

Barriers to Adopting ICT and e-commerce with SMEs in Developing Countries: An Exploratory study in Sri Lanka

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Abstract

Research indicates that e-commerce offers a promising way for organizations to meet challenges of an ever-changing environment. However, the few available studies related to SMEs in developing countries reveal that they lag behind and are skeptical about adopting the technologies irrespective of their effectiveness. Literature reveals many significant reasons contributing towards this reluctance. The various factors identified as causes for the reticence can be broadly classified as Internal Barriers and External Barriers. Internal Barriers can be resolved within the organization by the organization itself, while External Barriers need to be addressed either by government intervention or by collaboration of SMEs. This paper presents a model for barriers to adoption of ICT and e-commerce, collected from the available literature and the results of an exploratory pilot studies and subsequent survey. In addition to the barriers facing SMEs, this research identifies the relevant support required by SMEs in a developing country, Sri Lanka. The methodology and initial issues found in the study are also discussed.

Keyword: E-commerce, SMEs, adoption, developing countries, factors, barriers, model

1. Introduction

The emergence of the Internet has allowed Small- and Medium-sized Enterprises (SMEs) to compete effectively and efficiently in both domestic and international markets [27]. It is a well-known fact that e-commerce and Internet technologies can benefit an organisation [1]. Developing countries have the potential to achieve rapid and sustainable economic and social development by building an economy based upon an ICT enabled and networked SME sector capable of applying affordable yet effective ICT solutions (UNDP, 2004).

Information and Communication Technologies (ICT) play a prominent role in the field of commerce and trade nowadays. While the developed world forges ahead with e-transformation of businesses, the developing world struggles to keep pace with emerging technologies. In a challenging global society, effective use of ICT is critical for the success of businesses especially SMEs. In their handbook Heeks and Duncombe [10] discuss the opportunities that ICT provides for SMEs in developing countries. SMEs, vital to the economy in any country, are very often recognized as an economy growth engine (Brouthers et al, 1998). They often occupy strategic positions in the economy, whereas large companies lack their flexibility. The SME sector plays a significant role in its contribution to the national economy in terms of the wealth created and the number of people employed (Rashid et.al, 2001). With the development of ICT and the shift to a knowledge-based economy e-transformation and the introduction of ICT is becoming an increasingly important tool for

SMEs both to reinvigorate corporate management and promote growth of the national economy (UNDP, 2004).

Despite advances in IT and the acceptance by large organizations of such technologies, the same level of adoption is not evident among SMEs ([4], [21]). This also suggests that SMEs face significant and unique challenges in adopting ICT and e-commerce [22]. This low level of adoption, particularly impedes SMEs in developing countries.

Literature reveals that many studies have been carried out in developed countries to investigate the factors inhibiting adoption of ICT and e-commerce. These studies have looked at organizational perspectives, owner/manager perspectives and environmental perspectives. (for example [31],[23],[33],[34]). Among the few research studies carried out in developing countries are studies that investigate the facilitators/inhibitors affecting adoption ([37],[38], [35],[39],[36]). Predominantly these studies investigate the technological, organizational, physical and socio-economical environmental factors that hinder the adoption of ICT and e-commerce. The differences between developed and developing countries (such as available infrastructure, social and cultural issues) does not support generalizing the findings for developed countries to developing countries. SMEs in developing countries are faced with barriers that are specific to them, some more pronounced than would be in the case for SMEs in developed countries. To understand the lack of, or slow uptake of ICT and e-commerce technologies, it is appropriate to look into the environment in which they operate. Due to the many constraints inherent to developing countries they are faced with many barriers within the organization and also outside the organization. To gain a better understanding and assist them in overcoming the barriers it is imperative to examine these barriers in depth.

