Original Research Article

Conceptualise Scale to Quantify E-Readiness of Farmers: Sri Lankan View

Abstract

Aim: E-agriculture is vital for supporting the development in agricultural sector. Before developing any e-agriculture technology, it is essential to measure e-readiness as it will be an indicator to foresee the application of the developed technology. This has necessitated the concept of e-readiness. The literature has not yet adequately assessed the farmers' e-readiness level due to a lack of contextually appropriate assessment tools. This study aims to identify factors that contribute to measure e-readiness of farmers in Sri Lanka and constructing and standardising a scale that can be used to quantitatively score e-readiness across each of these factors.

Design: The study utilized the criteria 8Cs developed by Rao and embraced a structured literature review approach to identify measurement items to 8Cs. To finalise the statements, the study used mean value and Kendall's coefficient of concordance.

Findings: The analysis of the literature demonstrates that most of the indicators of e-readiness related to technology infrastructure, human skills, people and accessibility and connectivity. However, the challenge is to construct a comprehensive model that would incorporate all the major driving forces of an economy that would directly effect on the improvement of e-agriculture. We proposed 89 independent measures across eight factors.

Originality: This paper provides a first attempt to conceptualise the scale to quantify the e-readiness of farmers in Sri Lanka utilizing the criteria 8Cs. The proposed assessment framework would rectify the areas excluded by the existing e-readiness tools and provide a more inclusive foundation for measuring and monitoring e-readiness in agricultural community.

Implications: The study will be useful to know farmers' preparedness and ability to use technological devices. The e-readiness measurement will be utilized to evaluate the farming community's readiness to engage in e-activities such as e-commerce, e-learning and e-government.

Keywords: E-readiness; Farmers; Conceptualization; 8Cs; Sri Lanka

Introduction

Information and Communication Technology (ICT) is anticipated to be instrumental in the achievement of the sustainable development goals envisaged for the year 2030 (Inegbedion, 2021). Agri-business plays a significant role in the advancement of a country, while humans cannot live without food (Sathya et al., 2019). In line with that, the Food and Agriculture Organization of the United Nations (UNFAO) has projected that more than 60% of the world population depends on agriculture for survival (Poudel et al., 2020) and in 2019, 26.85% of employers in total employer population were represented in agricultural sector (World Bank,

2019). Tactlessly, the more than 820 million people across the globe are suffering from hunger, stressing that there is a global food and nutrition security challenges (World Farmers' Organization (WFO), 2020). The COVID-19 pandemic brought significant effects on the stages of agriculture value chains due to shortage of agri-inputs, labourers are unable to move from one place to another, lack of strong food storage infrastructure and facing challenges to sell products (Fan, 2020). Despite the pandemic constraints, the communal challenges in the agricultural sector are the ageing of farmers, labour shortages, low productivity and poor functioning markets. Governments around the world have been putting in place a range of policies to ensure that economic actors have the wherewithal to resume their food security level; developing digital transformation in agricultural sectors becomes the prominent strategy. Considering larger acceptance of information technology (IT) and e-commerce among the consumers, institutions belonging to agri-businesses are rapidly applied IT-driven strategies for their supply chain. Moreover, the view of shocks like COVID-19 emergency, is stressing the relevance and significance of the smart technologies and a wider analysis of the impact that such transformation can have on the agri-business industry.

The role of ICT to prompt the growth of agricultural sector, improve food security and enhance farmer's livelihoods is increasingly recognised and thus accepted at the World Summit on the Information Society 2003-2005 (Steinen et al., 2007). It has a profound impact on various activities in the agriculture sector like research, cyber-extension, marketing and transfer of technologies leading to its sustainable development (Pal et al., 2020). Utilizing e-agriculture can create transparent mechanism in purchasing and selling, fair information dissemination and incorporate proficient transportation methods. As Inegbedion et al. (2020) insisted it is essential to access the acquisition of the necessary skills to bridge the digital divide. Evidence proved that many rural-inhabitants are not fully gaining benefits from mobile technology as they have not utilized the full potential of technology; in reality, mobile phone-based financial transactions are still very low (Akintunde and Oladele, 2019). All these notes bring us to the question of how finest to prepare a nation to successfully assimilate e-agriculture. There can be no understanding of future policy steps without reference to the status of ICT implementation and application procedures (Hanafizadeh et al., 2009). Quantifying e-readiness is intended to channel expansion efforts by providing standards for evaluation and determining growth. Before developing any e-agriculture technology, it is essential to measure the e-readiness as it will be an indicator to foresee the application of the developed technology by the target group.

