The Uptake of E-Commerce Services In Johannesburg

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Abstract

The aim of study was to assess the pace of adoption and quality of E-Commerce services that are provided to customers in Johannesburg, South Africa. Data was collected from 180 E-Commerce enterprises operating in Fourways, Eastgate and Rosebank. A one-way multivariate analysis of variance model (MANOVA) with maximum likelihood estimation was used for comparing the three business districts of Johannesburg with regards to the average cost of services and the average length of time required for providing services to customers. The adequacy of E-Commerce services provided to customers was assessed based on criteria defined by Bonson et al. [1]. The study showed that there was no significant difference among the three business districts of Johannesburg with regards to both variables of comparison (cost and time). The results showed that the pace of adoption of E-Commerce services in the three business districts was significantly influenced by a combination of technological and organisational factors. The study has shown that E-Commerce enterprises in Johannesburg need assistance from the City of Johannesburg in areas related to infrastructure, economic incentives, skills-based training, and monitoring and evaluation.

Keywords: Fire Detection; Early Warning; "Incipient" Fire Stage; Probabilistic Risk Assessment; Reactor Regulation.

1. Introduction

The aim of study was to assess the extent of adoption of E-commerce services in three major suburbs of Johannesburg (Eastgate, Fourways and Rosebank). Two key aspects of comparison were used in the study. These were the average cost of services and the average time needed for performing standardised activities. The quality and efficiency of E-Commerce services provided to customers was assessed based on criteria defined by Bonson et al. [1] for ensuring satisfactory service delivery in E-Commerce.

E-Commerce activities are relatively new in South Africa. Biener et al. [2] have outlined various socioeconomic factors that are known to affect the pace of adoption of E-Commerce services. The author has pointed out that skills that are vital for the efficient utilisation of Information and Communication Technology (ICT) operations are a key requirement for the efficient adoption of E-Commerce activities. Gheyas and Abdallah [3] have identified factors that affect satisfaction with E-Commerce activities along with potential threats such as cyber-attacks and theft of valuable data sets. The authors have shown that infrastructural development is a key requirement for ensuring speedy and reliable E-Government services at local municipality level. Kitch [4] has shown how vital E-Commerce is for ensuring and promoting growth and profitability in newly established small, micro and medium-sized enterprises (SMMEs). E-Commerce services are critically important for ensuring efficiency in all business operations that are carried out by utilising the internet and on online platforms [5]. Gross et al. [6] have detailed consequences of cyber-attacks on valuable data sets along with appropriate remedial actions. The authors have provided a list of precautionary measures that are vital for SMMEs utilising E-Commerce operations. The use of E-Commerce activities ensures easy marketing and retail distribution to customers [7, 8].

E-Commerce activities require the availability of modern infrastructure such as fiber optics technology [9]. Fiber optics brings e-commerce to the world by enabling SMMEs to transfer massive trade-related data sets and business information to customers and clients within seconds [10]. The transfer of such data sets is carried out in secure and speedy environments. Howe, Suich et al. (2014) have shown that E-Commerce activities have the potential to take over all other forms of conducting business due to their ability to utilise modern satellite technology and fiber optic cables [11]. Cavelty and Mauer (2016) have pointed out that global business transactions depend on fiber optic cables and satellite technology [12]. Traditional cables are made of copper and transmit electrical energy. By contrast, fiber optic cables transmit light [13]. This fact enables fiber optic cables to transfer massive data sets much faster in a secure environment and minimal interference. In fact, fiber optic cables are preferable to satellites as they are cheaper and faster. The other benefit of fiber optic cables is that they are buried deep underwater. Currently, there are more than 550, 000 miles of fiber optic cables connect the various continents [14]. As such, E-Commerce activities are not restricted by borders and working hours. E-Commerce activities and transactions can be readily executed in seconds in all parts of the world at an affordable rate. E-Commerce enables the sharing of valuable data sets and business information in a highly secure environment [15].

The use of E-Commerce has enabled major global companies to deliver highly efficient, reliable and affordable services to billions of people in all parts of the world [16]. Due to rapid development in the world of E-Commerce, companies in all parts of the world are capable of providing essential services to the global community at affordable rates. The best examples in this regard are companies such as Amazon, Alibaba, CNN, Walmart and Netflix [17]. Technological advancement in E-Commerce has enabled national governments to ensure the quality and cost of service delivery in all economic sectors. E-Commerce enables local municipalities to minimise the cost of service delivery, stocktaking, inventory, auditing and accounting. Supply chain activities can be better conducted by using E-Commerce as it is significantly easier and faster to procure services by using online platforms [18]. An E-Commerce study conducted in Lagos, Nigeria has found that national governments could reduce failure rates in start-up SMMEs by educating operators of business enterprises on how to utilise E-Commerce and online platforms for conducting routine business operations [19]. According to the authors, the key obstacles in this regard are lack of leadership, lack of awareness about the potential benefits of E-Commerce and online platforms, and poor infrastructural development.

The total population of the City of Johannesburg in 2016 was estimated at 4.4 million. Johannesburg is the business capital of South Africa. The City of Johannesburg consists of various suburbs. This study was conducted in three of the suburbs of Johannesburg (Eastgate or Bruma, Fourways and Rosebank). The population density of Johannesburg is about 2, 900 people per square kilometre [20]. Black people constitute about 76% of the population in Johannesburg. This figure includes Africans from the rest of Africa. Whites account for about 13%, Coloured people account for about 6%, and Asians account for about 5%. The most commonly spoken languages are Nguni (33%), Sotho (25%) English (18%), Afrikaans (7%) and Tshivenda (6%). About 7% of the population of Johannesburg are illiterate. About 3.4% of the population in Johannesburg have primary level education only. In 2016, the percentage of households headed by a single person in Johannesburg was estimated at 66%. About 29% of residents of Johannesburg live in informal dwellings [20].

Eastgate or Bruma, Fourways and Rosebank are three suburbs of Johannesburg in which E-Commerce activities are utlised extensively. All three suburbs are popular business districts in which world-class services are provided to customers and the general public at affordable cost. All three suburbs rely extensively on online and internet based entrepreneurial services for conducting business operations. Businesses in all three suburbs are highly competitive. Customers in all three suburbs require speedy, reliable and affordable services and business transactions. As such, utilisation of online systems, the internet and E-Commerce is fairly robust.