SMEs are hindered in adopting the technologies, due to the impediments that arise as a result of the many barriers within the organization, that is the *Internal Barriers*. They are also inhibited by another set of impediments that arise due to infrastructure (technological, economic), political, legal, social and cultural barriers that exist in the country, that is the *External Barriers*. For an SME to successfully adopt the technologies these two sets of barriers need to be addressed as SMEs are affected by both. The internal barriers that arise within the organization may be resolved within the organization, but they may have to work within the constraints of the external barriers, which are beyond their control and therefore may require government intervention. Hence, it is vital to understand the barriers that inhibit SMEs in developing countries, how they could overcome these barriers if they are to take advantage of the benefits from ICT and e-commerce.

Even though there is now an interesting and growing number of studies addressing e-commerce adoption within the specific context of SMEs (for example [17], [1], [24], [6]), little research has been conducted in developing countries, especially Sri Lanka, in relation to ICT and e-commerce adoption. Thus this paper seeks to fill this gap to help understand the factors that hinder the adoption of ICT and e-commerce by SMEs in developing countries, and to explore how best they can be overcome. Sri Lanka was chosen as the test bed as it is a developing country struggling with its economy, but on its way to an e-society. The research findings from Sri Lanka will prove to be useful for other developing countries of a similar nature.

This paper will first outline a review of current research into ICT and e-commerce technology adoption in developing countries. It discusses how previous research has attempted to categorize the numerous barriers to adoption. Then it presents the framework established in this research. A description of the research methodology used to carry out the empirical study is given next. This is followed by a discussion of preliminary issues arising

from the survey. The paper then discusses the study's conclusions, limitations and future areas of research.

2. Theoretical Framework

This section discusses the SMEs in Sri Lanka, barriers to ICT and e-commerce adoption in SMEs in general, and the barriers to adoption in developing countries.

2.1. SMEs in Sri Lanka

SMEs are extremely important to the economy of any country whether developed or developing. They play a critical role in economic development, and Sri Lanka is no exception.

Different countries use different parameters to define SMEs. Some use the number of persons employed, amount of capital invested, amount of turnover or nature of the business [14]. In Sri Lanka there is no clear definition of an SME as government agencies use various different criteria to define SMEs ([7], [14]). The main criteria used are the number of employees, the size of fixed investment, and the nature of the business and the sector [7]. In Sri Lanka, The National Development Bank (NDB), the Export Development Board (EDB), and Industrial Development Board (IDB) use value of fixed assets as the criterion for definition, whereas the Department of Census and Statistics (DCS), Small and Medium Enterprise Development (SMED), and the Federation of Chambers of Commerce and Industry (FDCCI) use the number of employees as the criteria. The World Bank defines enterprise size in Sri Lanka based on the number of employees: those with fewer than 49 employees are small; those with 50-99 employees are medium-sized; and those with more than 100 employees are large. For this study we consider the following criteria to define the SMEs in Sri Lanka.

Table 1: Definition of Terms: SMEs
(adapted from European Union, 2003;Gamage, 2003)

Micro Enterprises	Within SMEs Category, micro enterprises are enterprises with fewer than 10 employees
Small Enterprises	Small enterprises have between 10 and 49 employees
Medium-sized Enterprises	Medium sized enterprises have fewer than 250 employees

SMEs in Sri Lanka perform a strategic role by accounting for a very high percentage of the total number of business establishments. The 2004 mission statement of the International Labour Organization (ILO) reported that 75% of Sri Lanka's labour force was employed in the SME sector (including the agricultural sector). A more recent World Bank survey on Sri Lanka records approximately one million people working in the manufacturing sector while the Survey of Industries finds around 400,000 working in establishments employing 25 or more workers. These numbers suggest that SMEs contribute substantially to employment and income generation.

While the domestic market is the main outlet for SMEs in Sri Lanka, they make a significant contribution towards exports. Although direct exports from this sector may not be large, SMEs play an important role as indirect exporters. There are a large number of SMEs that manufacture export products or parts, with larger entrepreneurs coordinating such

arrangements and handling the direct exports. Coir-based products, wood, handicrafts, leather products, plants and foliage are examples of such arrangements involving SMEs which are sub-contracted by large-scale exporters.