Historically, Sri Lanka had been a self-sufficient economy comprising a peasant agriculture economy. After several transformations in agriculture and trade regimes over time, the present agriculture sector in Sri Lanka comprises both locally produced foods (79%) as well as imported foods (21%). Domestic production of major food categories like rice, meat, eggs, fish, vegetables and fruits exceeds 87% of total supply. The agriculture sector is dominated by smallholding farm families and more than 70 percent of the population is residing in rural areas whose main source of revenue generated from agriculture (Agstat, 2019). Currently, 24 percent of the total land area of Sri Lanka is being used to agricultural purposes. The sector constitutes 7 percent of GDP and 23.3 percent of export earnings in 2020 (Central Bank Report, 2020) and provided employment to about 25.3 percent of the labour force (Sri Lanka

Labour Force Survey Annual Report, 2019). Due to the poor functioning markets and lack of ICT involvement in agri-food supply chain system, the food supply system in Sri Lanka involves a large number of intermediaries, handling a number of agricultural commodities that are seasonal, bulky and in some instances are highly perishable. Awkwardly, post-harvesting wastage is also high, specifically for fruits and vegetables. In addition, the purchase of agriculture product is left to those who function as organized traders, and these traders typically purchase at relatively low prices (IPS Report, 2020). The ICT Agency of Sri Lanka (ICTA) was created in 2003 as the policy implementing body in Sri Lanka in relation to e-governance and e-services. Moving on, Sri Lanka e-agriculture strategy was introduced in 2016 with envision of achieving excellence in adopting e-solutions to transform agriculture for national prosperity (Sri Lanka e-agriculture Strategy, 2016). Interestedly, Department of Agriculture plays the major role in agri-technology generation and transfer and has already embarked several e-agriculture programs such as Wikigoviya web site; Krushilanka agriculture portal; AgMIS; e-SMS Service; Agriculture videos on the Internet; Market price Information Systems. However, inadequate deployment of appropriate technologies for crop production and marketing is still emerging issue in Sri Lanka. Nowadays, the digitalisation represents a need for the Sri Lankan farmer (IPS Report, 2020) as it is still rare. There are hesitations whether the infrastructure within telecommunication industry and agricultural institutions are ready to support both the required resources and farmers using them. It also begets the query regarding whether these institutions are able to maintain deployment of appropriate technologies for agriculture. Moreover, it is crucial to understand and examine the deployment of e-agriculture, particularly from the users' perspective. It would appear that what is missing at these points is the aggregate level of understanding on farmers' e-readiness. Possibly too, the literature on farmers' e-readiness has not yet adequately assessed the level of e-readiness due to a lack of contextually appropriate assessment tools. To decide where to go, each community must first know where it is. This has necessitated the concept of e-readiness. However, to the best of our knowledge, the literature on farmers' e-readiness in Sri Lanka is still scarce. Recognizing what is needed, in which way, for what purpose, and if successful still exemplifies the challenges in agriculture sector. This is where the current study comes in. The study is undertaken with the objectives of identifying the factors that contribute to measure e-readiness of farmers in Sri Lanka and constructing and standardising a scale that can be used to quantitatively score e-readiness across each of these factors.

Review of the Concepts

E-readiness

The United Nations announced that e-readiness measures how well a society is located to utilize the prospects provided by ICT, where ICT infrastructure, human capital, regulations, policies and internet penetration are all crucial components of e-readiness (Ojo et al., 2007). According to the developing countries' readiness guidance, Harvard University defined e-readiness as the degree to which a community is prepared to participate in the Networked World. It is gauged by assessing a community's relative advancement in the areas that are most critical for ICT adoption and the most important applications of ICTs (Alaaraj and Ibrahim, 2014). The study follows the definition of (CID, 2006); the degree to which a

