Impact of ICT-Usage on SMEs' Innovations in Western Province of Sri Lanka

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Abstract

Small and Medium Size Enterprises (SMEs) are major sources of employment and value creation, as it plays a key role in Sri Lankan livelihood. It is evident that the SME sector in Sri Lanka does not provide the expected results and this sector lacks innovation. Thus, it is important to identify opportunities to improve the SME's innovative capacity and business performance. This study was designed to investigate the impact of Information and Communication Technology (ICT) on innovations of SMEs in the Western Province of Sri Lanka, and to identify the existing level of ICT usage among the SMEs in the Western Province of Sri Lanka. This study used a quantitative research method. The population of the study was SMEs with less than 500 employees in the Western Province. The sample frame was derived from the two main listings of organizations: the Ceylon Chamber of Commerce and the Ministry of Industries and Industrial Development Board. Accordingly, 285 respondents were selected by using the simple random sampling method. Data were analyzed using the SPSS statistical tool with descriptive and inferential statistics. This study identified four main types of innovations namely; product, process, market, and organizational, and found that there is a significant effect of ICT usage on SMEs innovations. Future research could be undertaken to examine the mediating effect of ICT-based innovations and ICT usage on business performance.

Keywords: Entrepreneur, Innovation, Small and Medium Size Enterprises, Information and Communication Technology

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1. Introduction

Small and Medium Scale Enterprises (SMEs) are a key source to generate more employment not only for skilled labor but also for non-skilled labor. Productivity and labor quality could be greater in medium and large-scale industries (Amaratunge, 2003). The sector plays a major role in the creation of employment for rural workers, mobilizing domestic savings, poverty reduction, income distribution and regional development, training of workers, and creating an economic environment in which large industries flourish and contribute to export earnings. Hence, successive governments in Sri Lanka have taken various measures to develop the sector (Gamage, 2000). However, currently, this sector does not provide the expected results compared to other developing countries (Vijayakumar, 2013). Historical trend of SME contribution towards the economy shows a decreasing trend in the year 1983, 98% of the small enterprises accounted for 48.6% of total employment and 31.1% of value added (Central Bank of Sri Lanka, 1998; Vijayakumar, 2013; Wickremasinghe, 2011). According to Pushpakumari and Wantanae (2006) in 1996, Small and Medium Scale Industries accounted for 85.4% of all businesses and 36.3% of employees were, employed by them. In 2008, 91.6% of small enterprises accounted for 29.6% of total employment and 20.3% of value added (Department of Census and Statistics, 2009; Vijayakumar, 2013; Wickremasinghe, 2011). But year 2017, 93.7% of SMEs accounted for 37.7% employment and for year 2018, 93.9 % SMEs accounted for 32.4 % employment (ADB Data Library, 2021) which showed an improvement, but the data indicate the decreasing performance of SMEs in Sri Lanka except 2017 and 2018.

Even with such an immense potential to contribute to the economy of the country, SMEs face significant survival challenges. Thus, researchers need to focus on the reasons behind this failure and possible solutions for the long-term survival of SMEs. It can be observed that the governments through various projects have tried to improve the existing businesses in the sectors like gem and jewelry, clothing, handicraft, etc. instead of pursuing more innovative opportunities for the entrepreneurs. Therefore, the government should focus on new entrepreneurial opportunities for the sector (Ministry of Enterprise Development and Investment Promotion, 2009). There is a lack of research to explain the root causes for lower performances of entrepreneurial performance in Sri Lanka.

Premaratne (2008) has also studied the effect of entrepreneurial networks on SME development but there is a lack of discussion on the impact of ICT usage on innovative performance. Gamage (1989) examines entrepreneurial characteristics and growth of small business ventures and Gamage et al. (2003) explained how Sri Lankan entrepreneurs use socio-cultural values to manage risk. Most of the researchers who conducted studies on entrepreneurship have not tried to find the causality between SMEs' ICT usage and ICT-based innovations. Thus, this paper tries

to examine the impact of ICT usage on SMEs' innovations to find solutions for entrepreneurs' success.
There are several productive practices in the global scenario related to the topic and this study examines the impact of ICT usage on SME innovations related to the Sri Lankan context.
This study provides with evidence that there is a lack of ICT usage in SMEs in Sri Lanka which has an impact on their innovation capability. Research conducted in other countries shows ICT as a salient facilitator for innovations aiding better business performance. Thus, this study tries to investigate the impact of ICT usage on SME innovations.

