Original Research Article

Deriving Solutions to the Contemporary Issues in Entrepreneurship: Determinants of Establishing Digital Entrepreneurship Ecosystem in Sri Lanka

Abstract

Purpose: Entrepreneurship is one of a country's economic engines, particularly in developing countries. Sri Lanka was sliding down in Global Entrepreneurship Index. The main purpose of this study is to investigate the key determinants to the establishment of digital entrepreneurial ecosystem for deriving solutions to the contemporary issues in entrepreneurship in Sri Lanka.

Method: Quantitative research approach was employed. Primary data were collected through a structured questionnaire, using 234 undergraduates who are following entrepreneurship degree programs in the selected universities. Acknowledging the literature, digital entrepreneurship, infrastructure, user citizenship and marketplace were selected as the determinants of establishing the digital entrepreneurship ecosystem.

Findings: Multiple regression analysis results indicated that digital entrepreneurship, digital infrastructure, digital user citizenship and digital marketplace have a significant influence on the establishment of the digital entrepreneurship ecosystem. Digital entrepreneurship has the greatest effects on the establishment on digital entrepreneurship ecosystem, followed by digital infrastructures. The digital marketplace has the smallest effect on establishing the digital entrepreneurship ecosystem.

Research Implication: Findings of the study would be useful in monitoring the involvement of digital technologies in entrepreneurship. Local, provincial, and national governments can play an important role in encouraging digital entrepreneurship and digitalization among potential entrepreneurs.

Future Research Suggestion: The study focused only on the effect of digital infrastructure, users and marking aspects on the establishment of the digital entrepreneurial ecosystem. The developing countries like Sri Lanka, the lack of law, investment hunger, corruption, and gaps in the low of innovation environment and inefficiency of administration agents and business forms are impeding the progress of the enormous preference for innovation and digital technology. Further research should be conducted to investigate how these factors play a role in this model.

Key words: Digital entrepreneurial ecosystem; Undergraduates; Digital infrastructure; Digital user citizenship; Digital marketplace

Introduction

Entrepreneurship plays a major role in accelerating the pace of economic development the world over through innovative and creative approaches to the process of production and product launching in the market. Entrepreneurship is a process of identifying and begging a business firm, sourcing and organizing the required resources and taking both the risks and rewards connected with the firm (Balasundaram 2010). Also, another way we can express entrepreneurship simply as the process of introducing new products/services or methods which are not in use currently. It has thus helped to user a new economic order by the

perception of new opportunities and converting them into profitable ventures. In developing countries such as Sri Lanka, it is widely acknowledged that entrepreneurship development is critical not only to address the problem of unemployment, but also to achieve higher levels of economic development and growth. Unfortunately, Sri Lanka's position in the Global Entrepreneurship Index (GEI) was deteriorating. During the period from 2015 to 2019 Sri Lankan's value in the GEI has been declined by more than 30%. It was declined down from 31.1% in 2015 to 19.1 % in 2019.Currently Sri Lanka was ranked 101th among 137 countries which is comparatively the lowest rank in the region (Global Entrepreneurship Development Institution, 2019). The GEI provides a clear replica of the current conditions in Sri Lanka which is needed to enhance of entrepreneurship. Summarizing all the above, it appears that there is a widening gap in entrepreneurship skills in Sri Lanka and therefore there is an urgent need to develop entrepreneurship skills.

Typically, Sri Lankan society is oriented toward aversion to risk-taking in business and prefers to stick to traditional paths or conventional norms. Sri Lankans have inherited this mental attitude as a result of their cultural and educational systems. Essentially, there is no room for entrepreneurship to thrive unless one is willing to fail and take risks. Therefore, education is the foundation for creating a favorable ecosystem for entrepreneurship development. When considering the scope of entrepreneurship in the Sri Lankan school curriculum, the theoretical subjects of the entrepreneurship that are included in the junior secondary syllabi from grades 6-9 in Sri Lanka are the initial stage of imparting entrepreneurship knowledge. Students in grades 10 and 11 gain foundation knowledge about entrepreneurship and have the opportunity to improve their knowledge, skills, and attitudes through the subject of entrepreneurial studies.

Furthermore, many local universities in Sri Lanka have paved the way for students to pursue higher education regarding the entrepreneurship for learning a broad view of entrepreneurship subjects (National Institute of Education Sri Lanka, 2014). Many local universities now accept entrepreneurship as a core concentration or major area of study at both the graduate and undergraduate levels. They currently offer Certificate Level, Diploma Level, Advance Diploma Level, and Master's Degree programs. As an example, the University of Sri Jayewardenepura has formed a Small and Medium Enterprise Development Support Unit (SMEDSU) under the Department of Entrepreneurship to provide study programs to develop future entrepreneurs' entrepreneurial knowledge, skills, and attitudes (Dailyft, 2019). Also, now entrepreneurship training is conducted by several governmental, non- governmental and private sectors agencies in Sri Lanka such as Industrial Development Board (IDB) established the Centre for Entrepreneurship Development and Consultancy Services (CEDACS) to give quality management service to train entrepreneurs, Sri Lanka Business Development Centre (SLBDC) is supported by a German donor (GTZ) and is known as CEFE (Competency -based Economic through Formation of Entrepreneurs) etc. in addition, it is estimated that more than 100 graduates are produced per year only from the state universities in Sri Lanka (Dailyft,2019). Though, Sri Lanka has introduced entrepreneurship as a subject to the education system which is including the school curriculum since 2007, it is still questionable whether it has achieved the desired results when looking at the GEI. Despite so many sources, facilities and resources, Sri Lankan's lack of entrepreneurship is a problematic situation because even low-resource countries like

