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AN ANALYSIS OF FACTORS AFFECTING THE ADOPTION OF ICT BY MSMES IN RURAL AND URBAN JAMAICA

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Abstract

Researchers argue that small and medium sized enterprises (SMEs) play a pivotal role in national and regional economies. These companies play a major part in sustaining domestic and regional economic growth and are important agents for alleviating poverty in developing countries. It has been suggested that the use of Information Communication Technologies (ICT) increases richness, reach and the ability of local SMEs to participate in the digital economy. However the concept of the internal digital divide suggests that the pattern of ICT diffusion vary between urban and rural area with rural areas adopting ICT at a slower rate. This research-in-progress will compare the adoption patterns of Micro Small and Medium Enterprises (MSMEs) in two regions: urban and rural Jamaica. Five hundred MSME will be sampled and Rogers Innovation Diffusion Theory will be used as the base theory for the study. The results of the research will have the potential to assist the Jamaican government in implementing programs and policies to increase the adoption and diffusion of ICT in rural areas. The results of the study will also be used to create ICT training programs for MSMEs in Jamaica.

Keywords: MSME, Adoption, Internal Digital Divide, ICT, Jamaica

1 INTRODUCTION

In the knowledge based global economy, the development of small and medium enterprises (SME's) sector in developing countries is key to job creation, poverty alleviation, growth and social inclusion. The economic contribution of MSMEs in Jamaica is significant. A recent study by Small Business Association of Jamaica (2007) stated that SME contribute up to one third of the Gross Domestic Product and 33% of Jamaica total workforce.

Despite the importance of MSMEs in Jamaica, this sector has been slow to adopt information and communications technologies. Research has shown that the use of ICT by MSMEs can serve to increase market reach, enhance customer service, and reduce both marketing and distribution cost (Alam, Khatibi, Ahmad, & Ismail 2007). In addition there is evidence to suggest that there is a clear disparity in the diffusion of ICT among rural and urban SMEs in Jamaica. An analysis on ICT penetration in Jamaica suggested that the two distinct weaknesses of ICT diffusion were the high rate of illiteracy and poverty in rural communities and the urban/rural IT divide (Jamaica E-Readiness Assessment, 2002). This is substantiated by Golding (2002) who reported that rural areas in Jamaica had adult illiteracy rates as high as 35% in comparison to urban areas with 12%.

There is paucity of research on the rate of ICT adoption of SMEs in developing countries, and in particular Jamaica. The purpose of this study is to investigate the factors that will drive adoption, empirically determine the extent of the urban, rural digital divide and the contributing factors. The structure of this paper is as follows. Section two will give a definition of SME's in Jamaica followed by a description of the ICT landscape highlighting the rural urban digital divide. Sections three and four will summarize the purpose and significance of the research. Section five will outline a comprehensive literature review and develop a theoretical framework using Roger's Innovation Diffusion Theory as the base theory. Section six will discuss the methodology and section seven will conclude this work in progress paper.

2 BACKGROUND

Jamaica is an island located in the Greater Antilles of the Caribbean. The population of the island currently stands at 2.6M. The country is divided into fourteen (14) parishes with Kingston as the capital and the main business hub. The Small Business Association of Jamaica (2007) defined MSMEs based on annual turnover and number of employees. Micro Enterprises are regarded as one with an annual turnover of less than US\$100,000; Small Enterprises are regarded as one with an annual turnover of between US\$100,000 and US\$5,000,000 and a staff compliment of 1-50 employees; and Medium Size Enterprises are regarded as annual turnover of between US\$5,000,000 and US\$25,000,000 with a staff compliment of between 50-500 employees.