community is prepared to participate in the networked world, which is gauged by assessing a community's relative advancement in the areas that are most critical for ICT adoption and the most important applications of ICTs. Thus, it is of immense significance in stressing the value of a community in terms of its ability to assess the opportunities as well as challenges relating to technological change compliance (Khalifa et al., 2021).
Literature reveals various e-readiness assessment initiatives namely; E-commerce readiness assessment guide, Readiness for the networked world, E-readiness rankings, Ready Net Go, Network Readiness Index, Negotiating the digital divide (Pal et al., 2020). CID Harvard (2002) proposed the measurement of e-readiness including the areas of human capital, infrastructure and access and connectivity. Individual E-readiness is the degree to which an individual can access and use the ICT tools and has the necessary skills to get him/her updated with the technological developments (Jirli et al., 2012). Individual e-readiness was categorized into six components *i.e.*, possession of smart devices, availability at personal level, elementary ICT expertise, internet expertise, software literacy expertise and motivational dynamics. The review of the literature proves that the prior indicators of e-readiness mostly related to technology infrastructure, people and human skills and accessibility and connectivity (Goh and Blake, 2021; Zaied et al., 2007). In this line, Rao (2003) considered the 8Cs: connectivity (affordability and widespread of ICT devices), content (useful of content and generate in local language), community (forum to discuss the issues), commerce (infrastructure for e-commerce), capacity (human resources such as technical, managerial, policy and legal to use ICTs), culture (forward-looking progressive influence to use ICTs), corporation (governmental support to use ICTs) and capital (adequate financial resources to use ICTs) as the checklist to measure the capacity of any country to be elaborate in e-readiness to make efficient businesses models or develop new export sectors. Rao's framework is furthered utilized to access the citizens' access to ICT on the performance of e-government (Abdulkareem and Ramli, 2021; Rao, 2018), readiness of knowledge management practices by employees in IT companies such as JD Edwards, EDS, EMC, Novell, Open Text, Oracle, SAS, Sun Philippines and Xerox (Halawi et al., 2017) and e-readiness in higher education context (Goh and Blake, 2021).

Aforementioned, there are many models and tools developed to assess the e-readiness. In general view, e-readiness assessment models include one or more of the aspects (Durek and Rađep, 2016; Peter, 2005) namely: Physical infrastructure (telecommunications infrastructure); ICT use (levels of use throughout society); Human capacity (literacy, ICT skill levels, and vocational training); Policy environment (the legal and regulatory environment affecting ICT sector and ICT use) and ICT economy (the size of ICT sector). However, these readiness assessment tools and models are frequently used to theorize and measure the e-readiness of a nation (Goh and Blake, 2021) and each assessment tool/ model incorporates a different underlying goal and definition of e-Readiness. No tool will tailor every user's needs. Maugis et al. (2003) noticed that most e-readiness indexes are not considered the distinctive characteristics of the countries or the demands for specific communities. On this note, the user of ICT should have a clear understanding on the particular tools that are likely to lead development of the technology. In summary, we acknowledge that there are scientifically grounded e-readiness tools they are explained in a transparent manner. Yet, most of these e-readiness tools invent in more developed western countries (Goh and Blake, 2021) there is a concern that e-readiness tools and strategies in developed countries may be incompatible with a developing country's context. Interestedly, the readiness tools tend to focus its measurement on the digital readiness of countries rather than the e-readiness of different sectors. In fact, the debate is still emerging to perceive

quantification of e-readiness index, specifically to the marginalized groups around the world like farmers. Thus, the alternative is to create new e-readiness indicators.