It is an ambition of the Sri Lankan to enjoy a leading position on the electronic highway. This ambition is implemented in the 'e-Sri Lanka' program, which should provide Sri Lankan SMEs 'a ramp to the digital highway' and stimulate e-commerce and e-business.

2.2 Barriers to ICT and E-commerce Adoption in SMEs

This section outlines recent literature on the barriers/inhibitors for adopting ICT and e-commerce by SMEs. Research works investigating the barriers that affect SMEs adoption of ICT and e-commerce have identified a variety of factors which can be grouped into several categories. A number of authors (for example [5], [24]) identify factors relating to three major categories: owner/manager characteristics, firm characteristics, and costs and return on investment[1].

The owner/managers play an important role in decision making in SMEs. Hence it can be concluded that a number of factors that affect the adoption of e-commerce relate to owner/manager characteristics. Iacovou et al. [17] found that the owner's lack of awareness of the technology and perceived benefits is a major barrier to a take up of e-commerce. The lack of knowledge on how to use the technology and the low computer literacy are other contributory factors for not adopting e-commerce [20]. Mistrust of the IT industry and lack of time are two other factors that affect the decision to adopt e-commerce [1]. SME owners are concerned about a return on their investments, reluctant to make substantial investments particularly when short-term returns are not guaranteed [1].

There are some other factors related to the characteristics of the organization, which affect adoption of e-commerce. Iacovou et al.[17] found that the current level of technology usage within the organization affects the process of adoption. In another study by the OECD [25] it was identified that: lack of awareness; uncertainty about the benefits of electronic commerce; concerns about lack of human resources and skills; set-up costs and pricing issues; and, concerns about security as the most significant barriers to e-commerce for SMEs in OECD countries. Low use of e-commerce by customers and suppliers, concerns about security, concerns about legal and liability aspects, high costs of development and computer and networking technologies for e-commerce, limited knowledge of e-commerce models and methodologies, and unconvincing benefits to the company are among some factors found in another study [6]. SMEs definitely have limited resources (financial, time, personnel). This "resource poverty" has an effect on the adoption of e-commerce, as they cannot afford to experiment with technologies and make expensive mistakes [11].

2.3 Barriers to e-commerce adoption in Developing Countries

It is revealed that less attention with SME e-commerce research has been paid to developing countries with different economic, political, and cultural circumstances. Identifying the differences is an initial step to understanding the process of technology adoption. This is particularly important if governments believe that electronic commerce can foster economic development [23].

SME studies of electronic commerce issues in developed countries ([8], [16], [24]) indicate that issues faced by SMEs in developed countries can be totally different from those experienced by SMEs in developing countries. Organizations adopting ICT and e-commerce

in developing countries face a number of challenges that are specific to them and are more pronounced than would be the case in developed countries. Some of these are the lack of telecommunications infrastructure, lack of qualified staff to develop and support e-commerce sites, lack of skills among consumers needed in order to use the Internet, lack of timely and reliable systems for the delivery of physical goods, low bank account and credit card penetration, low income, and low computer and Internet penetration ([2], [3], [21]). Lack of telecommunications infrastructure includes poor Internet connectivity, lack of fixed telephone lines for end user dial-up access, and the underdeveloped state of Internet Service Providers.

Cultural barriers in some countries may also exist to deter the acceptance of e-commerce as a way of doing business [3]. In countries like Sri Lanka and India, shopping is a social activity and personal face-to-face contacts with sellers is an important part of the shopping experience. Distrust of what businesses do with personal and credit card information is an e-commerce issue in any country, but in countries where there may be good justification for such distrust, it could become a serious obstacle to e-commerce growth ([2], [12]). Lack of developed legal and regulatory systems also would inhibit the development of e-commerce in developing countries.

