ICT Usage, Bounded Rationality and Business Performance of SMEs in Sri Lanka

R. V. S. P. K. Ranatunga\textsuperscript{a}, H. M. S. Priyanath\textsuperscript{b}, R. G. N. Megama\textsuperscript{c}

\textsuperscript{a}Center for Computer Studies, Sabaragamuwa University of Sri Lanka, Sri Lanka

\textsuperscript{b}Department of Economics and Statistics, Sabaragamuwa University of Sri Lanka, Sri Lanka

\textsuperscript{c}Department of Computer Science, University of Sri Jayewardenepura, Sri Lanka

Abstract

This study endeavours to investigate empirically how Information and Communications Technology (ICT) usage affects the bounded rationality and business performance of Small and Medium Enterprises (SMEs) in Sri Lanka. The data collection has been done with 400 owners of SMEs in Sri Lanka by employing telephone and face to face interviews using a structured questionnaire. The Partial Least Squares-Structural Equation Modelling (PLS-SEM) was utilized to analyse the data. The empirical results discovered that the different dimensions of ICT usage such as infrastructure, applications, policy, human resources, and mobile technology have a negative impact on bounded rationality and positive effects on the business performance of SMEs in Sri Lanka. Thus, the study recognizes that several dimensions of ICT usage make proper information flow to pull out information asymmetry and reduce the bounded rationality of SMEs, thereby increasing the business performance of SMEs in Sri Lanka.

Keywords: Bounded Rationality, Business Performance, ICT Usage, Small and Medium Scale Enterprises

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Introduction

SMEs are a major development engine of a country and they provide valuable economic activities such as making new employment opportunities, reducing poverty, income inequality, and inflation, as well as introducing innovative products, services, and business types in a country (Kayanula & Quartey, 2000; Prasad et al., 2012; Priyanath & Premaratne, 2014; Singh et al., 2010). Hence, SMEs have been given more attention in national planning and economic policymaking in a country (Birch, 1989; Henderson & Weiler, 2010; Organization of Economic Co-operation and Development [OECD], 2017). However, according to OECD (2017), the growth and business performance of SMEs is low, especially in developing countries such as Sri Lanka, and as a result, SMEs are unable to execute their capabilities and contribute a valuable share to the GDP. A number of studies also identified this characteristic of SMEs and mentioned they have a high failure rate on various factors including capital, human as well as market-based, legal or regulatory and thus, their business performance is problematic (Abor & Quartey, 2010; Gbandi & Amissah, 2014; Kayanula & Quartey, 2000; Petković et al., 2016). However, few studies have attempted to introduce a cost-based approach for the issue.

Transaction cost economics (TCE) is based on two assumptions: opportunism and bounded rationality. It is due to these two factors that Transaction Cost (TC) is generated between the exchange partners (Williamson, 1981). According to these assumptions, SMEs have greater likelihood of encountering hazards of the opportunistic behaviour of exchange partners because of insufficient knowledge of the market and lack of other information. Further, even when information is available, due to the incapability of handling information such as gathering, evaluating, and using information for decision-making, they lack the experience to avoid opportunistic behaviour. Hence, they lack the experience to avoid opportunistic behaviour (Carmel & Nicholson, 2005; Nooteboom, 1993). Businesses use market discrimination and incurs costs for searching, negotiating, monitoring, and enforcing transactions for safeguarding from opportunism (Storey, 1994).

Information asymmetry, which results in bounded rationality and hence, opportunistic behaviour, is mainly dependent on the available amount of adequate, reliable, and timely information. At present, the information technologies provide sufficient facilities to disseminate such information among transaction parties of SMEs (Tarute & Gatautis, 2014; Chinomona, 2013; Cuevas-Vargas et al., 2016). However, there is a scarcity of quantifiable measures to identify the extent to which SMEs of developing countries use these technologies to obtain information necessary
to minimize their bounded rationality as well as TC, and thereby, to finally achieve business success. Some recent studies revealed that the shortage of ICT adoption and usage especially, in Information Technology (IT) infrastructures, personal motivation, internet connection issues, trust issues, and lack of knowledge are critical challenges of developing SMEs in Sri Lanka (Athapaththu & Nishantha, 2018; Nishantha, 2018). Therefore, this research aims to explore the effect of different dimensions of ICT usage on bounded rationality, understand the effect of different dimensions of ICT usage on SMEs’ business performance, and identify the effect of bounded rationality on the business performance of SMEs, in Sri Lanka. Applying several theoretical concepts to examine business performance of SMEs is the key contribution of this research because such examinations have previously been conducted primarily in relation to large firms. Both theoretical and empirical findings of this study may lead the policymakers on a new approach to developing SMEs in the country with rapid growth.

The remainder of the paper is organized as follows: The past literature on factors affecting less performance of SMEs, ICT usage, bounded rationality, and business performance are reviewed in the next section. The theoretical framework underlying the proposed model and hypothesis are discussed next. Then the research methodology used is presented, followed by the results of data analysis and a discussion of the results. Finally, the study’s conclusions, limitations, as well as implications and recommendations for future research and practice are presented.

**Literature Review**

**ICT Usage**

Human behaviour such as lifestyle, how they work, how they socially engage, and their economic activities have dramatically been changed by the digital technologies (International ICT Literacy Panel, 2002). From the invention of the computer as the data processing machine, it revolutionized the technologies and automation came to the forefront where the business organizations also absorbed these technologies and changed their business structures and economic activities accordingly. Hence, ICT usage is essential and it should be established around the businesses because of the availability of digitally enabled people, products, capital, ideas, decisions, and all the other things around the businesses (James & Marakas, 2006; Laudon & Laudon, 2013).

At the beginning of information era, it has been understood that all things depend on information and that the literacy of handling such information is essential.
American Library Association (ALA) has defined it as ICT literacy and mentioned four aspects that should be obtained to have such literacy including 1. The ability to recognize when information is needed; 2. The ability to locate the required information; 3. The ability to evaluate the suitability of retrieved information; and 4. The ability to use effectively and appropriately the needed information (1989).

Technological improvements have changed the scope of ICT literacy (Erstad, 2006). Glister (1997) suggested a form of ICT literacy as “Digital Literacy” which he defined as, “an ability to understand and to use information from a variety of digital sources” while emphasizing the idea of “mastering ideas, not keystrokes” (p. 01). Lankshear & Knobel (2003) explained the characteristics of digitally literate people. Such people move quickly from one type of medium to another to find the most relevant knowledge to become skilled and present it to the public in the most understandable way. Lennon et al. (2003, p. 08) revised these ideas as “the interest, attitude, and ability of individuals to appropriately use digital technology and communication tools to access, manage, integrate, and evaluate information; construct new knowledge, and communicate with others to participate effectively in society”. According to the above definitions, ICT usage may be described as a concept that is beyond ICT literacy. Hence, more dimensions of ICT implementations should be considered when studying the ICT usage of an organization (Esselaar et al., 2007). Pham (2010) and Kien et al. (2013) mentioned that ICT usage of a SME is a level of technological maturity that a SME can achieve in a particular period.

Most of the researchers who studied the usage of ICT, especially in the SMEs, considered the adoption of ICT from different perspectives such as organizational, owner/manager, and environmental (Kapurubandara & Lawson, 2007). However, adoption of ICT and e-commerce technologies in developed countries are executed with different perspectives including technology, organization, cost of adoption and Return on Investment (ROI), individual factors, and finally, information and network security (Athapaththu & Nishantha, 2018; Kuruwitaarachchi et al., 2018; Rahayu & Day, 2015).

**Bounded Rationality**

The classical economists explained that the perfectly competitive market transactions between exchange partners are coordinated by demand and supply through price mechanism and these exchange partners should have the perfect knowledge about the market (Wang, 2003). However, Coase (1937) said that a perfectly competitive market does not exist in reality, and exchange partners pay costs
to eliminate the imperfection because imperfection occurs due to the scarcity of information. According to Williamson (1981), this asymmetrical information creates bounded rationality to one partner and opportunism by the opposite partners. According to Simon (1990), the bounded rationality of the human intrinsically arises because of the incapability of handling information. He stated, “Human rational behaviour is shaped by scissors whose two blades are the structure of task environments and the computational capabilities of the actor” (Simon, 1990, p. 07). Further, he mentioned, “human behaviour is intendedly rational, but only boundedly so” (Simon, 1997, p. 88). He also identified two kinds of limitations. One involving cognition and perception, and the other involving language limitations. Therefore, the barriers in gathering, processing, and assessing information to make the proper decision affecting the business are introduced as bounded rationality (Zhang, 2009).

This limitation allows a supplier to design the alternative paths for the contract since the firm does not have required cognitive abilities and rationality to identify the supplier’s behaviour; as a result, the TC may increase (Gigerenzer & Goldstein, 1996; Nguyen & Crase, 2011). The firm is unable to make correct decisions freely since it cannot obtain enough information about the contract (Williamson, 1985). Economizing on bounded rationality takes two forms. One concerns the decision processes and the other involves governance structures, and thus bounded rationality increases the cost. TCE is principally concerned with the economizing consequences of assigning transactions instead of the realities of bounded rationality. Accordingly, the costs of planning, adapting, and monitoring transactions need to be considered. (Williamson, 1985).