The Ministry of Commerce Science, and Technology (MCST), under the Government of Jamaica, has the primary responsibility for promoting the use of ICT in Jamaica. A coherent strategy for the development of the Information Communication and Technology (ICT) sector was developed by the MCST with the support of the U.S. Government Services Administration (GSA). The overall goal of the strategy was to bridge the digital divide within Jamaica, and between Jamaica and the rest of the World, by improving and increasing Internet access to all in Jamaica. The methodology included ICT related training, improving intergovernmental interaction and efficiency through ICTs, and the establishment of a legal and regulatory framework, to discourage factors that restrict equal access and participation in the ICT sector

Already, there is an increasing number of government online services and the implementation of the pilot phase of the e-learning project utilizing ICT in the delivery of a number of subjects at the high school level. This commitment has been demonstrated in the passing of the Electronic Transactions Bill in Parliament in November 2006. The Bill seeks to create a legal framework by which e-commerce will be governed.

The Office of Utilities Regulation (OUR) reports that over 65% of the 2.7 million population has access to cellular phones and 40% of the population has access to the Internet. This number is expected to increase with the governments' e-Learning project and the aggressive deployment of broadband technologies by a number of telecommunication providers. Cellular companies have also started to deploy 3G wireless technologies such as WiMax and ED-VO. Consequently online bill-payment, online shopping, telecommuting, telemarketing, video-conferencing and use of Internet cafes and hotspots, are some of the activities that are becoming increasingly commonplace in Jamaica.

Despite these improvements there is evidence to suggest that these developments are skewed towards the urban metropolitan areas. This uneven internal ICT development is referred to as the internal digital divide. According to the United Nations (2006) an internal digital divide exist within individual countries where ICT is often non-existent in poor and rural areas of developing countries.

According to Inter-American Development Bank (2002) in 2001, there were approximately 4,458 businesses with Internet accounts, representing only 9% of businesses in Jamaica (see appendix). Kariyawasam (2002) reported that there is a clear difference in ICT penetration between the urban and rural Jamaica (see table 1). Very few businesses operate websites and are aware of online business transactions (Kariyawasam, 2002). The lack of ICT in rural Jamaica have also been emphasized by the Government of Jamaica (2001), which explained that unfortunately Internet access is limited for a large portion of the population especially in rural Jamaica. Anecdotal evidence suggested that the majority of Jamaican businesses that have a website are larger, or more established businesses as the majority of smaller businesses in Jamaica do not have an ecommerce capacity or presence on the World Wide Web.

ICT Characteristics	Rural Jamaica	Urban Jamaica
Information Infrastructure	Rural Jamaica is not nearly as well served as urban areas, which is reflected in the high cost of service provision to rural areas. Waiting time for fixed line in rural areas range from 2 weeks to several months	Access to telecommunications is generally good in most urban centres with a teledensity of 23 lines per 100 people.
Service and Support	Rural Jamaica has a patchwork of service support. In some of the remote parishes, main line installation can take well over a month with service and support being of a lower standard than urban areas.	Mainline take at least one month for installation. There is a nascent software industry and a growing number of hardware technicians and network administrators.
School's Access to ICTs	The ministry of education have placed a computer lab in most primary schools in rural Jamaica however a major problem for schools is getting access to adequate fixed line telephones infrastructure.	In Urban Jamaica computers are found at universities, technical colleges, secondary and primary schools.
B2C electronic Commerce	Very few businesses in rural communities operate websites and have an awareness of online business	There are many businesses with websites, but the information is static and infrequently updated
E- government	Very few government resources online. There is little awareness of e-government and all dealings between government and citizens or businesses are in person or on paper.	There are many government websites though most are static and not transactional.

Table 1. State of ICT presence in Rural and Urban Jamaica (Kariyawasam, 2002)

The disparity in rural and urban ICT diffusion in Jamaica has also been highlighted by Allen Consulting Group (2002) which reported that a survey of small business in the Kingston metropolitan area indicated that: over 40% used computers in their businesses, 31% indicated their intent to purchase computers and approximately nine percent had Internet access while five percent had websites. It was explained that these results were expected since businesses in the capital Kingston and St. Andrew are likely to be closer to ICT adoption than other businesses in other locations in Jamaica.