Cloete, Courtney, and Fintz [6] in their study of SME adoption of e-commerce in South Africa found that adoption is heavily influenced by factors within the organization. Lack of access to computers, software, other hardware, and telecommunications at a reasonable cost; low e-commerce use by competitors and supply chain partners; concerns with security and legal issues; low knowledge level of management and employees; and unclear benefits from e-commerce were found to be the major factors that inhibit adoption. Another study of e-commerce in China found that there are many significant barriers to e-commerce adoption. Limited diffusion of computers, high cost of Internet access, and a lack of online payment processes were found to directly inhibit e-commerce. Inadequate transportation and delivery networks, limited availability of banking services, and uncertain taxation rules indirectly inhibit e-commerce[7].

El-Nawawy and Ismail [13] in their study of e-commerce adoption by SMEs in Egypt found that the main factors contributing to the non-adoption of electronic commerce in Egypt are awareness and education, market size, e-commerce infrastructure, telecommunications infrastructure, financial infrastructure, the legal system, the government's role, pricing structures, and social and psychological factors.

Schmid et al.[28] suggest that the main e-commerce issues facing SMEs in Argentina are awareness, access to hardware, infrastructure, organizational culture, financial issues. A comparison of the two studies in Argentina and Egypt, (both developing countries) suggests that the key factors of electronic commerce adoption in developing countries are: awareness, telecommunication infrastructure, and cost. It also suggests that SMEs in developing countries share similar issues. The Internet and e-commerce issues of SMEs in Samoa are consistent with the studies conducted in other developing countries ([28], [12]).

In a study of Sri Lankan SME capability to adopt e-commerce conducted by the Sri Lankan Business Development Centre in 2002 identified the key factors inhibiting the adoption of e-commerce by SMEs as lack of knowledge and awareness about the benefits of electronic commerce, current unprepared-ness on the part of the SMEs to adopt e-commerce as a serious business concept, lack of exposure to IT products and services, language barriers and lack of staff with IT capability, Web-based selling was not seen as practical as there was

limited use of Internet banking and web portals, as well as inadequate telecommunications infrastructure[40].

The above literature review of SME barriers for e-commerce adoption reveal that there are many significant factors, which affect the adoption of e-commerce technologies. These factors can be grouped to develop a framework for investigations. This paper applies the following framework for this purpose. The barriers for SMEs in adopting ICT and e-commerce can be broadly categorised into Internal and External Barriers as follows.

Internal Barriers: A SME has control over and the ability to change the internal factors within the organization. For example, lack of time or resources, and lack of awareness on the part of the owner/manager. Internal Barriers could be further categorised into *Individual* (owner/manager), *Organizational* barriers and *cost and return on investment*[1].

External Barriers: Barriers that cannot be resolved by the SME. They have no control over these, and are compelled work within the constraints, for example inadequate telecommunication infrastructure. Some of the barriers could be addressed by the SMEs working together, and can get together irrespective of the industry sector to form clusters to share expenses, resources and facilities, Alternatively, SMEs from the same industry sector can work together to address certain other external barriers where governmental intervention may be required.