E-readiness in Agriculture

ArunBabu (2005) assessed e-readiness level of farmers using a tool developed for the study that covered indicators like E-access (connectedness, internet availability, internet usage, and internet affordability), E-learning (e-literacy, e-experience, e-training), E-society (people and organisations online in society and ICT usage by the society members), E-business (awareness and usage of online business), E-governance (awareness and usage regarding E-governance program), E-willingness (willingness to access ICT). Acknowledging that, Vankudothu and Padaria (2018) developed a composite e-readiness index to assess e-readiness of farmers covering six indicators namely E-skill (defined as the confidence of farmers in trying and adopting various ICT based tools); E-awareness (related to the state of being aware of various ICT tools); E-ownership (number of ICT tools possessed by an individual); E-accessibility (defined as the availability of resources); E-frequency of use (measurement of the frequency of ICT usage) and E-willingness (willingness of the individual to continue with ICT tools). Koyu et al. (2018) measured e-readiness of farmers towards the use of ICTs in agricultural extension system. The index includes: Access and Availability at an individual level (ability to use the internet, computer, smartphone); Elementary ICT expertise (capability to take part in the online program, ready to use computers, MS Windows); Internet expertise (understanding of online technology, emails, chatting tools, file sharing, knowledge of social networking); Software literacy expertise (know-how about file compression or zip, curiosity to learn more ICT courses) and Motivational dynamics (overcoming physical and psychological commotions and Motivation to learn without proper training, speed of ICTs. Senthilkumar (2020) opined that among various ICT tools, mobile phone appeared as one of the widely accepted and adopted instruments among farming communities to ease the information communication process. In line with that, Poornima and Husain (2021) constructed and standardized a scale to measure the m-readiness of farmers. A total of 159 statements signifying the m-readiness of farmers were identified and they were categorised in to four sub-groups such as physical readiness, technological readiness, psychological readiness, and economic readiness.

Measurement of E-readiness in agriculture is necessary to check farmers' preparedness and ability to use technological devices as well as to identify the extent of ICT use. It can then contribute to agriculture development by providing better coordination of the information facilities developed in government and various institutions. Menou (2001) suggests that such an explanation could be attained via the analysis of ICT effects on areas like personal life, social life, family life, professional life, economic life, and citizenship. It is challengeable to construct a comprehensive model that would embrace all the major driving forces and keep the balance between set of drivers that would directly influence on the improvement of e-agriculture. The difficulty will arise when one model chooses to use a wide set of potential economic, political and social factors, it is rather easy to lose sight of the most influential forces. To fulfill this gap, the present study is undertaken to identify the factors that contribute to measure e-readiness of farmers in Sri Lanka and construct and standardise a scale that can be used to quantitatively score e-readiness across each of these factors.

Methods and Results

To accomplish the first objective (identifying the factors that contribute to measure e-readiness of farmers in Sri Lanka), the study utilized the criteria 8Cs developed by Rao (2003). While looking at the available literature, it is apparent that a variety of e-readiness tools currently exist, Rao's 8Cs (connectivity, content, community, commerce, capacity, culture, corporation and capital) cover the general areas that e-readiness assessment models need to be focused (Refer Table 1). In other words, to understand the performance of e-agriculture, particularly from the users' perspective, it is vital to examine the adequate access to IT tools, user-friendly work-oriented content, communities of practice, a culture of knowledge, capacity of learning, a spirit of cooperation, commercial and other incentives, and carefully measured capital investments and returns. Paying close attention to all the parameters of the 8Cs framework, it can be assisted to examine the success of IT practices in any sector (Abdulkareem and Ramli, 2021; Goh and Blake, 2021; Halawi et al., 2017; Rao, 2018). Extensive review of the prior studies revealed that 8Cs framework is widely used to examine the readiness of e-government, knowledge management practices and e-readiness in higher education. However, the comparison (Table 1) exhibits that the integration of all the 8Cs into one model is constrained by various core goal and definition of e-readiness. The point we intend to highlight is the requirement of more voices to be reflected in e-readiness measures. It is important that the country needs to realize the most opportune pathway for its e-agriculture development strategy as there is no heard and fast rule. The country must endeavor to find e-readiness indicators that would best align with its agri-business strategies and trade policies.

Table 1: E-readiness measurement models comparison

Model	**Areas Focused**	**Areas covered by 8 Cs model**
Ojo et al. (2007)	ICT infrastructure, human capital, policies, regulations, and internet penetration	Connectivity, community, corporation, capacity
Center for International Development (CID) at Harvard University (2002)	Network access, Networking learning, Network society, Networked economy, Network policy	Connectivity, content, community, commerce, corporation, capacity
Networked Readiness Index (NRI) (Luyt, 2006)	Market, political, and infrastructural, individuals, businesses, and governments	Connectivity, content, community, commerce, corporation
Asian Pacific Economic Cooperation (APEC) (2000)	Basic infrastructure and technology, Access to necessary services, Current level and type of use of the Internet, Promotion and facilitation activities, Skills and human resources; and Positioning for the digital economy.	Connectivity, content, community, commerce, corporation, capital
Bui et al. (2003)	Digital infrastructure, macro economy, ability to invest, knowledgeable citizens, competitiveness, access to skilled workforce, culture, and cost of living and pricing	Connectivity, content, community, commerce, capacity, culture, capital
Bridge.org (2001)	Number of users or computers, Infrastructure, Access, Affordability, Training, Relevant content, Poverty, IT sector geography	Connectivity, content, community, commerce, capacity, capital
Economist Intelligence	Connectivity, Business environment,	Connectivity, community,