3 PURPOSE OF STUDY

The ability of local enterprises to participate in the global economy depends on the technological readiness of local markets and their ability to connect globally through ICT. The disparity in ICT diffusion in Jamaica shows that the rural areas have limited accessibility to technology (Kariyawasam, 2002). This however is an area of concern as the literature suggests that ICT impacts business success through investment in skills, organizational change and innovation (OECD, 2004). Against this background, the purpose of this research is to investigate the digital divide in Jamaica by examining the ICT adoption patterns of MSMEs in urban and rural areas. This study will also seek to determine the constraints and hindrance of ICT diffusion in these areas.

4 SIGNIFICANCE OF STUDY

There has been considerable research conducted on ICT adoption in developed. In contrast there is sparse research of a similar nature in developing countries in general and in particular the Caribbean. In addition there is the absence in the literature on location, as a factor in explaining adoption of ICT within a country. The main point of departure of this paper is the examination of the urban/rural (location) digital divide as a factor influencing the adoption of ICT in SMEs. It is posited that location will have a mitigating effect on adoption attributes: relative advantage, compatibility, complexity, trialability, and observability.

5 LITERATURE REVIEW

5.1 The effect of location on ICT adoption

Cayla, Cohen and Guigon (2005) defined digital divide as the unequal access to ICT. Peters (2003) explained that the digital divide between countries is usually measured in terms of the number of telephones, computers, and Internet users. In a study conducted by Chinn and Fairlie (2001) to identify the determinants of cross-country disparities in personal computer and Internet penetration, the results suggested that the income level of different economies accounts mainly for the global digital divide. It was also highlighted that public investment in human capital, telecommunications infrastructure, and the regulatory infrastructure can mitigate the gap in PC and Internet use in different economies.

Beyond the digital divide which exists between countries, analysts also describe the unequal access of ICT within countries as the domestic digital divide between the have and have not (Sciadas, 2002). This divide examines the disparity in the diffusion of ICT between rural and urban, well educated or poorly educated populations or poor and rich citizens (Cayla et al, 2005). Braun (2004) corroborates the impact of geographic location on ICT adoption stating that being located in peripheral regions

where the ICT infrastructure, especially broadband, is either inadequate or prohibitively expensive will be a major deterrent to ICT adoption.

While numerous studies have been done on the digital divide in developed countries, there is a lack of similar research in developing countries. Peters (2003) explained that digital divide is a complex problem, presenting both practical and policy challenges, and the solutions that work in developed countries cannot simply be extrapolated to developing countries. It is emphasized that solutions must be based on an understanding of local needs and conditions. Hung (2003) corroborated these views and stated that the regional distribution of Internet users in China were found to directly correspond with the disparity of different geographical areas. The importance of understanding local needs in addressing the internal digital divide have also been addressed by Khan (2000), who explained that in Africa and other parts of the world the value of local knowledge and understanding must be recognised while implementing ICT development projects. Khan (2000) also emphasized that the absence of local understanding and involvement in the design and implementation of development projects has been the source of many failures.

The importance of geographic location in ICT diffusion cannot be ignored and is considered relevant in assessing technology adoption among MSME in Jamaica. Therefore the evaluation of the base theory and the construction of the research model will be done in the context of assessing the impact of location on adoption attributes. The following section will discuss the Rogers Innovation Diffusion Theory, Organizational Attributes and Managerial attributes as possible issues that may explain the differences in adoption of MSME in rural and urban Jamaica.

5.2 Rogers Innovation Diffusion Theory (IDT)

Quaddus and Hofmeyer (2006) explained that studies on organizational innovation adoption found that adoption occurs in two stages. The first stage is defined as the initiation stage, which is followed by the implementation phase. In the initiation stage, the organization develops an awareness of the innovation, forms an attitude towards it and evaluates the innovation. The actual adoption decision was found to occur between the initiation and the implementation phases. According to London (2006), this transition from knowledge of the innovation to its implementation is measured as a sequential process which encompasses the innovations rate of adoption. The adoption process may be affected by the type of innovation decision being made, which includes collective/organizational and authoritarian/hierarchical. On the other hand diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system (El-hadary, 2001). According to Quaddus and Hofmeyer (2006), Rogers (1995) defined an innovation as an idea or practice that is perceived as new by the adopting organization. Braun (2004) argued that Rogers Innovation Diffusion Theory (IDT) analyzed the process of diffusion, and mapped the impact of a combination of social, economic, and technical forces on that process.