Luxembourg (20th), Uruguay (60th), Nigeria(92th) hold a high position in the global entrepreneurship index than Sri Lanka (Global Entrepreneurship Development Institution, 2019).

The lack of scope for new technological knowledge in entrepreneurship education in Sri Lanka has directly affected the lack of entrepreneurship in the Sri Lankan context. Entrepreneurship education in schools in Sri Lanka is limited to the conceptual aspects of entrepreneurship but it should be merged with a technical knowledge base platform (Balasundaram, 2010). Accordingly, the gap in entrepreneurship in Sri Lanka should be filled by a combination of the digital platform and the role of traditional entrepreneurship. Thus, the Digital Entrepreneurship Ecosystem (DEE) can be introduced through the integration of the conceptual theoretical background of entrepreneurship and the digital ecosystem to formulate a new conceptual framework for digital entrepreneurship.

Now digital technologies have a substantial impact on how new entrepreneurial endeavors are imagined and developed. Therefore, digital technological intervention is essential for development of entrepreneurship (Elia et al., 2020). Building a technology-based entrepreneurship education curriculum is essential at the moment, as the digitalization process can broaden student partnerships and networks with their peers across countries, entrepreneurial educators, and business communities. The DEE therefore can be introduced through the integration of the conceptual theoretical background of entrepreneurship and digital ecosystem to formulate a new conceptual framework for digital entrepreneurship ecosystem highlighted four key factors which effect on the effectiveness of digital entrepreneurship ecosystem namely digital infrastructure governance; digital user citizenship; digital entrepreneurship; and digital marketplace (Sussan and Acs, 2017).To reshape the gap of entrepreneurship in Sri Lanka, DEE can also be introduced into the Sri Lankan higher education system. The study intends to investigate the key determinants to the establishment of DEE for deriving solutions to the contemporary issues in entrepreneurship in Sri Lanka.

Without digital infrastructure, digital users, the digital marketplace, and the digital ecosystem, discussions about digital entrepreneurship would not be effective. Therefore, the findings of this study will be useful in monitoring the involvement of digital technologies in entrepreneurship education in Sri Lanka and making suggestions to relevant parties from the school level to university level. The problem of unemployment among the working population is taking a serious turn on a frequently. In developing countries such as Sri Lanka, it is widely acknowledged that the development of digital entrepreneurship is critical not only to solve the problem of unemployment, but also to attain greater levels of economic development and progress. The findings will contribute to the digital entrepreneurship development through entrepreneurship education in Sri Lanka. It is critical because digital entrepreneurship is like a self-employment that takes place through online platforms. This information will help to create the bridge between the entrepreneurship gap and new technological knowledge through the introduction of a digital entrepreneurship ecosystem to the entrepreneurship education system in Sri Lanka.

Literature Review

Entrepreneurship ecosystem

An "entrepreneurial ecosystem" is a network of actors that interact with one another and influence the chances of survival of a venture creator and their innovation in a region or country. Furthermore, innovators' competencies, networks, formal institutions, wealth creation, culture, new knowledge, and financing are critical for value creation from entrepreneurship. The challenge is to allow all of these aspects to complement each other in such a way that they offer greater value when combined. That is what distinguishes a well-functioning ecosystem (Hill et al., 2019). In 2014, Stam revised the overview of the entrepreneurial ecosystem as shown in Figure 1.