Model	Areas Focused	Areas covered by 8 Cs model
Unit (EIU) (2001)	E-commerce consumer and business adoption, Legal and regulatory environment, Social and cultural infrastructure and supporting e-services	commerce, corporation, capacity, culture, capital
Applied Research and Communications (ARC) (2002)	Network access, e-education, e-society and e-economy	Connectivity, content, community, commerce
Economist Intelligence Unit (EIU) (2002)	Business environment, Social and cultural infrastructure, Connectivity and technological infrastructure, Consumer and business adoption, Legal and political environment and supporting e-services	Connectivity, content, community, corporation, capacity, culture, capital
Brown (2002)	Policy discourse culture, Legal culture, Democratization culture, Diversity culture, Trust culture and Communications culture	Connectivity, content, community, corporation, capacity, culture
Bakry (2004)	Strategy (ICT leadership and ICT future development plans); Technology (ICT basic infrastructure, ICT e-Services infrastructure, ICT provisioning and ICT support); Organisation (ICT regulations: government, ICT cooperation and ICT management); People (ICT awareness, ICT education and training, ICT qualifications and jobs and management of ICT skilled); and Environment (knowledge, resources and economy, organisation and general infrastructure).	Connectivity, commerce, corporation, capacity, culture, capital
Ifinedo (2005)	Demand forces (culture, understanding and effectiveness, knowledgeable citizens); Measuring the supply forces (industry competitiveness, skilled workforce and investments); and Societal infrastructure (cost of living and pricing, advanced infrastructure and macroeconomic environment).	Connectivity, community, commerce, capacity, capital
Peters (2005)	Legal and regulatory environment, Affordability, Availability, Integration, Socio-cultural factors, Macroeconomic environment, Government's role, Appropriateness, Capacity and training, Use if ICT in business, Physical access to ICT and Security and peoples' trust in ICT	Connectivity, community, commerce, corporation, capacity, culture, capital
Mutula and Brakel (2006)	Connectivity, internet access, applications and services, network speed, quality of network access, ICT policy, ICT training programs, human resources, and computer literacy	Connectivity, content, community, commerce, capital

Model	Areas Focused	Areas covered by 8 Cs model
Jirli et al. (2012)	possession of smart devices, availability at personal level, elementary ICT expertise, internet expertise, software literacy expertise and motivational dynamics	Connectivity, content, community, capacity, capital
Najjar et al (2003)	Access and infrastructure, Government leadership, Human capacity, E-business and economic environment, Social environment and public awareness	Connectivity, content, community, commerce, corporation, capital
ArunBabu (2005)	Connectedness, internet availability, internet usage, and internet affordability, E-literacy, E-experience, E-training, People and organisations online in society and ICT usage by the society members, Awareness and usage of online business, Awareness and usage regarding E-governance program, Willingness to access ICT.	Connectivity, content, community, corporation, capacity, culture, capital
Vankudothu and Padaria (2014)	E-skill, E-awareness, E-ownership, E-accessibility, E-frequency of use, E-willingness	Connectivity, commerce, corporation, capacity, capital
Koyu et al. (2018)	Ability to use the internet, computer, smartphone, Capability to take part in the online program, ready to use computers, MS Windows, Understanding of online technology, emails, chatting tools, file sharing, knowledge of social networking, Know-how about file compression or zip, curiosity to learn more ICT courses, Overcoming physical and psychological commotions and Motivation to learn without proper training, speed of ICTs	Connectivity, content, community, commerce, capacity, culture
Poornima and Husain (2021)	physical readiness, technological readiness, psychological readiness, and economic readiness	Connectivity, content, commerce, corporation, capacity, capital