There is a general agreement among researchers that IDT is a suitable and valid theory for examining the process of adoption. In a research conducted by Jeyaraj, Rottman and Lacity (2006) on adoption Information Technology by individuals and organizations, IDT was recognized as the only theory which has been used to evaluate adoption on the individual and organizational level. Looi (2004) suggested that the Rogers' innovation diffusion theory is perhaps the most frequently cited theory in most research on diffusion of innovation. Looi (2004) stated that Rogers' theory is considered valuable because it attempts to explain the factors which influence the adoption of an innovation and the manner in which new innovations are disseminated through social systems over time. El-hadary (2001) emphasized that one of the major contributions of IDT is the innovation decision process, which starts with one's knowledge about the existence of the innovation and ends with the confirmation of the adoption/rejection decision. Aghaunor and Fotoh (2006) outlined the following as components of IDT:

- Relative advantage

The degree to which an innovation is perceived as being superior to its predecessor in terms of economic profitability, low initial cost, a decrease in discomfort, savings in time and effort, and the immediacy of the reward. Gemino, Mackay and Reich (2006) highlighted that relative advantage is expressed by perceived benefits. Aghaunor and Fotoh (2006) elaborated that the perceived benefits for managers could be direct, such as cost savings or income generation, or indirect, such as potential opportunities in new markets, marketing, or publicity. Gemino et al (2006) conveyed that research has found that relative advantage is the primary reason for encouraging ICT growth and a positive relationship has been identified between perceived advantages and adoption. We therefore posit:

- H₁: There is a positive relationship between ICT adoption and perceived relative advantage in MSMEs
- H₂: Location has an impact on the perceived relative advantage of ICT in MSMEs

- Compatibility

The degree to which an innovation is perceived as being compatible with existing beliefs, experience and needs of potential adopters. A faster rate of adoption occurs when an adopter perceives an innovation as meeting the needs of the client. Alam, Khatibi, Ahmad and Ismail (2007) stated that an innovation is more likely to be adopted if it is compatible with individual job responsibility and value system. Alam et al (2007) affirmed that organizations should determine the needs of their customers and then recommend innovations that fulfill those needs. It is therefore anticipated that as needs are met the adoption will occur. We therefore posit:

- H₃: The adoption of ICT by MSMEs will be positively related to the perceived compatibility of using ICT
- H₄: Location has an impact on the perceived compatibility of ICT in MSMEs

- Complexity

The degree to which an innovation is perceived as being relatively difficult to understand and use. The perceived complexity of an innovation is negatively related to its rate of adoption. Alam et al (2007) reported that previous studies on the adoption of innovations indicated that the adoption of complex technologies require organizational personnel to possess sufficient technical competencies. We therefore posit:

- H₅: The adoption of ICT by MSMEs will be negatively related to the perceived complexity of using ICT
- H₆: Location has an impact on the perceived complexity of ICT in MSMEs

- Trialability

The degree to which an innovation can be used on a trial basis before confirmation of the adoption must occur. Rogers' (1995) studies found that "the trialability of an innovation, as perceived by members of a social system, is positively related to its rate of adoption. Alam et al (2007) suggested that trialability has become an important feature of innovation because it provides a means for prospective adopters to reduce their uncertainties regarding unfamiliar technologies or products. We therefore posit:

- H₇: The adoption of ICT by MSMEs will be positively related to the perceived trialability of using ICT
- H₈: Location has an impact on the perceived trialability of ICT in MSMEs

- Observability

The degree to which the potential adopter perceives that the results of an innovation are visible to others. Displaying an innovation's superiority in a tangible form will increase the adoption rate. We therefore posit:

- H₉: The adoption of ICT by MSMEs will be positively related to the perceived observability of using ICT
- H₁₀: Location has an impact on the perceived observability of ICT in MSMEs

5.3 Organizational Attributes

The impact of organizational attributes on the adoption of ICT has been identified in the literature as an area which warrants further attention. Dixon, Thompson and McAllister (2002) argued that further research needs to be undertaken in the SME sector which recognises the diversity of firm and culture so that policy can be tailored to fit the SME sector's requirements. According to Taylor (2003) and Dixon et al (2002) SMEs are not a homogeneous set of businesses as they vary significantly by size, age, sector, motivation, mode of organisation, ethnic background, location, knowledge base, power and control of resources, and innovative capacity among other things. Taylor (2003) elaborates further that all these characteristics can directly affect the organization's adoption of ICT. This may be seen in Braun's (2004) citing the example given by Werthner and Klein (1999) that highlighted the fact that small and medium size sectors such as tourism tend to be time and resource poor, with their size being the main disadvantage in adopting ICT. Lucchetti and Sterlacchini (2002) also substantiate the claim that size plays a role in the adoption of ICT. They further indicate that the adoption of ICTs is directly related to the type of industry to which the organization belongs. They found that production-integrating ICTs are significantly and positively associated with firm size, while market-oriented ICTs are independent on a firm's size or its productive or technological features. We therefore posit

- H₁₁: The adoption of ICT by Jamaican MSMEs will be positively related to the size of the organization
- H₁₂: The adoption of ICT by Jamaican MSMEs will be positively related to the industry of the organization

5.4 Management attributes

Previous research suggested that managers/owners are a key influence in determining use of ICT which is impacted by their attitudes, level of ICT skills, and management orientation. Martin and Margi (2003) also argued that managers/owners of SMEs that are attracted to ICT tend to be more entrepreneurial, innovative and risk takers. In addition, Braun (2004) found that the education and professional background of managers/owner have proven to be a significant factor to the adoption of ICT. In terms of attitude, Dixon et al (2002) in citing Blackburn and McClure (1998) characterised management into three (3) categories, namely, enthusiasts, pragmatists and artisans (see table 2).

Enthusiasts	Pragmatists	Artisans
High IT skills	Low IT skills	Low IT skills
Positive attitude	Pragmatic attitude	Unconvinced attitude
IT management focus	IT management focus	IT operations/administrative focus

Table 2 Characteristics of managerial attitude in ICT adoption

London (2004) posited that while management characteristics are perceived as a large part in the decision-making processes towards ICT adoption, it is the characteristics of managerial practices that bear a direct relationship to the adoption-diffusion process. Another managerial attribute affecting adoption is age. London (2004) suggested that older managers are more likely to be uncomfortable

with taking rapid steps towards ICT adoption, while younger individuals may be more likely to embrace ICT. It was found that managers with the most positive attitude towards ICT adoption were those who interpreted IT as an effective tool in transforming business operations. We therefore posit:

- H₁₃: The adoption of ICT by Jamaican MSMEs will be positively related to the manager's attitude towards ICT
- H₁₄: The adoption of ICT by Jamaican MSMEs will be positively related to the manager's age

The research model presented below represents the relationships of the constructs identified in the literature (See Figure 1). It is expected that the ability of the model to explain adoption of ICT by MSMEs will be improved by incorporating location as an integral demographic variable. In summary the model posits that MSMEs location will have an impact on the adoption of ICT by MSMEs via adoption attributes. The model also illustrates a direct relationship between organizational attributes, managerial attributes and adoption.