The specific objectives of the study are:

1. To identify the existing level of ICT usage among SMEs in the Western Province of Sri Lanka.
2. To investigate the impact of ICT usage on SMEs innovations in the Western Province of Sri Lanka.

This study is highly significant for the government in finding the way forward to bring success to the SME sector. Furthermore, entrepreneurs in the SME sector and corporate entrepreneurs could also benefit by understanding the impact of ICT usage on increasing innovations and consequently, business performance.

2. Literature Review

This section provides a comprehensive literature review on ICT usage, innovation, and SMEs to understand the extent to which theoretical insights in the domain explain the phenomenon. Secondly, the background of the research, definitions of core constructs and concepts, and the conceptual framework based on the theories and empirical findings of previous studies will be presented.

2.1. ICT Usage

Usage of ICT is defined by Blurton (2002) as the "diverse set of technological tools and resources used to communicate and to create, disseminate, store, and manage information". ICT is a key concept in obtaining and facilitating the creation of explicit knowledge using the collection, storage, aggregation, and transmission of quantitative data (Phang & Foong, 2010).
ICT is an important facilitator of innovation which enables companies to substantially improve all administrative activity, providing significant efficiency improvements, helping companies to keep up with the trends of customers, to monitor the actions of competitors and thereby obtain feedback from users quickly, helping them seize

opportunities for all different types of innovation (Hector et al., 2016). Manal et al. (2017) recognize myriad innovation potentials that have been made possible by ICT. In the era of globalization and digitization, innovations are galvanized by the advancements in information and communication technologies (ICT) that are taking place at a rapid pace (Pilat & Wolfl, 2004). Today's business environment has become dynamic and in such a business environment ICT has been a driver of innovation-based activities for better efficiency and higher performance (Igun, 2014). ICT maintains competitiveness and improves profitability. ICT-based innovations under the Dynamic Capability View (Teece et al., 1997) emphasize resource development and renewal (Manal et al., 2017). According to Wade and Hulland (2004), Information Systems (IS) resources may take on many of the attributes of dynamic capabilities, and thus may be particularly useful to firms operating in rapidly changing environments.

The ICT resources and the ICT-based innovations should be well examined for present and future opportunities for higher competitiveness levels. Thus, innovation is the catalyst that will transform ICT resources, organizational processes, and tacit and explicit knowledge into new and upgraded resources, capabilities, and initiatives (Agarwal & Brem, 2015).

Technology is considered one of the main factors fostering entrepreneurship as technological innovations, such as social media, mobile commerce, cloud computing, and others have presented a vast array of opportunities for entrepreneurial organizations to take and develop (OECD, 2003). ICT may help a firm to introduce new products and services, be more customer-oriented, respond better to market changes, and thus innovate (Koellinger, 2008; Tran et al., 2014). Thus, with the dynamic capabilities of the firm, ICT enhances efficiency and innovation (Melville et al., 2004). The dynamic capability view (Teece et al., 1997) with the theory of innovation explains the best way to utilize ICT systems and resources to provide better performance (Latour, 1996). Ndubisi and Kahraman (2005) categorized varieties of ICT systems used in organizations; according to the job tasks where applied systems were divided into three categories; those for administrative purposes (i.e. producing reports, letters, and memos, data storage/retrieval, communication with others); those for planning purposes (e.g. analyzing trends, planning/forecasting, analyzing problems/alternatives, and making decisions) and control purposes (e.g., budgeting and controlling and guiding activities).

Bigliardi et al. (2010) categorized ICT according to the knowledge creation process. As per the authors, this creation process is detailed in the subsequent paragraph. Creation refers to computer-aided design, virtual reality, investment workstations, etc. including the applications supporting the creation of artificial realities, simulation, or modelling. Searching and acquisition refer to browsers, data warehouses, database index systems, etc., and supporting information searches related to a specific subject of business. 'Protection' refers to a virtual protection

network, firewall, etc. to secure generated information; 'use' refers to e-meetings, group decision support systems, collaboration suites, e-mail message broadcast software, etc. used for making use of developed and stored information. 'Sharing' refers to groupware, computer-supported cooperative work, intranet, portals, etc. to share required information with clients, suppliers, and distributors. 'Distribution' includes word processing, imaging and web publishing, electronic calendars, personal information management, etc. for managing and scheduling the work. 'Capture and codification' refer to expert systems, neural nets, fuzzy logic, genetic algorithms, intelligent agents, etc. supporting the decision-making and the analysis of information for unseen patterns and opportunities.