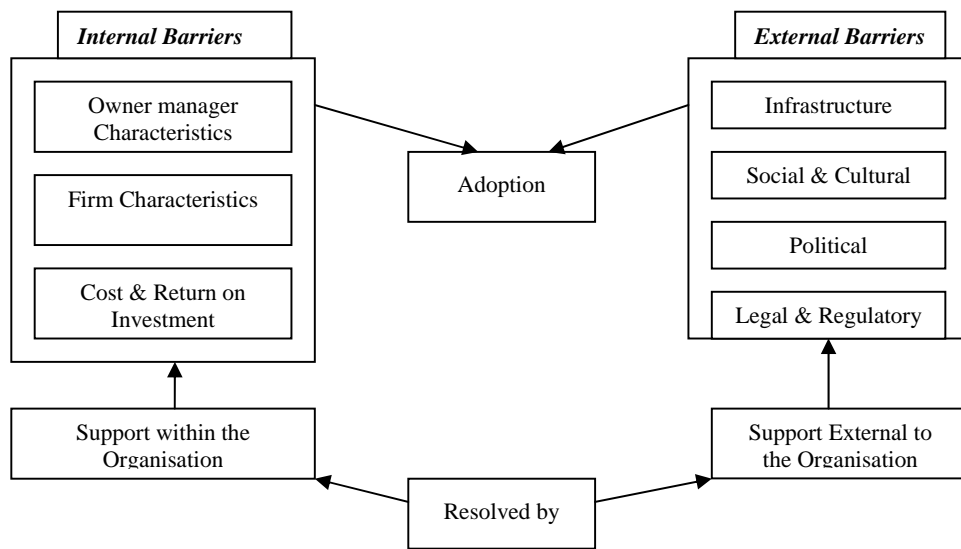


Figure 1 : Model – barriers to adoption

3. Research Methodology

This research is investigating the barriers to adoption of ICT and e-commerce in SMEs in Sri Lanka. The purpose of this study is to come up with a set of potential determinates that affect the adoption and set of potential supporting activities to overcome the barriers.

The goal of this study is to :

- Extend the understanding and find empirical evidence of the barriers faced by the SMEs in adopting the technologies.
- Determine the significance of the potential barriers which impacts the adoption.
- Determine the significance of the supporting activities which will help overcome the barriers.

3.1 Research Approach

Given the lack of empirical research in this area especially in Sri Lanka, an exploratory investigation was considered the most suitable approach. Sri Lanka, a developing country, on its way to an e-society, is the chosen test bed. This research initially looks at SMEs in Colombo District, the capital and the springboard for all advanced technologies in Sri Lanka. It also boasts the highest density of companies using ICT. A methodology suitable for Sri Lanka could prove to be useful with other developing countries. One criterion for enterprises to be a part of the project is the size of the enterprise regarding the number of employees. In this research we consider that SMEs are enterprises with 10 to 250 employees. Another criteria when the enterprises were selected was that they should not be completely immature regarding the use of ICT and e-commerce. It was also important that the organization had adopted at least one of the following areas of ICT: phone, fax, at least basic office packages (Word, Excel etc), Internet searching and browsing, e-mail, or a Web site.

The study was conducted in two stages: Preliminary Pilot Study, and then a questionnaire and interviews with SME intermediary organizations. The preliminary pilot interviews with 17 SMEs in the Colombo district and were conducted in July 2005. This provided direction to what barriers are imperative to the SMEs. This was supported by an extensive literature review, which contributed to the design of the research model presented. The questionnaire of 625 SMEs and 6 interviews with intermediary organizations were conducted in July 2006.

3.2 Survey Instrument

Questionnaire was the main instrument of this exploratory study and was designed after going through a few similar research studies on SMEs in developed countries. A survey instrument with questions using likert scales was developed and pilot tested to capture the information, reflections and perceptions of the SME owner/managers. It was designed to investigate the internal and external barriers, as well as the internal and external support required by the organizations and their significance and influence. The survey was divided into four sections: Section A focused on collecting information about barriers internal to the organization (related to owner/manager, firm, return on investment) for not using or extending the use of ICT and e-commerce; Section B dealt with barriers external to the organization (related to infrastructure, cultural, political, legal & regulatory) for not adopting or extending the use of ICT and e-commerce; Section C focused on the internal and external support required by the organizations; and Section D and E collected the usage of ICT and demographics of the company.

Several pilot tests were carried out prior to the distribution of the questionnaire. Pilot tests were conducted with a group of 4 Ph.D students, 2 academics, and 3 SME owner/managers. The questionnaire was administered in Colombo by using a combination of postal, e-mail and telephone surveys. Overall, 625 questionnaires were personally disseminated and addressed to the owner/managing director of the organizations with no constraints on the type of industry sectors.

