



Exploring Constraints and Catalysts: A Comprehensive Analysis of Technology Adoption in Sri Lankan Small and Medium Enterprises

A. R. M. Yazeer ^a and Vilani Sachithra ^{a*}

^a University of Sri Jayewardenapura, Sri Lanka.

Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Purpose: Small and Medium Enterprises (SMEs) are considered as the backbone of the economy, however they face many difficulties and challenges for their survival. Adapting to changing technology is one of the primary challenges SMEs face. Globally new technologies such as social media and e-commerce have become the trend in contemporary business activities in Business to Consumer (B2C) communications for SMEs. The study aims to find the factors affecting to the adoption of technology in SME sector in an emerging economy, Sri Lanka.

Design: The study utilized Technology, Organizational, and Environmental (TOE) model. The data was collected from 102 SME owners in Western province Sri Lanka who are registered as SME sectors with less than 50 employees. Qualitative data were collected from 7 SME owners through semi-structured interviews to evaluate new opportunities can gain via technology adaptation and to evaluate the impact of performance via technology adaptation in SME sector in Sri Lanka.

Findings: Descriptive statistics revealed that there are substantial disparities in how organizations and the environment adapt to new technologies. The ordinal regression analysis emphasised that

*Corresponding author: E-mail: vilani@sjp.ac.lk;

organizational and environmental factors significantly influence on adaption of technology. Content analysis revealed that SMEs have gained many new opportunities via adaption of technology such as expand their businesses from local to global using e-commerce platform and online money transactions. Social media has made direct business to business instant contact. Further, transparency of business transactions increase trust with suppliers and customers.

Implications: The SME sector needs both new technology and updates existing technology status and guided towards modernization and continuous improvement process. Finding of this study will give policy makers and government officials on strengthening and arming SME sector with technology to face challenge and complete with local and international competition.

Keywords: Content analysis; small and medium scale enterprises; technology adaption; TOE model.

1. INTRODUCTION

Over 90% of businesses worldwide are small and medium-sized enterprises (SMEs), which account for roughly 70% of all employment and 50% of the global Gross Domestic Product GDP [1]. Approximately 7.80 million people are directly working in SME sector. Globally SMEs are been playing a major role on United Nations Development Program's (UNDP) Sustainable Development Goals (SDG) towards eradication extreme poverty and hunger, reduce unemployment, SME considerably improves the scenario of income distribution, creates jobs, and lowers poverty, especially in emerging nations [2]. Although SMEs have a enormous impact on rising economies, they are unable to compete in today's competitive and volatile marketplaces [3]. SMEs encounter numerous significant obstacles, such as intense competition [4]. SMEs could not meet the expected quality standards due to changing trend technological requirements to fulfill ever changing customer expectations such as quality standards. Prior studies mostly highlighting the challenges that SMEs confront in terms of financial availability, energy costs, technology, management capacity, and other economic issues [5]. Further, researchers have also identified SME's common issues such as lack of initial capital, scarcity of resources, finance access, technology, skilled human resource, market access, market information access, access to non-financial inputs, and high cost of raw material as common challenges [4,6,7] Moreover, institutional factors (norms and culture, regulations and legislation, and governance), market factors (market structures, contracts and business processes) and technical factors (information exchange and transactions, the distributed ledger and shared infrastructure) are identified as the list of crucial factors for technology adoption [8]. Over the time Organizations re-shape themselves with changing industry standards. In other words they

adapt new technologies in its daily business activities. SMEs are compelled to adopt new technology to meet industry demands such as quality and quantity and increasing pressure. As Shahadat et al. [9] opined, technological innovation built the competitiveness of SMEs in emerging economies and help to streamline the decision-making process. Therefore technology adoption can be defined as organizational inception and migration to new systems and procedures using state of art technologies.

Sri Lankan context, SME play a significant role in economic process accounting to 75% of total enterprises and 45% of employment engagement and 52% contribution on Gross Domestic Product (GDP) [10]. Despite its importance of SME, Only 20 percent of SMEs survive, and an astonishing 80 percent of SMEs fail during their first five years of operation, [11]. Regrettably, Covid-19 and Easter attack cause severe blow nation's economy. Sri Lanka lost not just foreign currency but also many jobs related to service sector [12]. By 2021 Sri Lanka was de-graded from middle income nation to lower middle income earning nation by International Monetary Fund [13]. These events has triggered need for national policy for diversify the economy. Strengthening SME sector is the only alternative option for foreign exchange [3]. Addressing constraints faced by SME sector and updating technological advancements are need of the time.

Technology is going to be the key factor in future business activities where seller and buyer will meet online. One of the crucial factors for success and growth in the current competitive environment is anticipated to be e-commerce [14]. The present study focuses to identify factors that influencing technological utilization of SMEs in Sri Lanka. Out of many factors hindering SME sector, technology acquisition need to be specifically identified. The ability of

SME to adapt to changing business landscapes is its ability to participate in technology. The main objective of this study eventually is to focus on the issue of technology as a factor influencing performance and growth of SME in Sri Lanka. As such, the study aims to identify the factors influencing technology adaption in SME sector in Sri Lanka; to evaluate new opportunities can gain via technology adaptation in SME sector in Sri Lanka and to evaluate the impact of performance via technology adaptation in SME sector in Sri Lanka.

