an overall strategy of redefining old business models using online technologies to achieve value-addition through enhanced customer value and company profit maximisation, as well as other intangible value- enhancing outcomes ([7], [8]). With the current global business environment characterised by the devastating COVID-19 pandemic, e-business assumes pole position as a business model the world over. Zimbabwe has been reported by various researchers as lagging behind in the widespread use of e-business ([9], [10]). This has been attributed to various socio-economic problems [11], including the closure of big organisations and relocation of international firms’ headquarters into other countries like South Africa, Kenya and Dubai. This study investigated the impact of the contextual factors impinging on the SMEs’ operating environment, with the objective of paving ways to facilitate the process of e-business diffusion for the sector in order to achieve a more competitive position nationally, regionally and globally. While research on SMEs’ ICT adoption has been carried out by several writers in Zimbabwe ([12], [13], [14]), there is no study done on the influence of contextual factors on e-business diffusion focusing on Tornatzky and Fleischer’s TOE framework as re-conceptualised in this research. On the backdrop of the above background, the main objective of this research was to, ***‘Establish and confirm the influence of the contextual factors on e-business diffusion in the SME sector in Zimbabwe’***.

III. LITERATURE REVIEW

Tornatzky and Fleischer’s TOE framework is based on three variables, technology, organisation and environment, which they considered central in the adoption of new ideas [6]. Several researchers in literature anchored their studies related to the adoption of new innovations in various fields and subjects on this framework. The researcher in the current study adapted the TOE variables, as discussed in the introduction section, in accordance with what was envisaged to be more specific and relevant in the SME sector within the context of the Zimbabwean market environment.

3.1 Technology

Technology in the TOE framework has been described through various dimensions by different writers. These paint an integrative characterisation which depicts technology as the technological infrastructure encompassing both the hardware and the software of ICT. It is not just the technical physical features and software, it also involves human knowledge and skills on how to operate the technology, knowing its purpose, and its efficacy [15]. **the technological infrastructure** is described as the hardware platform that hosts IT workloads, enabling businesses and individuals to access and make use of data and services for business or other purposes [16]. It also includes the media infrastructure, which is an important mass communication platform making e-transactions possible for e-commerce and e-business managers. Studies posit that the adoption of new technologies is facilitated by the existence of a well-developed technological infrastructure, both at national level and within the respective organisations [17]. On the other hand, poor telecommunications infrastructure and under-developed internet services are considered an impediment to the adoption of e-business [18]. In a similar vein, inadequate ICT infrastructure and erratic power supply have been regarded as the major drawbacks to the adoption of e-commerce in most developing countries [19]. This is echoed by the observation that Zimbabwe is characterised by poor ICT infrastructure, which results in an unaffordable and poor network [20]. From this discussion, it is clear that technological infrastructure is an indispensable pre-requisite to e-business diffusion.

3.2 Legal context

In the TOE framework, the ‘legal context’ is part of the overall economic environment affecting the business sector ([6], [21]). However, in the current study it has been extracted from its composite position in the framework and analysed as a standalone variable, as it assumes a critical role in the Zimbabwean business environment. For that reason, this aspect is not extensively

discussed in extant literature. The ‘legal context’ relates to the legal and regulatory framework of the environment in which the business operates. The legal framework points to the laws that spell out what is considered legal and illegal in business transactions. The regulatory framework, on the other hand, outlines the rules, policies and regulations that govern the way businesses should be run in respective national or international markets [22]. Government policies and regulations have the effect of expediting or slowing down the adoption of technology [23]. Complex and restrictive government regulations and agency requirements also slow down adoption ([24], [25]), while a favourable policy environment stimulates the inclination to adopt new technologies [26]. A favourable policy environment can be characterised by tax incentives, duty rebates on technological equipment and other government incentives. In essence, a favourable legal and regulatory environment provides a conducive platform for the adoption of new technologies, thus facilitating e-business diffusion. For these reasons, it is important to gauge how the legal framework of the country facilitates or inhibits adoption of progressive innovation in enhancing business performance and survival. This helps to find ways of amplifying its positive effects and reduce its negative impact.