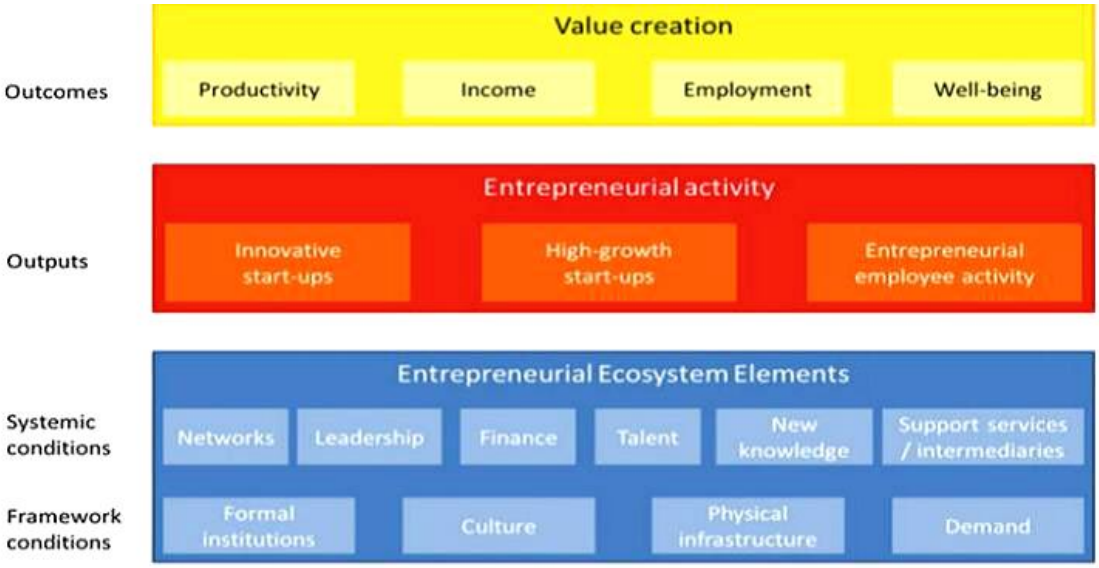

Figure 1: Revised overview of entrepreneurial ecosystem

Source: (Stam, 2014)

Stam goes on to define the synopsis of an entrepreneurial ecosystem as "an interdependent set of elements and components governed. It enables entrepreneurial action refers to the process by which individuals pursue opportunities for innovation. That involves new value creation in society, which is the ultimate outcome of an entrepreneurial ecosystem.

Entrepreneurship trainees in Sri Lanka have the opportunity to gain a comprehensive understanding of all of the above conditions, but do not appear to have achieved the desired results according to the Global Entrepreneurship Index in the last few years. Accordingly, it appears that there is some weakness in the structure of the traditional entrepreneurial ecosystem. Compared to global entrepreneurship, entrepreneurship in Sri Lanka has often only reached the first level of output in the above Figurer 1 and some entrepreneurship has not even reached the first level of output. The main reason for that, Sri Lankan entrepreneurship is not up to date with the latest technology as globally. Therefore, the local entrepreneurship index remains in a lower level compared with the globally.

Digital Ecosystem

Digital technologies are enabling or enhancing an unprecedented convergence of communications, content, and human networking, resulting in the so-called fourth industrial

revolution (World Economic Forum, 2016) and digital transformation (European Commission, 2017). Mobile services, social media, cloud computing, the Internet of things, big data, and robotics have all supported novel approaches to collaborating, organizing resources, designing products, matching complex demand and offer, and developing new standards and solutions over the last few years. The competitive environment has been gravely altered as a result of such rapid development and it has reshaped traditional business strategies, models, and processes. In theory, a digital ecosystem is a self-organizing, scalable, and sustainable system composed of diverse digital entities and their interrelationships to increase system utility, cooperation, and innovation (Li et al., 2017). The concept of a digital ecosystem was defined as the result of three different but interrelated elements, namely digital artifacts, digital infrastructures, and digital platforms (Nambisan, 2016), as illustrated in Figure 2.

Figure 2: Formation of digital ecosystem

Source: (Elia et al., 2020)

A digital artifact is a digital component, application, or media content that is part of a new product or service and provides a definite functionality or value to the end user, such as an Amazon Dash Button or a Nike sensor. A digital artifact extends physical products or services to support innovation, such as those used by businesses to develop social capital and identify new business opportunities. A digital infrastructure is a collection of digital technology tools and systems that enable communication, collaboration, and computing. Digitalization is a sociotechnical process defined by the use of digital infrastructure (Lyytinen et al., 2017). An organization stands out in its industry based on the intensity of this digital infrastructure. Amazon Web Services and Microsoft Azure, are examples of digital infrastructure specialized in cloud computing. Eventually, digital platforms are software-based platforms that are created by the extensible codebase of a software-based system and provide core functionality shared by the modules and interfaces with which it interacts (Elia et al., 2020).

IT and digital technologies have a multifaceted impact on business innovation and entrepreneurship because they can be a facilitator, mediator, or outcome of entrepreneurial operations or the entire business model (Steininger, 2018). Thus, the term "digital entrepreneurship" was coined to refer to the creation of new ventures and the transformation of existing businesses through the development of new digital technologies or the experimentation of novel applications of existing ones. It is also referred to as cyber-entrepreneurship because it involves the use of the Internet and technology platforms to manage and implement the business operations with customers, intermediaries, or partners, as well as sell digital products or services over electronic networks (Zhao and Colier,2018). Digital entrepreneurship is an important pillar for digital economic development (Shen and

Lindsay, 2018). However, entrepreneurship ecosystems emerge from dynamic, institutionally embedded interactions between individuals' entrepreneurial attitudes, abilities, and aspirations. Therefore, digital technological intervention of entrepreneurship in a country cannot be discussed without entrepreneurial attitudes, capabilities and aspirations.

