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

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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 from31.1% 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.

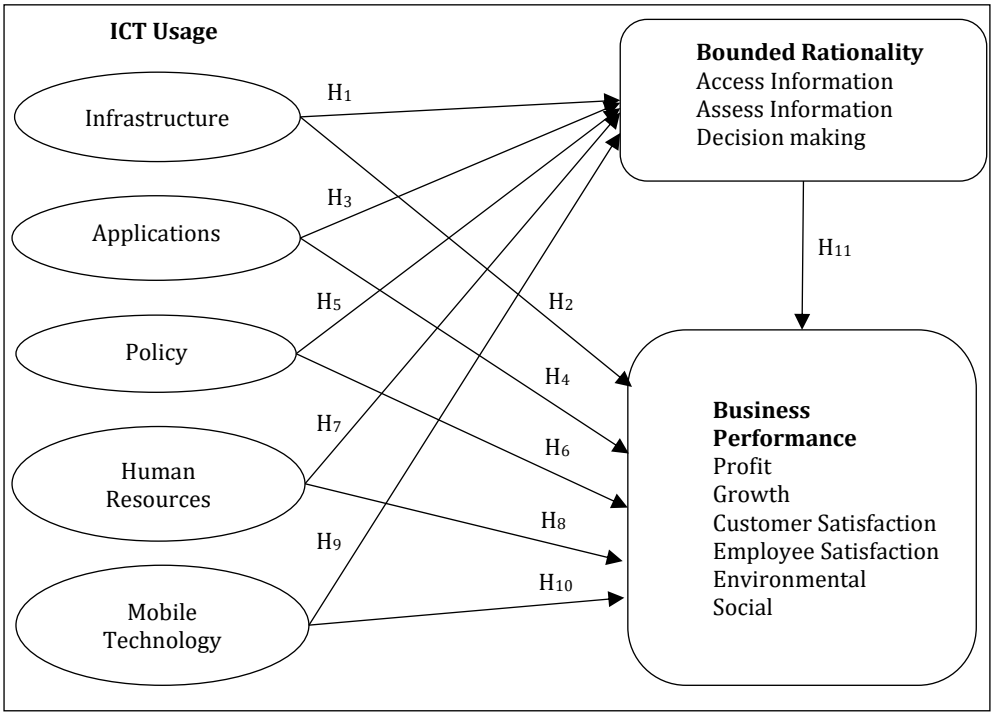
Many researchers announced various related factors for the poor performance of SMEs in Sri Lanka. One aspect is the lack of access to adequate and timely financing financial intermediaries (Task force for small & medium enterprise sector development program, 2002; World Bank, 2011; Damayanthi & Rajapakse, 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



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; Omiunu, 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:

H_1: Usage of ICT infrastructure negatively relates to the bounded rationality of SMEs.

H_3: Usage of ICT applications negatively relates to the bounded rationality of SMEs.

H_5: Usage of ICT policy negatively relates to the bounded rationality of SMEs.

H_7: Usage of ICT human resources negatively relates to the bounded rationality of SMEs.

H_9: 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: Usage of ICT infrastructure positively relates to the business performance of SMEs.

H_4: Usage of ICT applications positively relates to the business performance of SMEs.

H_6: Usage of ICT policy in the organization positively relates to the business performance of SMEs.

H_8: Usage of ICT skilled human resource skills positively relates to the business performance of SMEs.

H_{10}: 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}: 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	*α*
Business Performance Customer Satisfaction			0.971	0.828	0.965
Customer feedback on our production	0.937	57.091			
Changes of production according to the customer feedback	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			0.864	0.560	0.808
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			0.915	0.682	0.884
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			0.970	0.869	0.962
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			0.986	0.681	0.984
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			0.942	0.700	0.928
Profit	0.805	17.389			
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	0.981	0.990
Access to the information	0.931	392.167			
Assess the information	0.964	541.726			
Make decisions on information	0.963	421.832			
ICT Usage Infrastructure			0.905	0.659	0.869
Use the fixed-line telephone for business purposes.	0.749	13.504			
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	0.898
Handle business activities using standard applications such as MS office with the computers	0.743	17.700			
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 massaging 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	27.536			
Generally, employees do video conferencing through mobile phones during their activities	0.848	29.956			
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.
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	2.749	3.285		
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
a. Dependent Variable: BP									

Note: n=400

Using the PLS bootstrap process, the study assessed the significance of the path coefficients using β 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 → BR	-0.290**	2.178	Accepted
H_2	ICT_Inf → BP	0.195**	1.985	Accepted
H_3	ICT_App → BR	-0.056	0.303	Not Accepted
H_4	ICT_App → BP	0.103*	1.695	Accepted
H_5	ICT_Pol → BR	-0.087	0.520	Not Accepted
H_6	ICT_Pol → BP	0.197*	1.882	Accepted
H_7	ICT_HR → BR	-0.093	0.583	Not Accepted
H_8	ICT_HR → BP	0.163*	1.829	Accepted
H_9	ICT_MT → BR	-0.394***	2.659	Accepted
H_{10}	ICT_MT → BP	0.328***	3.080	Accepted
H_{11}	BR → 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.

Table 7: Assessment of Effect Sizes – f^2

Independent Construct	R^2 Included	R^2 Excluded	A = [(R^2 Included) - (R^2 Excluded)]	B = 1 - (R^2 Included)	(f^2) (A/B)	Effect Size
BIQ						
BR	0.74	0.724	0.016	0.26	0.062	Small
ICT_APP	0.74	0.731	0.009	0.26	0.035	Small
ICT_HR	0.74	0.732	0.008	0.26	0.031	Small
ICT_MT	0.74	0.692	0.048	0.26	0.185	Medium
ICT_POL	0.74	0.731	0.009	0.26	0.035	Small
ICT_INF	0.74	0.715	0.025	0.26	0.096	Small

(n=400)

Table 8: Assessment of Predictive Relevance

Variable	Q^2	Effect Size
BR	0.406	Large
ICT_APP	0.492	Large
ICT_HR	0.369	Large
ICT_MT	0.639	Large
ICT_POL	0.862	Large
ICT_INF	0.498	Large

(n=400)

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, (β = -0.290 and *t*-value = 2.178) and (β = -0.39.4 and *t*-value = 2.659) respectively, on bounded

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 (β = 0.195 and t-value = 1.985) as well as applications (β = 0.103 and t-value = 1.695) and policies (β = 0.197 and *t*-value = 1.882) have a positive impact on business performance. ICT human resource has significant positive effect (β = 0.163 and *t*-value = 1.829) and finally, the largest positive effect provides the mobile technology (β = 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 (β=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 (β = -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.

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