**Business Performance**

Performance is the concept which depends on a standard or a benchmark to determine the value of the outcome of a particular process (Bourne et al., 2003; Khare et al., 2012; Morgan, 2004; Robbins & Coulter, 2013). According to Neely (2004, p. 68), it is “doing today what will lead to measured value outcome tomorrow.” Cavalluzzo and Ittner (2004) mentioned that it’s a sequence of business activities or processes as responsibility, accountability to the public and individuals for a particular expected level. The performance depends on measures that aim at the major objectives which create paths from the previous business activities to the undecided state of the organization’s plan (Lebas, 1995; Wholey, 1996). Measuring performance is the process of quantifying the actions that the organization is carrying out. They can be subjective or objective, and both or a combination of both for measuring performance can be determined according to the objectives of the organisation (Ilgen & Favero, 1985).
The measurement of the business performance is characterized by the plans, investments, and expected achievements which can be evaluated quantitatively. However, the selection of measurement is a more frustrated and controversial issue and hence, a deep agreement of the best measurements cannot be found (Richard et al., 2009). Most past researchers employed only financial measures for evaluating the performance. Some recent studies mostly rely on the relevance of non-financial viewpoints such as personal satisfaction, personal growth, skill improvement, flexible lifestyle, business survival, customer satisfaction, customer retention, and career progress (Bititci et al., 2001; O’Regan & Ghobadian, 2004; Perren, 2000; Simpson et al., 2004; Walker & Brown, 2004).

According to Haber and Reichel (2005), Lumpkin and Dess (1996), and Murphy et al. (1996), focusing on a narrow area of performance measures may give an incorrect understanding of the success and conversely, multiple types of measures provide significant explanatory power to predict the business success. Garengo et al. (2005) and Taticchi et al. (2010) have also mentioned how performance measurement systems play an important role in SME’s development. A researcher who is attempting to measure the performance of SMEs should pay more attention to overall performance rather than the traditional measures of only using financial performance. (Chalmeta et al., 2012; Waśniewski, 2017). Santos and Brito (2012) identified two types of performance, financial performance and strategic performance, instead of standard operational performance. Waśniewski (2017) proposed another system for measuring SMEs’ performance, which depended on the organization’s key success factors. Nevertheless, according to the literature at the beginning of the past decade, researchers have been attempting to use not only strategic factors but also operational factors to evaluate business performance.

**Conceptual Framework and Hypotheses**

The successive governments after the independence in Sri Lanka in 1948 have given their fullest support as well as provisions to the SMEs for developing them as required for the economic requirements of the country. However, according to Priyanath and Premaratne (2014) and Vijayakumar (2013), SMEs have not figured out the correct path to achieve the established goals and still have less performance than large businesses. According to the Central Bank of Sri Lanka (1998), 98% of small enterprises account for 48.6% of total employment and 31.1% of gross value-addition. However, by 2008, 91.6% of small enterprises accounted for only 29.6% of total employment and 20.3% of value-addition (Department of Census and Statistics, 2009; Priyanath & Premaratne, 2014). Thus, there is a considerable decline in all the
important statistics, with total employment reducing from 48.6% to 29.6% and the value addition also reducing from 31.1% to 20.3% Sri Lanka obtained a growth of 11 scores in the Ease of Doing Business Index (2019), being ranked 100 among 190 economies and only 1 increment was obtained in 2020 (World Bank, 2019). As per the report, Sri Lanka does not show any change in the overall score compared to the 2019 year adjusted score but shows little gains in several subtopics. The Economic Freedom Index (2020) mentioned that 09 of Sri Lanka’s indicators out of 12 are below in global average levels (James et al., 2020). These indices depict that some problems prevent the good performance of SMEs in Sri Lanka.

Many researchers announced various related factors for the poor performance of SMEs in Sri Lanka. One aspect is the lack of access to adequate and timely financing financial intermediaries (Task force for small & medium enterprise sector development program, 2002; World Bank, 2011; Damayanthi & Rajapakse, 2008). Furthermore, policy level and industry level inconsistencies such as opposing economic policies, inadequate market demand, problems of access to credit, problems of raw material supply, rigid and unfavourable regulations, lack of infrastructure and utilities, lack of business development services, lack of information are some other factors (Abeyratne, 2005; Wickremasinghe 2011; Wijetunge & Pushpakumari, 2014; Vaikunthavasan et al., 2019). Some researchers like Premaratne (2002), Priyanath and Premaratne (2017a, 2017b), Priyanath & Buthsala (2017), Pretheeba (2014), and Kapurubandara and Lawson (2007) mentioned other aspects such as social capital, transaction cost, the problem of SME networks, technology infrastructure problems with the scarcity of information and ability of internet access. In this context, the study identified a gap which focused on the bounded rationality and the business performance of SMEs which are not considered by the researchers with the perspective of using ICT by the SMEs.

The major goal of SMEs is obtaining a satisfactory level of performance. However, due to the considerable behavioural characteristics of the market, SMEs fail to reach this level (Carmel & Nicholson, 2005; Dyer & Chu, 2003; Nooteboom, 1993; Priyanath, 2017). Especially, the opportunistic behaviour of the market incur more cost on the SMEs and hence they finally fail in doing business (Priyanath, 2017; Priyanath & Premaratne, 2014; Priyanath & Premaratne, 2017a, 2017b). This cost generated by the market mechanism is called TC and it is incurred due to the limitation of decision-making power (bounded rationality) on solving the business management issues created by opportunism (Zhang, 2009). Williamson (1981) mentioned bounded rationality as one of the major reasons which leads to generating
the TC. Increasing the rational power that can be used to make optimum decisions depends mainly on the availability of adequate, reliable, and timely information (James & Marakas, 2006; Laudon & Laudon, 2013). The ICT today sufficiently facilitates disseminating necessary information among the transaction partners in the market (Laudon & Laudon, 2013). Nevertheless, the problem with the SMEs especially in developing countries is in the use of digital technologies to disseminate adequate knowledge to decrease bounded rationality and thereby increase the success of their business performance. (Cordella, 2006; Pham, 2010, Kien et al., 2013).

In this study, ICT usage, bounded rationality, and business performance have been conceptually combined to create the theoretical framework. All the variables are multidimensional and Figure 1 depicts the direct relationships between the dimensions of ICT usage, which are considered as independent variables and the two dependent variables.

**Figure 1: Conceptual Framework**

![Conceptual Framework](image)

**ICT Usage and Bounded Rationality**

Use of ICT creates the value chain from supplier to a customer by using infrastructure and various software applications such as supply chain management...
systems, customer relationship management systems as well as various other applications for collaborative work (Laudon & Laudon, 2013). These facilities boost the communication between business partners of the marketplace and enhance the dissemination of information freely between the exchange partners. This adequate, reliable, and timely information may increase the rationality of the business partners (Cordella, 2006; Omiumu, 2019; Tan & Eze, 2008; Zhang, 2009). Furthermore, Markus and Thomas (2002) stressed that the digital networks mitigate the bounded rationality. Increasing the access and capability to assess information by encouraging formal and informal networks of SMEs in Sri Lanka significantly reduce their bounded rationality (Priyanath & Premaratne, 2017c; Priyanath & Buthsala, 2017). In these perspectives, ICT infrastructure, applications, policy, human resources, and mobile technology facilitate access and capability to assess information which directly affects to minimize the bounded rationality of the decision-makers. Therefore, the following hypotheses are developed:

H₁: Usage of ICT infrastructure negatively relates to the bounded rationality of SMEs.
H₃: Usage of ICT applications negatively relates to the bounded rationality of SMEs.
H₅: Usage of ICT policy negatively relates to the bounded rationality of SMEs.
H₇: Usage of ICT human resources negatively relates to the bounded rationality of SMEs.
H₉: Usage of ICT mobile technology negatively relates to the bounded rationality of SMEs.

**ICT Usage and Business Performance**

According to James and Marakas (2006) and Laudon and Laudon (2013), the ICT provides greater facilities to the businesses by creating a massive network among the businesses, automating the activities of the businesses, leading to higher productivity, as well as by flattening the organization structure with smooth information flow which results in higher efficiency. ICT and its enhanced applications establish the collaborative business environment, leading to innovations, research, and development, as well as technology-rich human resource for visionary leadership in the organization. These characteristics initiate decentralized decision making, which aims towards higher business performance (Esselaar et al., 2007; Giotopoulos et al., 2017; James & Marakas, 2006; Laudon & Laudon, 2013). The ICT can be used as an essential tool to reduce cost, make customer relationships and in supply chain management. It also establishes a market niche that exhibits the business functionalities from national to international level and how the businesses are
growing in the knowledge economy (Laudon & Laudon, 2013; Kutlu & Özturan, 2008). Many researchers concentrated on the adoption of ICT as a powerful strategic instrument for promoting and strengthening the competitiveness and thus, the economic performance (Tarute & Gatautis, 2014; Bayo-Moriones et al., 2013; Brynjolfsson & Hitt, 2000; Liang et al., 2007). Therefore, the study hypothesizes that:

\[ H_2: \text{Usage of ICT infrastructure positively relates to the business performance of SMEs.} \]

\[ H_4: \text{Usage of ICT applications positively relates to the business performance of SMEs.} \]

\[ H_6: \text{Usage of ICT policy in the organization positively relates to the business performance of SMEs.} \]

\[ H_8: \text{Usage of ICT skilled human resource skills positively relates to the business performance of SMEs.} \]

\[ H_{10}: \text{Usage of mobile technology positively relates to the business performance of SMEs.} \]