A covering letter explaining the purposes of the study, assuring anonymity of respondents and their organization, and providing instructions on how and who should complete the questionnaire. A postage-paid, self-addressed return envelope was sent to the owners /managing directors of 625 organizations. The recipients were selected using a random systematic sampling technique from a reputable business directory publication in Sri Lanka and also from the list of SMEs from Tradenet, the e-commerce arm of the Export Development Board of Sri Lanka. Follow-up efforts to non-respondents were made through phone calls and post, three weeks after the mail-out. Out of 169 total responses, 19 were incomplete, resulting in 150 usable responses, that is, a 19% response rate from the 625 delivered questionnaires. This sample size is considered adequate for the analysis and is comparable to response rates in IS literature [30].

The respondent SMEs were predominantly limited liability companies, family businesses and partnerships (94.7%). All organizations had computers, with 75.7% using a local area network, and 63.2% with a website. These companies primarily used the phone (92.1%) and email (78.9%) for communication with their customers and suppliers. Industry sectors represented included: Services (36.8%), Manufacturing (34.2%) and Wholesale Trade (10.5 %). Most owner/managers were male (94.7%) and a majority were professionally qualified (52.6%).

4. Some Preliminary Results

Based on the initial 50 that responded to the postal survey, Table 2 identifies the top six internal barriers of 9 listed. Table 3 shows the external barriers, divided into Cultural, Infrastructure, Political, Social, and Legal and Regulatory Barriers. Respondents were asked to indicate their agreement with statements by circling a number of the Likert scale (1=strongly disagree to 5=strongly agree). The results shown returned a mean higher than 3.

Table 2: Internal Barriers to using or extending use of e-commerce technologies

	Mean	n	%
Employees lack required skills	3.37	18	60.0
e-commerce cannot give a financial gain	3.26	14	51.9
e-commerce not suited to products and services	3.07	14	50.0
e-commerce not suited to way business is conducted	3.03	13	44.8
e-commerce not suited to our customers and suppliers	3.03	12	41.4
Security concerns with payments over the Internet	3.03	14	46.7

N=number of organizations

Interpretation of preliminary internal barriers.: Internal barriers such as the lack of skills required and the lack of awareness of any return on investment are holding back SMEs from adopting ICT and e-commerce technologies. Also the fact that e-commerce is not suited to the way the business is conducted appears to be another inhibiting factor.

Table 3: External Barriers to using or extending use of e-commerce technologies

	Mean	n	%
Cultural Barriers			
- lack of popularity for online marketing and sales	3.19	19	51.4
Infrastructure Barriers			
- inadequate speed and quality of infrastructure	3.23	19	54.3
- low Internet penetration in the country	3.24	20	54.1
Political Barriers			
- unstable economic climate in the country	3.16	18	50.7
- changing regulations with each government change	3.21	20	52.6
Social Barriers			
- no one-stop shop facility for services	3.37	21	60
- lack of information on e-commerce	3.32	23	62.2
- senior management in other sector lack ICT knowledge	3.06	15	44.1
Legal and Regulatory			
- little support and policies for SMEs from government and industry associations	3.64	27	75
- inadequate legal framework for businesses using e-commerce	3.47	21	62.8
- no simple procedures and guidelines	3.38	24	64.9
- lack of suitable software standards	3.21	20	52.6
N=number of organizations			

Interpretation of preliminary external barriers.

A majority of the respondents agree that political barriers have a major impact on every advancement or expansion be it technology or otherwise. The SMEs are hesitant to invest, probably due to a fear of changing policies to suit changes of government a has been evident.