2. LITERATURE REVIEW

Globally modern business practices are strongly influenced by technology and its many commercial applications [11]. Technology is not just about computerizing procedures but also about new way of treating customers and suppliers [15]. Businesses get a competitive edge through innovation. They view innovation in a broader way. incorporating both new technologies and methods of operation [16]. Effective ecommerce implementation allows businesses to compete in new national and international markets without being constrained by their physical presence [12]. Digital marketing and social media platform has provided many opportunities to SMEs with global customer reach. With regard to redefining and changing business and communication, digital technologies are pushing digital entrepreneurship and re shaping business scopes [17].

Literature has developed various models to test adoption of technology among SMEs. They are a) Technology Acceptance Module (TAM) [18]. Diffusion innovation theory(DIT) [19], c) Theory planned behaviours (TPB) [20] , d) Technology, Organizational, Environmental (TOE) [21]. Among them, TOE model is well received by many researchers for its approach towards adaption of technology and innovation [22,11,17]. This study utilized the TOE model as it supersedes other models considering macro and micro factors hindering organizational constraints of adoption of technology.

TOE model describe adoption of technology and categorized into three main factors namely;

The TOE focuses on three aspects in particular: technological, organizational and environmental factors that may have an impact on how technology and innovation can be used. The

following sub-sections explained the aspects in the TOE model.

2.2 Technological Factors

The technological factors (TF) contains any technology that is essential to the company, including those that are already used within the company and those that are currently accessible on the market but not being used [23]. Stephen, [24] opined that users in the SME sector have viewed the adoption of technology with 'skepticism,' some academics have attributed the phenomenon to 'technophobia'. It is the fear of change or challenging the status quo for new technology. The prior studies identified measurable sub dimensions of technology factors namely Compatibility; Infrastructure; Complexity; Relative advantage and Security.

Organizational and technological compatibility are the two components of compatibility. Technical compatibility is the perception of organizational existing technologies as being compatible. While organizational compatibilities is the state of fit to absorb new technologies. Organization's existing technologies plays a significant impact in the choice to adopt new technology Kamal, [7]. Complexity refers to the technical barriers such as knowledge incur by the users when adaption of new technology to organization. As cited in [25] the degree to which an innovation is deemed to be somewhat challenging to understand and use is referred to as its complexity [26]. According to Kamal, [7], a key aspect influencing judgments on technological adaptation is the complexity of the technology. Infrastructure refers to organizational internal readiness to accept technology. The core concept of ICT adaption is organizational infrastructure. IT infrastructure refers to the entire set of resources, hardware, software, networks, data centers, facilities, and equipment that are used to create, test, manage, and support information systems in organizations [27]. Organizations adapt rapid infrastructure changes to accommodate e-platform into business activities. The most important determinant in the adoption of technology is relative advantage [22]. Technology has provided perceived usefulness to organization to gain increased productivity and efficiency. Technology link cross functional activities and deliver accurate information for management decisions. The relative advantage of technology over another is a major antecedent of new technology adaption, and it plays a key role in innovation adaption [27]. Security and

trust is vulnerable in an organizational information database from manipulation and foul play. Organizations should hire skilled staff to protect organization's database from internal and external threats and even possible sabotage. Even a virus attack could endanger organizational information systems. Therefore a proper disaster management procedure should be in place to continue business operations smoothly with least downtime. (Salah et al. [27] reveals that the top essential adaptation barrier in a variety of fields, including security to systems and e-commerce is security priority. As cited in SMEs are probably going to have to pay more for system security and protection measures [28].

According to the above arguments, the following hypothesis is postulated:

H1 - There is a positive relationship between existing technology and technology adaption in SME sector in Sri Lanka.

2.3 Organizational Factors

Organizational factors refer to characteristic of a firm. The most important variables of organizational factor includes "Organizational slack, trust, technological resources, top management support, support for innovation, organizational knowledge accumulation, expertise and infrastructure, quality of human capital, organizational readiness, organizational knowledge, innovation capacity, knowledge capability, operational capability, strategic use of technology, financial resources, firm structure, innovation competence, technology competence, while financial resources and technology competence are identified as insignificant [29]. The prior studies identified measurable sub dimensions of organizational factors namely owners' perception; employee engagement; organization culture and financial resources.