**Bounded Rationality and Business Performance**

Bounded rationality generates fear among the exchange partners and therefore, transacting parties attempt to safeguard their transactions from the opportunistic behaviour of others. Thus the additional cost called TC manifests as the costs of searching information, negotiation, monitoring, and enforcement for safeguarding from such unbalanced opportunistic behaviour of the market (Dyer & Chu, 1997; Hobbs, 1997; Priyanath & Buthsala, 2017; Williamson, 1985). In this situation, according to Priyanath and Premaratne (2017c), if one party in the transaction cannot understand the behaviour of another party then perhaps the former would have to incur higher cost to balance the situation. Finally, it leads to reducing the outcome of the business activity. Therefore, the study predicts that:

\[ H_{11}: \text{Bounded rationality negatively impact on the business performance of SMEs} \]

**Methodology**

Three theoretical aspects have been combined to address the research problem and hence, the deductive approach is employed. The survey method is used for data collection. The research study selected only manufacturing SMEs for the study. The unit of analysis is the owner of a SME who directly starts, manages, and runs the business. As per the definition given by the Department of Census and Statistics (DCS) of Sri Lanka, SME is considered as an established organization with 5 – 24 persons engaged for small enterprises and 25 – 199 persons engaged for medium enterprises. This definition has been employed for selecting the population and as
identified by the DCS of Sri Lanka, the number of firms in the population is 81,531 SMEs. After conducting a pilot survey and analysis of 110 SMEs, 400 SMEs were selected from the sample frame (81,531 SMEs), employing the minimum sample size determination formula for the Partial Least Square - Structural Equation Modelling (PLS-SEM) (Kock & Hadaya, 2018; Ranatunga et al., 2020a). The sample is populated according to the percentage share of the SMEs located in each district which determined the number of SMEs to represent all the districts in Sri Lanka. Then, SMEs of each district were listed out according to the International Standard Industrial Classification of All Economic Activities (ISIC) and the sample was selected using the stratified sampling method to represent all the manufacturing industrial divisions. In Sri Lanka, in the majority of SMEs, the owner is the entrepreneur and the manager; therefore, data was collected through face-to-face interviews or telephone interviews with owners. The data collection instrument was a questionnaire.

The questionnaire utilising a 7-point Likert scale (1 – Strongly disagree; 2 – Disagree; 3 – Somewhat disagree; 4 – Neither agree nor disagree; 5 – Somewhat agree; 6 – Agree; 7 – Strongly agree) to measure all items, was developed by using a two-step procedure. Initially, a pool of items from each dimension is identified by reviewing empirical literature. Then, items which are more helpful to measure the dimensions of the constructs are carefully nominated. By following these steps, the items of the questionnaire were systematically designed according to the literature published in cited journals. Each respondent gave a rating for each question expressing their degree of agreement with the question statement. In order to protect the validity and reliability of the study, the questionnaire was pre-tested by using a pilot survey before the main survey and it was verified whether the questions are understood; whether the instructions were clear; whether the order of the questions was appropriate and the questions were useful, etc.

**ICT Usage Measures**

The usage of ICT is assumed to be a broader concept which represents the long-term capacity of using ICT. Hence, it has been measured using five variables, namely, implemented ICT infrastructure, used ICT applications, organization’s ICT policy, ICT skilled human resources, and the usage of mobile technology (Giotopoulos, et al., 2017; Mithas et al., 2012; Pham, 2010; Kien et al., 2013; Ranatunga et al., 2020b). Based on Pham (2010) and Kien et al. (2013), 10 items were used to measure the infrastructure, another 10 items to measure applications, 06 items to measure the policy and 04 items to measure skilled human resources. Another 10 items were utilized to operationalize the usage of mobile technology.
**Bounded Rationality Measures**

Bounded rationality, which has not been directly measured in the empirical literature, has three major characteristics (Priyanath, 2017): limitations in accessing information, assessing information, and the capability of making good decisions on that information (Priyanath, 2017). These three kinds of capabilities are utilized by this study for operationalising bounded rationality. Accessing information, i.e., the ability to find information on the market, suppliers, and buyers, was measured by using 08 items; assessing information, or capability of evaluating information on each market, supplier, and buyer was measured by using another 04 items; and finally, using information to make good decision, which is the capability of using information for handling influences of the market, suppliers was measured by using another 04 items.

**Business Performance Measures**

Liang et al. (2007) and Santos and Brito (2012) identified two types of performance as financial performance and strategic (operational) performance. Financial performance is measured in terms of profitability, growth, market value, and strategic or operational performance is indicated by customer satisfaction, employee satisfaction, environmental performance, and social performance. This study also used both financial and strategic or operational performance. According to Santos and Brito (2012) and Tarute and Gatautis (2014) within financial performance, profitability is operationalized by 05 items and the growth by using another 05 items. Within strategic or operational performance, customer satisfaction is operationalized by 07 items, employee satisfaction by 05 items, environmental performance by 04 items and social performance by another 02 items.

**Data Analysis Technique**

The hypothesised relationships were tested using the PLS-SEM, which is a statistical analytical technique for evaluating the relationships between multiple independent and dependent variables and evaluating more than one construct at the same time. Data were analysed employing a two-step procedure including testing the measurement model followed by testing hypotheses with the help of the structural model. The measurement model is assessed by examining reliability (indicator reliability and internal consistency reliability) and validity (convergent validity and discriminate validity) tests. The study developed latent variables to measure all the variables (ICT Usage, BR, and BP), following a hierarchical model using PLS path modelling. A two-step procedure was applied to measure variables as first-order and second-order. The first-order latent variables were constructed with their respective
manifest indicators in the measurement model. Then the second-order constructs were developed using the underlying first-order latent variables scores. Finally, the structural model was run to test the hypotheses and the model’s efficiency was examined by multicollinearity issues, $R^2$, effect size ($f^2$), and predictive relevance ($Q^2$). The Smart PLS (version 2) software was used to analyse data.

**Results and Discussion**

The study focused on SMEs in manufacturing industries and the age of the respondents ranged from 27 to 77 years. Male participation was 67%. Their education qualification ranged from primary level to graduation. Thirty two percent of urban industries, 61% of rural industries, and 7% of estate industries were included in the sample. Experience of the selected participants in manufacturing industries was between 3 to 31 years.

Two kinds of characteristics should be deeply considered while obtaining the result of the data analysis in PLS-SEM; validity and reliability (Hair et al., 2012; Robson, 2002). The study evaluates the reliability of the measurement model by using indicator reliability and internal consistency reliability. The validity of the reflective indicators is examined using the measures of convergent validity and discriminant validity (Hair et al., 2014). According to Table 1, seven first-order endogenous latent variables are evaluated. It shows the standardized factor loading values are above the minimum threshold criterion of 0.7 and, hence, obtained indicator reliability at a statistically significant level of 0.05. The internal consistency reliability was also examined by using Cronbach’s alpha and composite reliability. All the indicators are above the threshold of 0.7 of both measures and therefore, all the indicators confirmed reliability. The convergent validity of the first-order constructs was evaluated by using Average Variance Extracted (AVE) values. All the AVE values obtained by the indicators are above the threshold of 0.5 and thus, the first-order indicators satisfy the convergent validity.

**Table 1: Analysis of First Order Constructs**

| Construct                                      | Loading | $t$  | CR   | AVE  | $\alpha$ |
|-----------------------------------------------|---------|------|------|------|----------|
| **Business Performance Customer Satisfaction**|         |      |      |      |          |
| Customer feedback on our production           | 0.971   | 0.828| 0.965|      |          |
| Changes of production according to the customer feedback | 0.937   | 57.091|      |      |          |
|                                               | 0.920   | 41.554|      |      |          |
| Construct                                                                 | Loading | t     | CR   | AVE  | α    |
|---------------------------------------------------------------------------|---------|-------|------|------|------|
| Introduce new products according to the customer requests                 | 0.905   | 34.066|      |      |      |
| Growth in Number of customers in each marketing area                       | 0.888   | 41.952|      |      |      |
| Complaints on the production(s) received from customers                    | 0.894   | 26.929|      |      |      |
| The frequency of returning items                                           | 0.886   | 30.479|      |      |      |
| Growth of popularity of the tradename                                      | 0.939   | 49.029|      |      |      |

**Business Performance Employee Satisfaction**

| Construct                                                                 | Loading | t     | CR   | AVE  | α    |
|---------------------------------------------------------------------------|---------|-------|------|------|------|
| Growth of expenditure for training programs                               | 0.759   | 26.589|      |      |      |
| Growth of providing gifts and bonus for the employee                      | 0.775   | 18.233|      |      |      |
| Decrement of resignation                                                  | 0.700   | 9.635 |      |      |      |
| Increment of employee salary                                              | 0.755   | 10.859|      |      |      |
| Increment of employee welfare                                             | 0.750   | 10.559|      |      |      |