Carbonara (2005) establishes a classification of ICTs in the function of (a) coordination technologies (e.g. LAN, WAN, database, shared elaboration systems, data modeling support systems, a group working support systems, groupware, internet) which support communication and coordination, (b) process technologies (e.g. CNC, FMS, CAM) which help different business functions and knowledge management technologies (e.g. software agents, groupware, internet) which support to manage information and knowledge.

Papastathopoulos and Beneki (2010) identify (a) enterprise systems (e.g. enterprise resource planning, customer relationship management, supply chain management), (b) information systems (e.g. management information systems, decision support systems, executive support systems), (c) digital technologies (e.g. e-commerce, e-business, e-management), (d) telecommunication systems (e.g. Internet, e-mail, local area networks), (e) identification and data capture technologies and telematics technologies (e.g. portable data collection, handheld readers, magnetic and smart card readers).

Garcia-Alvarez and Teresa (2015) developed a better classification for ICT based on its usage for organizations' internal activities and external activities. Internal uses of technologies are listed as; to search for information (specialized database, internet access, etc.); to aid communication (email, video conferencing, chat, discussion forums, etc.); to filter and to personalize information in these types of technologies, information channels are classified. There are proactive tools based on a set of thematic contents which are selected and made available to network users by an information supplier. Users access information by means of email, their system desktops, intranet, or a corporate portal to develop integrated tools applicable specifically to KM (Knowledge Management) (document management systems, storage supports) to analyze data (data mining and text mining). They allow to exploit and analyze the data stored within the organization by means of searching for behavior patterns that cannot be observed directly and simulation tools virtually reproduce a particular process according to the previous planning; to develop information systems such as knowledge maps (directories that facilitate the location of knowledge within the organization) and to establish learning support (e-learning is

a set of methods, technologies, applications and services which are oriented towards facilitating the learning that takes place through web technologies, on-line tutors, etc.) (Garcia-Alvarez & Teresa, 2015).

According to GarcIa-Alvarez and Teresa (2015) ICT technologies for external activities included Customer Relationship Management (CRM). As per the authors, fundamental in the present competitive environment, this tool aims to promote the establishment of relationships with customers and permits the creation of databases with relevant information that can facilitate customer retention and loyalty by establishing customized actions for communicating with them according to their preferences. E-commerce is based on a technology that allows companies to perform economic transactions (sales and purchases) with their stakeholders (including customers, suppliers, and creditors) using electronic systems and therefore this tool permits the reduction of distribution costs and greater proximity to both customers and suppliers (Garcia-Alvarez & Teresa, 2015).

Entrepreneurs must realize that ICT usage is no longer merely a choice, but a must in today's globalized world. A few decades back ICT usage was a leading factor, but now it is an essential factor to address the competitive disadvantage. But effective strategic utilization of ICT-based innovations will generate a competitive advantage for enterprises. Technology advances at a much faster rate which has undoubtedly offered vast opportunities to SMEs for international market access (Fillis et al., 2004) and to participate in international supply chains if they adopt ICT. To be able to do this, the owners and/or managers must equip themselves with sufficient ICT knowledge.

2.2. Innovation

Entrepreneurship is the primary act underpinning innovation (Amit et al., 1993; Drucker, 1985b; McGrath, 1996; Stevenson & Jarillo, 1990), which also resonates with Schumpeter's (1961) view of entrepreneurship, as the primary catalyst for innovation that can be a concept, product, or service. The creation adds value to the individual and the community and is based upon perceiving and capturing an opportunity.

Nightingale (2015) defines innovation as "the process that takes an invention, discovery or insight about a new device, processor system to its first successful commercial application". As such, it can apply to new products, processes, and services, to new markets, to new sources of supply, and new forms of organization (Nightingale, 2015).

According to Cooper (1998), innovation has many facets and is multi-dimensional. As per the author, the most prominent innovation dimensions can be expressed as dualisms; radical versus incremental, product versus process, and administrative

versus technological. According to these views' innovation is mainly related to originality and the change of the existing state.