Digital Entrepreneurship Ecosystem (DEE)

Digital Entrepreneurship and the Entrepreneurship Ecosystem are well-developed topics in practices that focus on entrepreneurship literature, however, the concept of the Digital Entrepreneurship Ecosystem is relatively new, with few attempts to provide an automated definition. Nevertheless, many developed countries use this concept in their innovation process. The nature of digital entrepreneurship-based businesses integrates of IT and traditional business knowledge. The rapid proliferation of digital technologies with new features has drastically transformed competitive environments, reshaping traditional business strategies, structures, and processes. Many countries perceive digital entrepreneurship as a key pillar for economic growth, job creation, and innovation (Barraza, 2021). The integration of components within a region that supports the development and growth of innovative start-ups pursuing new opportunities presented by digital technologies is defined as a digital entrepreneurial ecosystem (Elia et al., 2020). Integrated contributions on the digital ecosystem and entrepreneurial ecosystem were introduced by (Stam ,2014) and (Sussan and Acs, 2017) by providing a framework including four factors such as digital infrastructure governance; digital user citizenship; digital entrepreneurship; and digital marketplace.

Digital infrastructure is a social cognition mechanical system that includes technological and human components, networks, systems, and processes that generate self-reinforcing feedback mechanisms (Henfridsson and Bygstad, 2013). The presence or absence of technological infrastructure directly affects the success of DEE. However, countries like Nigeria, Croatia and Senegal which do not have enough digital infrastructures, are ahead of Sri Lanka in the GEI (Report of Global Entrepreneurship Index, 2019). It depends not only on the quantity of the physical digital infrastructure, there also on the ease of access to the digital infrastructure, the protection in the digital space and the non-disruptive environment of the users. As an example, in 2019 China, 854 million of digital internet users are aware of their country's digital data protection and privacy rules (Johnson, 2020). Therefore, they have guaranteed protection of their digital activities. As the result, in China, digital economy development reached 25% in 2019. According to this, digital protection directly impacts the development of the country's digital infrastructure and it also affects the country’s innovation process, and finally, it determines the best place for the country’s development of economics.

Users are the second foundation pillar of DEEs. Users, previously defined as technologists who directly interact with digital technologies, have evolved to include anyone who has access to digital technologies as a result of interconnected devices and increased device usability (Sussan and Acs, 2017). In digital entrepreneurship, users consist of people who have digital technological entrepreneurship intentions. The protection of user privacy is crucial for a proper and active digital citizenry. The DEE's long-term viability is jeopardized if public trust is eroded. The loss of trust in platforms can result in a decrease in user activity or membership. For example, Facebook's Cambridge Analytical Scandal exposed millions of

users and served as a turning point that prompted increased government regulation of the internet to protect consumer privacy. Since then, Facebook's daily active users in Europe have steadily declined (Komlosi et al.,2020).

The difference between a traditional entrepreneur and digital entrepreneurs is based on technological adaptation and technical transfers (Komlosi et al., 2020). When a traditional entrepreneur becomes a digital entrepreneur, new opportunities open up because recently digital technology has taken over human lives. Therefore, technological transfer is an essential factor for success as an entrepreneur. Only digital transfer is not enough to digital entrepreneurship, digital adoption is most essential pillar for digital entrepreneurship. Apple Inc becomes more successful business in technology industry because they continuously go with latest digital technologies and they maintain digital adoption with latest technologies.

For digital entrepreneurship to be successful, there must be essential an online platform to implement that entrepreneurial process. Digital marketplace is a very essential functional pillar for implementation of the digital entrepreneurship ecosystem. One major path to a sustainable digital entrepreneurship ecosystem is continuous value co-creation between entrepreneur agents and users in the digital marketplace (Sussan and Acs,2017). Usually, a digital marketplace involves integrating advanced technologies such as cloud, network, IoT, security, data, AI, applications and hardware together, to solve business problems in a new, innovative way e.g., smart cities, smart agriculture, smart grid, smart factory etc. (Sussan and Acs,2017). A competitive digital marketplace creates where the group of digital users supports each other to enhance their social connection and through that build up a network of digital space for their innovative ideas (Komlosi et al.,2020). As an example, Uber Eats build up the digital network for their innovative business by providing full-time or part-time jobs to unemployed youth and connecting small and medium scale hotels to this digital network.

The theoretical entrepreneurship concepts cannot implement in the practice because present entrepreneurship ecosystems are totally different from prior entrepreneurship ecosystems due to the improvement of digital technologies. Thus, developing countries need to first introduce technological changes and then develop the infrastructure and other facilities needed to cope with technological changes. As an example, in India, 68 percent of the country's 51 million small and medium enterprises are lack in internet access. Only 2% are active on the internet. Those statistics demonstrate the difference in need that must be filled in order for entrepreneurs to begin using the internet to reap its benefits (ITUNews,2018). Thus, it appears that basic facilities and relevant knowledge are required to integrate digital technology with entrepreneurship. The impact of information and digital technologies on business innovation and entrepreneurship is therefore multifaceted as they can be a facilitator, mediator or result of entrepreneurial operations or the general business model. The concept of digital entrepreneurship has thus been introduced to designate the creation of new businesses and the transformation of existing businesses by developing new digital technologies or by experimenting with new use of them.