Table 4: Internal Support required for SMEs to use or extend use of e-commerce technologies

	Mean	n	%
Awareness building and education in ICT and e-commerce	3.83	30	88.2
Guidance in overcoming risks associated with implementation	3.65	26	72.2
Assistance with guidelines for appropriate hardware and software	3.5	26	72.2
Advice and direction for ICT and e-commerce	3.39	24	66.7
n=number of organizations			

Table 5: External support required for SMEs to use or extend use of e-commerce technologies

	Mean	n	%
Improve computer and Internet diffusion in the country	3.97	34	97.1
Provide financial assistance to SMEs	3.94	34	94.4
Provide tax incentives	3.92	34	94.4
Improve national infrastructure	3.88	31	91.2
Improve low bank account and credit card penetration in the country	3.82	28	82.4
Government and industry associations to take leadership and promotion role	3.71	29	82.9
Improve collaboration among SMEs	3.49	24	68.6
Enforce suitable software standards	3.46	25	67.6
n=number of organizations			

The above preliminary results indicate that if the SMEs are provided with the necessary supporting activities, it would facilitate the SMEs in adopting ICT and e-commerce technologies.

5. Discussion

The data collection was completed in July 2006 and is in the process of being analyzed statistically. One observation made by the researcher during the various visits to SMEs for data collection was that the companies are resigned to the fact that they have to live with many limitations with regard to ICT and e-commerce. However, they do admit that ICT and e-commerce could be beneficial to their organizations. Interestingly, the question from the majority of the responding organizations was ‘What more can we achieve by extending the use of ICT and e-commerce’?

It is possible to draw some conclusions from the initial findings of this research study. The barriers both internal and external predominantly point to the lack of skills and a lack of awareness. A process of education and training of the owner/manager can overcome these barriers. Education and training is viewed as being crucial to addressing the lack of readiness of SMEs in adopting and developing their electronic business capabilities (Chau, 2001).

The SMEs agree that they are plagued with many barriers both internal as well as external. Whether internal or external, they all hinder the process of adoption. It is therefore, perceived that an attempt has to be made to overcome these barriers first. The SMEs seem to agree that with the internal and external activities for support the barriers could be overcome. Priority with external support activities, particularly legal and regulatory, demands direct intervention from the government for solutions. Intervention from industry is also considered necessary for the provision of external support.

As mentioned before the objective of this study was to investigate and determine the significance of the barriers faced by the SMEs in adopting technologies and to further investigate the significance of the supporting activities. Determining the barriers and understanding the support the SMEs need in order to overcome the barriers is of paramount importance to facilitate take up of ICT and e-commerce. Development of a framework (methodology) to address this requirement is crucial to facilitate adoption for SMEs and e-transform their organizations successfully.

6. Conclusion

The preliminary study helps draw some conclusions. Adoption of ICT and e-commerce in SMEs developing countries is different from the developed countries. The SMEs in developing countries fall behind with adoption due to barriers, both internal and external, prominent and inherent in a developing country. It is interesting to note, however, that this investigation confirms findings of previous research with regard to barriers.

Another factor that emerged in this study was the level of ICT adoption ([13],[27] currently practiced by participants, who were eager to go further. This observation, again confirms findings of previous research where lack of awareness has been found to be major issue. We found that most SMEs are aware the market will become more dynamic, competitive, and global, making it imperative to use ICT and e-commerce in business. With hardly any research in Sri Lanka to determine SMEs’ barriers for adoption of ICT and e-commerce, this study has shown that while the SMEs agree that adoption is essential in today’s business, they are hindered from adoption, as they are plagued with many constraints, some of which are

more specific to developing countries like Sri Lanka. Therefore, the next step is to find ways to overcome these barriers and construct a framework (methodology) that will facilitate the transformation of SMEs to adopt ICT and e-commerce.

The survey reported in this paper, attempts to provide more in-depth information about the factors/barriers in the context of SMEs in Sri Lanka. The initial focus, therefore, was to ascertain the barriers and to determine supporting activities necessary for SMEs to help facilitate technology adoption. Currently the existing literature seems to concentrate more on the facilitators and barriers on IT adoption with in SMEs. However there is lack of research on strategies for SMEs in developing countries to overcome the barriers and successfully e-transform their organisation. The next step therefore will be to develop a practical framework, efficient in use, for the SMEs to e-transform their organizations.

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