Radical innovations refer to path-breaking, discontinuous, revolutionary, original, pioneering, basic, or major innovations (Green et al., 1995). These radical innovations are riskier. Radical innovations require huge knowledge capital and financial capital to be invested. Incremental innovations are small improvements made to enhance and extend established processes, products, and services. It is less risky, and entrepreneurs are supposed to deal with more certainty. When the risk is higher on innovation, it makes higher returns or losses. A similar view is emphasized by March (1991) that exploration and exploitation have emerged as the twin concepts dominating the analysis of technological innovation, organizational adaptation, competitive advantage, and organizational survival and progress. March (1991) defines exploration as "things captured by terms such as search, variation, risk-taking, experimentation, play, flexibility, discovery, innovation", and exploitation as "such things as refinement, choice, production, efficiency, selection, implementation, execution". From a resource-based perspective, exploitation refers to refinements of existing resources, whereas exploration involves the creation of whole new resource bundles (Lumpkin & Dess, 2001). Exploratory innovations respond to and affect latent environmental trends by creating new products or services, and new markets (He & Wong, 2004).

Schumpeter (1934) also suggested taxonomy types of innovation based on the object of change related to the product, process, market, and organizational innovations. He identified innovation to be based on the level of change and newness. Zhao (2005) tried to define innovation broadly by using similar arguments to include new products, new processes, new services (including new uses of established products, processes, and services), new forms of organization, new markets, and the development of new skills and human capital. The author has been able to summarize the arguments of many research which will be instrumental in understanding innovation more sensibly. Varis and Littunen (2010) in their research adopted the definition of innovation suggested by the OECD (Organization for Economic Co-operation and Development) (2005). As per the above discussion, there are four different kinds of objects of change, i.e., product, process, market, or organizational innovations. These are more aligned with the views of Zhao (2005). This knowledge-based innovation challenges Schumpeter's (1934) theory of the congenital 'innovative individual'. Concerning the literature what the author suggests here is that congenital entrepreneurship can be further optimized by knowledge-based innovations.

Product innovation included three items, namely; the introduction of a new product, technological newness in the product, and product differentiation (Otero-Neira et al., 2009; Lan & Wu, 2010).

Process innovation embraces reengineering the business process (Cumming, 1998) and therefore implies the improvement of internal operations and capacities. Process innovation comprised three items; research and development orientation, the application of new technology, and a new combination of materials in production (Otero-Neira et al., 2009; Lan & Wu, 2010).

Market innovation is concerned with the mix of markets of the company and how chosen markets are best served while accurately interpreting buying preferences (Johne, 1999). This directly influences the sales and lately the company results. Market innovation consisted of three items, i.e., the application of online transactions, innovative marketing and promotion, and the ability to find new markets (Otero-Neira et al., 2009; Lan & Wu, 2010).

Actor-Network Theory (ANT) and Innovation Translation Theory are instrumental in this research to understand how ICT usage can influence to generate innovations. The ANT describes 'innovation as a process'; as a translation in which actors, both human and non-human constantly negotiate and adjust the social (use) and technical (functionality) characteristics of innovation over time. Innovation can be developed only if the innovator creates a network where "unusual links between different 'actors', human and non-human are combined" (Akrich, 1991). In this process, both technology and humans collectively derive innovations and innovations evolve by passing through different human and non-human actors.

As an essence, the innovation emanates in two different intensities; radical or explorative innovation and incremental or exploitive innovation where both types explain a change. This change can occur about four domains as per the literature, product, process, market, and organization.

2.3. Small and Medium Size Enterprises (SMEs)

SMEs can be defined in many terms such as the number of persons employed, amount of capital invested, amount of turnover, or a combination of the two or more. There is no single or unique definition regarding SMEs. The European Union defines SMEs as small-scale businesses that consist of fewer than 50 employees of which the annual turnover is less than EUR 7 million or where the annual balance-sheet total is below EUR 5 million. According to them, medium-scale businesses are considered to consist of 50-250 people and the annual turnover must be less than EUR 40 million or the annual balance-sheet total must not exceed EUR 27 million (Vijayakumar, 2013). As per the practice adopted by the Department of Census and Statistics in compiling data related to the industrial sector, small establishments are those enterprises comprising less than 25 (in the year 2000) and less than 10 employees (the year 2003/2004) and those enterprises having more than 25 (the year 2000) and more than 10 employees (the year 2003/2004) as medium and large. The Department of Small Industries (DSI) classifies enterprises with a capital investment of less than Rs.