**Business Performance Growth**

| Construct                                                                 | Loading | t     | CR   | AVE  | α    |
|---------------------------------------------------------------------------|---------|-------|------|------|------|
| Opening of a new factory                                                 | 0.825   | 21.153|      |      |      |
| Increment in the number of employees                                     | 0.828   | 25.212|      |      |      |
| Establishing new buildings                                                | 0.795   | 16.089|      |      |      |
| Establishing new Machines                                                 | 0.858   | 32.647|      |      |      |
| Growth of investments                                                     | 0.823   | 24.089|      |      |      |

**Business Performance Profit**

| Construct                                                                 | Loading | t     | CR   | AVE  | α    |
|---------------------------------------------------------------------------|---------|-------|------|------|------|
| Growth of monthly sales volume                                            | 0.968   | 126.045|     |      |      |
| Growth of monthly income                                                  | 0.926   | 59.015 |     |      |      |
| Growth of profit                                                          | 0.946   | 73.546 |     |      |      |
| Decrement of sold product returning volume                                | 0.909   | 40.559 |     |      |      |
| Increment of stock movement                                               | 0.910   | 66.941 |     |      |      |

**Bounded Rationality Access Information**

| Construct                                                                 | Loading | t     | CR   | AVE  | α    |
|---------------------------------------------------------------------------|---------|-------|------|------|------|
| Able to find an accurate price for the product in the market.              | 0.931   | 43.897|      |      |      |
| Able to find the new market and buyers for the product.                    | 0.964   | 109.346|     |      |      |
| Able to find information about reliable buyers for the product.           | 0.963   | 120.692|     |      |      |
| Able to easily identify the activities of the competitors.                | 0.954   | 117.510|     |      |      |
| Able to easily find accurate information about raw materials.              | 0.984   | 308.889|     |      |      |
| Construct                                                                 | Loading  | t       | CR     | AVE   | α     |
|--------------------------------------------------------------------------|----------|---------|--------|-------|-------|
| Able to easily find accurate information about new suppliers for raw materials. | 0.982    | 226.195 |        |       |       |
| Able to easily find information about reliable suppliers for raw materials. | 0.975    | 183.429 |        |       |       |
| Able to easily find the required technology for my production process.    | 0.831    | 28.423  |        |       |       |
| **Bounded Rationality Assess Information**                               |          |         | 0.991  | 0.967 | 0.989 |
| Capability to evaluate the needed information about the behaviour of the market price on production | 0.985    | 206.793 |        |       |       |
| Capability to evaluate the needed information about the behaviour of the market price on raw materials | 0.990    | 297.456 |        |       |       |
| Capability to evaluate the needed information about the threats from the competitors | 0.989    | 299.416 |        |       |       |
| Capability to evaluate the needed information about the change of business environment, political situations and external pressures | 0.971    | 103.949 |        |       |       |
| **Bounded Rationality Decision on Information**                          |          |         | 0.981  | 0.927 | 0.974 |
| Capability to make proper sales decisions                                | 0.926    | 48.506  |        |       |       |
| Capability to identify the market behaviour of the raw materials and make a proper decision on purchasing them | 0.972    | 164.011 |        |       |       |
| Capability to decide to avoid threats from competitors.                  | 0.984    | 276.133 |        |       |       |
| Capability to make decisions to face the changes in the business environment, political situation, and external pressures. | 0.969    | 78.762  |        |       |       |

Note: n=400

According to Fornell and Larcker (1981), the square root of AVE in each latent variable is utilized to examine the discriminant validity. These values should be larger than other correlation values among the latent variables. As mentioned in Table 2, all the inter-construct correlation values are lower than the square root of the AVE. This satisfies the criterion of the discriminant validity of first-order constructs and shows
that the first-order constructs are acceptable to interpret the relationships among constructs. Two latent variables that apply to the second-order have been formed in the first-order structural model.

### Table 02: Discriminant Validity of First Order Constructs

|       | BPF_Growth | BPF_Profit | BPO_Cus | BPO_Emp | BR_Access | BR_Assess | BR_Decision |
|-------|------------|------------|---------|---------|-----------|-----------|-------------|
| BPF_Growth | 0.826      |            |         |         |           |           |             |
| BPF_Profit  | 0.813      | 0.932      |         |         |           |           |             |
| BPO_Cus    | 0.810      | 0.904      | 0.910   |         |           |           |             |
| BPO_Emp    | 0.641      | 0.615      | 0.621   | 0.748   |           |           |             |
| BR_Access  | -0.533     | -0.652     | -0.648  | -0.360  | 0.825     |           |             |
| BR_Assess  | -0.557     | -0.667     | -0.643  | -0.348  | 0.802     | 0.983     |             |
| BR_Decision| -0.510     | -0.625     | -0.603  | -0.329  | 0.952     | 0.960     | 0.963       |

Notes: 1. Diagonal values in bold are the square roots of the AVE values. The diagonal elements must be greater than the off-diagonal elements below in the corresponding rows and columns to establish discriminant validity.
2. n=400

The latent variable scores of the first-order constructs were used to develop the second-order constructs. Seven endogenous latent variables, namely, business performance (BP), Bounded Rationality (BR), ICT Applications (ICT_APP), ICT Human Resources (ICT_HR), ICT Mobile technology (ICT_MT), ICT Policy (ICT_POL), and ICT Infrastructure (ICT_INF) have been utilized at the second-order level in the hierarchical model. Table 3 indicates that all the factor loading values are higher than the required threshold value of 0.7. In order to estimate the significance of each loading, the bootstrapping procedure was conducted and t-statistics were examined. According to Table 3, all the t-statistics are significant at 0.05 significance level. Furthermore, Cronbach’s α and composite reliability have been obtained and both values are higher than the recommended value of 0.7 on all the second-order constructs. It depicts that all the second-order constructs have been created by using reliable methods and have reached internal consistency reliability. As shown in Table 3 all the AVE values are greater than 0.5 and hence, the results endorsed the convergent validity of the second-order construct used in the model. Table 4 indicates the discriminant validity of the second-order constructs and square root of all the AVE values are higher than the inter-construct correlation values and it satisfies the criterion of the discriminant validity of the second-order constructs.
Finally, the inner model has been assessed following the guidelines of Hair et al. (2014). The initial step is assessing the collinearity issues. According to Table 5, VIF values range from 1.738 to 4.77, and the analysis does not depict any collinearity issues since VIF values are lower than the threshold of 5. The tolerance levels range from 0.223 to 0.575, which exceeded the threshold value of 0.2. Therefore, the structural model does not contain any multicollinearity issues between the constructs.

Table 3: Analysis of Second-Order Constructs

| Construct                                      | Loading | t      | CR   | AVE   | α    |
|------------------------------------------------|---------|--------|------|-------|------|
| **Business Performance**                       |         |        |      |       |      |
| Profit                                         | 0.805   | 17.389 | 0.700| 0.928 |      |
| Growth                                         | 0.880   | 31.392 |      |       |      |
| Employee satisfaction                          | 0.920   | 76.508 |      |       |      |
| Customer satisfaction                          | 0.921   | 76.113 |      |       |      |
| Policy on environmental protection             | 0.757   | 16.503 |      |       |      |
| Job opportunities for employees represent less income group | 0.757   | 14.994 |      |       |      |
| Social activities such as help to disabilities, cultural events, etc. | 0.796   | 20.453 |      |       |      |
| **Bounded Rationality**                        |         |        |      |       | 0.994|
| Access to the information                      | 0.931   | 392.167| 0.981| 0.990 |      |
| Assess the information                         | 0.964   | 541.726|      |       |      |
| Make decisions on information                  | 0.963   | 421.832|      |       |      |
| **ICT Usage Infrastructure**                   |         |        |      | 0.905 | 0.659|
| Use the fixed-line telephone for business purposes. | 0.749   | 13.504 | 0.659| 0.869 |      |
| Use computers for business purposes.           | 0.912   | 51.118 |      |       |      |
| Use local area network                         | 0.915   | 54.381 |      |       |      |
| Has Broadband internet access and Wi-Fi        | 0.756   | 14.478 |      |       |      |
| Use other peripherals like POS, barcode readers, fax machines, photocopy/scanner machines, etc. | 0.704   | 11.733 |      |       |      |
| **ICT Usage Applications**                     |         |        |      | 0.919 | 0.620|
| Handle business activities using standard applications such as MS office with the computers | 0.743   | 17.700 | 0.620| 0.898 |      |
| Use customized software for handling business functions | 0.798   | 24.848 |      |       |      |
| Use Management Information Systems             | 0.806   | 19.903 |      |       |      |
| Use Databases and knowledge bases              | 0.862   | 32.195 |      |       |      |
| Construct                                                                 | Loading | t     | CR   | AVE   | α     |
|--------------------------------------------------------------------------|---------|-------|------|-------|-------|
| The organization has an e-Mail address                                  | 0.752   | 12.706|      |       |       |
| Use social media like Facebook for business purposes                     | 0.778   | 13.691|      |       |       |
| Use e-Banking/e-money applications for business purposes                 | 0.766   | 14.988|      |       |       |
| **ICT Usage Policy**                                                     |         |       | 0.983| 0.908 | 0.980 |
| Investment for ICT development                                           | 0.966   | 107.031|     |       |       |
| Assess the ICT infrastructure on regular time                            | 0.956   | 52.864|      |       |       |
| Security policy                                                          | 0.943   | 62.290|      |       |       |
| Followed rules and regulations                                           | 0.950   | 61.396|      |       |       |
| Employee training as a policy                                            | 0.941   | 48.144|      |       |       |
| Updating software and hardware as a policy                               | 0.961   | 89.371|      |       |       |
| **ICT Usage Human Resources**                                            |         |       | 0.872| 0.578 | 0.822 |
| Employees have IT knowledge                                              | 0.731   | 13.045|      |       |       |
| Recruiting specialized IT persons                                       | 0.802   | 19.190|      |       |       |
| Employees can use computers and related equipment’s                      | 0.814   | 17.127|      |       |       |
| Employees use Internet Messaging or e-mails                               | 0.717   | 12.293|      |       |       |
| Decision making using MIS                                                | 0.734   | 12.832|      |       |       |
| **ICT Usage Mobile Technology**                                          |         |       | 0.958| 0.718 | 0.950 |
| Use of mobile phones                                                     | 0.852   | 25.683|      |       |       |
| Use of mobile equipment with internet connection for business purposes   | 0.867   | 28.411|      |       |       |
| Use of mobile applications for communications (Viber, WhatsApp, Imo)     | 0.867   | 27.954|      |       |       |
| Use of social media through mobile connection (Facebook, LinkedIn)       | 0.883   | 34.441|      |       |       |
| Employees use internet messaging or email through mobile phones for business purposes | 0.736 | 17.133 | | | |
| Generally, employees use the internet and its services through mobile phones for business purposes | 0.850 | 27.056 | | | |
| Generally, employees do video conferencing through mobile phones during their activities | 0.848 | 29.056 | | | |
| Use knowledge bases through mobile phone for solving business issues      | 0.804   | 19.417|      |       |       |
Construct | Loading | t | CR | AVE | α
--- | --- | --- | --- | --- | ---
Do innovation for business using internet through mobile phones | 0.909 | 53.945 | |