The Eastgate area of Johannesburg falls under Bruma, which is one of the most vibrant business districts of Johannesburg. Bruma is well-known for its popular flea market in which artifacts from all over Africa are sold at affordable prices. Bruma is also home to a large Chinese mall and the East Gate Shopping Mall. The Fourways area of Johannesburg is the fastest-developing commercial and residential hub in northern Johannesburg. Rosebank is a cosmopolitan commercial and residential suburb to the north of central Johannesburg. Rosebank is home to the famous Gautrain Station of Johannesburg. Rosebank is also a very busy business district of Johannesburg.

E-Commerce has enabled local companies to cross borders and reach out to clients and customers from all over the world. The global nature of the world economy has forced local enterprises and government agencies to seek higher degrees of service excellence in all sectors of service delivery. Newcomer et al. (2015) have reported that SMMEs operating in developing countries stand to benefit the most from the use of E-Commerce and online platforms [20]. Although there is no specific definition of E-Commerce, it can be looked at as the buying and selling of goods and services over the internet via the World Wide Web (www). At present, E-Commerce is the most efficient and preferred mode for conducting business throughout the world. E-Commerce has revolutionised the global workplace by improving performance and productivity [21]. E-Commerce has realised the task of mediating the exchange of goods and services electronically at an affordable and highly efficient rate [22-24].

Kerber (2016) has pointed out that the pace of adoption of E-Commerce is still low in developing countries such as South Africa [25]. The key obstacles are lack of awareness, poor infrastructural development, lack of good governance, the abuse of public resources and assets, lack of respect for free enterprise and the free flow of information, censorship of information, and the abuse of power by political leaders [26, 27]. Shaikh and Karjaluoto (2015) have recommended that national governments and local municipalities must work together in areas such as assessing the basic operational needs of SMMEs and service delivery institutions [28]. According to Skopik et al. (2016), E-Commerce and internet based online platforms are most helpful and least costly for monitoring and evaluating the quality of services that are provided to customers and the public. The needs and aspirations of E-Commerce enterprises are perfectly aligned with the needs and requirements of E-Government projects that are currently being rolled out by the South African Government. This shows that the task of assisting E-Commerce enterprises has the potential for fostering growth in South African E-Government projects.

The primary objective of research was to compare E-Commerce services that are provided to customers by E-Commerce enterprises operating in Fourways, Eastgate and Rosebank with regards to cost and time needed for providing services based on criteria defined by Bonson et al. (2017). The study had the following specific objectives:

- To identify factors that affect the cost of E-Commerce services; and
- To identify factors that affect the length of time required for providing E-Commerce services.

2. Literature Review

E-Commerce has numerous benefits to SMMEs and public sector agencies. It enables service delivery institutions to provide an accurate description of services to be expected along with the cost of such services and the expected time required for providing the services [30]. It enables service providers to disseminate changes in service delivery issues effectively to all customers and stakeholders including members of the media along with the reasons involved. E-Commerce platforms enable service providers to advise consumers on precautionary measures and the recall of faulty products. E-Commerce platforms enable service providers to accept payment online. E-commerce platforms enable service providers to disseminate accurate product-related information online to all their customers at the same time. Automated transactions are made possible at all times by E-Commerce platforms. E-Commerce platforms are conducive and affordable to all customers as they are not affected by time differences and national boundaries [31]. E-Commerce services are affordable to all customers, and enable service providers to reach out to all their customers at the same time, thereby ensuring fairness, optimal efficiency and objectivity in the course of service delivery. E-Commerce services cut down operational cost and reduce the time required for rendering services significantly. The convenience of shopping online and paying for services electronically is quite valuable to all customers in all parts of the world [32].

E-Commerce services could be Business-to-Consumer (B2C), Business-to-Business (B2B), Government-to-Business (G2B), and Customer-to-Customer (C2C). E-Commerce platforms enable entrepreneurs conducting business in developing countries to benefit from technological advances with minimal effort [33]. E-Commerce in South Africa is growing rapidly, it has only been accelerated by big organisations. The adoption of E-Commerce platforms has been fast in large companies. One key user of E-Commerce is the airline industry. The other main users are commercial banks, insurance companies, and large retail shops. South Africa benefits from a highly advanced telecommunications industry that uses state of the art technology for performing business transactions. Some of the enterprises that have so far well excelled in It services include; banks, academic institutions, airline and travel bureaus, supermarket for groceries, small business and upper income households, apparel and book stores [34, 35]. According to the World Bank (2017), there are 21 million internet users out of a population of size 54 million [36]. This figure shows that South Africa is quite ready for benefiting from E-Commerce activities and operations. Most retail shops in Johannesburg accept online payments and orders. The quality of E-Commerce services depends on the availability of online services and the quality of access to the internet. In this regard, bandwidth is vital. Customers with positive experience are relatively more loyal to E-Commerce service providers in comparison with customers with negative experience [37].

E-Commerce services are prone to internet-based threats such as the loss or theft of databases, theft of valuable information belonging to customers and hacking. E-Commerce users must be adequately aware of online threats at all times. Operators of SMMEs must take training on a regular basis as a means of having themselves and their customers adequately protected. The bandwidth of service providers must be large enough in order to ensure reliable, speedy and highly efficient services. However, most service providers do not have the necessary money to pay for large bandwidths. As a result, their service quality is poor. Often, online business transactions fail. This leads to customer dissatisfaction. E-Commerce enterprises must use adequate protection against hackers and intruders in order to safeguard databases and personal details of their customers. However, E-Commerce operators often fail to take adequate precautionary measures against potential intruders for fear of incurring high operational cost of conducting business [38].

Due to advancement in E-Commerce activities, SMMEs are obliged to be very highly competitive and global in nature [32]. The study conducted by Romanosky (2016) has shown that lack of awareness about the numerous benefits of E-Commerce activities is a major bottleneck for growth and development in developing cities [38]. The author has

highlighted various obstacles that hinder the pace of adoption of E-Commerce activities in developing cities such as the City of Johannesburg. Bonson et al. (2017) have provided an integrated framework that could be used for enhancing the pace of adoption of E-Commerce platforms in developing cities such as Johannesburg [1]. The authors have listed down core functional responsibilities of local municipalities that are essential for promoting and accelerating the pace of adoption of businesses intelligence systems and models. The authors have argued that local municipalities must invest heavily on modern technological applications in areas related to the internet, information communication and technology (ICT) systems and applications, online systems, fiber optic cables and digital technology.