The study therefore seeks to determine how to reshape and fill the entrepreneurship void in Sri Lanka by introducing a digital entrepreneurship ecosystem in Sri Lanka. It is essential to develop a model in order to answer the question, what are the determinants for introducing

DEE to reshape and fill the gap in entrepreneurship in Sri Lanka. Acknowledging the literature, the study proposed the following hypotheses.

H1: Digital infrastructures effect on the establishment of digital entrepreneurship ecosystem in Sri Lanka.

H2: Digital user citizenship effects on the establishment of the digital entrepreneurship ecosystem in Sri Lanka.

H3: Digital marketplace effects on the establishment of the digital entrepreneurship ecosystem in Sri Lanka.

H4: Digital entrepreneurship effects on the establishment of the digital entrepreneurship ecosystem in Sri Lanka.

Methods

To achieve the research objective, the study utilized a deductive research approach under the positivism research philosophy. Aforementioned, acknowledging the frameworks developed by (Komlosi et al., 2020) and (Sussan and Acs, 2017), the study used four independent variables namely digital infrastructure, digital user citizenship, digital marketplace and digital entrepreneurship and dependent variable to establishing the digital entrepreneurship ecosystem. The measurement items of the selected variables were based on established scales from the literature. Table 1 shows the measurement items of each of the variable.

Table 1: Measurement Items

Variables	Dimensions	Measurement Items
Digital Infrastructure (DI)	Digital Openness	No restrictions to use computer labs in the university Adequate computers to use for students in computer labs Able to install new software without any restrictions. Even outside of the university, I constantly work in an environment with technological tools and the Internet
	Digital Protection	University prevents access to websites (Facebook, Instagram) that are not required for academic purposes University facilitates computer access or data storage for all students using a unique code number or password to protect privacy Try to comply with all existing legal frameworks and privacy policy when using the Internet and other websites. During their free time the involvement of lecturers and other staff members is minimal when using computers in the computer labs.
	Digital Freedom	There are high speed internet facilities in computer labs to explore subject matter. There are minimal oversight and legal barriers to using the internet in the university computer labs. University provided facilities for free open access to some websites that students cannot access on their own to explore the subject matter.
Digital User Citizenship	Digital Literacy	Adequate time is included in the schedule to acquire technical knowledge in addition to the major subjects

(DUC)		Understand the basic functions of the computer hardware components Understand the basic functions of the computer software Easy to learn subject matters using internet sources.
	Digital Access	Browsing the Internet for academic activities (e.g. for preparing an essay or presentation) Browsing the Internet to follow up lessons, e.g. for finding explanations Using learning apps. Using email for communication with lecturers and submission of academic works or other subject related activities
Digital Marketplace (DM)	Networking	Try to build up social connections through using social business networks like LinkedIn Use social media for commutation with other parties regarding the new things in the business world University organizes various workshops to help students acquire new technical and business knowledge
	Financing Facilities	Have considerable financing facilities to acquire the latest technological devices. Ability to deal with online financing systems like E-banking, online payments, applying for the loan online
Digital Entrepreneurship (DE)	Digital Adoption	I forget about the time when I'm using digital devices. I'm really excited discovering about new digital devices or applications I usually spend a considerable amount of time to search new knowledge regarding the business world I really feel bad if no Internet connection is possible
	Digital Transfer	Comfortable to use digital devices (computers, tablets, smartphone) for my study than paper format (Newspapers, Books) Get update on my computer hardware and software with the latest technology. If I have a problem with my study, I start to solve it by browsing internet or other websites on my own
Establish the Digital Entrepreneurship Ecosystem (EDEE)		Digital intervention into entrepreneurship is essential Linkage of digital technology and entrepreneurship should done in practicable ways Improve the digital technology base education with entrepreneurship education in practicable ways New technology and basic entrepreneurial concepts need to be aligned Implement basic entrepreneurship concepts taught in the lecture hall by using digital media

The scope of this study includes undergraduates who are following bachelor of entrepreneurship degree programmes in the selected universities in Sri Lanka. The study is mainly concerned on the opinion of these undergraduates because they are the most potential

users of digital tools in particular to learn entrepreneurial skills such as business feasibility and market research, as well as to design their own business plans (Anggraeni and Grisna, 2019). Further, universities introduced several subjects such as Techno- Entrepreneurship, Electronic Business, Management Information Systems to enhance digital entrepreneurship in their degree programmes, in return, the undergraduates have possible competency to apprehend the importance of establishing the DEE. There are approximately 600 students currently enrolled in entrepreneurship degree programmes. To obtain the desired sample size, the proportionate stratified random sampling technique was employed and selected 350 undergraduates from the selected universities.