Note: n=400

**Table 04: Discriminant Validity of Second-Order Constructs**

| BP | BR | ICT_APP | ICT_HR | ICT_MT | ICT_POL | ICT_INF |
|----|----|---------|--------|--------|---------|---------|
| BP | 0.837 | | | | | |
| BR | -0.624 | 0.990 | | | | |
| ICT_APP | 0.711 | -0.501 | 0.787 | | | |
| ICT_HR | 0.770 | -0.523 | 0.735 | 0.760 | | |
| ICT_MT | 0.750 | -0.594 | 0.584 | 0.757 | 0.848 | |
| ICT_POL | 0.706 | -0.476 | 0.821 | 0.725 | 0.558 | 0.953 |
| ICT_INF | 0.721 | -0.584 | 0.761 | 0.692 | 0.660 | 0.665 | 0.812 |

Notes: 1. Diagonal values in bold are the square roots of the AVE values. The diagonal elements must be greater than the off-diagonal elements below in the corresponding rows and columns to establish discriminant validity.
2. n=400

**Table 5: Assessment of Structural Model for Collinearity Issues**

| Model | Unstd. Coefficients | Std. Coefficients | t | Sig. | 95.0% Confidence Interval for B | Collinearity Statistics |
|-------|---------------------|-------------------|---|------|--------------------------------|------------------------|
|       | B | Std. Error | Beta | | | Lower Bound | Upper Bound | Tolerance | VIF |
| (Constant) | 3.017 | .136 | | 22.17 | .000 | | | | |
| BR | -.089 | .019 | -.159 | -4.600 | .000 | -.127 | -.051 | .575 | 1.738 |
| ICT_APP | .045 | .031 | .079 | 1.456 | .146 | -.016 | .105 | .232 | 4.305 |
| ICT_HR | .104 | .034 | .171 | 3.074 | .002 | .037 | .170 | .223 | 4.477 |
| ICT_MT | .145 | .026 | .268 | 5.498 | .000 | .093 | .196 | .290 | 3.453 |
| ICT_POL | .098 | .024 | .199 | 4.084 | .000 | .051 | .145 | .291 | 3.436 |
| ICT_INF | .065 | .021 | .140 | 3.074 | .002 | .024 | .107 | .332 | 3.013 |

Note: n=400
Using the PLS bootstrap process, the study assessed the significance of the path coefficients using $\beta$ values and $t$-statistics to identify the effect of ICT usage on the bounded rationality and the business performance of the SMEs. The path coefficient should be larger than 0.1 to demonstrate its significance and the estimated $t$-value should be 1.65 for a significance level of 90%, 1.96 for a significance level of 95%, and 2.58 for a significance level of 99% in a two-tailed $t$-test (Hair et al., 2014). Table 6 demonstrates the results of the analysis and it is evident that 8 out of the 11 hypothesised relationships can be accepted.

**Table 6: Path Coefficient and Significance**

| Hypotheses | Relationship | Beta (Path) | $t$   | Decision     |
|------------|--------------|-------------|-------|--------------|
| H$_1$      | ICT_Inf $\rightarrow$ BR | -0.290*** | 2.178 | Accepted     |
| H$_2$      | ICT_Inf $\rightarrow$ BP  | 0.195**    | 1.985 | Accepted     |
| H$_3$      | ICT_App $\rightarrow$ BR  | -0.056     | 0.303 | Not Accepted |
| H$_4$      | ICT_App $\rightarrow$ BP  | 0.103*     | 1.695 | Accepted     |
| H$_5$      | ICT_Pol $\rightarrow$ BR  | -0.087     | 0.520 | Not Accepted |
| H$_6$      | ICT_Pol $\rightarrow$ BP  | 0.197*     | 1.882 | Accepted     |
| H$_7$      | ICT_HR $\rightarrow$ BR   | -0.093     | 0.583 | Not Accepted |
| H$_8$      | ICT_HR $\rightarrow$ BP   | 0.163*     | 1.829 | Accepted     |
| H$_9$      | ICT_MT $\rightarrow$ BR   | -0.394***  | 2.659 | Accepted     |
| H$_{10}$   | ICT_MT $\rightarrow$ BP   | 0.328***   | 3.080 | Accepted     |
| H$_{11}$   | BR $\rightarrow$ BP        | -0.152*    | 1.795 | Accepted     |

Note: ***, ** and * denote significance levels $p < 0.01$, $p < 0.05$ and $p < 0.1$, respectively.

The next step is to study the correlation between independent and dependent variables. According to Hair et al. (2014), the model having $R^2$ as 0.67, 0.33, and 0.19 are considered as substantial, moderate, and weak respectively. The relationship between ICT usage and SME business performance contains 0.74 (substantial), and the relationship between ICT usage and bounded rationality of SMEs contains 0.42 (moderate) correlations. The last two steps are to examine the effect size and the predictive relevance of the bounded rationality as well as ICT usage on all dimensions according to Cohen (1988) and Chin (1998). Tables 7 and 8 show the result which demonstrate the large explanatory power depicted by the variables.
Studies like Giotopoulos et al. (2017), Laudon and Laudon (2013), Pham (2010), and Kien et al. (2013) have identified that the ICT infrastructure, applications, human resources, policy, and mobile technology influence to generate an appropriate information flow among the business stakeholders resulting in, proper communication among them. Nevertheless, researchers have not paid much attention to its effect on bounded rationality, the exploration of which is a contribution of this study. The conceptualisation of this study predicted a negative relationship between ICT usages in terms of the dimensions mentioned above and bounded rationality as proposed in hypotheses $H_1$, $H_3$, $H_5$, $H_7$, and $H_9$. The hypotheses testing in the PLS-SEM shown in Table 6 revealed that only ICT infrastructure ($H_1$) and ICT mobile technology ($H_9$) can be accepted and both variables have a negative effect, ($\beta = -0.290$ and $t$-value = 2.178) and ($\beta = -0.39.4$ and $t$-value = 2.659) respectively, on bounded rationality.
rationality of SMEs. Although the other three dimensions negatively influence bounded rationality, the effect is inconsiderable and the relevant hypotheses cannot be accepted.

This result is understandable because most SMEs use ICT infrastructure such as fixed-line telephone, broadband internet link, computers, and related peripherals. Also, the use of mobile phones is very high, and almost all SMEs use at least a mobile phone for their business activities. Because mobile technology is easier to implement and use of its facilities to access the Internet to gain knowledge for problem-solving, doing research and experiments, innovations, etc. is easier than using computers. Liang et al. (2007) stated that if a firm is practicing these things, it can access and obtain critically essential and timely information for its business functions. According to Priyanath and Premaratne (2017c), the interpersonal trust positively impacts the rational ability of the small industries of Sri Lanka. Bounded rationality could arise from low rational ability and hence interpersonal trust negatively affects bounded rationality. Mobile technology and various applications easily enhance interpersonal trust. Because it provides timely, highly available information to the business partners than ever. Therefore, the study provides some evidence related to their ideas.