Management approach towards new technology and innovation are the key push factors of organizational technology adaption. According to Abbad et al. [22] The organizational factors that influence technology adoption also include the standards for senior management support, managerial judgments, financial support, and organizational framework. Implementing novel technology needs employee motivation and acceptance. According to Abbad et al. [22] The perceived ease of usage has a significant influence on e-technology acceptance For a successful implementation of technology It is

crucial that the company's personnel understand the technology, its workings, and its genuine purpose [3]. According to Thottoli [30], organizations does not make maximum usage of technology due to lack of available expertise. Although in many SME organizations owner managers are technical in their routine business activities, they face digital transformation fear or technophobia. Digital transformation is the new era challenge entrepreneurs face to overcome global business to business B2B connectivity. Porter [16] states that Companies must make accepting challenges a part of their organizational culture if they want to remain dynamic. Therefore time to time acquiring new technology should be part of organizational sustainable growth strategy. Otieno, [31] argues that most businesses are governed by their owners, and their attitude toward information and communications technology strongly influences whether they will implement ICT systems and applications. Accepting new technology depends on organizations culture of employee motivation and perceive usefulness. Individual drive to work hard and advance one's skills is crucial for gaining a competitive edge [16]. Management financial backing is key element in a successful technology adaption. Organizations need financial support for new innovations. Businesses with limited financial resources are less likely to invest on innovation [4]. SMEs may find it challenging to explain the need to invest money on ICT infrastructure and systems due to the scarcity of financial resources [31].

Acknowledging the prior studies, the present study postulated the hypothesis as;

H2 - There is a positive relationship between organizational factors and technology adaption in SME sector in Sri Lanka

2.4 Environmental Factors

Environment factors (EF) describes the business environment, including the industry, rivals, rules, and interactions with the government, as well as the factors affecting the adoption of new technology. External pressure such as competitor pressure and customer pressure are key variables in EF [29]. In addition to the aforementioned socio-cultural barriers, other factors that affect technology adoption include transactional trust, limited personal interaction, conventional buying habits, and language barriers. The prior studies identified measurable sub dimensions of environmental factors namely Customer pressure and Competitor pressure.

Digital transformation is applying new-age digital technologies for better customer engagements or for making digitalized operations to take better competitive advantage [32]. Competitive pressure makes relative pressure and impact adaption of technology. An essential component that not only improves business performance but also makes it easier to get a competitive edge is e-business adaptation [22]. The market share of SMEs that were performing well locally (i.e., in the domestic protected market) was being eaten away by foreign companies using more aggressive business strategies and techniques. Such organizations who don't take timely decisions will eventually end-up unable to face competition and survive. The above arguments led this study to hypothesize the following:

H3 - There is a positive relationship between environmental factors and technology adaption in SMEs

3. METHODOLOGY

This study mainly used quantitative approach to investigate factors that hindering technology adaption in SME sector in Sri Lanka. In a quantitative approach, techniques include exact variable measurement and data gathering from a randomly chosen sample under standardized settings. The target population of this research consisted of SME owners/managers in western province Sri Lanka. According to the annual survey [33] there are 20920 registered SMEs in Sri Lanka and approximately 9237 SMEs registered in Western province. The study selected western province SMEs because of out of 20920 registered SME whole island 9237 represents 44% of total registered SME are in western province. SME owners from different background in manufacturing / trading / import export industry were chosen for the study. The simple random sampling method was used to select the sample of the study [34]. According to Morgan, [35], the sample size should be 370. Literature opined that roughly 14 percent of the overall response rate record in web-based or internet surveys [36] In this vein, 700 SMEs owners were selected as the sample of the study.

The operationalization of the study's variables is shown in Annexure 1. The study further used nominal scale type measurements (6 items) for dependent variable (technology adaption). Based on the mean values of the 6 items, the study categorised the level of technology adaption of

SMEs as low (mean value of less than 2), medium (mean values between 2 and 4) and high (mean values of more than 5).

Both quantitative and qualitative methods were used in this study to collect primary data. The study relies primarily on a structured questionnaire as primary data collection for quantitative data in this study. Online survey method was employed to get data from owners/managers of the selected SMEs. The questionnaire approach was utilized with a series of closed ended questions that are developed with the objective of gathering the direct responses from the SME owners. Semi-structured interviews were used to gather qualitative information. Seven SME owners were interviewed. Snowball sampling method was used to choose the SME owners because it was convenient for the researcher and because they were willing to participate in the study. The semi-structured interview may yield genuine descriptions of participants' feelings [37]. While conducting the interviews, through open-ended questions, the study was able to gather comprehensive details on the topic and explained better understand, and investigate respondents' perspectives and experiences, allow respondents to contribute information in their own words, and are useful for gathering in-depth data.

3.1 Data Analysis - Quantitative

To prevent errors that could happen when inputting data, the first step of data analysis entails verifying the data set for inaccuracies. To evaluate the quality of the data, the measuring items' validity and reliability are tested. With the use of Cronbach's alpha values, the internal consistency of measurement items is evaluated. The findings of the measurement items are evaluated for convergent and discriminant validity to see how effectively the theories underlying. To acquire a sense of the data, the central tendency (mean and ranges), the dispersion (standard deviation and variance), and the frequency (%) for qualitative and quantitative variables were all verified. This will show how the respondents have responded to the items in the questionnaire. After the data met the requirements for goodness, the hypotheses could be tested. Since dependent variable was measured using nominal scale measurements and categorized the level of technology adaption as low, medium and high, to examine the link between a dependent variable and the

independent factors, an ordinal regression analysis was used. The statistical tool SPSS (version 26) was used to examine the data from the firm level survey.