3.3 Economic Context

The economic context describes the environment in which the business carries its operations. This may be inhibitive to growth and development or it may be facilitative. In the TOE framework, this factor is under the ‘environment’ which encompasses various descriptives of the general business operating space. This study isolated the ‘economic context’ from the all inclusive general term of the ‘environment’ and considered it from a perspective of specific economic conditions which allow free flow of information and equitable distribution of resources facilitating investment for both external and internal investors. Much of the existing literature focuses on the impact of e-commerce on the business environment or the macro-economic impacts of e-business on national economies [27]. Not much is written on how the ‘economic context’ impacts on the diffusion of e-business in SMEs. In general, favourable economic conditions are associated with the firms’ readiness to adopt and implement new technologies for business development and sustainability. Financial resources are key to the firm’s readiness [17]. They create the enabling economic and skills base of the organisation, hence the importance attached to this dimension in this study.

From the literature reviewed and the adaptation made to the TOE framework, the researcher developed a conceptual framework that depicts the relationship of the three independent variables – technological infrastructure, legal context and economic context – to the dependent variable – *diffusion* (Figure 1).

3.4 The Study Conceptual framework.

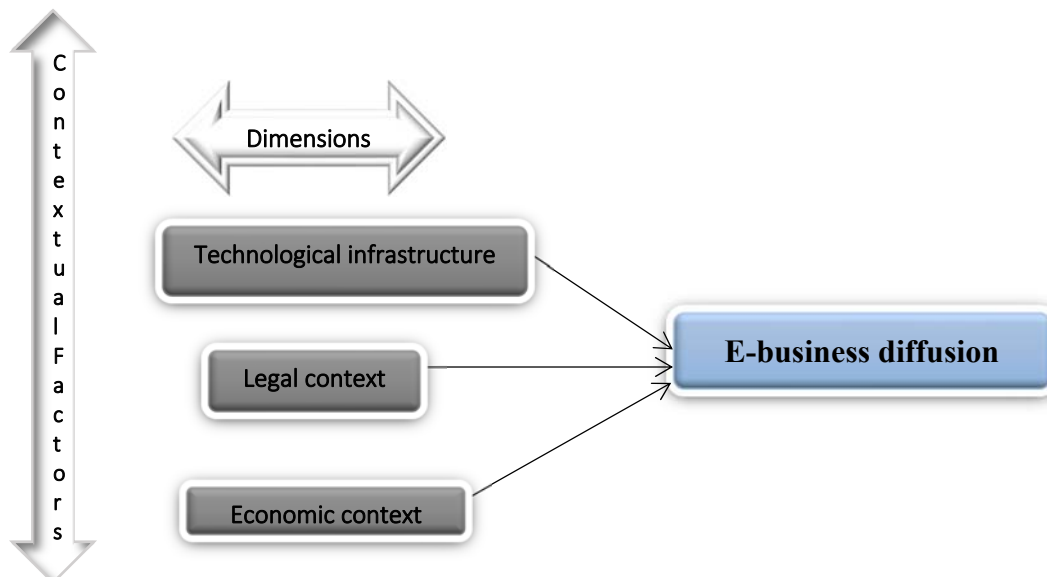


Figure 1: Adapted from Technology-Organisation-Environment (TOE) Framework [6]

3.5 Hypotheses Derivation

From the resultant conceptual framework, the researcher derived the main hypothesis – **H0: Contextual factors influence e-business diffusion in the SME sector in Zimbabwe.**

This hypothesis is operationalised through three sub-hypotheses which relate to the dimensions that constitute the contextual construct of the study, namely, technology infrastructure (**H1**), legal context (**H2**) and economic context (**H3**).

H1: *Technology infrastructure has a significant influence on e-business diffusion in the SME sector in Zimbabwe.*

H2: *The legal context has a significant influence on e-business diffusion in the SME sector in Zimbabwe.*

H3: *The economic context has a significant influence on e-business diffusion in the SME sector in Zimbabwe.*

IV. RESEARCH METHODOLOGY

4.1 Research Design, Target Population and Sampling

This research engaged the quantitative design, anchored on the positivist philosophy. The quantitative design relies on a large sample for generalisability of results. This was deemed appropriate for the indeterminate population of SMEs in Zimbabwe and the large sample size of the study. The quantitative design provides the data in numerical form, which simplifies analysis and allows the explanation or understanding of the research problem through statistical models [28]. In addition, this design relies on objective information gathering and this adds to its characteristic of generalisability [29]. Given the spread of the SME population and the inadequate records available in the Ministry responsible for this sector, the researcher selected the SMEs in the Harare Metropolitan area which are registered with the Zimbabwe Revenue Authority (ZIMRA) as the target population for this study. Registration with ZIMRA meant the SMEs were most likely exposed to the concept of e-business since they would be expected to run on proper business lines.