The study conducted by Mackey and Nayyar (2016) shows that local municipalities must create an economically enabling environment to SMMEs as a means of promoting the uptake and adoption of E-Commerce activities [33]. Loudon and Loudon (2016) have shown that E-Commerce activities require infrastructural input and maintenance from local municipalities [15]. The authors have provided examples on how national governments and local municipalities can work together with the private sector with a view to create an economically enabling environment as a means of encouraging SMMEs to utilise E-Commerce and online platforms for conducting business operations. In this regard, an equally important aspect of the task is the promotion of awareness campaigns in all business districts. An awareness campaign includes the task of demonstrating the value of technical skills and the provision of tailor-made training sessions to entrepreneurs and young graduates of high schools, technical colleges and universities [31, 34].

Jokar et al. (2016) have reported that one of the most effective ways in which local municipalities can attract lucrative SMMEs into central business districts is to invest on modern technological infrastructure as a means of easing the task of conducting E-Commerce business activities [32]. Members of the general public are often abused by service providers in developing municipalities. In the public service, E-Commerce enables local municipalities to assess service quality and the degree of compliance by service providers with government guidelines and statutory regulations. E-Commerce platforms are vital for ensuring adequate compliance with statutory requirements [33]. Enabling service providers to use digital technology, E-Commerce and online platforms makes the task of verification significantly easier. Doing so would also enable service providers to be adequately accountable to the people.

E-Commerce platforms are indispensable tools for conducting monitoring and evaluation exercises in the public sector as a means of ensuring value for money [35]. Yaraghi (2015) has shown that E-Commerce platforms are essential for ensuring the delivery of cost-effective and reliable service delivery in public service institutions [37]. E-Commerce platforms save valuable resources such as time, databases, manpower and money. They also enable local municipalities to store digital data for the purpose of routine reporting and verification of service delivery. Use of modern information technology enables local municipalities to improve overall efficiency and effectiveness that will lead to better customer service. Leveraging on E-Commerce activities and online IT applications enables local municipalities to achieve a competitive advantage on all aspects of public sector service delivery [38].

3. Materials and Methods

3.1. Sample Size of Study and Sampling Technique

A stratified random sample of size n=180 E-Commerce enterprises were selected from three business districts of Johannesburg (Eastgate, Fourways and Rosebank). From each one of the three business districts, a simple random sample of size 60 E-Commerce enterprises were selected for the study. In order to be selected into the sample, a business enterprise had to conduct E-Commerce activities on a regular basis. The adequacy of E-Commerce services provided to customers by each one of the 180 business enterprises selected into the sample was assessed based on criteria defined by Bonson et al. (2017).

3.2. Statistical Methods of Data Analyses

A one-way Multivariate analysis of variance (MANOVA) model was used in the study in order to compare the three suburbs of Johannesburg with regards to cost and time. MANOVA is an analysis of variance test (ANOVA) that is used for comparing the equality of group means in experiments involving 2 or more dependent variables of study. In a simple one-way ANOVA test, 3 or more independent groups are compared with each other with regards to group means based on only one dependent variable of study. MANOVA is used in cases where the number of dependent variables of study in the experiment is 2 or more. MANOVA is useful in experimental situations where at least some of the independent variables are manipulated. It has several advantages over ANOVA. First, by measuring several dependent variables in a single experiment, there is a better chance of discovering which factor is truly important. The use of MANOVA minimises the likelihood of Type 1 errors (rejecting a true null hypothesis) that occur when 2 or more ANOVA tests are conducted independently. The use of MANOVA is also vital for detecting differences that are not identified by ANOVA tests. MANOVA is simply an ANOVA with several dependent variables. That is to say, ANOVA tests for the difference in means between two or more groups, while MANOVA tests for the difference in two or more vectors of means.

The null hypothesis for MANOVA enables the researcher to test if the vector of means of the dependent variables is equal for multiple independent groups. For the one-way Multivariate Analysis of Variance (MANOVA), the null

hypothesis is stated as follows:

$$H_0 : \mu_1 = \mu_2 = \ldots = \mu_k \tag{1}$$

In Equation (1), k denotes the total number of levels of one independent variable of study; and μ denotes a vector of means for a given number of dependent variables of study.

In general, one can find out if the vector of means of the dependent variables is equal for multiple independent groups. In this case, the MANOVA model could be written as follows:

$$H_0 : \mu_1 = \mu_2 = \ldots = \mu_k$$

$$H_0 : \begin{bmatrix} \bar{X}_{11} \\ \bar{X}_{21} \\ \\ \bar{X}_{p1} \end{bmatrix} = \begin{bmatrix} \bar{X}_{12} \\ \bar{X}_{22} \\ \\ \bar{X}_{p2} \end{bmatrix} = \begin{bmatrix} \bar{X}_{13} \\ \bar{X}_{23} \\ \\ \bar{X}_{p3} \end{bmatrix} = \ldots = \begin{bmatrix} \bar{X}_{1k} \\ \bar{X}_{2k} \\ \\ \bar{X}_{pk} \end{bmatrix} \tag{2}$$

In Equation (2), p denotes the number of dependent variables, and k denotes the number of levels of one independent variable of study.