3.2 Data Analysis – Qualitative

This study's qualitative data analysis employed content analysis. As despite by Haggarty, [38] using the content analysis research method, qualitative data obtained for data analysis of the study can be studied methodically and dependably. Based on the researcher's interests, generalization may be made in relation to the category. Two common types of content analysis are relational analysis and conceptual analysis. Conceptual analysis can reveal the existence and occurrence of concepts inside a text, whereas relational analysis constructs conceptual analysis by looking at the relationships between concepts within a text. Researchers can quantify and analyze the occurrence, meanings, and contacts of specific words, topics, or concepts by coding them using content analysis. Using content analysis, researchers can quantify and analyze the occurrence, meanings and contacts of such certain words, themes, or ideas.

4. RESULTS AND DISCUSSION

The study distributed 700 emails and 102 respondents had replied, indicating 15 percent response rate. The first part of the questionnaire was intended to collect demographic information of the respondents. Such as gender, type of the organization, number of employees, years of operation and so on. Considering the ownership status, nearly half of SME owners are sole proprietorship businessmen whole 15% partnership and 40% are private limited businesses. According to years of business operation almost half of the organizations are less than 10 years and balance half of the businesses are stable and operating successful with more than 11 years in business. Finally Number of employees concern nearly half of the organizations are operating with less than 10 employees. As per type of business 46% are sole proprietorship businesses. Therefore 48% of SMEs are Micro SMEs in this study. The most notable part of the data demographic information is the education level of SME owners, indicating more than 70% are having vocational training and degree above qualification (Table 1). Moreover, the study intended to capture organization current level technology usage such

as ERP systems and E-Commerce platforms, social media and digital platform in their everyday business activities. Based on the mean values of the 6 items, the study categorised the level of technology adaption of SMEs as low (mean value of less than 2), medium (mean values between 2 and 4) and high (mean values of more than 5). According to the results (Table 1), nearly 30 percent of the respondents scored in each category of technology adaption level.

4.1 Goodness of Measurements

Factor analysis was used to reduce the amount of data and combine the items from each construct of the study's variable into a single component. The sample adequacy Kaiser-Meyer-Okin (KMO) measure was used. Table 2 displays the findings of the factor analysis. According to Table 2 the measurement items' KMO values are above 0.60 and their combined variance is explained. KMO numbers demonstrate that to be regarded a good factor analysis, a factor analysis must have a KMO value of 0.60 or higher. The measurement elements were finally separated into a single component for each variable. As a result, every finding emphasizes the usefulness of factor analysis. The average variance extracted (AVE) value of the measurement items is calculated to assess convergent validity. AVE was calculated utilising the formula developed by Raykov & Marcoulides, [39]. In general, the AVE values of above 0.50 are acceptable [40] demonstrating the appropriateness of the overall variation in the relevant factors' items [41]. Table 2 indicate that AVE values were greater than the cut-off levels, according to the results indicate sufficient validity, and so the data were appropriate for further analysis. The mean value of technology adaption is close to 3.50 and above, indicate that respondents moderate and above level of technology readiness.

Calculating Cronbach's alpha levels and examining the internal consistency values, the study illustrates the dependability of the variables. According to Hair [40], the Cronbach's alpha value must be greater than 0.70. Findings (Table 1) indicated that the alpha values were higher than the cut-off values, indicating sufficient dependability. After testing the goodness of measurements of each dimensions, the study integrated the dimensions into respective variables. Likewise, compatibility, infrastructure, complexity, relative advantage and security integrated as existing technology factors

(mean value = 3.54). Owners' perception, employee engagement organisational culture and financial resources combined as organisational factors (mean value = 3.46). Finally, customer pressure and competitive pressure integrated as environment factors (mean value = 3.87).

4.2 Ordinal Regression Analysis

Since dependent variable, technology adaption, was measured using nominal scale measurements and categorized the level of technology adaption as low, medium and high, an ordinal regression analysis was employed to analyse the influence of existing technology, organization and environment factors on technology adaption. The results of model summary in the ordinal regression model were given in Table 3. The Cox and Snell, Nagelkerke and McFadden pseudo-R squares can be used to evaluate the overall explanatory power of an ordinal regression model. These pseudo-R square values of the regression model are given in Table 3. Accordingly, the regression model

has an explanatory power of 89.4%, this implies that the model can explain around 90% of the variance of the technology adaption of SMEs firms.