The second objective of the study is to construct and standardise a scale that can be used to quantitatively score e-readiness across each of 8Cs. We embraced a structured literature review approach to identify measurement items to 8Cs. With the extensive review of the prior studies, initially there were 15, 13, 11, 13, 12, 16, 18 and 15 statements which represents connectivity, content, community, commerce, capacity, culture, corporation and capital, respectively. The connectivity characterizes the availability of telecommunication devices, bandwidth, platform, interfaces, standards and portals. The sophisticated strategies to manage news, information and databases represent the content. The community represents the group dynamics and support taken to discuss the issues in ICTs. Commercial and non-commercial incentives to price and reward on e-agriculture signify the commerce. The capacity denotes the skills, talent, support and training to use ICTs. Intently, culture represents openness to change and forward-looking progressive influence to use ICTs.

Sophisticatedly, collaboration with people, industry, government, academia, non-governmental organisations and external institutes include in the corporation. Finally, substantial investment can be made to adopt in ICTs connotes the capital.

The statements were then sent to a group of experts comprising experts representing from academic (5) and industry (5). The experts were then invited to score the relevancy of the statements to measure the e-readiness of farmers on a 5-point scale (1 embodied irrelevancy of the statement and 5 indicated high relevancy) (Poornima and Husain, 2021). Among them, 8 experts scores returned, and they were taken for the final measurement. To finalise the statements, we used mean value and Kendall's coefficient of concordance (W). W-value indicates the degree of association among different scores assigned by the experts on different measurement items (Hardesty and Bearden, 2004). Therefore, a W value close to one implies high agreement among 8 experts. Further, p values (<.000) indicates that measurement items are not independent each other. The mean values and standard deviations were computed to finalise the statements. A total of 89 statements (mean value greater than 3.0 and SD less than 1.0) were finalised reflecting the e-readiness of farmers which were categorized into eight sub-headings (Table 2). Finally, rigorous reviews were carried out by three academics with relevant expertise and three industry experts to ensure comprehensiveness and clarity.

Table 2: Operationalisation of 8Cs

No.	***Items***	**Mean**
	Connectivity (W = 0.781, Chi-Sq = 65.6, p = .000)	
1	Mobile network coverage is sufficient	3.4
2	Internet speed is sufficient	3.1
3	Download speed is sufficient	3.3
4	Can take calls without interruptions	3.1
5	Different mobile network providers available in the area	3.6
6	Different mobile phone brands available in the area	3.2
7	Different computer/laptops brands available in the area	3.0
8	Mobile network provider has good customer care service	3.1
9	Mobile phone/Computer/Laptop provider has good customer care service	3.2
10	Mobile phone/Computer/Laptop technical experts are available in the area	3.3
11	Mobile phone/Computer/Laptop accessories are available in the area	3.4
12	Mobile phone/Computer/Laptop service centers/repairing centers are available in the area	3.3
	Content (W = 0.691, Chi-Sq = 43.5, p = .000)	
1	Internet information are available in Sinhala/Tamil language	3.6
2	Send SMS in Sinhala/Tamil language	4.1
3	Send emails in Sinhala/Tamil language	3.1
4	Sinhala/Tamil fonts available in Mobile phone/Computer/Laptop	3.3
5	Easy to find information using Internet	3.1
6	Technical terms associated with Mobile phone/Computer/Laptop are easy to understand	3.2
7	Information provided in Internet sources are confusing	3.3
8	Able to handle Mobile phone/Computer/Laptop using English language	3.2
9	Mobile phone/Computer/Laptop assist to find agricultural related information quickly	3.3