In a one-way ANOVA experiment, the aim of the experiment is to compare k groups or treatments that are mutually independent with each other. The one-way ANOVA model is given by the Equation 3:

$$Y_{ij} = \mu + T_j + \varepsilon_{ij} \tag{3}$$

Where;

$j = 1, 2, \ldots . K$ = number of treatments

$i = 1, 2 \ldots n_j$ = number of observations per group (treatment)

Y_{ij} = observation in cell (i, j) or the ith row and jth column

μ = overall (common) effect

T_j = effect of the jth treatment

ε_{ij} = random error associated with observation Y_{ij}

The one-way ANOVA test is used to test the null hypothesis:

$H_0 = \mu_1 + \mu_2 = \cdots = \mu_k$ versus the alternative hypothesis

H_1: At least 2 means differ significantly from each other

The null hypothesis H_0 is rejected if $F_{cal} > F_{tab}$ or if $P < \alpha$. The null hypothesis cannot be rejected if $F_{cal} > F_{tab}$ or if $P < \alpha$ where:

$$F_{tab} = F_{1-\alpha}(k - 1, N - k) \tag{4}$$

In Equation 4, k is the number of distinct treatments or groups being compared, and

$$N = \text{total sample size} = n_1 + n_2 + \ldots\ldots + n_k \tag{5}$$

$$SS(\text{tot}) = \sum_{j=1}^{k} \sum_{i=1}^{n_j} Y_{ij}^2 - \frac{T_{..}^2}{N} = \text{ total sum of squares} \tag{6}$$

$$T_{..} = \sum_{j=1}^{k} \sum_{i=1}^{n_j} Y_{ij} = \text{the sum total of all observations} \tag{7}$$

$$SS(\text{trt}) = \sum_{j=1}^{k} \frac{T_{.j}^2}{n_j} - \frac{T_{..}^2}{N} = \text{treatment sum of squares} \tag{8}$$

$$SS(\text{error}) = SS(\text{tot}) - SS(\text{trt}) = \sum_{j=1}^{k} \sum_{i=1}^{n_j} Y_{ij}^2 - \sum_{j=1}^{k} \frac{T_{.j}^2}{n_j} = \text{error sum of squares} \tag{9}$$

The calculated value of the F-statistic is obtained as follows:

$$MS(trt) = \frac{SS(trt)}{k-1} = \text{mean squares for treatments} \tag{10}$$

$$MS(err) = \frac{SS(err)}{N-k} = \text{mean squares for error terms} \tag{11}$$

$$F_{cal} = \frac{MS(trt)}{MS(err)} = \text{the calculated value of the F-statistic} \tag{12}$$

α is the level of significance of test.

The tabulated value of the F-statistic is given by $F_{tab} = F_{1-\alpha}\left(k-1,\ N-k\right)$ $\tag{13}$

Where $k-1$ and $N-k$ are the degrees of freedom of the F-statistic.

In a one-way MANOVA experiment,

$$\Lambda = \frac{|W|}{|T|} = \frac{|W|}{|B+W|} \tag{14}$$

In Equation 14, W denotes the determinant of the within sum of squares and cross-product matrix, and T denotes the determinant of the total sum of squares and cross-product matrix. B denotes the between effect. In cases where B is large, Λ approaches 0. In cases where B approaches 0, the values of Λ approaches 1.

The calculated value of the F-statistic is given by $F_{cal} = \dfrac{MS_{between}}{MS_{within}}$ $\tag{15}$

MANOVA provides theoretically reliable estimates only when the distributions of the dependent variables of study are normal with mean zero and constant variance. The relationships among all pairs of dependent variables, all pairs of covariates, and all dependent variable-covariate pairs in each cell must also be linear in order for the estimated results to be reliable. All variances corresponding to the predictor variables in the study must be homogenous. Since there are two dependent variables of study, it is assumed that the inter-correlations or covariances among these dependent variables of study are homogeneous across the cells of the study design.

4. Results and Discussion

Validity ensures that what is measured is what the study aims to measure. Reliability refers to the trustworthiness of the constructs and the measuring instrument used for measurement in the study [20]. In this study, face validity was used in order to ensure validity. This was done by conducting a pilot study with a random sample of size 5 respondents. The Cronbach Alpha test was used for ensuring reliability. Table 1 shows estimates for Cronbach's Alpha coefficients. All Cronbach Alpha coefficients had magnitudes of 0.75 or above, thereby confirming that all measurements taken as part of the survey were reliable enough.

Table 1. Estimates for Cronbach's Alpha coefficients

Variables of study	Cronbach's Alpha coefficients	Number of items
Business district	0.762	3
Gender	0.769	2
Age category of respondents	0.771	5
Highest level of education of respondents	0.804	5
Type of enterprise	0.797	4
Position held by respondent in enterprise	0.797	4
Skills in use of computers for E-Commerce activities	0.843	4
Skills in use of the internet for E-Commerce activities	0.864	4
Duration of operation of E-Commerce activities	0.894	4
Duration of utilisation of the internet for conducting E-Commerce	0.867	4

Table 2 shows the general characteristics of the 180 respondents who were selected for the study. The percentage of personal or family business was about 44%. The percentage of private enterprises was about 37%. The percentage of public enterprises was about 9%. About 73% of respondents were male, whereas about 27% of respondents were female. About 12% of respondents had ages of 20 years or less. About 36% of respondents had ages of 21 to 30 years. About

37% of respondents had ages of 31 to 40 years. About 11% of respondents had ages of 41 to 50 years. About 24% of respondents had post-matric certificates or less. About 7% of respondents had diplomas. About 23% of respondents had Bachelor's degrees. About 42% of respondents had Master's degrees. About 4% of respondents had Doctoral degrees.

Table 2. General characteristics of respondents (n=180)

Variable of study	Number (Percentage)
Business district	Eastgate: 60 (33.33%)
	Fourways: 60 (33.33%)
	Rosebank: 60 (33.33%)
Type of E-Commerce enterprise	Personal or family business: 80 (44.44%)
	Private enterprise: 66 (36.67%)
	Public enterprise: 16 (8.89%)
	Others: 18 (10.00%)
Gender of respondent	Male: 132 (73.33%)
	Female: 48 (26.67%)
Age category of respondent in years	20 years or less: 21 (11.67%)
	21 to 30 years: 64 (35.56%)
	31 to 40 years: 67 (37.22%)
	41 to 50 years: 20 (11.11%)
Highest level of education of respondent	Certificate or less: 43 (23.89%)
	Diploma: 12 (6.67%)
	Bachelor's degree: 42 (23.33%)
	Master's degree: 75 (41.67%)
	Doctoral degree or above: 8 (4.44%)

Table 3 shows a distribution for the types of E-Commerce activities conducted by the 180 respondents who were selected for the study. About 44% of respondents operated personal or family businesses. About 37% of respondents operated private enterprises. About 9% of respondents operated public enterprises. About 6% of respondents were top level managers. About 41% of respondents were operational employees. About 29% of respondents were low level managers. About 93% of respondents had adequate level of skills in the utilisation of computers for conducting E-Commerce activities. About 93% of respondents had adequate level of skills in the utilisation of the internet for conducting E-Commerce activities. The results indicate that the respondents who took part in the study has adequate skills and expertise in using computers and internet-based operations in the course of rendering E-Commerce services to customers by international standards. Romanosky (2016) has pointed out that operators with adequate skills in using web-based tools are capable of adapting to innovative E-Commerce operations with relative ease [38].