As shown in Table 3, the estimates of each independent variable indicate the change of the log odds ratio of technology adaption in response to one unit change in the respective independent variable. And the significant values of these independent variables indicate whether these variables are statistically significant within the regression model given that the other predictors are also in the regression model. In other words, the significant value tests whether the coefficient of the variable is different from zero or not. The regression results suggest that the organizational and environmental factors were statistically significant factors towards technology adaption of the selected SMEs on the study. However, existing technology factor has no statistical significant influence over technology adaption of the selected SMEs on the study.

Table 1. Demographic information

Number of Employees		
	Frequency	Percent
Less than 10 employees	48	47
10 - 50 Employees	24	24
More than 51 employees	30	29
Total	102	100
Years of experience in business		
	Frequency	Percent
Less than 5 years	24	23
5 - 10 Years	26	26
more than 11 years	52	51
Total	102	100
Type of business		
	Frequency	Percent
Sole Proprietor	46	45
Partnership	16	16
Private Ltd	40	39
Total	102	100
Current level of technology adaption		
	Frequency	Percent
Low	40	39.2
Moderate	30	29.4
High	32	31.4
Total	102	100.0

Table 2. Factor Analysis

	Construct	Dimension	Component matrix	Mean Value	Cronbach's alpha	Kmo value	Bartlett's test of sphericity	Total variance explained	Ave
			Factor loading						
Technology	Compatibility	Compatibility	.885	3.45	.774	.645	215.543817	68.891	0.6888
		T113	.702						
		T112	.861						
		T114	.859						
	Infrastructure	Infrastructure	.845	3.38	.775	.690	131.128	60.93	0.6094
		T124	.595						
		T122	.842						
		T123	.813						
	Complexity	Complexity	.809	2.95	.644	.659	89.297	53.416	0.5341
		T132	.860						
		T133	.520						
		T134	.687						
	Relative Advantage	Relative Advantage	.871	4.13	.840	.840	247.46	63.343	0.6335
		T142	.862						
		T143	.684						
		T144	.659						
T145		.874							
Security	Security	.879	3.61	.892	.871	461.620	72.36	0.7236	
	T152	.851							
	T153	.860							
	T154	.826							
	T155	.800							
	T156	.885							
Organizational	Owners perception	Owners Perception	.981	3.72	.877	.863	929.783	91.91	0.9187
		O212	.965						
		O213	.986						
		O214	.958						

Construct	Dimension	Component matrix	Mean Value	Cronbach's alpha	Kmo value	Bartlett's test of sphericity	Total variance explained	Ave	
		Factor loading							
Employee Engagement	O215	.900	3.60	.892	.722	185.847	82.585	0.8256	
	Employee Engagement	.909							
	O222	.879							
	O223	.937							
Organizational Culture	Organization Culture	.892	3.54	.833	.855	334.646	83.275	0.8329	
	O232	.925							
	O233	.933							
	O234	.900							
Financial Resources	Financial Resource	.855	3.08	.743	.700	95.087	54.743	0.5477	
	O242	.857							
	O244	.727							
	O245	.444							
Environmental	Customer Pressure	Customer Pressure	3.62	.825	.711	273.703	87.26	0.8721	
		E312							.962
	Competitive pressure	E313	.949	4.05	.878	.795	212.216	73.25	0.7325
		Competitor Pressure	.839						
		E322	.878						
		E323	.855						
E324	.851								

Table 3. Ordinary regression analysis results

Model Fitting Information					
Model	Model Fitting Criteria		Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	df	Sig.	
Intercept Only	511.542				
Final	282.658	228.884	48	.000	
Goodness-of-Fit					
		Chi-Square	df	Sig.	
Pearson		605.474	752	1.000	
Deviance		282.658	752	1.000	
Pseudo R-Square					
Cox and Snell	.894				
Nagelkerke	.900				
McFadden	.447				
Parameter estimates	B	Std. Error	95% Wald Confidence Interval		Sig.
			Lower	Upper	
(Intercept)	-.601	.1328	-.862	-.341	.000
TECHNOLOGY	.274	.267	-.249	.797	.304
ORGANIZATIONAL	5.623	.991	3.681	7.566	.000*
ENVIRONMENT	2.183	.518	1.166	3.199	.000*
(Scale)	1 ^a				

Dependent Variable: Demographic
 Model: (Intercept), TECH, ORG, ENV
 a. Fixed at the displayed value.

4.3 Content Analysis

In order to respond to the inquiry in the study, the study employed qualitative approach to get firsthand word direct from the SME owners. The study designed structured questionnaire relating to research objective, 7 structured interviews were conducted from selected and accessible SME owners feedback from SME owners on their issues faced by them on adaption of technology in their everyday business activities can be further analyzed for generalization of the research task. Interviews with different sectors responded various personal opinions of their own scenario. To ensure they operate in similar condition, we acknowledged that they come under SME category and registered under Sole proprietor / private Ltd business act of western province Sri Lanka. Table 4 lists the participants’ details. Names of the organizations were listed with their consent.