A structured questionnaire was constructed, including a total of 37 items to collect primary data from the desired sample. The items were measured by five-point Likert scale type questions with strongly disagree and strongly agree as end points. Considering the COVID 19 outbreak in the country, the study utilized an online platform to collect data through Google from based questionnaires. In the quantitative approach, data analysis consists of three steps: measuring the sample profile, testing the goodness of the data, and testing the hypotheses. The sample profile is measured using frequency analysis. The measurement items' reliability and validity were tested to ensure the measurement goodness. Factor analysis, construct reliability, average variance extraction, Cronbach's alpha values, and discriminant validity were all tested. Multiple regression analysis is used to test the hypotheses. The multiple regression analysis is utilized to determine whether key determinants of digital entrepreneurship ecosystem significantly effect on establishment of the digital entrepreneurship ecosystem to reshape the gap of entrepreneurship through introduction to the education system in Sri Lanka.

Results

The survey was conducted with 350 undergraduates and 238 responses were received. Out of 238, 4 questionnaires were not filled in correctly, 234 questionnaires were taken to conduct the statistical analysis of this study, indicating 88% of the response rate. The characteristics of the responders are described in terms of gender, the responders are already an entrepreneur, if not the responder intends to become an entrepreneur, measures the respondent's technological knowledge and the respondent digitization level. Base on the study sample 62.3% consisted of females & males, 37.6%. While considering undergraduates who are following entrepreneurship degree the study sample consisted of twenty-three (23.5%) already an entrepreneur ninety-four (94%) aspiring to be a digital entrepreneur. Over the previous year, Sri Lanka's digital literacy increased from 42.4 percent to 46 percent, and computer literacy increased from 29 percent to 32.8 percent. Although computer literacy and digital literacy have developed exponentially, concurring to the study more than a quarter of responders at a rate of 36.8%, have never taken after any additional courses relevant to Data Technology/Computer Science/Software,63.2% as of now completed any additional courses relevant to Data Technology/Computer Science/Software. While considering enterprise undergraduates the study sample consisted of 29.1% & 9.8% utilize only personal smartphone & desktop/laptop respectively. Based on the study sample 50.9% utilize both personal smartphones & desktop/laptops, only a very small percentage of 0.9% do not have any technical devices. Among those responders, 9.4% utilize only institutional computers.

To reduce the data and purify the items under each study variable, factor analysis was used. The Kaiser-Meyer-Oklin (KMO) sample adequacy measure was used. According to Vinayan et al. (2012), a KMO value of 0.60 or higher indicates a good factor analysis. Table 1 shows that the KMO value of the measurement items was greater than 0.50 and that the Bartlett's test of sphericity showed a significant level ($p < 0.001$), indicating the appropriateness of factor analysis. The loadings of the items on their correspondents ranged from 0.531 to 0.929 (greater than 0.50). There were some items not loaded properly to the respective variable (3 items from DI, 4 items from DUC, 4 items from DE), they were dropped from the analysis. The reliability of each variable was assessed using Fornell and Larcker's (1981) measure of composite reliability (CR) and Cronbach's (1951) alpha, as shown in Table 1. The CR and Cronbach's alpha values for each construct were above 0.70, which falls within the acceptable reliability range (Hair et al., 2010). The convergent validity of the constructs was assessed by examining the average variance extracted (AVE). The results presented in Table 2 further shows that AVE values exceed the respective threshold values (above 0.50) ensuring the convergent validity. The discriminant validity was ensured as the square root values of all AVEs exceed the correlation values of the respective constructs (Fornell and Larcker, 1981) (Table 2). The values of the square root of the AVE are as given in italic along the diagonals in Table 2.

The mean value of establishing the Digital Entrepreneurship Ecosystem was close to 3, implying the moderate level establishes the digital entrepreneurship ecosystem in the Sri Lankan entrepreneurship education. According to Table 3, the mean values of key determinants of digital user citizenship and digital entrepreneurship are close to three. Therefore, can conclude those key determinants are needed to establish the digital entrepreneurship ecosystem because the majority of respondents agreed with the questions posed by the researcher.

Based on the correlation values, there were statistically significant correlations among digital infrastructure, digital user citizenship, digital marketplace and digital entrepreneurship ecosystem at a 0.01 significance level. Further, none of the correlation coefficients was above 0.85, indicating the absence of multicollinearity in the variables (Hair et al., 2010).