Table 3. Type of E-Commerce activities (n=180)

Variable of study	Number (Percentage)
Type of E-Commerce enterprise	Personal or family business: 80 (44.44%)
	Private enterprise: 66 (36.67%)
	Public enterprise: 16 (8.89%)
	Others: 18 (10.00%)
Position held in enterprise	Top level manager: 10 (5.56%)
	Operational employee: 74 (41.11%)
	Low level manager: 53 (29.44%)
	Others: 43 (23.89%)
Level of skill in utilisation of computers for conducting E-Commerce activities	Good: 20 (11.11%)
	Above average: 104 (57.78%)
	Average: 43 (23.89%)
	Basic: 13 (7.22%)
Level of skill in utilisation of the internet for conducting E-Commerce activities	Good: 15 (8.33%)
	Above average: 87 (48.33%)
	Average: 66 (36.67%)
	Basic: 12 (6.67%)

Table 4 shows a distribution for the duration of service in operating E-Commerce enterprises. About 44% of respondents operated personal or family businesses. About 37% of respondents operated private enterprises. About 9% of respondents operated public enterprises. About 6% of respondents were top level managers. About 41% of respondents were operational employees. About 29% of respondents were low level managers. About 93% of respondents had adequate level of skills in the utilisation of computers for conducting E-Commerce activities. About 93% of respondents had adequate level of skills in the utilisation of the internet for conducting E-Commerce activities by the standards of Bonson, Royo and Ratkai [1].

Table 4. Duration of experience in operating E-Commerce enterprises (n=180)

Variable of study	Number (Percentage)
Duration of experience in operating E-Commerce enterprises	Less than a year: 10 (5.56%) 1 to 2 years: 57 (31.67%) 3 to 5 years: 27 (15.00%) 6 years or more: 86 (47.78%)
Duration of experience in utilising internet based activities	Less than a year: 11 (6.11%) 1 to 2 years: 36 (20.00%) 3 to 5 years: 61 (33.89%) 6 years or more: 72 (40.00%)
Level of skill in utilisation of computers for conducting E-Commerce activities	Good: 20 (11.11%) Above average: 104 (57.78%) Average: 43 (23.89%) Basic: 13 (7.22%)
Level of skill in utilisation of the internet for conducting E-Commerce activities	Good: 15 (8.33%) Above average: 87 (48.33%) Average: 66 (36.67%) Basic: 12 (6.67%)

Figure 1 shows a distribution for the assessment of the perception held by respondents about the average cost of services and the average length of time required for providing services by E-Commerce enterprises. About 75% of respondents felt that their average service fees were fair enough to their customers.
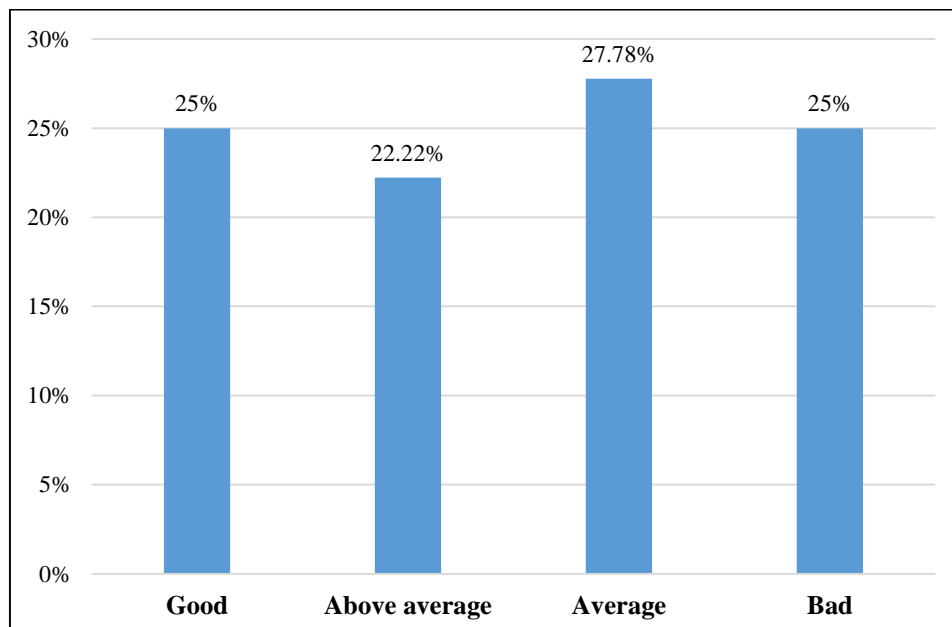