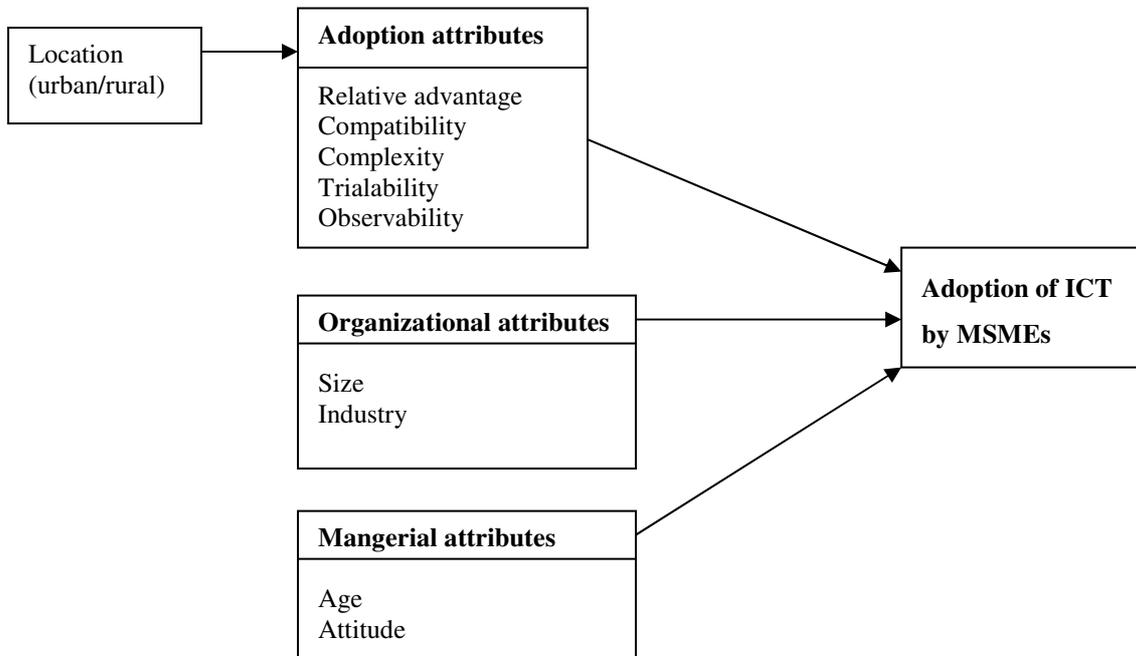


Figure 1 Research Model

6 METHODOLOGY

6.1 Data Collection and Analysis

The sample size of the study will consist of 500 MSME. Fifty (50) MSMEs will be selected from ten (10) parishes in Jamaica. Eight of the parishes (Portland, St Thomas, St. Mary, Trelawny, Hanover, Westmoreland, St Elizabeth, and Clarendon, (see figure 2) are rural parishes which were selected based on the premise that they have the highest illiteracy rates in Jamaica, and are considered as areas in which ICT training will have the greatest impact on transactional networks and competitiveness (Golding, 2002). The other two parishes are Kingston and St. Andrew which are classified as urban

areas. The target group will include MSMEs in the wholesale or retail distribution sector, Tourism, Agriculture, Manufacturing, Finance, Health and Personal services. The target group was selected based on MacFarlane's (1997) study which indicated that majority of MSMEs in Jamaica were in the distributive trade (63%), Hotel and Tourism (10%), Personal services sector (11.2%) and the Finance sector (14.5%).

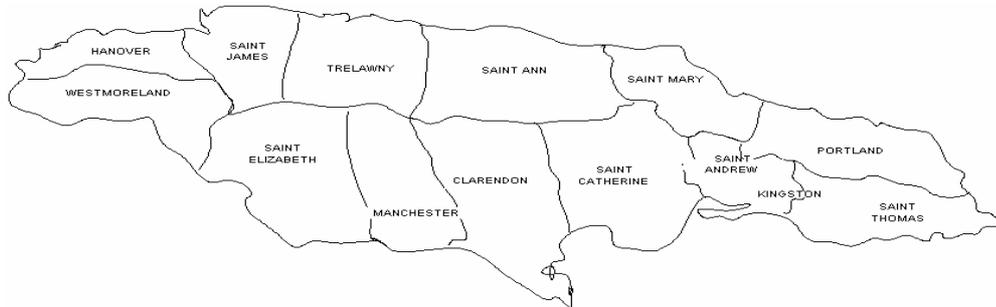


Figure 2 Map of Jamaica

The survey instrument will consist of a five-point likert type scale ranging from Strongly Disagree (1) to Strongly Agree (5). Sections of the instrument were adopted from Moore and Benbasat (1991) and Seyal and Rahmal (2003). The instrument will measure organizational, managerial and adoption attributes identified in the literature review. The data collection will be done through the Chamber of Commerce for each parish which will be responsible for issuing the survey instrument to MSMEs.