4.2 Data Collection

A survey approach was used because of its wide coverage and suitability to embrace large samples. A survey based on a questionnaire was done electronically through survey monkey, selected on the strength of its convenience and its appropriateness to the nature of the topic under study. The questionnaire was based on a 5-point Likert scale, with closed-ended questions to aid in the statistical analysis of the data. The questions were derived from the research objective and are the basis for the study hypotheses. The sample size of 567 was attained through power analysis. However, the researcher distributed 700 questionnaires to allow for attrition, incomplete responses and spoilage. The sample was randomly selected to give a fair chance of selection to all the SMEs in the Harare Metropolitan area on the ZIMRA data base. A response rate of 86.14% (603) was attained. This was well above the 60% return rate recommended ([30], [31]). Only 1.86% (13) of the returned questionnaires were eliminated through data cleaning and this was way below the suggested acceptable threshold of 15% ([32], [33]). This left 590 (84.29%) valid cases for analysis. The researcher deemed this to be adequate for generalisation of results.

4.3 Data Analysis

IBM Statistical analysis package SPSS v26 was used to capture and clean the data for errors, missing items and possible outliers. The process was followed by testing for validity and reliability of the dimensionality of the study's scales through exploratory factor analysis (EFA), to ensure they were in line with the current study [34]. This was to guard against the possible distortion of results emanating from using a priori scales of other researches ([35], [36]). The two key assumptions – the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy of greater than 0.700 [37] and Bartlett's test of sphericity threshold of $p < 0.05$ [38] were both met at 0.803 and $p = 0.000$ ($\chi^2 = 1793.950$, $Df = 91$) respectively. The principal component analysis (PCA) was utilised as the extraction method using the orthogonal varimax rotation rather than the oblique, since the factors were not highly correlated [39]. All the items met the minimum threshold of 0.4 ([40], [41]), hence none were dropped (**Table 1**).

The three components extracted had a cumulative total variance explained of 57.591%. The first component, with an Eigen value of 4.040, explained 28.857% of the variance, while the second component with 2.387 explained 17.048% of the variance and the third at 1.636 explained 11.686% of the variance. As the total variance of the three components was higher than the acceptable prescribed minimum threshold of 50% [41] they were found to be representative of the greater portion of the contextual construct (**Table 1**). Cronbach's alpha was computed to ascertain their internal consistency and reliability of scale. All the items successfully

loaded in each of the three dimensions, indicating an *alpha* value above the recommended minimum threshold of 0.7 [42] ‘Legal context’ loaded at 0.798, ‘economic context’ at 0.724 and ‘technological infrastructure’ at 0.716. This confirmed reliability of all the items for each factor and thus determining the internal consistency of the dimensions.

Table 1: Contextual Variables – Rotated Component Matrix

Determinant Factor	Extractn	Factor Loadings			C α
		1	2	3	
Legal Context (LC)					.798
High business taxes negatively affect investment into e-business systems.	0.645	.797			
Restrictions on imports affect acquisition of e-business equipment.	0.640	.793			
Lack of legislation to protect e-business transactions negatively affects adoption.	0.583	.754			
Lack of supportive ICT policies negatively affects e-business adoption.	0.490	.652			
Economic Factor (EC)					.724
The costs of ICT consulting services are too high.	0.653		.781		
The cost of hiring IT staff in the organization is too high.	0.560		.733		
It is too costly to setup e-business systems.	0.505		.691		
The fees charged by internet service providers are too high.	0.455		.611		
Technology Infrastructure (TI)					.716
Latest technologies are easily accessible to SMEs	0.519				
Fast internet speed makes it easy to use e-business effectively.	0.705			.793	
Internet connectivity is good and makes it easy to adopt e-business.	0.571			.688	
Modern technology infrastructure has positively affected adoption.	0.461			.636	
Government has developed adequate national technology infrastructure.	0.757				
Eigen value		4.040	2.387	1.636	
Variance explained		28.857%	17.048%	11.686%	
Accumulated variance explained		28.857%	45.905%	57.591%	