Figure 1. Perception held by customers on the average cost of services

Figure 2 shows a bar chart for the perception held by respondents about the average waiting time required by E-Commerce service providers to assist customers. It can be seen from the figure that about 74% of respondents felt that the waiting time for services was fair enough.
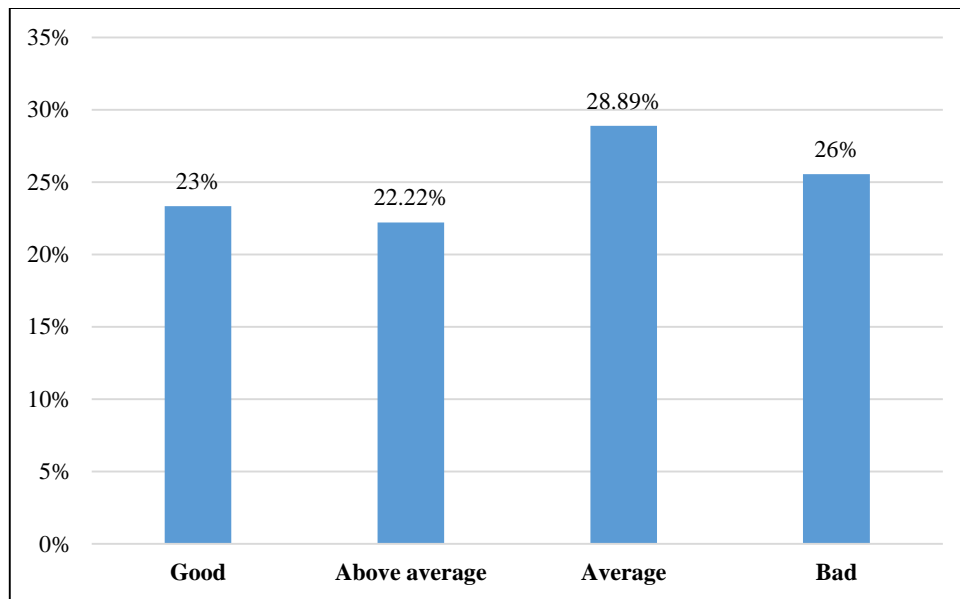
Figure 2. Perception held by customers on the average waiting time

About 39% of respondents in the study stated that they had to use E-Commerce operations in order to conduct business with large business organisations and government agencies. These findings are in agreement with what has been reported by Biener et al. [2] in which the authors have stated that E-Commerce operations are used in developing nations for conducting business with large private companies or government agencies. About 46% of respondents indicated that E-Commerce enterprises needed massive support from local municipalities and the South African Government in terms of business contracts, infrastructural development and training opportunities. This finding is in agreement with what has been reported by Newcomer, Hatry and Wholey [20]. About 46% of respondents indicated that the pace at which E-Commerce activities grew in South Africa was relatively slow by the standards of North America, Europe, Japan, China, Singapore and South Korea. This finding is consistent with what has been reported by Cavelty and Mauer [12]. About 79% of respondents argued that tangible economic incentives such as tax reduction had to be provided to them by their local municipalities as a means of promoting the use E-Commerce activities among operators of small, micro and medium-sized enterprises (SMMEs). This finding is consistent with what has been reported by Marz and Warren [19] based on a similar study.

Table 5 shows that utilisation of E-Commerce operations was significantly influenced by use of E-Commerce for high market share, use of E-Commerce for big private businesses, high level of formal education, adequate knowledge of the internet, long duration of using the internet, adequate knowledge of computer use, and gender of respondents.

Table 5. Factors associated with the quality of E-Commerce services (n=180)

Variable associated with utilisation of E-Commerce services	Observed chi-square value	P-value
Use of E-Commerce for high market share	99.29	0.0000
Use of E-Commerce for big private businesses	98.11	0.0000
High level of formal education	87.77	0.0000
Adequate knowledge of the internet	79.22	0.0000
Long duration of using the internet	69.23	0.0000
Adequate knowledge of computer use	55.12	0.0001
Gender of respondents	41.23	0.0002

Table 6 shows estimates from one-way MANOVA analysis. All P-values in the table are larger than 0.05 (the level of significance of test). This indicates that that there is no statistically significant difference between the 3 business districts in the study with regards to the average cost of E-Commerce services and the average waiting time for E-Commerce services at the 5% level of significance.

Null hypothesis 1: There is no difference among the 3 suburbs of Johannesburg with regards to the average cost of service

Null hypothesis 2: There is no difference among the 3 suburbs of Johannesburg with regards to the quality of service

P-value from Wilk's Lambda statistic = 0.202 > 0.05.

Null hypotheses 1 and 2 cannot be rejected at the 5% level.

We conclude that the average cost of services and the average waiting time for services at the three business districts are equal at the 5% level of significance.

Table 6. Estimates from one-way MANOVA analysis (n=180)

	Effect	F-statistic	P-value	Partial Eta Squared	Observed Power
Intercept	Pillai's Trace	2903.735	0.000	0.971	1.000
	Wilks' Lambda	2903.735	0.000	0.971	1.000
	Hotelling's Trace	2903.735	0.000	0.971	1.000
	Roy's Largest Root	2903.735	0.000	0.971	1.000
Business district	Pillai's Trace	1.499	0.202	0.017	0.464
	Wilks' Lambda	1.500	0.202	0.017	0.464
	Hotelling's Trace	1.501	0.201	0.017	0.465
	Roy's Largest Root	2.845	0.061	0.031	0.552

Table 7 shows a comparison between business districts with regards to cost and time. The table shows that the average cost of services and the average waiting time for services at the three business districts are fairly equal.

Table 7. Comparison of percentage scores for cost and waiting time (n=180)

Business district	Percentage score for the average cost of services	Percentage score for the average time taken for providing services
Eastgate	60.31667	64.30000
Fourways	59.66667	65.93333
Rosebank	61.55000	68.66667
Overall	60.51111	66.30000