According to the interview results, the thoughts of the respondents were coded into 17 categories (Table 5). Out of the seven respondents, 5 companies have mentioned that technology in important in their business and marketing, promotions purposes business expansions. Four

respondents mentioned that technology have indicated contributed to increase sales revenue and 3 mentioned that governmental support, use of social media, get competitor edge, increase on customer base, agreed that technology is ease of use and business expansions. Qualitative survey indicated that SME have gained many new opportunities via adaption of technology. They were able to expand their businesses from local to global using e-commerce platform and online money transactions. Social media has made direct business to business instant contact and lead them to create avenue for new business expansions, transparency of business transactions and increase trust with suppliers and customers.

Utilizing technology has further increased efficiency of business by saving time with inter relation of internal and external business entities. Due to direct contact, sales revenue has increased thereby profits. Technology has given competitive edge to organizations while opening of new employments opportunities from expansion of business activities. Share organizational knowledge and skills and proper track of organizational knowledge management systems also increased employee job satisfaction.

Table 4. Respondents profile

No	Organization Name	Business type	No of employees
1	Paradise homes	Constructions/ Gloves and face masks.	20
2	C-Mind creations	Advertising	7
3	Sapel food products	Food products	8
4	SunSeya Exports (Pvt) Ltd.	Used Tyre Exports	15
5	Healthy foods (pvt) Ltd	Curd by products	10
6	Green life Solutions	Solar panels solutions	30
7	AluTech	Aluminum fabrication	5

Table 5. Content analysis summary

Sr No	Organization name and Code Codes	Cmind creations	Sapel Foods	Paradise homes	Sunseya Exports (Pvt) Ltd	Healthy foods (Pvt) Ltd	Green Life solutions	Aluminium fabricators	Frequency
		CP	PA	MJ	DW	LA	SP	SL	
Gains from technology									
1	Important	Yes	Yes	Yes	Yes		Yes		5
2	online platform	Yes	Yes			Yes		Yes	4
3	e-commerce		Yes						1
4	time saving	Yes		Yes					2
5	Increase connectivity	Yes			Yes				2
6	low Employee knowledge skills				Yes				1
7	Employment generation				Yes	Yes			2
8	Increase sales	Yes	Yes		Yes			Yes	4
9	Business expansion	Yes	Yes	Yes	Yes	Yes			5
10	Competitor Edge	Yes	Yes					Yes	3
11	Customer base increase		Yes		Yes	Yes			3
12	Future plans of ERP		Yes						1
13	social media		Yes	Yes				Yes	3
14	Increase efficiency			Yes					1
15	Marketing and promotions	Yes	Yes	Yes		Yes		Yes	5
16	Ease of use	Yes		Yes			Yes		3
17	Innovation		Yes		Yes		Yes		3

5. DISCUSSION

This study aims to contribute to the growth of SME by identifying the constraints and barriers. The study brings conceptual clarity and insight to SME nature of technology adaption with its dependent variables, technology factors, organizational factors and environmental factors. In doing so, the study systematically links the comprehensive model of technology adaption and its dependent variables.

As per the analysis among the three determinants, organizational factors have highest influence followed by environmental factors. According to Otieno, [31] similar research done in Kenya, organizational factors such as employee knowledge and skills, owner manager support, funding for ICT are barriers of adaption of technology. Which has similarity with this Sri Lankan study, According to Senarathna & Wickramasuriya, [15], there is a correlation between SMEs' adhocracy cultural traits and their level of technological adoption. Organization culture towards adaption and innovative thinking and absorbing new way of doing thing has impact of adaption of technology [31]. Confirming to Otieno, [31], finding of Dahbi, [14] also confirm similar organizational factors are significantly influence on adaption of technology in SME sector Palestine. Dahbi adds internal organizational strength such as IT infrastructure and top management support are key factors behind technology adaption level. According to Das et al. [42], When implementing sustainable practices, SMEs have an advantage over large firms due to their structural flexibility and simple hierarchical structure. Therefore SMEs taking relative advantage of flexibility can assign random task forces to implement step by step approach towards technology adaption. As stated by interviewee CP who personally monitors and supervise tasks assigned to remote work from home users to deliver the best fit to customer satisfaction.

As stated by interviewee DW who is an exporter of used tyre's, DW uses social media platform to keep his contacts intact with his global supply chain to supply used tyre's to his customers. In case CP who is running an advertising and event organizing company needs to deliver the product or service on-time is most critical. On day delay is loss of order. In MJ's case who is doing a construction company point out responding overseas client promptly is important, else client might change decision which could lose a big

order. In above three cases technology plays an important role to delivering the product to customer on time. Organizational culture and management attitude towards technology is key factor and vulnerable of technology adaption.