5 million (US$ 52500) and fewer than 50 employees as SMEs. Following the World Bank definition, in Sri Lanka, those with fewer than 49 employees are small; those with 50-99 employees are medium enterprises. Generally, the number of employees as a criterion can be more acceptable because other criteria can be affected by inflation. As this research needs to continue at the international level this study uses the world bank employee number-based definition.

2.4. Impact of ICT Usage on Innovations

Japanese SMEs using computers were more likely to engage in innovative activities than firms without computer applications (Morikawa, 2004). Conversely, Hempell and Zwick (2008) investigated to what extent the usage of ICT fosters innovation activities by facilitating more flexible organizational structures in firms. By distinguishing between functional flexibility (the ability of workers to cooperate and take decentralized decisions) and numerical flexibility (the reduction of fixed costs, mainly due to outsourcing business processes) they were able to show that ICT use is associated with an increase in both types of flexibility. The study explicitly stresses the importance of ICT being part of the innovation process within a firm.

Hector et al. (2016) concluded that ICTs as an important facilitator of innovation which enables companies to substantially improve all administrative activity, providing significant efficiency improvements, helping companies to keep up with the trends of customers, monitor the actions of competitors and thereby obtain feedback from users quickly, helping them seize opportunities for all different types of innovation. Manal et al. (2017) suggested drawing attention to the importance of having certain complementary factors in an organization to enable better use of ICT and accordingly reaping its benefits towards creating innovative business opportunities and achieving competitive advantage.

Malone and Laubacher (1998) discussed the new economy, in which knowledge is the most important strategic resource, and how it is forcing growing numbers of firms to review their traditional practices and take advantage of powerful information tools, enabling the handling of commercial transactions on a much broader scale, deal with new partnerships and networks with customers and suppliers, and operate techno-watch systems to help detect new business opportunities and innovations. This concept sheds the light on the significance of Information and Communication Technology to promote Innovation.

Companies are getting more innovative with intensive ICT use in marketing, as it perceives that its usage breaks down barriers to innovation and speeds up processes that in turn become more efficient, it explains how ICT promotes innovation within the organization and how things that incurred a significant cost to innovate earlier is much more possible with the support of ICT (Vilaseca-Requena et al., 2007).

Effective strategic utilization of ICT-based innovations will generate competitive advantages for enterprises. Technology advances at a much faster rate which has undoubtedly offered vast opportunities to SMEs for international market access (Fillis et al., 2004). ICT usage provides a definite advantage for small businesses to get into international markets. It provides more cost-effective and innovative opportunities to access international markets. ICT helps in the generation, integration, development, and enhancement of key resources over time. e-Business, e-Commerce, new production methods, new services, new business models, and effective ways for better-supply chain management, customer relationship management, and decision-making are few of the many ways that ICT manifests its dynamic capability features (Manal et al., 2016). This conforms with Schumpeter's (1934) view regarding the achievement of the competitive advantage based on improving, shaping, or enhancing existing resources and competencies via innovative ways and complex processes and the involvement of knowledge integration from various sources (Hamel & Prahalad, 1990), learning processes (Pisano, 1994), seizing new opportunities, and managing risk and uncertainty. ICT may help a firm to introduce new products and services, be more customer oriented, respond better to market changes, and thus innovate (Koellinger, 2008; Tran et al., 2014). Thus, with the dynamic capabilities of the firm, ICT enhances efficiency and innovation (Melville et al., 2004).

Latour (1996) describes innovation translation as the movement of innovation across space and time in the hands of people who deal with it in different ways. Depending on people's reactions to it, the innovation may be accepted, modified, or dropped. Accordingly, the adoption of the innovation comes because of the actors' reactions to it and how they shape it. Latour (1996) mentioned that innovation is a process characterized by continuous transformation. ICT-based innovations continuously change and are adopted by decision-makers in the organization and those who can assess the opportunities made possible by those innovations which adhere to the innovation translation theory. ICT acts as an effective non-human actor which immensely supports shaping innovation by specialized capabilities to simulate, form, and forecast the future of innovation.

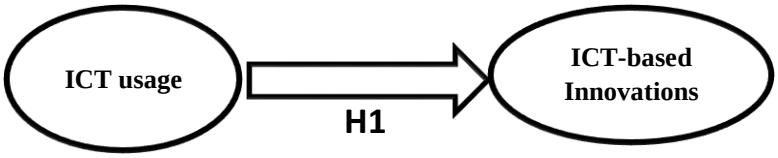
Spiezia (2011) noted that concerning service and manufacturing, in companies in the OECD countries, ICTs are an innovation facilitator, particularly in product and marketing innovations, and concluded that the ICTs facilitate a company to incorporate innovation.