Figure 3 shows a graphical depiction for comparing the average cost of service by business district.
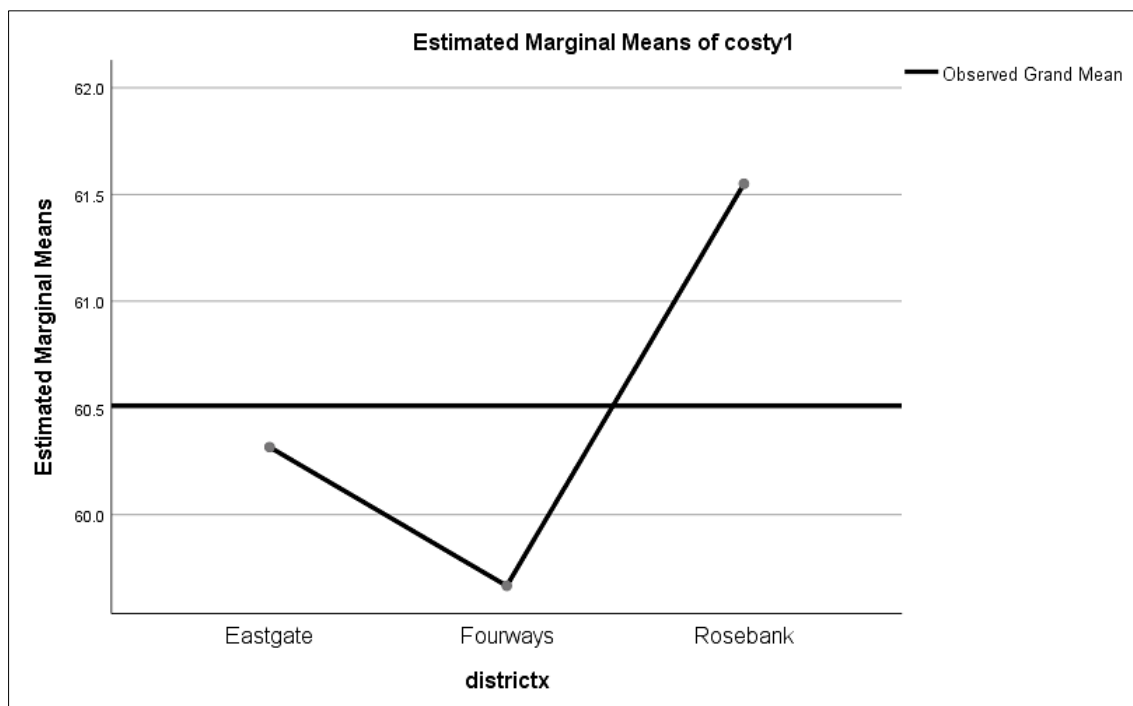

Figure 3. Plot for comparing average cost of services by business district

Figure 4 shows a graphical depiction for comparing the average waiting time for services by business district.
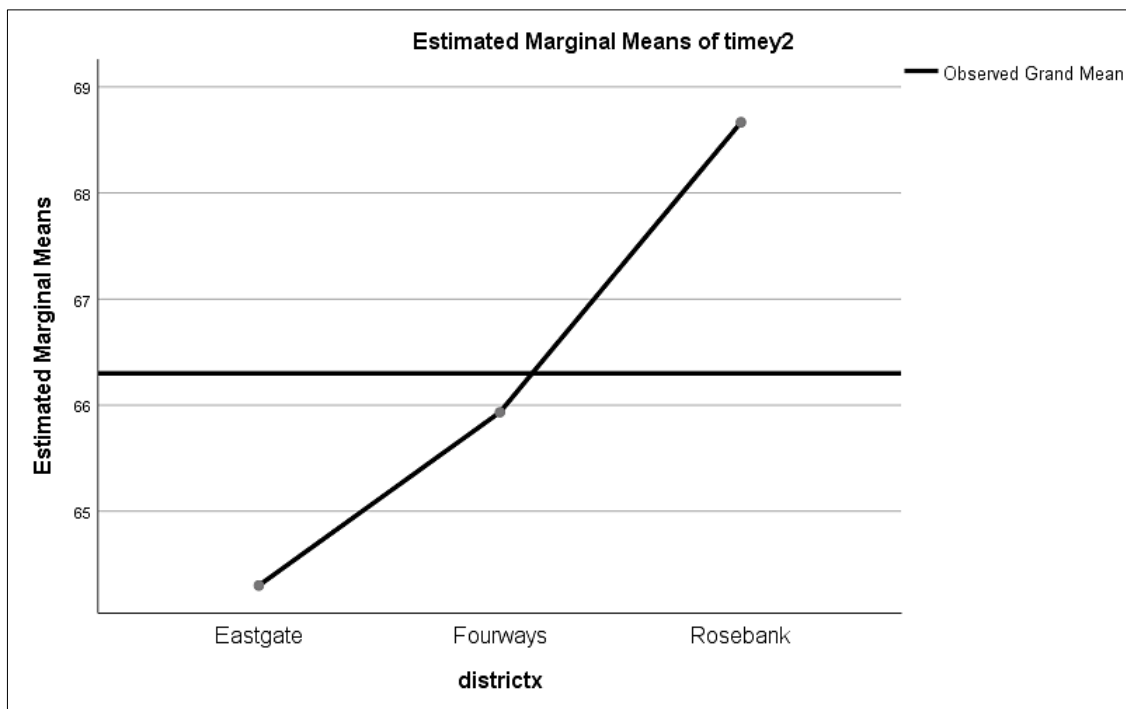
Figure 4. Plot for comparing waiting time for services by business district

Table 8 shows a list of 8 key research hypotheses that were tested as part of the study along with the decisions taken at the 5% level of significance [39]. At the 5% level of significance, a null hypothesis is rejected if the P-value falls below 0.05. It can be seen from the table that all 8 hypotheses were rejected at the 5% level.

Table 8. List of 8 research hypotheses tested as part of study

Constructs that affect the quality of E-Commerce services	Null hypothesis tested by research	P-value	Decision taken at the 5% level
Technological accessibility	Technological accessibility has no significant influence on the quality of E-Commerce services provided to customers	0.008	Rejected
Technological resources and quality factors	Technological resources and quality factors have no significant influence on the quality of E-Commerce services provided to customers	0.048	Rejected
Organisational commitment	Organisational commitment has no significant influence on the quality of E-Commerce services provided to customers	0.016	Rejected
Organisational human resources, planning and management	Organisational human resources, planning and management factors have no significant influence on the quality of E-Commerce services provided to customers	0.042	Rejected
Organisational business resources and governance	Organisational business resources and governance factors have no significant influence the quality of E-Commerce services provided to customers	0.040	Rejected
Political conditions	Political conditions have no significant influence on the quality of E-Commerce services provided to customers	0.023	Rejected
Market condition and external environment	Market condition and the external environment have no significant influence on the quality of E-Commerce services provided to customers	0.028	Rejected
Perception of customers on the quality of E-Commerce services	The perception held by customers on the quality of E-Commerce services provided to customers has no bearing on sustained growth and development in E-Commerce enterprises	0.004	Rejected

Findings reported in Table 8 above are in agreement with findings reported by Shaikh and Karjaluoto [28] in which the authors have found that technological and infrastructural factors are crucial for the provision of quality E-Commerce services. The study has also found that the political environment is critical for the development of E-Commerce. Unfavourable E-Commerce policies adversely affect sustained growth and development in E-Commerce services provided to customers in developing municipalities.