Confirmatory factor analysis was subsequently conducted for construct validity through convergent and discriminant validity tests as a prerequisite to engaging structural equation modelling ([43], [37], [44]). Both construct validity tests met the stipulated conditions. The convergent validity fell within the acceptable limit of a standardised path coefficient of at least 0.40, with all items in the range of 0.453 and 0.762 ([45], [37], [44]). The discriminant validity was within the tolerable upper threshold of 0.85 ([37], [44]). None of the covariances was above 0.85, with the highest coefficient of 0.537 between ‘economic’ and ‘legal’ contexts.

The results were further confirmed by goodness of fit tests, namely, absolute fit indices, relative fit indices, parsimonious fit indices and non-centrality based fit indices. CMIN/DF for the absolute fit index was less than 3.0 ([44], [41]) at $2.001 < 3.0$; the comparative fit index (CFI) for the relative fit indices, greater than 0.90 [46] at $0.917 > 0.90$; the Root Mean Square Error of Approximation (RMSEA) for the model parsimony, less than 0.07 [44] at $0.054 < 0.07$.

Table 2: Model Fit Results (CFA)

Goodness of Fit Index	Threshold(s) and author(s) supporting	Finding(s)
CMIN/DF	< 3.0 ([44], [41])	$2.001 < 3.0$
CFI	> 0.90 [46]	$0.917 > 0.90$
RMSEA	< 0.7 [44]	$0.054 < 0.7$

The researcher adopted the covariance-based structural equation modelling (CB-SEM) on the basis of the large sample size (590) ([46], [47]). In addition, the assumption for multivariate normality was met, with a kurtosis of 7.706, which is above the suggested minimum of 7.0 [48] and a multivariate critical ratio above the stipulated minimum of 1.96 at 38.213 ([49], [46]), thus qualifying the study for SEM.

The results of the structural equation modelling show a high statistical significance in influencing e-business diffusion in two of the three variables, namely, technological infrastructure (TI) ($p0.007 < 0.05$) and legal context (LC) ($p0.045 < 0.05$ (**Table 3**)). The result showed a non-significant relationship between the dependent variable 'diffusion' and the independent variable 'economic context', with a negative standardised coefficient of -0.007, critical ratio of -0.167 and p value of $0.868 > 0.05$.

Table 3: Standardised Regression Weights (SEM) for Contextual Factors

			Estimate	Standardised	Standard Error	Critical Ratio	P-Value
DIFF	<---	TI	.045	.089	.026	2.707	.007
DIFF	<---	EC	-.003	-.007	.016	-.167	.868
DIFF	<---	LC	.034	.086	.017	2.008	.045

Model fit tests were carried out to confirm the validity of the model derived from the structural equation modelling. The CMIN/DF measured 2.002 which is within the acceptable threshold of < 3.0 at $2.002 < 3.0$ ([44], [41]). Although the p -value was below the stipulated limit of > 0.05 , this was attributed to the large sample size which renders the test sensitive ([50], [51]). The sensitivity of the CMIN/DF test was compensated for by the fulfilment of the measures from the other tests, namely, CFI, which fell within the stipulated threshold of $0.902 > 0.90$, PNFI/PCFI at $0.634 > 0.5$ and $0.665 > 0.5$ respectively [46] and RMSEA of $0.052 < 0.7$ [44].

Table 4: Model Fit: Structural Equation Modelling

Goodness of Fit Index	Threshold(s) and author supporting	Finding(s)
CMIN/DF	< 3.0 [41]; ($p > 0.05$)	$2.002 < 3.0$; ($p0.030 < 0.05$)
CFI	> 0.90 [46]	0.902
PNFI;PCFI	> 0.5 [46]	0.634; 0.665
RMSEA	< 0.7 [44]	0.052

V. DISCUSSION AND HYPOTHESIS VALIDATION

The analysis of the results showed some variations of this research from extant literature and corroboration of some aspects relating to the influence of contextual factors on e-business diffusion as it pertains to the Zimbabwean market place.