The other important element of technology adaption is environmental factors. The role of the government / external business entities such as suppliers and customers / economic recession and lack of support from local bodies can influence organizational technology adaption. As per the quantitative results, competitor pressure and customer pressure have high significant influence in adaption of technology. Similar researches has done in SME growth in Sri Lanka [43] argue that government support is not just financial backing but also creating local conducive business climate and opening of international market opportunities. Building a friendly ecosystem is the base platform for SME growth. As stated by interviewee SP, who is doing a solar panels assembling plant stated that, government support towards renewable green energy policy is required to promote and transfer environmental friendly domestic solar panels to local market. Incentives such as tax concessions on import of solar cells can reduce cost of ownership to domestic user.

As per interviewee MJ, government lacks infrastructure development towards rural areas. They argued that non-stop power supply and reliable strong telecommunication facilities such as fiber connectivity are basic fundamentals before talking about SME growth. According to MJ, it is a good idea to build public private partnership to build infrastructure. However, according to the finding of this research existing technology was not significantly influencing factor for technology adaption. The antecedents of technology was technology already in-place at the organization. As opined [5], Existing technologies within a company are crucial to the adaptation process because they place strict restrictions on the amount and speed of technical change a company may make. They are not directly relevant to business owners or respondent's scope. This is something to be outsourced or technical person has to answer. Although existing technology is important to implement a digital transformation to newly adaption of technology the bridge is a set of organizational requirement versus technology available in the market. Therefore this is assumed that this is less significant at business owner's level. As indicated in table 5, out of 7

qualitative interviews only 1 respondent has answered relative advantage of technology adaption.

5.1 Implications

According to the finding, existing technology is not a significant factor of technology adaption among SMEs in Sri Lanka. Infrastructure being a construct of technology adaption, [32] pointed out that the decreasing cost of dependable infrastructure hardware is significantly lowering the total cost of ownership of digital infrastructure. Which is spurring widespread use of smart devices that serve as a platform for digital technologies. The purpose of technology is to obtain real-time data from digital devices and using the insights of real-time data processing. Many organizations meet minimum threshold level of owning basic infrastructure such as computers and internet. Thus, organizations with poor infrastructure do not comes with new innovations. Therefore addressing issues relating to providing and sustaining infrastructure at organizational level and at national is critical for SME growth.

Organizational factors are the most significant factor of adaption of technology. Main constructs of organization factors are a) owner's perception, b) employee engagement, c) organizational culture, d) financial resources. According to the finding, traits of the owner towards new technology are vital to technology adaption decisions. SME owner's knowledge and education level and attitude towards new technology are keys to SME technology acceptance. According to Kulupparachchi', [44] lack of novel business opportunities based upon new technologies, lack of planning for the next stage of the business, lack of information about new technology are some causes of SME failures in Sri Lanka. Arrange state level SME owners' annual / semi-annual meeting and get to-gathers on sector wise keep intact on knowledge sharing and up skill forums relevant to their sector discuss issues on industry innovations on state of art technologies.

At organization level, financial resources is the main constraint in technology adaption. Due of financial constraints, initially SME tend to avoid spending on auxiliary expenses other than core business objectives. They lack seed capital at startup seek funding sources seek investors for investment capital. According to Kulasinghe, [45] Many SMEs need funds for expansion, including

capital expenditure upgrades, management professionalization, entering export markets, and talent up-skilling, while banks continue to primarily engage in collateral-based lending. As a result, their growth has been limited. Ease of access to financial services for equity capital, reduced collateral requirements from state banks need to be formalized. Additional fund offers a means of financing to help SMEs overcome their capital limits will motivate them to apply new technological practices to enhance growth of their business. Organizational structure has been studied to identify its relationship to the innovation adaption process [23]. According to Baker, an organizational structure with centralized decision making and clearly set roles and responsibilities to employees with accountability and goals achievement are set of good internal practices organizational growth and reputation.

According to the environmental factors, competitive pressure and customer pressure are significant effect on technology adaption among SME sector in Sri Lanka. As a contribution from interview results, governmental support, telecommunication infrastructure were proved to have a significant effect on technology adaption. Educate SME owners on gaining competitive advantage of technology, time to time environmental scanning using SWOT analysis on organization to recognize organizational strengths and weaknesses as well as knowing opportunities and threats. This study suggest above implications for sustainable growth of SME sector in Sri Lanka.

6. CONCLUSION AND FURTHER RESEARCH SUGGESTIONS

The findings in this study provide valuable insights and practical information for decision makers of technology adaption. The adaption of technology in Sri Lankan SMEs is closely associated with a number of factors. The results of this study showed that some factors have hampered the expansion of SMEs in Sri Lanka. The biggest obstacle limiting the development and growth of SMEs is a lack of access to new technology. However, access to new technology is directly linked organizational and environmental factors such as financial inadequacies. The growth and expansion of SMEs are also constrained by government policies and regulations on imports and exports, particularly those that impose levies and limits on particular raw materials.