Several studies, such as Cordella (2006), Esselaar et al. (2007), and Giotopoulos et al. (2017) have identified that ICT, even partial ICT capabilities, contributes to enhancing business performance since it enables networking among businesses, automation of business functions resulting in higher productivity, smoothening of information flow, as well as better decision making. This study builds on the ideas of the above research and expands their findings to a broader context. According to Table 6, all the dimensions of ICT exhibit a positive impact on the business performance of SMEs in Sri Lanka. The findings revealed that infrastructure ($\beta = 0.195$ and $t$-value = 1.985) as well as applications ($\beta = 0.103$ and $t$-value = 1.695) and policies ($\beta = 0.197$ and $t$-value = 1.882) have a positive impact on business performance. ICT human resource has significant positive effect ($\beta = 0.163$ and $t$-value = 1.829) and finally, the largest positive effect provides the mobile technology ($\beta = 0.328$ and $t$-value = 3.080). Therefore, hypotheses $H_2$, $H_4$, $H_6$, $H_8$, and $H_{10}$ can be accepted. These findings are similar to the findings of Laudon and Laudon (2013), which demonstrated that ICT enhances business performance in large firms. Similarly, this study has empirically demonstrated that the same is true in the SME context. Furthermore, Priyanath and Buthsala (2017) explored a similar situation and revealed the ability to access information significantly affects ($\beta=0.414$ and $t$-value=2.5805) to enhance the business performance of small businesses of Sri Lanka and
that, ICT could also totally facilitate the access information. The above findings of this study provide additional support for these ideas.

Hypothesis $H_{11}$ was established to explore the negative effect of bounded rationality on the business performance of SMEs in Sri Lanka. Bounded rationality is measured in terms of incapability to access and assess the required business information, and make proper decisions on such information. The study discovered that bounded rationality has negatively influenced ($\beta = -0.152$ and $t$-value = 1.795) SME business performance. Although SMEs maybe equipped with ICT facilities, they still have some barriers in obtaining an using necessary information. Therefore, they face opportunistic behaviour and high cost to avoid opportunism, reducing their business performance.

**Conclusions and Implications**

The study proposed 11 hypothetical relationships. Of these, five hypotheses proposed that the dimensions of ICT usage, namely, infrastructure, applications, policy, human resources, and mobile technology have a positive impact on business performance and all the hypotheses were accepted. Then, although the study predicted the above dimensions of ICT usage would negatively impact bounded rationality, only two hypothetical relationships were accepted and three other relationships were rejected. Finally, the predicted negative relationship between bounded rationality and SME business performance was accepted. Therefore, 8 relationships out of 11 (72.7%) were accepted.

Findings of the research show that each dimension of ICT has a positive relationship to the business performance of SMEs in Sri Lanka while some ICT dimensions have a negative impact on the bounded rationality of SMEs. Simultaneously, the study found that bounded rationality negatively impacts the business performance of SMEs in Sri Lanka. Although the research examined all the applicable aspects of ICT in the context of SMEs, according to Pham (2010) and Kien et al. (2013), some dimensions do not make an appreciable contribution to reduce the bounded rationality of SMEs. This study indicates that a substantially higher influence is made by mobile technology on both bounded rationality and business performance of SMEs. It is possible that since SMEs, especially small businesses, mostly depend on less capital investment, they may not be investing more in the ICT infrastructure like computers and related computer network facilities. Instead, they could be using mobile technology as a better alternative, which provides them with the necessary facilities at a lower cost. It also has other additional benefits such as
mobility, availability, accuracy, etc. Such reliance on mobile technology maybe the reason for the identified strong impact of mobile technology on bounded rationality and business performance; because mobile technology may lead to enrich the information flow of the market information, such as information on the buyer, supplier, and input materials. As a result, bounded rationality may reduce leading to increased business performance. Further, if an SME uses this technology as the key ICT facilitator, it would not require complex rules, regulations and policies or much technological expertise for their business functions linked to ICT. This may be the reason for the insignificant impact of ICT policy, applications and HR on bounded rationality.

This research has made a contribution to knowledge by presenting a model consisting of theoretical bases of ICT, bounded rationality, and business performance to understand the how ICT usage affects bounded rationality and the business performance of SMEs. Past researchers have not empirically examined the dynamics between ICT and bounded rationality in relation to the business performance of SMEs. Therefore, the study offers a valuable comprehension of the practical applicability of these concepts in the SME environment, particularly in the Sri Lankan context.

As previously noted, the study has identified that instead of sophisticated computer-related infrastructure and applications, mobile technology-related infrastructure and applications are more applicable for enhancing the business performance of SMEs in Sri Lanka. Therefore, the study implies that policymakers should take measures to develop, and promote the existing mobile technology-related infrastructure and applications. The adoption of ICT through mobile technology is more practical and effective since it is cheaper and easily understood by SME owners with different levels of education and experience. Further, in order to help increase the rationality of SMEs, government agencies and private sector institutes are recommended to establish common information centres through which SMEs can easily access updated online information about the market, suppliers, buyers, and other relevant parties.

This research operationalized the independent variable, ICT, as five dimensions and configured each dimension separately for testing the relationships. It has not been empirically tested previously in the domain of the SME sector. Using this as the point of departure, researchers can further enhance the used indicators contextually, according to the ICT development and adoption level of a country. This research uses
a small sample (400) and future researchers can use larger samples to minimize the generalization issues. This research was conducted in the Asian region and researchers are encouraged to conduct similar studies in different regions with different educational, social, and cultural environments since ICT usage as well as bounded rationality can vary widely due to such contextual differences.

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The authors declared no potential conflicts of interest with respect to the research, authorship, and publication of this article.

**References**

Abeyratne, S. (2005). *Small and medium enterprises in Sri Lanka: Integrating the SME sector with the market* [Paper presentation]. Regional Convention on Policy Reforms for SME Development in SAARC Countries, Colombo.

Abor, J., & Quartey, A. (2010). Issues in SME development in Ghana and South Africa. *International Research Journal of Finance and Economics, 39*, 218–228.

American Library Association (1989). *Presidential committee on information literacy: Final report*.

Tarute, A., & Gatautis, R. (2014). ICT impact on SMEs performance. *Contemporary Issues in Business, Management and Education, 110*, 1218–1225. [https://doi.org/10.1016/j.sbspro.2013.12.968](https://doi.org/10.1016/j.sbspro.2013.12.968)

Athapaththu, J. C., & Nishantha, B. (2018). Information and communication technology adoption in SMEs in Sri Lanka: Current level of ICT usage and perceived barriers. *International Journal of E-Entrepreneurship and Innovation (IJEEI), 8*(1), 1–15. [https://doi.org/10.4018/IJEEI.2018010101](https://doi.org/10.4018/IJEEI.2018010101)

Bayo-Moriones, A., Billón, M., & Lera-López, F. (2013). Perceived performance effects of ICT in manufacturing SMEs. *Industrial Management & Data Systems, 1*(1), 117–135. [https://doi.org/10.1108/02635571311289700](https://doi.org/10.1108/02635571311289700)

Birch, D. (1989). Change, innovation, and job generation. *Journal of Labor Research, 10*(1), 33–38. [https://doi.org/10.1007/BF02685510](https://doi.org/10.1007/BF02685510)

Bititci, U. S., Turner, T., & Bourne, M. (2001). Performance measurement: The comparison between a process and a model approach. *International Journal of Business Performance Management, 3*(2/3/4), 135–153. [https://doi.org/10.1504/IJBPM.2001.000095](https://doi.org/10.1504/IJBPM.2001.000095)

Bourne, M., Franco, M., & Wilkes, J. (2003). Corporate performance management. *Measuring Business Excellence, 7*(3), 15–21. [https://doi.org/10.1108/13683040310496462](https://doi.org/10.1108/13683040310496462)
Brynjolfsson, E., & Hitt, L. (2000). Beyond computation: Information technology, organizational transformation and business performance. *Journal of Economic Perspectives, 14*(4), 23–48. https://doi.org/10.1257/jep.14.4.23

Carmel, E., & Nicholson, B. (2005). Small firms and offshore software outsourcing: High transaction costs and their mitigation. *Journal of Global Information Management, 13*(3), 33–54. https://www.igi-global.com/article/small-firms-offshore-software-outsourcing/3627

Cavalluzzo, K. S., & Ittner, C. D. (2004). Implementing performance measurement innovations: Evidence from the government. *Accounting, Organizations and Society, 29*(3-4), 243-267. https://doi.org/10.1016/S0361-3682(03)00013-8

Central Bank of Sri Lanka. (1998). *Cottage and small-scale industry, the economic progress of independent Sri Lanka.*

Chalmeta, R., Palomero, S., & Matilla, M. (2012). Methodology to develop a performance measurement system in small and medium-sized enterprises. *International Journal of Computer Integrated Manufacturing, 28*(8), 716–740. https://doi.org/10.1080/0951192X.2012.665178

Chin, W. W. (1998). The Partial Least Squares Approach to Structural Equation Modeling. In G. A. Marcoulides (Ed.), *Methodology for business and management. Modern methods for business research* (pp. 295–336). Lawrence Erlbaum Associates Publishers.

Chinomona, R. (2013). The fostering role of information technology on SMEs’ strategic purchasing, logistics integration and business performance. *Southern African Business Review, 17*(1), 76–97.

Coase, R. H. (1937). The nature of the firm, *Economica, 4*(16), 386–405. https://doi.org/10.1111/j.1468-0335.1937.tb00002.x

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences* (2nd ed.). Lawrence Erlbaum Associates.