5.1 Technology infrastructure

The 'technology infrastructure' registered a standardised path coefficient of 0.089, a critical ratio of 2.707 and $p=0.007<0.05$. The critical ratio shows a high statistical significance in accordance with the threshold of 1.96 at 95% confidence level [52]. The p -value was also significant at $p=0.007<0.05$. This shows that e-business diffusion in SMEs is anchored on the quality of the national technology infrastructure which links the internal systems to the external network both at national and international level. The significance of the 'technology infrastructure' as shown in the results also confirms the observations by other researchers on the importance of the technology infrastructure in expediting the diffusion of e-business in SMEs [17]. Technology infrastructure, thus, significantly influences e-business diffusion in the SME sector in Zimbabwe. On the basis of these results, hypothesis **H1**: *Technological infrastructure has a significant influence on e-business diffusion in the SME sector in Zimbabwe* was accepted.

5.2. Legal Context

The 'legal context' also emerged as having a significant influence to the process of e-business diffusion, with a standardised path coefficient of 0.086, a critical ratio of 2.008, which is higher than the acceptable 1.96 at 95% confidence. This was also supported by the p -value 0.045 which is less than the stipulated acceptable threshold of $p\leq 0.05$ ($p=0.045<0.05$).

The main issues of concern in the 'legal context' related to high business taxes levied by the government institutions, restrictions on imports, lack of foreign currency access and the lack of legislative protection and enabling ICT policies. These issues have impeded the development and adoption of e-business among the SMEs. Policy inconsistencies that have characterised the legal context in Zimbabwe ([53], [54]) have resulted in a wide gap between government's articulated goals on technology developmental programmes and the level of success achieved. This has been an area of great concern for commerce and industry at large. From the results registered on the dimension of legal context, hypothesis **H2**: *The legal context has a significant influence on e-business diffusion in the SME sector in Zimbabwe* is accepted.

5.3 Economic context

The 'economic context' had a negative standardised path co-efficient of -0.007, which is a much lower statistic than the acceptable 1.96 at 95% confidence level. A corresponding negative critical ratio of -0.167 and a p -value of 0.868, which is much higher than the stipulated $p\leq 0.05$ ($p=0.868>0.05$), shows that the dimension had no significant impact on diffusion. This finding is counter to the suggestions by some writers that financial resources are critical in establishing e-commerce [17] and that fiscal measures and economic stimuli have an impact on the rate of diffusion [22]. The effect of the economic situation on e-business diffusion is not discussed much in literature, but rather how e-business affects the economy. The result of this study possibly hints at the SMEs' lack of insight regarding the relationship between e-business diffusion and the prevailing economic conditions. It may also be caused by their concentration on more immediate pressing issues resulting from the ailing economic climate. Issues relating to ensuring survival of the company for the sustenance of the families, the workforce and other daily needs come to the fore in such difficult economic times. Developing ICT systems and associated activities become the least of their considerations, which possibly explains why the relationship between the 'economic context' and e-business diffusion was weak. On the basis of this finding, **H3**: *The economic context has a significant influence on e-business diffusion in the SME sector in Zimbabwe* is rejected.

From the discussion of the results of the three dimensions of the contextual construct, the main hypothesis – **H0**: *Contextual factors have a significant influence on e-business diffusion in the SME sector in Zimbabwe* is accepted. This influence of the contextual construct hinges on the significant influence of the 'technological infrastructure' and the 'legal context'.

VI. CONCLUSIONS AND RECOMMENDATIONS

The empirical model emanating from this research is depicted in **Figure 2**. Out of the three contextual factors analysed in the study, two showed a significant influence in the adoption of e-business in the SME sector in the current Zimbabwean market environment. The third dimension was not considered important in the process.