	Community ((W = 0.684, Chi-Sq = 38.3, p = .000)	
1	Family members know how to use Mobile phone/Computer/Laptop	3.8
2	Friends know how to use Mobile phone/Computer/Laptop	3.4
3	Mobile network provider assists with technical support when needed	3.5
4	Mobile phone/Computer/Laptop provider assists with technical support when needed	3.1
5	Family members help to find information from Internet	3.7
6	Friends help to find information from Internet	3.4
7	Mobile phone/Computer/Laptop providers carry out promotion campaign in our area	3.3
8	People with operational knowledge of Mobile phone/Computer/Laptop are available in the area	3.2
	Commerce ((W = 0.711, Chi-Sq = 54.7, p = .000)	
1	There are options for online agriculture sales	3.0
2	There are options for online agriculture purchases	3.1
3	There are options for online transactions (other than agri products)	3.2
4	Facebook provides platform to sell our products	3.5
5	Use Mobile phone/Computer/Laptop to pay bills	3.2
6	Use Easy Cash payment method	3.4
7	Like to do online transactions	4.1
8	It is easy to do online transactions	4.2
9	Family members do online transactions	4.1
10	Friends do online transactions	3.9
11	Used to get help from others to do online transactions	3.8
	Capacity ((W = 0.740, Chi-Sq = 46.6, p = .000)	
1	Use Mobile phone/Computer/Laptop without others' assist	3.3
2	Use internet applications (google search, email ..) without others' assist	3.2
3	Learn to use Mobile phone/Computer/Laptop without others' assist	3.4
4	Not afraid to use Mobile phone/Computer/Laptop	3.7
5	Difficult to remember the operations in Mobile phone/Computer/Laptop	3.8
6	Mobile phone/Computer/Laptop are meant for the younger generation	3.9
7	Eager to learn about Mobile phone/Computer/Laptop new applications	3.4
8	It is easy for me to search information from Internet	3.2
9	Eager to learn about online transaction process	3.3
	Culture ((W = 0.673, Chi-Sq = 65.9, p = .000)	
1	Mobile phone/Computer/Laptop are the symbol of a standard lifestyle	3.9
2	Mobile phone/Computer/Laptop are not user friendly	3.7
3	Using Mobile phone/Computer/Laptop leads to health problems	3.5
4	Language becomes a barrier to use internet	4.1
5	Language becomes a barrier to use Mobile phone/Computer/Laptop	3.8
6	Ready to use Mobile phone/Computer/Laptop as a good learning tool	3.1
7	Mobile phone/Computer/Laptop serve as a good tool to find information	3.2
8	Mobile phone/Computer/Laptop allows more contact among farmers	3.1

9	Technology helps to get more profit from agri-business	3.6
10	Knowledge on Mobile phone/Computer/Laptop is essential for the farmers	3.4
11	Knowledge on Internet is essential for the farmers	3.8
12	Agriculture productivity can improve by using technology	3.9
13	Farmers can get more knowledge by using Internet	3.9
14	Updated information can get from the Internet	3.4
	Cooperation ((W = 0.713, Chi-Sq = 74.8, p = .000)	
1	Facebook pages are available to solve agricultural issues	3.1
2	Agricultural related information is available in Agriculture Department website	3.5
3	Useful information related to agriculture is available in Internet	3.4
4	Mobile apps related to agriculture are available	3.3
5	Agri-officers in the area encourage to use Mobile phone/Computer/Laptop	3.6
6	Agri-officers in the area encourage to use Internet to search information	4.1
7	Training/workshops organized to make awareness of internet usage	4.2
8	Training/workshops organized to train us to use the internet	3.9
9	Training/workshops organized to encourage the use of Mobile phone/Computer/Laptop	3.1
10	The government has a proper intention to improve agriculture sector using technology	3.7
11	My family members/friends encourage me to use Mobile phone/Computer/Laptop	3.6
12	My family members/friends encourage me to search information in Internet	3.3
13	Government Institutions provide agricultural information quickly	3.1
14	Agriculture related videos are available in YouTube	4.1
15	WhatsApp group/s created among farmers in our area	4.3
	Capital ((W = 0.692, Chi-Sq = 53.2, p = .000)	
1	Price of Mobile phone/Computer/Laptop is affordable	3.2
2	Call rates are affordable	3.8
3	Data charges are affordable	3.4
4	Mobile phone/Computer/Laptop accessories are affordable	3.5
5	I like to change my Mobile phone/Computer/Laptop when new models are available in the market	4.1
6	Search information in Internet is costly	4.2
7	Repairing charges of Mobile phone/Computer/Laptop are very high	4.1
8	Installment payment method is available when buying Mobile phone/Computer/Laptop	3.8
9	Online transactions are costly	3.6
10	Online agriculture selling make more profit than physical selling	3.4
11	Online agriculture purchasing is cheaper	3.5

Research Implications and Conclusion

The ongoing hasty advance of ICT has a vital responsibility in linking research, market toward mounting the specialized and entrepreneurship capabilities, institutions and the agricultural societies. In Sri Lanka, agriculture is one of the most imperative sectors, and could gain enormously with the appliance of ICTs. Apparently, the value to a community of evaluating its e-readiness keeps in evaluating its exceptional opportunities and challenges.