Cordella, A. (2006). Transaction costs and information systems: Does IT add up? *Journal of Information Technology, 21*(3), 195–202. https://doi.org/10.1057/palgrave.jit.2000066

Cuevas-Vargas, H., Estrada, S., & Larios-Gómez, E. (2016). The effects of ICTs as innovation facilitators for greater business performance. Evidence from Mexico., *Procedia Computer Science, 91*, 47–56. https://doi.org/10.1016/j.procs.2016.07.040

Damayanthi, D. G. S., & Rajapakshe, B. (2008). *The financial information gap: The financial intermediaries and the small and medium enterprises in Sri Lanka* [Paper presentation]. International Research Conference on Management and Finance, University of Colombo.
Department of Census and Statistics (2009). *Census of industry 2003/2004.*

Dyer, J. H., & Chu, W. (2003). The role of trustworthiness in reducing transaction costs and improving business performance: Empirical evidence from the United States, Japan, and Korea. *Organization Science, 14*(1), 57–68.  
https://doi.org/10.1287/orsc.14.1.57.12806

Erstad, O. (2006). A new direction? Digital literacy, student participation and curriculum reform in Norway. *Education and Information Technologies, 11*, 415–429.  
https://doi.org/10.1007/s10639-006-9008-2

Esselaar, S., Stork, C., Ndiwalana, A., & Deen-Swarray, M. (2007). ICT usage and its impact on the profitability of SMEs in 13 African countries. *Information Technologies and International Development, 4*(1), 87–100.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39–50.  
https://doi.org/10.1177/002224378101800104

Garengo, P., Biazzo, S., & Bititci, U. S. (2005). Business performance measurement systems in SMEs: A review for a research agenda. *International Journal of Management Reviews, 7*(1), 25–47.  
https://doi.org/10.1111/j.1468-2370.2005.00105.x

Gbandi, E.C., & Amissah, G. (2014). Financing options for small and medium enterprises (SMEs) in Nigeria. *European Science Journal, 10*(1), 114–123.

Giotopoulos, L., Kontolaimou, A., Korra, E., & Tsakanikas, A. (2017). What drives ICT adoption by SMEs? Evidence from a large-scale survey in Greece. *Journal of Business Research, 81*, 60–69.  
https://doi.org/10.1016/j.jbusres.2017.08.007

Gigerenzer, G., & Goldstein, D. G. (1996). Reasoning the fast and frugal way: Models of bounded rationality. *Psychological Review, 103*(4), 650–669.  
https://doi.org/10.1037/0033-295X.103.4.650

Glister, P. (1997). *Digital literacy.* Wiley.

Haber, S., & Reichel, A. (2005). Identifying performance measures of small ventures: The case of the tourism industry. *Journal of Small Business Management, 43*(3), 257–287.  
https://doi.org/10.1111/j.1540-627X.2005.00137.x

Hair, J. F., Sarstedt, M., Ringle, C. M., & Mena, J. A. (2012). An assessment of the use of partial least squares structural equation modeling in marketing research. *Journal of the Academy of Marketing Science, 40*, 414–433.  
https://doi.org/10.1007/s11747-011-0261-6

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2014). *A primer on Partial Least Squares Structural Equation Modeling (PLS-SEM).* SAGE Publications.
Henderson, J., & Weiler, S. (2010). Entrepreneurs and job growth: Probing the boundaries of time and space. *Economic Development Quarterly, 24*(1), 23–32. [https://doi.org/10.1177/0891242409350917](https://doi.org/10.1177/0891242409350917)

Hobbs, J. E. (1997). Measuring the importance of transaction costs in cattle marketing. *American Journal of Agricultural Economics, 79*(4), 1083–1095.

International ICT Literacy Panel (2002). *Digital transformation a framework for ICT literacy.* https://www.ets.org/Media/Research/pdf/ICTREPORT.pdf

Ilgen, D. R., & Favero, J. L. (1985). Limits in generalization from psychological research to performance appraisal processes. *The Academy of Management Review, 10*(2), 311–321. [https://doi.org/10.2307/257972](https://doi.org/10.2307/257972)

James, A. O’B., Marakas, G. M. (2006). *Management information systems.* McGraw-Hill.

James G., Robert L., Joshua H., & Ryan M. (2020). *Economic Freedom of the World: 2020 Annual Report.* Fraser Institute.

Kapurubandara, M., & Lawson, R. (2007). SMEs in developing countries need support to address the challenges of adopting e-commerce technologies. *BLED 2007 Proceedings, 24.* University of Maribor.

Kayanula, D., & Quartey, P. (2000). *The policy environment for promoting small and medium-sized enterprises in Ghana and Malawi. Finance and Development Research Programme* (Working Paper No 15). IDPM, University of Manchester.

Khare, A., Saxsena A., & Teewari, P. (2012). Supply chain performance measures for gaining competitive advantage: A review. *Journal of Management and Strategy, 3*(2), 25–32. [https://doi.org/10.5430/jms.v3n2p25](https://doi.org/10.5430/jms.v3n2p25)

Kien, P. X., Son, L. N., & Giang, N. T. P. (2013). Measuring the ICT maturity of enterprises under uncertainty using group fuzzy ANP. *International Journal of Machine Learning and Computing, 3*(6), 524–528. http://www.ijmlc.org/index.php?m=content&c=index&a=show&catid=42&id=409

Kock, N., & Hadaya, P. (2018). Minimum sample size estimation in PLS-SEM: The inverse square root and gamma-exponential methods. *Information Systems Journal, 28*(1), 227–261. [https://doi.org/10.1111/isj.12131](https://doi.org/10.1111/isj.12131)

Kuruwitaarachchi, N., Ab Yajid M. S., Khatibi, A., & Azam S. M. F. (2018). Enhance the use of internet based advanced communication technologies in small and medium scale enterprises in Sri Lanka. *European Journal of Social Sciences Studies, 3*(2), 44–56. [http://doi.org/10.5281/zenodo.1316934](http://doi.org/10.5281/zenodo.1316934)

Kutlu, B., & Özturan, M. (2008). The usage and adoption of it among SMEs in Turkey, An exploratory and longitudinal study. *Journal of Information Technology Management, 19*(1), 12–24.
Lankshear, C., & Knobel, M. (2003). *New literacies: Changing knowledge and classroom learning*. Open University Press.

Laudon, K. C., & Laudon, J. P. (2013). *Management information systems: Managing the digital firm* (11th ed.). Prentice Hall.

Lebas, M. (1995). Performance measurement and performance management. *International Journal of Production Economics, 41*(1-3), 23–25. https://doi.org/10.1016/0925-5273(95)00081-X

Lennon, M., Kirsch, I., Von Davier, M., Wagner, M., & Yamamoto K. (2003). *Feasibility study for the PISA ICT literacy assessment. report to Network A*. Organization for Economic Co-operation and Development. http://www.oecd.org/education/school/programmeforinternationalstudentassessmentpisa/33699866.pdf

Liang, T. P., Huang, C. W., Yeh, Y. H., & Lin, B. (2007). Adoption of mobile technology in business: A fit-viability model. *Industrial Management & Data Systems, 107*(8), 1154–1169. https://doi.org/10.1108/02635570710822796

Lumpkin, G. T., & Dess, G. G. (1996). Clarifying the entrepreneurial orientation construct and linking it to performance. *Academy of Management Review, 21*(1), 135–172. https://doi.org/10.2307/258632

Markus, A., & Thomas, H. (2002, June 6-8). Online content syndication – A critical analysis from the perspective of transaction cost theory. *Proceedings of the 10th European Conference on Information Systems: Information Systems and the Future of the Digital Economy*. Association for Information Systems.

Mithas, S., Tafti, A. R., Bardhan, I., & Goh, J. M. (2012). Information technology and firm profitability: Mechanisms and empirical evidence. *MIS Quarterly, 36*(1), 205–240. https://doi.org/10.2307/41410414

Morgan, C. (2004). Structure, speed and salience: Performance measurement in the supply chain. *Business Process Management Journal, 10*(5), 522–536. https://doi.org/10.1108/14637150410559207

Murphy, G. B., Tailer, J. W., & Hill, R. C. (1996). Measuring performance in entrepreneurship research. *Journal of Business Research, 36*(1), 15–23. https://doi.org/10.1016/0148-2963(95)00159-X

Neely, A. (2004). *Business performance measurement: Theory and practice*. Cambridge University Press.

Nguyen, P., & Crase, L. (2011). Vietnam’s state-owned enterprise reform: An empirical assessment in the international multimodal transport sector from the Williamson’s TCE perspective. *Asia Pacific Journal of Marketing and Logistics, 23*(3), 411–422. https://doi.org/10.1108/13555851111143286
Nishantha, B. (2018, December). Small and Medium Enterprise Sector (SMEs) in Sri Lanka: Significance, opportunities and challenges. *Certified Management Accountant*, 5(4), 29–36.

Nootboom, B. (1993). Firm size effect on transaction cost. *Small Business Economics*, 5, 283–295. https://doi.org/10.1007/BF01516249

Omiunu, O. G. (2019). E-literacy-adoption model and performance of women-owned SMEs in Southwestern Nigeria. *Journal of Global Enterprise Research*, 9, 26. https://doi.org/10.1186/s40497-019-0149-3

O’Regan, N., & Ghobadian, A. (2004). Leadership and strategy: Making it happen. *Journal of General Management*, 29(3), 76–92. https://doi.org/10.1177/030630700402900305

Organization for Economic Co-operation and Development. (2017). *Small, medium, strong trends in SME business performance and business condition*.