Table 2: Assessment of adequacy of measurement

Variable	**No. of Items**	**KM measure**	**Bartlett's test of sphericity**	**AVE**	**CR**	**Cronbach's alpha**
Digital Infrastructure (DI)	08	0.873	1062.047	0.67	0.814	0.861
Digital User Citizenship (DUC)	05			0.73	0.882	0.788
Digital Marketplace (DM)	06			0.71	0.871	0.821
Digital Entrepreneurship (DE)	05			0.73	0.883	0.753
Establish the Digital Entrepreneurship	05			0.85	0.917	0.851

Ecosystem (EDEE)						

Table 3: Discriminant validity

Variable	Mean	Std. deviation	DI	DUC	DM	DE	EDEE
DI	2.6168	1.02001	*.818*				
DUC	2.9886	.67085	.314**	*.837*			
DM	2.7970	.64972	.543**	.619**	*.842*		
DE	3.2139	.79109	.490**	.803**	.407	*.837*	
EDEE	2.5620	.85662	.741**	.611**	.756**		*.922*

**Correlation is significant at the 0.01 level (2-tailed)

Multiple Regression analysis

The multiple regression analysis is used to see if the digital infrastructure, digital user citizenship, digital marketplace, and digital entrepreneurship have a significant impact on the establishment of the digital entrepreneurship ecosystem and the development of solutions to Sri Lanka's current entrepreneurship issues. The results are as given in Tables 4 and 5.

Table 4: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson	F	Sig.
1	.937[a]	.877	.975	.30259	1.759	409.604	.000[b]
a. Predictors: (Constant), digital infrastructure, digital user citizenship, and digital marketplace, digital entrepreneurship							
b. Dependent Variable: Establishment of the digital entrepreneurship ecosystem							

Table 5: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-.523	.102		-5.120	.000		
	Digital Infrastructures	.519	.033	.617	15.802	.000	.172	5.814
	Digital User Citizenship	.500	.063	.462	7.932	.000	.195	5.128
	Digital Marketplace	.413	.065	.571	8.245	.000	.163	6.134
	Digital Entrepreneurship	.729	.088	.571	8.245	.000	.342	2.924
a. Dependent Variable: Establishment of the digital entrepreneurship ecosystem								

The R2 value was 0.877 (F =228.3, p 0.001), implying that 87% of changes happening in establishing the digital entrepreneurship ecosystem is going to be represented by the independent variables of digital infrastructures, digital user citizenship, digital marketplace and digital entrepreneurship. In Table 5, the p-values for digital infrastructure, digital user citizenship digital marketplace and digital entrepreneurship were less than 0.05. As a result, these key determinants have a significant influence on the establishment of the digital entrepreneurship ecosystem. Digital entrepreneurship has the greatest effects on the establishment of a digital entrepreneurship ecosystem (beta = 0.729), followed by digital infrastructures (beta = 0.519) among the key determinants. The digital marketplace has the smallest effect on establishing the digital entrepreneurship ecosystem (beta = 0.413).

Discussion and Conclusion

This study investigates the key determinants of establishing of the digital entrepreneurship ecosystem in the Sri Lanka. Entrepreneurship education is one of the knowledge transfer processes involved in the development of entrepreneurs. In preparing students for technological changes, the digital transformation in entrepreneurship education is a novel approach as well as a significant challenge. According to literature digital entrepreneurship-focused teaching and learning is capable of encouraging knowledge and skills among students and has the potential to be long-life entrepreneurs (Fabeil, 2019; Murah and Abdullah, 2012). The modern world moves forward with advanced technology development. Among the technological advancements reported in the modern world are artificial intelligence, the internet of things, big data, and robotics. Technology education enables to entrepreneurs have the skills essential to face technology advancements. Today's entrepreneurs are expected to have the skills necessary to anticipate market changes, react to them, and initiate those (Radovic-Markovic et al., 2019). Therefore, every country has realized the real importance of integrating digital technology education and entrepreneurship education.

The DEE is made up of entrepreneurs who create digital companies and innovative products and services for many digital users in the global economy. The multiple regression results of the study suggest that the digital infrastructure, digital user citizenship digital marketplace and digital entrepreneurship significantly affect to the establishment of the digital entrepreneurship ecosystem to derive solutions to the contemporary entrepreneurship issues in Sri Lanka. Among the key determiners, digital infrastructures recorded the greater beta value. That indicates the digital infrastructures mostly affect the establishment of the digital entrepreneurship ecosystem. It depends not only on the quantity of the physical digital infrastructure, there also on the ease of access to the digital infrastructure, the protection in the digital space and the non-disruptive environment of the users.

Johnson (2020) opined that digital protection has a direct impact on the development of the country's digital infrastructure, as well as the country's innovation process, and it ultimately determines the best place of the country's economic development. If students and other digital users can freely access the digital space, they are naturally drawn to digital innovations. As an example, consider the new concept of "drop shipping." PayPal accounts are required for money transactions in the drop shipping business, but the Sri Lankan government does not permit PayPal accounts. This stumbling block is a negative sign for drop shipping doers.

However, in today's world, the vast majority of countries permit such accounts. As a result, a large number of foreign currencies come into the country. In the digital entrepreneurship ecosystem, digital users consist of people who have digital technological entrepreneurship intentions. The preservation of user privacy and data security are critical for being an active digital citizen. The DEE long-term viability is jeopardized if public trust is eroded. Breach of confidence in digital platforms can lead to a drop-in user activity or membership. For example, Facebook's Cambridge Analytica scandal exposed millions of users and acted as a tipping point, resulting in increased government regulation of the internet to protect consumer privacy. Since then, Facebook's daily active users in Europe have steadily declined (Komlosi et al.,2020).