Vilaseca-Requena et al. (2007) indicated a significant relationship between ICT use in marketing and product innovation and emphasized a strong relationship between ICT use in marketing and innovation which is explained to a large extent by the benefits that ICT offers when the organization develops product innovation processes. There, ICT can be identified as an extremely useful instrument in the innovation processes, and ICTs help in maintaining communicative and cooperative relationships both inside and outside the organization and makes new product

development (NPD) processes quicker, simpler, and less risky. ICT is also responsible for the acquisition of market data and its use during the innovation process, enabling the development of new products that are adapted to the needs and requirements of demand (Vilaseca-Requena et al., 2007). Hector et al. (2016) noted that ICT can also influence directly innovations based on ICTs in business products, processes, services, and in business models. Additionally, they can transform business processes and facilitate new products and services, as well as products and services with variety and personalization requirements that were not operational and economically feasible before without the use of ICTs.

According to the above literature, the following conceptual framework is drawn:

Figure 01: Conceptual Framework



Source: Literature Review

Based on the conceptual framework, the following hypothesis is developed

H1: Higher level of usage of ICT results in a higher level of innovation of SMEs.

3. Research Methodology

Based on the literature and considering the nature of the study, the positivist philosophy and hypothetical deductive approach with quantitative methods were used. This is a mono-method and cross-sectional study in which data were gathered only once. With the use of a structured questionnaire, the survey method was used mainly with physical meetings as responses for online questionnaire were not adequate.

The population for the study is the SMEs in the Western Province. Databases of the Ceylon Chamber of Commerce, Ministry of Industries, and Industrial Development Board were used to design the sample frame including 1098 companies. Respondents were screened at the data gathering stage to maintain companies with less than 500 employees to maintain SME level. Accordingly, 350 respondents were selected using simple random sampling method. Data gathered by the survey was analyzed by SPSS statistical tool with descriptive and inferential statistics.

4. Data Analysis and Discussion

This section presents the results of statistical data analysis to address the research objectives. The data about the sample, the current level of variables in the conceptual model, the screening data, Exploratory Factor Analysis (EFA), multivariate assumptions, and regression analysis were done in sequence. Subsequently, the evaluation of the measurement model with indicator reliability, measurement model reliability, and validity are presented.

4.1. Readiness and Fit for Data Analysis

With a confidence level of 95 and a margin of error of 5, the sample size was calculated according to Krejcie and Morgan (1970) as 285. Among the distributed questionnaires, 272 responses were collected. The main variables in the study are the ICT-usage and ICT-based innovations which showed a lower to moderate level of descriptive statistics.

Three of the data points were outside the acceptable range of values. Thus, the questionnaire was double-checked and fixed. There were no outliers found in the data set and the percentages of missing values were less than 10% and it was treated.

Based on the loading of the factor analysis, some indicators were removed and according to the EFA with an absolute value of .5, and all items with factor loadings larger than .5 were taken.

All items' outer loadings were greater than .7, indicating that the indicators' dependability was satisfactory. All Cronbach's alpha values of constructs were greater than .90 indicating that all constructs were reliable at an exceptional level. Composite reliability was greater than .7, and the AVE values were greater than 0.5 verifying the convergent validity of the constructs validity. Fornell-Larcker's discriminant validity criterion was satisfied. For each group-specific model estimation, discriminant validity was established since all the HTMT criteria were below the critical value of .9. Therefore, measurement model requirements were fulfilled. There were no multicollinearity problems because all inner VIF values were below the threshold of 10.

4.2. The Existing Level of ICT Usage in SMEs Western Province of Sri Lanka

Table 01 shows the ICT-usage level under eight categories. There is a lower-level usage of planning and analyzing related ICT systems. Mean values show that all the categories are used at a moderate level. The highest usage among the categories is visible at ICT usage for budgeting and controlling and ICT usage for enterprise solutions. ICT usage for e-Commerce also has a higher value. The ICT-usage latent variable also shows a moderate ICT-usage level.