Traditional literature on various phases of readiness, e-connectivity, and implications for economic development has highlighted many variables that are relevant to e-readiness and mainly focused on availability, ownership, and affordability of infrastructure. Thus, there is a need to spotlight on the missing areas such as culture, corporation; so that ICTs can be better exploited in agricultural sector.

The study examined and classified the popular studies on e-readiness. Although there are many different types of measures are introduced at present, there is no standardisation of measures (Bridges.org, 2001). Therefore, we identified a model and standardize scales to measure e-readiness of farmers by the status and progress on eight interrelated factors (connectivity, content, community, commerce, capacity, culture, corporation and capital) suggested by Rao (2003). We proposed 89 independent measures across eight factors. The proposed assessment framework would rectify the areas excluded by the existing e-readiness tools and provide a more inclusive foundation for measuring and monitoring e-readiness in agricultural community. Before developing any e-agriculture technology, it is desired to measure the e-readiness as it will be an indicator to envisage the usage of the developed technology by the farming community. The present study will be useful for the researchers for the measurement of e-readiness of farmers to know their awareness and competence to use technological devices. It further illustrates that whether the farmers are at its best and where the lacking is and thus highlights the stout and feeble points so that actions can be made consequently. The assessments then lead the policy makers to assemble a planning process, which in itself is an essential step in making sound policy and investment decisions. Further, different level of indicators allows policy analysts to determine areas of strengths and weaknesses, thus providing a balanced view in directing the farming community through the digital transformation.

In summary, e-readiness assessments of farmers help institutions better gauge potential best practices in the e-agriculture. More importantly, it enables farmers to probe the likelihood of success of any anticipated ICT-based applications. In other words, this measure will be used to assess how ready the farming community to engage in e-activities such as e-government, e-learning and e-commerce. The farming community e-readiness assessment tool should therefore enable agriculture related institutions to gauge their readiness to take advantage of the opportunities afforded by ICTs. The level of e-readiness can also provide an edge to effectively use ICTs to create new opportunities for farmers over those that are not e-ready. Therefore, any strategy for the use of ICTs must be well supposed systematically, after all, no farmers want to be seen as being digitally retrograde and non-competitive.

This study carries some limitations despite the contributions it offers. A scale was developed and standardised here with limited expert evaluations to measure the e-readiness of farming community. Utilizing survey method representing the farmers, it is our intention to continue this study with statistical validation of the e-readiness measurements. As the scope of future study, it would be comprised the farmers who are engaged in the commercial cultivation of horticulture, floriculture and livestock. These agri-products were specified because there is a vital requirement to use the information systems to share real-time information among the various stakeholders due to their perishable nature and the high dependence on the external environment. The easy to use e-readiness assessment scale presented in this study has its focus on agricultural aspects. The study presented the standardize scale to fulfill the requirements of agricultural sector e-readiness environment, from the farmers' perspectives

in the Sri Lankan context. The measurement items will have quantitative targets that could be used for benchmarking and quantitative assessment of e-readiness attempts in e-agriculture. In future work, a structured questionnaire will be designed to examine the participants' perception towards 89 measurement items. The participants will be asked to specify the extent of their agreement or disagreement on a five-point Likert-type scale (completely agree; agree; disagree; completely disagree; don't know). The research data presented in the form of interval data scores could be divided into four levels of e-readiness, namely: very low (0.0-1.0), low (1.1-2.0), high (2.1 - 3.0) and very high (3.1 - 4.0) (Iskandar et al., 2020). Then after, with minimum of 150 sample, it is required to conduct exploratory factor analysis. Following the results of the exploratory factor analysis, another pilot test will be conducted to test confirmatory factor analysis. Reliability of the measurement items should be tested with at least Cronbach alpha. The prior studies further proved that internet utilization by farmers was influenced by the farmers' age, level of education, quantity of production, income generated, and location of farm. On this note, including the demographic characteristics provides a comprehensive picture of assessing and evaluating unique opportunities and challenges of e-readiness of farming community.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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