The data analysis of the survey responses indicates that the digital marketplace is a very essential functional key determinant for the implementation of the DEE. A digital entrepreneurship hub facilitates the network of future digital marketplaces (Kalpaka et al., 2020). Because digital entrepreneurship hub facilitates the opportunity for emerging entrepreneurs develop with digital technology advances in developing countries. Through the digital entrepreneurship hub, digital entrepreneurs in developed countries offer the necessary digital experiences, digital frameworks, and network facilities to make the transition into digitalization with innovative ideas in developing countries. Through the digital entrepreneurship hub, digital entrepreneurs in developed countries provide the necessary digital experiences, digital frameworks, and network facilities for developing countries to make the transition to digitalization with innovative ideas. The DEE is the combination of the factors stated above within a region that fosters the development and growth of innovative start-ups seeking new opportunities presented by digital technologies (Du et al., 2018).

While digital entrepreneurship is not a panacea for reducing the entrepreneurial gap, public policies can play a role in removing obstacles to the creation of digital businesses by potential entrepreneurs from disadvantaged and underrepresented groups. Local, provincial, and national governments can also play an important role in encouraging digital entrepreneurship and digitalization among potential entrepreneurs.

One of the strategies taken by the government is to raise awareness about the digital economy and increase investments in digital platforms. Accordingly, building a more collaborative environment for digital start-ups, is a more important recommendation for narrowing the existing entrepreneurship gap in Sri Lanka. However, be wary not to endorse it as an activity for everyone, as digital start-ups have a lower rate of survival.

Including entrepreneurship modules in higher education with digital technology-based programs to raise awareness of entrepreneurship's potential among undergraduates is another suggestion recommended. For that, incorporate digital entrepreneurship modules into entrepreneurship education in order to assist students in developing both digital and entrepreneurship skills at the same time. As an example, Estonia, Finland, Latvia and Sweden introduced the “DigiYouth” programme for students aged in 14-19 years old. DigiYouth is a school-based foreign student start-up program that was established in 2018. The program serves together 220 students from Estonia, Finland, Latvia, and Sweden to work on the development of digital products or services. Students begin by developing ideas and forming teams, then progress to prototyping, sales, advertising and marketing, gaining hand-on

experiences. Students meet once every six months and collaborate with their peers frequently through video conferencing and collaboration tools. The program also includes hackathons, business idea and innovation competitions, and programs that are provide knowledge provide the business ideas (Alakaleek and Cooper, 2018). Education programs for digital entrepreneurship must assist students in simultaneously acquiring digital competencies and entrepreneurship competencies, as well as understanding how these skill sets can be used in tandem.

Traditional entrepreneurship training modules, such as business planning and financial skills as well as specialized digital modules, such as digital skills and digital marketing are provided by entrepreneurship programmes. Increased digital literacy should be a key component of programs so that potential entrepreneurs and self-employed people understand how digitalization can help them to improve their businesses and expand their opportunities.

In addition to that, improving access to resources and digital infrastructures for the creation of digital businesses and digitalization for the self-employed and potential entrepreneurs is another recommendation that is suggested. According to the literature, financial facilities are an essential factor for any entrepreneur seeking to enter the digital marketplace, which is a critical component of the digital entrepreneurship system. When considering the questionnaire responses, approximately 70% of respondents stated that they do not have adequate financial facilities to access the digital space. Therefore, the research points out that it is imperative to facilitate the financing of potential entrepreneurs. Many countries have implemented direct financial support (for example, business R&D and innovation grants, and institutional funding for public research) to empower research and innovation in critical areas for the digital transformations of industries. As an example, European countries introduced the “Goteo” program to entrepreneurs in order to raise funds. Goteo was founded in 2011 by a non-profit base with co-funding from the local government funding. It is a crowd funding platform that assists entrepreneurs in raising funds by soliciting donations or offering incentives to funders. As a result, the platform has received over EUR 6 million in project funding from over 84 500 backers. The overall success rate for funding is 75%. It directly is distributed among the new startups in Europa (European Crowd funding Network, 2018).

This study was conducted in a single community in Sri Lanka; the generalizability of the findings might be limited. This study focused on the effect of digital infrastructure, users and marking aspects on the establishment of EDD in Sri Lanka. However, in developing countries such as Sri Lanka, the lack of law, investment hunger, corruption, and gaps in the low of innovation environment and inefficiency of administration agents and business forms are impeding the progress of the enormous preference for innovation and digital technology. As a result, further research should be conducted to investigate how these factors play a role in this model. Although both technology education and entrepreneurship are economic development strategies, fewer studies have been conducted to determine the impact of technology education on entrepreneurship in Sri Lanka. When considering the Sri Lankan context there are a limited number of studies regarding the digital transformation economy. Therefore, future studies on digital transformation economies and digital entrepreneurship are required in Sri Lanka.

Consent

As per international standard or university standard, Participants' written consent has been collected and preserved by the author(s).

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