Table 01: Existing Level of ICT Usage of SMEs in the Western Province

ICT usage	Mean	Std. Deviation
ICT Usage for planning and analyzing	1.9939	1.25319
ICT Usage for budgeting and controlling	2.9816	1.04671
ICT Usage for the creation	2.3732	1.35814
ICT Usage for searching and acquisition	2.5110	1.27834
ICT Usage for sharing and collaboration systems	2.4774	1.27350
ICT Usage for enterprise solutions	2.9504	1.43825
ICT Usage for identification and data capture	2.5790	1.20355
ICT Usage for E-Commerce	2.8520	0.93390
ICT Usage	2.4990	1.15396

Source: Survey Data (2022)

4.3. The Existing Level of Innovation in SMEs

This research identified comparatively higher innovation levels in the process and organizational innovations in SMEs in the Western Province of Sri Lanka. Product and market innovations are slightly lower compared to process and organizational innovations. This research found that SMEs are having moderate to low levels of innovations related to the product, process, market, and organizational levels.

This shows that there is a much longer way to go for these organizations to achieve innovation. This answered the research question of the poor performance of organizations because of their poor level of innovation. Especially, a lower level of innovation at the product and market level results in lower revenues and profits for the organizations. It shows weakness in manufacturing the products and marketing the production innovatively in unique markets.

Table 02: Existing Level of Innovations of SMEs, Western Province

ICT-based innovation	Mean	Std. Deviation
Product Innovation	2.9208	1.03819
Process Innovation	3.0118	1.08431
Market Innovation	2.9681	1.11964
Organizational Innovation	3.0000	1.06275
Innovation	2.9775	1.04345

Source: Survey Data (2022)

4.4. Higher Usage of ICT Leads to a Higher Level of Innovation in SMEs

The literature in this paper explains ICTs' ability to act as innovation facilitators. The study is in full conformity with those theoretical assumptions and empirical findings.

Table 03: Impact of ICT-Usage on Innovation (ANOVA)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	235.426	1	235.426	900.049	.000[b]
	Residual	69.316	265	0.262		
	Total	304.742	266			

a. Dependent Variable: ave_INV (Innovation)

b. Predictors: (Constant), ave_ICTU (ICT-Usage)

Source: Survey data (2022)

Table 04: Impact of ICT Usage on Innovation (Model Summary)

Model	R	R Square	Adjusted R Square	Std. an Error of the Estimate
	.879[a]	0.773	0.772	0.51144

a. Predictors: (Constant), ave_ICTU

Source: Survey data (2022)

Table 05: Impact of ICT-Usage on Innovation (Coefficient)

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		Beta	Std. Error	Beta		
1	(Constant)	0.609	0.088		6.911	0.000
	ave_ICTU	0.888	0.030	0.879	30.001	0.000

a. Dependent Variable: ave_INV

Source: Survey data (2022)

Table 03 shows that at a 95% confidence level, the overall model is significant. It means that the ICT-usage explains ICT-based innovations. Table 04 shows that the R-Square value is .773. Therefore, 77% of the variation of the ICT-based innovation is explained by the ICT-usage.

To make inferences about a population from a regression analysis of a sample, certain assumptions need to be fulfilled. According to the analysis, the residuals have shown no autocorrelation, and the error terms were normally distributed.

According to the t-tests on regression coefficients in table 05, there is enough evidence to reject the null hypothesis, as the p-value is .000. Therefore, it can be concluded that there is a significant impact of ICT usage on ICT-based innovations.

Moreover, as the unstandardized beta coefficient is positive, it could be identified that the impact of ICT usage on ICT-based innovations is positive, which means that when ICT usage increases ICT based innovations also increase.

All statistical tests prove that higher ICT usage results in a higher level of innovation for SMEs. In conformity with the previous theoretical and empirical findings, SMEs in Western Province of Sri Lanka shows a higher level of innovation with a higher level of ICT usage. But the ICT-usage level and the innovation levels of SMEs reside

at a moderate level. Therefore, it is very important to increase the ICT usage and innovation levels of SMEs in Sri Lanka.

4.5. Discussion

These findings are in line with the previous research. Pilat and Wolfl (2004) emphasized the impact of information and communication technologies (ICT) on innovations. Igun (2014) identified ICT as a driver of innovation-based activities for better efficiency, higher performance, and to attain and maintain competitiveness as well as improve profitability ICT-based innovations under the "Dynamic Capability View" (Teece et al., 1997). Dynamic capability is one of the main theories explaining the complex relationship between ICT usage and innovations. This conforms with Schumpeter's (1934) view regarding the achievement of competitive advantage based on improving, shaping, or enhancing existing resources and competencies via innovative ways and complex processes. ICT helps firms to introduce new products and services, be more customer oriented, respond better to market changes, and thus innovate (Koellinger, 2008; Tran et al., 2014). The authors explain the way ICT supports the enhancement of innovation. ICT acts as an effective non-human actor which immensely supports shaping innovation by specialized capabilities to simulate, versioning, and forecast the future of innovation.