The data collected will be evaluated using Statistical Package for Social Sciences (SPSS). In order to test the validity of the constructs in the research model, the Principle Component Factoring Analysis will be used. To validate the appropriateness of the factor analysis, the Kaiser-Meyer-Olkin Measure will be applied. In determining the reliability of each derived construct from the Factor Analysis, the Cronbach's Alpha will be employed. In addition, multivariate analysis will be used to test the hypotheses.

7 CONCLUSION

The importance of MSME in the Jamaican economy has been identified as pivotal to economic growth and development. However the diffusion of ICT among MSMEs in Jamaica shows a general disparity among rural and urban businesses. The adoptive nature of MSMEs in Jamaica is a general concern of this research and it is believed that the ability of local MSMEs to adopt ICT may be limited by geographic location in terms of urban and rural areas. The gap in ICT availability and usage between rural and urban Jamaica has been pointed out by Kariyawasam (2002) which reported a clear disproportion in ICT service support, education usage and infrastructure between rural and urban Jamaica. Based on the adoptive nature of SME and the internal digital divide within the Jamaican economy among rural and urban MSMEs, this study will assess what factors explain the adoption of ICT among MSMEs in different localities in Jamaica. It is the intent that the results of the study will have the potential to assist governments in implementing programs to increase the adoption and diffusion of ICT in MSMEs. The results will also provide a basis for future evaluation of MSME adoption in Jamaica. It is expected that the results of the study will identify MSMEs location as the major determinant of ICT adoption in this group of business. It is also anticipated that Rogers Innovation Diffusion theory will provide major insight into explaining the differences that exist in the adoption of ICT among the different parishes in terms of ICT perceptions relative to location and other organizational attributes.

8 APPENDIX

Activity	Output
Total number of registered business in Jamaica	48,978
Number of Internet connected business	4458
Estimated Internet business penetration rate	9%
Estimated number of businesses with a web presence	1,000
Estimate website penetration rate	2%
Total number of ICT sector companies	96

Table 3. *Indicators of Jamaica Business Internet Readiness, Source: Inter-American Development Bank (2002)*

Perceived Benefit
I believe that ICT will provide my organization with the following benefits:
Reorganization and simplification of work routines
Savings in the use of resources
Increase sales and enlarge market share
Development of new products and services
Establish strong relationships with business partners
Provides good value for money
Improved productivity
Improved service quality
Improved customer satisfaction
Complexity
I believe that the following are complex issues that affect the usage of ICT in my organization
Lack of appropriate tool/equipment
Lack of technical internal expertise
Lack of technical external expertise
Lack of training systems to facilitate installation and maintenance of the technology
Lack of internet access
Cost of the technology
Lack of technical support from vendors
Compatibility
Experience of persons who have previously used the technology
Technology is consistent with business needs
Technology is consistent with industry needs
Trialability
Advice from consultants
Opportunity to test the technology before implementation
There are vendors I can go to experiment with ICT tools
My staff is able to test the technology
Testing the technology requires too much effort
New technology is often too complicated to use
Observability
The positive results of using ICT are apparent
Others in the industry speak of the benefits of ICT usage
Customers are more satisfied when businesses use ICT
Profits increase when ICT is used
Increased productivity
Increased product quality
Keep abreast with competition

Table 4. *Constructs adopted for the instrument, Source: Moore and Benbasat (1991), Seyal and Rahmal (2003)*

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