6.1 Empirical Study Model.

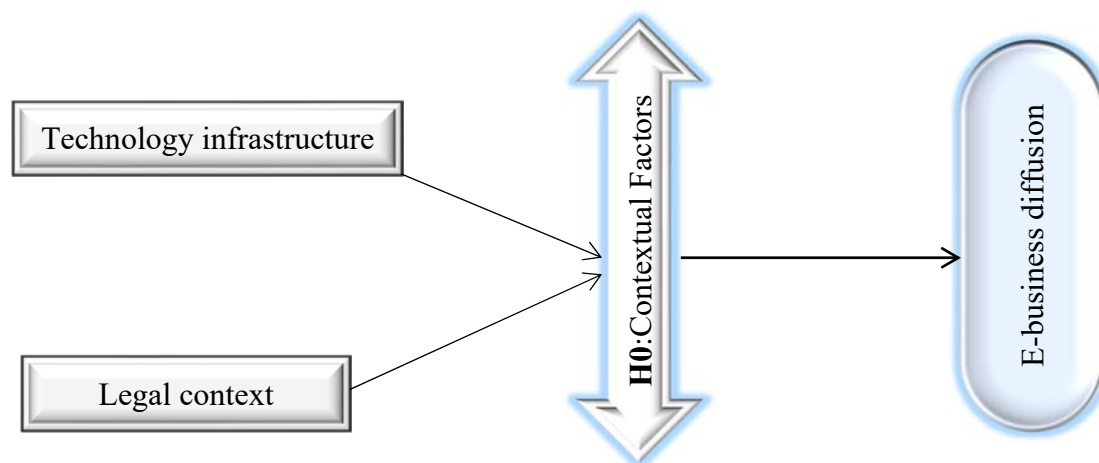


Figure 1: Empirical Model: Influence of Contextual factors on e-Business Diffusion in the Zimbabwean SME Sector

This study has shown that the technological infrastructure and the legal context have a great influence on the adoption of e-business as a business model for SMEs. The significance attached to the technological infrastructure points to the need for a well-developed ICT infrastructure as the pre-requisite for creating an enabling environment for e-business diffusion. It is, therefore, important for the relevant government ministry to form a national ICT management body which includes the business sector, manpower training institutions, educational institutions, service providers and other relevant bodies. This will ensure a holistic approach to the ICT infrastructure development programme which caters for the needs of all sectors of the economy. There is also need to revamp the whole legal system in line with the current economic development agenda of government which purports to achieve an upper middle income economy anchored on innovation and industrialisation by 2030. While the researcher is cognisant of some work done to date on ICT and harmonisation of the laws and policies of the country, there is a lot more that needs to be done to ensure that the use of technology becomes an integral part of conducting business. This can be possible if, firstly, the technological infrastructure is fully developed to include e-government services and, secondly, the legal and regulatory system is aligned to the country's national development agenda.

6.2 Managerial and Policy implications.

This study exposes the need for the management of SMEs to adopt technology packages that will enhance business growth, sustainability and competitiveness on the world business arena rather than focusing on their own closed environments. There is need to collaborate with other business partners and technology service providers to obtain the most appropriate technologies for their mode of operations. Government, on the other hand, needs to take an action-oriented initiative to create an enabling environment which motivates small and medium businesses to align their businesses to the current technology-oriented global business culture. Financial support and human resources development are key in this initiative. While the economic context was shown to be of insignificant influence on the adoption of e-business in this study, the researcher strongly recommends that government seriously considers it as central in creating a conducive business environment for nurturing the nascent small and medium business sector. This can be done through a harmonised legal and regulatory framework that encourages investment from both local and international investors. The development of a strong ICT infrastructure which enables the country, and specifically the SMEs, to join the current wave of global virtual business operations is also critical for business growth and development. This will enable the SMEs to be truly the engine of growth and sustainability for the Zimbabwean economy.

VII. LIMITATIONS AND CONTRIBUTIONS

Most studies based on the TOE framework focussed on the three dimensions as given by Tornatzky and Fleischer – technology, organisation and environment. The adaptation of the dimension 'environment' and splitting it into 'economic context' and 'legal context' introduced some limitations in accessing extensive and relevant literature focussing directly on these two dimensions. The researcher found that there is a paucity of studies specifically looking at the economic factor as a predictor for e-business adoption. This makes the current study a pioneering research, adding to the literary domain that future researchers can draw from for further

research. In addition, the methodological rigour from which the results were attained makes the study a rich resource for future researchers to draw from in terms of methodological approach.

VIII. PATH FOR FUTURE RESEARCH

The results of this research can be investigated further, using different settings within the country to establish whether they apply to the SME population at large, thus confirm their generalisability. The researcher recommends that future researchers look in more detail at the relationship between the economic context and e-business diffusion to confirm or refute the results of this study. It is also recommended that a different methodology be used to ascertain if the findings in this study on the three contextual dimensions can be corroborated.

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