There are potential limitations of this study. In this study, analysis was completed with input from SMEs' owner managers located in Western province Sri Lanka covering Kalutara / Colombo and Gampaha districts which consists of 40% of total SME in the Island. However there are SMEs in other provinces in Sri Lanka, which this study did not take into account. In this respect, there is a limitation with generalizability of the results. The participants of the research are comprised of mainly manufacturers and business owners with import export sector, but did not include service and agriculture sector. Service sector especially tourism is the highest income generator next to remittances from abroad. Since, Sri Lanka is identified as a traditional agricultural nation; agriculture sector is very important sector that can make self-sufficient nation in food. Therefore researches on these areas are suggested to be further researched. Finally, TOE model was utilized as the theoretical foundation. The direction for future researchers is to identify potential mediators and moderators such as technological readiness, information alertness, perceived desirability, which could affect the identified relationships.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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ANNEXURE 1. Operationalization of the variables

Variable	Dimension	Measurement Item	Source
Technology adaption	Technology	Does your business have a Website or Home Page	Dahbi, [14]
		Does your business use Social networks (e.g. Facebook, LinkedIn, Twitter, Youtube etc)	Hoti, [46]
		Does your business use electronic invoices	Hoti, [46]
		Does your business use an ERP software package	Gunawardana K.D, [12]
		Does your business use E-commerce	(Dahbi, 2019)
		Does your business use portal to connect with suppliers	Gunawardana K.D, [12]
		Technology factors	Compatibility
Technology is compatible with customers' ways of doing business.	Das et al. [42]		
Transformation towards technology adaption in our company is favorable.	(Gunawardana K.D, [12]		
Technology is compatible with our company's current software.	(Chandra et al., 2020)		
Infrastructure	Computers are provided for all employees.		Ghulam, [48]
	My organization has a high degree of information system interconnectivity.		Baker, [23]
	The data will be available to everyone in my organization by using technology.		
	The adaption of is important to share knowledge with my co-workers.		
Complexity	The skills required to use technology are too complex for the employees in the company.		Chandra et al. [49]
	It is difficult for us to integrate the technology to the current business operations.		
	Lack of appropriate tools to use technology.		
	Using technology needs a lot of mental effort.	Carroll, [50]	
Relative Advantage	Company lacks adequate computer systems to support technology.		
	The adaption of technology helps the company to increase customer base.		
	The adaption of technology cuts costs in operation.		
	The adaption of reduces order response time		
	The adaption of helps generate competitive advantage.		
Security	The adaption of technology provides timely and accurate information for decision making.		
	The organization protects its information assets adequately by adopting		

Variable	Dimension	Measurement Item	Source	
		technology.		
		It is important to understand the threats to the information assets (for example, systems and information) in my organization		
		Threats to security of information assets (for example, ICT) are controlled adequately in my organization	Dahbi, [14]	
		I believe my business unit will survive when using technology if there is a disaster resulting in the loss of systems, people and/or premises.		
		Since the technology has adequate security features, I feel that my privacy is protected at this system.	(Rosyadi et al. [5])	
		Assurance of security as a factor is important in choosing technology.		
Organizational factors	Owners perception	Relative importance is given by my organization to adopt Technology		
		I am committed to adopt technology in my organization.	Dahbi, [14]	
		I have the desire to adopt Technology to improve the competitive strategies of the organization.		
		My organization is very concerned with the performance of the technology	Dahbi, [14]	
			My organization makes an effort to provide sufficient funding for Technology adaption and operation.	(Gunawardana K.D, [12])
	Employee Engagement	Teamwork is encouraged and practiced in this organization.	Zamzami, [51]	
		Employees are extremely focused on customer needs.	Organization for Economic corporation and Development, [52,53]]	
		Employees are committed to maintain high standards of quality.	Chawla, [32]	
	Organizational Culture	Information in my organization is easy to access at any time.		
		My organization has formal procedures or policies to collect information regarding best practices and current research.		
My organization has a culture that promotes knowledge and information sharing among employees.				
In my organization, decisions are made at those levels where the most accurate information is available				
Financial Resources	The amount of money and time to be invested to adopt Technology are low.	Dahbi, [14]		
	The cost of Technology is quite low for my company.	Chandra et al. [49]		
	Availability of internal financial resources is positively sufficient to adopt	Chandra et al. [49]		

Variable	Dimension	Measurement Item	Source
		technology.	
		The equipment required to use Technology is not expensive.	Ghulam, [48]
		My company will take Technology more seriously when receiving adequate financial support.	Ghulam, [48]
Environment factors	Customer Pressure	Our customers are pressuring us to adopt Technology.	
		Customers' requirements indicate that our company need to adopt Technology.	
		Customers' behaviours indicate that our company need to adopt Technology.	
	Competitive pressure	We believe that we will lose our customers to our competitors if we do not adopt Technology	Dahbi, [14]
		We feel there is a strategic necessity to use Technology to compete in the market.	Ghulam, [48]
		Our organization has experienced competitive pressure to adopt Technology.	Chawla, [32]
	Our organization would experience a competitive disadvantage if Technology services are not adopted.	Chawla, [32]	

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