4.1. Summary of Key Findings of Research

The key objective of study was to identify and quantify key factors that influence the quality of E-Commerce services rendered by E-Commerce enterprises to customers in three business districts of Johannesburg (Fourways, Eastgate and Rosebank) by the standards of Bonson et al. [1]. The secondary aim of study was to compare the cost and time of E-Commerce services provided to customers by E-Commerce enterprises by business district. The study found that there was no significant difference among the three business districts of Johannesburg with regards to both variables of comparison (cost and time).

Ngai et al. [22] have listed down the key underlying causes of the slow pace of adoption of online, social media and E-Commerce activities in developing countries. The key underlying causes are lack of awareness, failure to utilise modern technological methods and applications for entrepreneurial activities, poor infrastructural development, low level of technical skills, lack of good leadership at municipal level, lack of respect for good corporate governance, the abuse of power, corruption, heavy bureaucracy and red tape. The study has shown that although Johannesburg is the business capital of the African continent, the adoption of E-Commerce activities are undermined by factors that are known to undermine the adoption of E-Commerce activities in other African cities such as Lagos, Accra, Nairobi and Cairo [18]. The study has found that the pace of adoption of E-Commerce activities depends upon a number of factors. Examples of such factors are content-related clarity of E-Commerce websites, ease of access to E-Commerce websites, short response time, ease of use of E-Commerce procedures with regards to both customers and service providers, the degree of reliability of E-Commerce services, the cost of services, the length of time needed for providing services, responsiveness and receptiveness to the needs of customers and clients, the ability of E-Commerce enterprises to protect and safeguard personal details and confidential information of customers and clients from intruders and hackers, the availability of adequate broadband, the speed of online and internet based business transactions, the degree of professionalism afforded to customers and the general public, the ability to communicate effectively with customers, the speed with which queries are resolved, and the ability to work on constructive criticisms provided by customers and clients to E-Commerce enterprises. These findings are in agreement with findings reported by Marz and Warren [19].

4.2. Framework for Ensuring Quality in E-Commerce Services

Based on findings obtained from the study, the pace of adoption of E-Commerce services provided to customers could be speeded up by addressing a combination of technological and organisational shortcomings in the three business districts of Johannesburg. Figure 5 provides a framework that could be used for achieving such an objective.
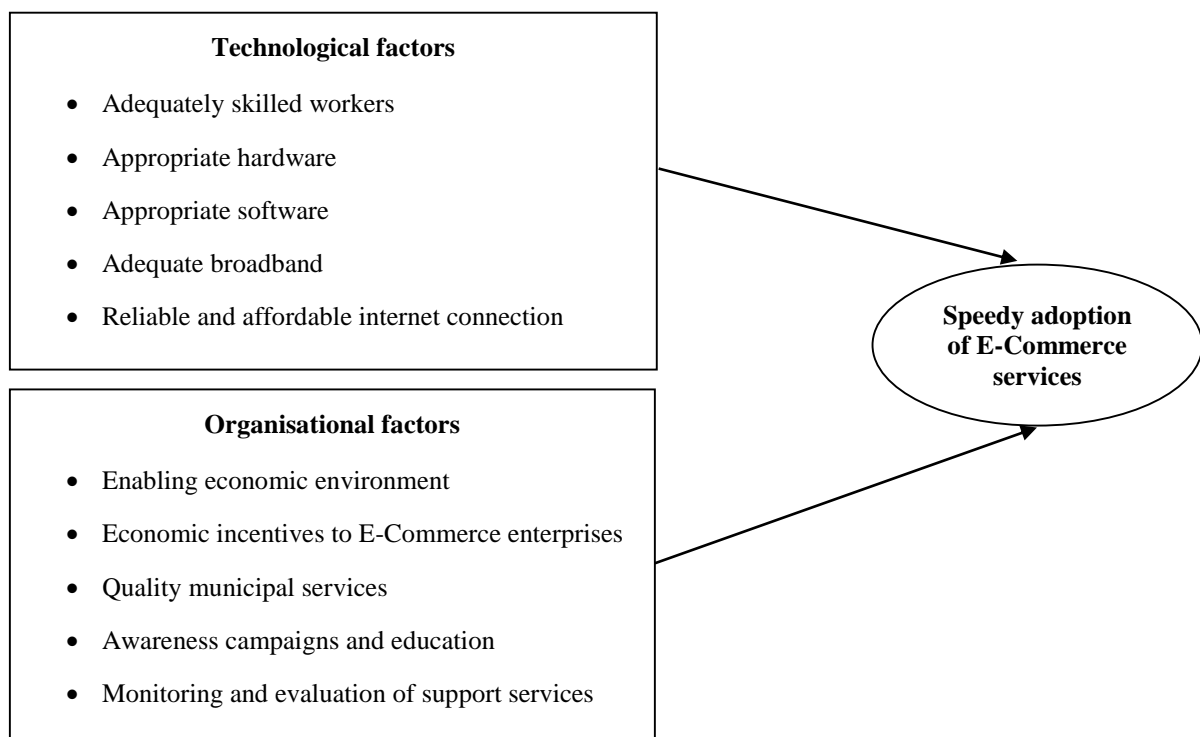

Figure 5. Framework for ensuring speedy adoption of E-Commerce services

5. Conclusion

The study showed that the quality of E-Commerce services provided to customers in Fourways, Eastgate and Rosebank was about the same with regards to cost and time. The results showed that the pace of adoption of E-Commerce services in the three business districts was significantly influenced by the pace of introducing modern technological infrastructure and operational efficiency in local municipalities. It follows that the City of Johannesburg, the Department of Science and Technology, the Department of Trade and Industry, and the South African Chamber of Commerce and Industry should launch an integrated programme of fulfilling the operational needs of E-Commerce enterprises. The key areas of need are the provision of skills-based training opportunities to E-Commerce enterprises, massive infrastructural investment, the creation of an economically enabling environment with regards to trade license applications and tax assessment, and the roll out of monitoring and evaluation programmes.

6. Funding

7. Conflicts of Interest

The authors declare no conflict of interest.

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