5. Conclusion and Recommendations

5.1. Conclusion

The rationale for the study was the lack of ICT usage, innovation, and performance of SMEs in Sri Lanka. At this stage, the study comes into a state which can make a conclusion with the topic investigated. The study examined the impact of ICT usage on the innovations of SMEs in Sri Lanka. The research focused on the SMEs operating in Western Province of Sri Lanka, and their levels of constructs during the period from 2017 to 2022.

The study identified the existing level of ICT usage among SMEs and investigated the impact of ICT usage on SMEs' innovations in Sri Lanka. According to the use of quantitative techniques, the population of the study was SMEs in the Western province with less than 500 employees. Accordingly, 285 respondents were selected as the sample by using a simple random sampling method, and the data were analyzed with 272 responses among the total sample by using SPSS statistical tool with descriptive and inferential statistics. The findings of the study empirically proved the suggestions of literature on the positive relationship between ICT usage to innovation. Further, the study revealed that there is a significant impact of ICT usage on SMEs' innovations and that ICT-usage opens myriad opportunities to innovate in products, processes, markets, and organizational levels.

5.2. Recommendations

As per the successful completion of the research, recommendations can be provided for areas having the relevance and benefits of this nature of studies.

The study found that the ICT usage of SMEs at lower to a moderate level is not satisfactory for businesses thriving to compete in the modern technology-based era. It is recommended the SMEs increase the ICT-usage in business which can open myriad innovative avenues for their growth and performance.

The research found lower to moderate levels of innovations in SMEs and out of four innovation types related to products and markets, innovations were lacking. Product innovations are very important for boosting the economy and market innovations are important in the process of taking those commodities to international markets effectively. Under product innovation, it is recommended for organizations to introduce new products to the market which could be technologically new, differentiated from competitors, and value-added unique designs. The whole product development and design process to be proactive. Usage of ICT in this innovation process makes the organization more agile and effective. Therefore, it is highly recommended that SMEs take steps in boosting their innovation performance related to products.

The second factor is to identify how effective the SMEs are in taking these innovative products into the potential markets. This is where market innovations need to be involved. With modern ICT-based strategies, innovative firms could find fast and effective roots to take their products to the market before competitors even think above it. Organizations striving to be innovative in markets may heavily engage in online transactions from product marketing and online payments to delivery. Companies should utilize top design techniques in their promotions and advertisements to be unique from the competition. Furthermore, organizations need to be research-oriented and must actively look for potential markets which can be local or international. Innovative companies must always look at unseen potential markets and must arrive at those markets before anyone else penetrates them. That will enable them to enjoy the first-mover advantage. ICT provides a myriad of opportunities for organizations to identify these unseen potential markets. Analytics store the behaviors of every individual internet user globally with their likes and dislikes. Organizations with good ICT background knows how to utilize this information in marketing.

It is highly recommended that SMEs take steps to boost their innovation performance related to products and markets. Causalities identified in this research bring implications for the SME sector, mainly suggesting ways and means to improve their innovation performance through effective deployment of ICT. As per the findings of this research, ICT needs to be utilized by SMEs effectively to increase the innovation

level in the company. The findings of this research are applicable for the SME sector and the country to come out from the current economic crisis.

6. Limitations and Future Research

With the current scope of the study and with the period, the researcher was not able to overcome those limitations, but they are highlighted for the betterment of future research and to give more avenues to consider in future research.

One of the main limitations identified in the research was that the research was conducted using a questionnaire survey. Conducting this kind of complex research through a questionnaire is not easy. The author recommends future researchers to address this limitation using a structured interview beyond the survey method. Further, it is suggested to use multiple strategies in the future when gathering data to improve trustworthiness in the research.

The sample size is a very important factor to generate generalizable results. The current research received responses from 272 respondents. If there was a possibility to reach a sample of at least 500 respondents, it would have been better. Further, the sampling method utilized was a simple random sampling method. To increase generalizability, it is useful to follow the stratified sampling on different clusters in the country. As this study is based on the Western Province of the country. To bring more comparative results, another cross-sectional study could be conducted covering different clusters in the country.

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