Pham, Q. T. (2010). Measuring the ICT maturity of SMEs. *Journal of Knowledge Management Practice*, 11(1), 34–56.

Perren, L. (2000). Factors in the growth of micro-enterprises (Part 2): Exploring the implications. *Journal of Small Business and Enterprise Development*, 7(1), 58–68. https://doi.org/10.1108/EUM0000000006805

Petković, S., Jäger, C., & Sašić, B. (2016). Challenges of small and medium-sized companies at the early stage of development: Insights from Bosnia and Herzegovina. *Management: Journal of Contemporary Management Issues*, 21(2), 45–76. https://hrcak.srce.hr/171234

Prasad, S., Tata, J., & Guo, X. (2012). Sustaining small businesses in the United States in times of recession: Role of supply networks and social capital. *Journal of Advances in Management Research*, 9(1), 8–28. https://doi.org/10.1108/09727981211225626

Premaratne, S. P. (2002). *Entrepreneurial networks and small business development: The case of Sri Lanka* (Doctoral Dissertation). Eindhoven University of Technology, Eindhoven, The Netherlands.

Pretheeba, P. (2014). Creating a conducive environment for SMEs in Sri Lanka. *Wayamba Journal of Management*, 3(2), 44–59. http://doi.org/10.4038/wjm.v3i2.7443

Priyanath, H. M. S., & Buthsala, W. K. A. (2017). Information, opportunism and business performance: A case of small businesses managed by women entrepreneurs in Sri Lanka. *Asian Journal of Multidisciplinary Studies*, 5(11), 230–239. http://ajms.co.in/index.php/ajms/article/view/2838/pdf_680

Priyanath, H. M. S., & Premaratne, S. P. (2014). Government SME development programs in Sri Lanka: A review in the lens of transaction cost economics.
Picryanath, H. M. S., & Premaratne, S. P. (2017a). Power of social capital on mitigating transaction cost of small enterprises in Sri Lanka: An empirical investigation. *International Journal of Arts and Commerce, 6*(4), 17–35. http://www.sciencepublishinggroup.com/journal/paperinfo?journalid=297&doi=10.11648/j.jbed.20180301.11

Picryanath, H. M. S., & Premaratne, S. P. (2017b). Effect of information access through social capital on mitigating business opportunism of small enterprises in Sri Lanka. *Colombo Business Journal, 8*(2), 42–67. https://mgmt.cmb.ac.lk/cbj/index.php/effect-of-information-access-through-social-capital-on-mitigating-business-opportunism-of-small-enterprises-in-sri-lanka/

Picryanath, H. M. S., & Premaratne, S. P. (2017c). The effect of inter-personal trust on transaction costs of owner-managed small enterprises in Sri Lanka. *Sri Lanka Journal of Economic Research, 5*(1), 1–29. http://doi.org/10.4038/sljer.v5i1.55

Picryanath, H. M. S. (2017). Effect of network structure on transaction cost of small enterprises in Sri Lanka: An empirical study. *Journal of Small Business and Entrepreneurship Development, 5*(1), 19–34. http://jsbednet.com/vol-5-no-1-june-2017-abstract-3-jsbed

Rahayu, R., & Day, J. (2015). Determinant factors of e-commerce adoption by SMEs in developing country: Evidence from Indonesia. *Procedia - Social and Behavioral Sciences, 195*, 142–150. https://doi.org/10.1016/j.sbspro.2015.06.423

Ranatunga, R. V. S. P. K., Priyanath, H. M. S., & Megama, R. G. N. (2020a). Methods and rule-of-thumbs in the determination of minimum sample size when applying structural equation modelling: A review. *Journal of Social Science Research, 15*(2020), 102–109. https://doi.org/10.24297/jssr.v15i1.8670

Ranatunga, R. V. S. P. K., Priyanath, H. M. S., & Megama, R. G. N. (2020b). Digital literacy, business uncertainty & economic performance: An empirical study of small businesses in Sri Lanka. *International Journal of Academic Research in Business and Social Sciences, 10*(5), 50–76. http://dx.doi.org/10.6007/IJARBSS/v10-i5/7171

Richard, P. J., Devinney, T. M., Yip G. S., & Johnson, G. (2009). Measuring organizational performance: Towards methodological best practice. *Journal of Management, 35*(3), 703–718. https://doi.org/10.1177/0149206308330560

Robbins, S. P., & Coulter, M. (2013). *Management* (13th ed.). Pearson.

Robson, C. (2002). *Real world research* (3rd ed.). Blackwell.
Ranatunga, Priyanath & Megama

Santos, J. B., & Brito, L. A. L. (2012). Toward a subjective measurement model for firm performance. *BAR - Brazilian Administration Review, 9*, 95–117. [https://doi.org/10.1590/S1807-76922012000500007](https://doi.org/10.1590/S1807-76922012000500007)

Simon H.A. (1990). Bounded rationality. In J. Eatwell, M. Milgate & P. Newman (Eds.) *Utility and probability* (pp. 15-18). Palgrave Macmillan. [https://doi.org/10.1007/978-1-349-20568-4_5](https://doi.org/10.1007/978-1-349-20568-4_5)

Simon, H. A. (Ed.). (1997). *Administrative behavior* (4th ed.). Free Press.

Simpson, M., Taylor, N., & Barker, K., (2004). Environmental responsibility in SMEs: Does it deliver a competitive advantage? *Business Strategy and the Environment, 13*(3), 156–171. [https://doi.org/10.1020/j.bse.398](https://doi.org/10.1020/j.bse.398)

Singh, R. K., Garg, S. K., & Deshmukh, S. G. (2010). The competitiveness of SMEs in a globalized economy; Observations from China and India. *Management Research Review, 33*(1), 54–65. [https://doi.org/10.1108/01409171011011562](https://doi.org/10.1108/01409171011011562)

Storey, D. J. (1994). *Understanding the small business sector*. Routledge.

Tan, K. S., & Eze, U. C. (2008). An empirical study of internet-based ICT adoption among Malaysian SMEs. *Communications of the IBIMA I*(1), 1–12.

Tarute, A., & Gatautis, R. (2014). ICT impact on SMEs performance. *Contemporary Issues in Business, Management and Education, 110*, 1218–1225. [https://doi.org/10.1016/j.sbspro.2013.12.968](https://doi.org/10.1016/j.sbspro.2013.12.968)

Task force for small & medium enterprise sector development program (2002). *National strategy for SME development*.

Taticchi, P., Tonelli, F., & Cagnazzo, L. (2010). Performance measurement and management: A literature review and a research agenda. *Measuring Business Excellence, 14*(1), 4–18. [https://doi.org/10.1108/13683041011027418](https://doi.org/10.1108/13683041011027418)

Vaikunthavasan, S., Velnampy, T., & Rajumesh, S. (2019). Exploring the problems and challenges of micro, small and medium enterprises in Northern Province. *Business and Management Horizons, 7*(1), 89–104. [https://doi.org/10.5296/bmh.v7i1.14314](https://doi.org/10.5296/bmh.v7i1.14314)

Vijayakumar, S. (2013). The status of small and medium enterprises and promotions for their growth in Sri Lanka. *International Journal on Global Business Management and Research, 1*(2), 46–56.

Walker, E. A., & Brown, A. (2004). What success factors are important to small business owners? *International Small Business Journal, 22*(6), 577–594. [https://doi.org/10.1177/0266242604047411](https://doi.org/10.1177/0266242604047411)

Wang, N. (2003). *Measuring transaction costs: An incomplete survey* (Working Paper No. 02). The Ronald Coase Institute.

Waśniewski, P. (2017). A performance measurement system for small enterprises – A case study. *Zeszyty Teoretyczne Rachunkowości, 93*(149), 211–233. [https://doi.org/10.5604/01.3001.0010.3197](https://doi.org/10.5604/01.3001.0010.3197)
Wholey, J. S. (1996). Formative and summative evaluation: Related issues in performance measurement. *Evaluation Practice, 17*(2), 145–149. https://doi.org/10.1177/109821409601700206

Wickremasinghe, S. I. (2011). *The status of SMEs in Sri Lanka and promotion of their innovation output*. TECH Monitor, Policy Research Division, National Science Foundation.

Wijetunge, W. A. D. S., & Pushpakumari, M. D. (2014). The relationship between strategic planning and business performance: An empirical study of manufacturing SMEs in Western Province in Sri Lanka. *Kelaniya Journal of Management, 3*(1), 23–41. http://doi.org/10.4038/kjm.v3i1.7476

Williamson, O. E. (1981). The economics of organization: Transaction costs approach. *American Journal of Sociology, 87*(3), 548–577. https://www.jstor.org/stable/2778934?seq=1

Williamson, O. E. (1985). *The economic institutions of capitalism*. Free Press.

World Bank (2019). *Doing business 2019: Training for reform*. https://doi.org/10.1596/978-1-4648-1326-9

World Bank (2011). *Small and medium enterprises: Engines of growth in post conflict Sri Lanka*. https://www.worldbank.org/en/news/feature/2010/09/30/small-medium-enterprises-engines-growth-post-conflict-sri-lanka

Zhang, A. (2009). Corruption as a determinant of the transaction governance structure. *Strategic Outsourcing: An International Journal, 2*(1), 27–36. https://doi.org/10.1108/17538290910935873