Impact of Entrepreneurial Orientation and Entrepreneurship Education on Entrepreneurial Intention and Internationalization of Engineer-Entrepreneur Start-ups

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Abstract

While application of entrepreneurship concept is gaining traction in engineering and the entrepreneurship courses embedded in engineering programs increase swiftly, there is a lack of study focusing on how engineering programs enable entrepreneurial experiences in their programmes. The influence of entrepreneurial orientation and entrepreneurship education on achievement entrepreneurial goals of engineers in Sri Lanka remains understudied and uncertain in many circumstances. This necessitates a thorough examination of the mechanisms by which entrepreneurial orientation and education influences entrepreneurial intention. Further, as per international entrepreneurship theory, entrepreneurial intent leads to internationalization intent when facilitated by conducive environment factors. The objective of research is to investigate the influence of entrepreneurial orientation and entrepreneurship education on entrepreneurial intention and internationalization intent of engineer entrepreneurs in Sri Lanka. Three hypotheses related to above links were tested using a validated questionnaire through a survey of 92 engineer-entrepreneurs. The results show that there is a significant positive relationship between entrepreneurial orientation and entrepreneurship education on entrepreneurial intention and internationalization intent of engineer entrepreneurs in Sri Lanka. The variable entrepreneurial intention explained 40% variance of internationalization intention. This research gives valuable inputs and suggestions with respect to entrepreneurship education and promotion of entrepreneurship orientation of engineers in Sri Lanka for policy makers.

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Introduction

Government of Sri Lanka have stated in that supporting youth with business opportunities and fostering entrepreneurship is the way forward for Sri Lanka's development. But only 2.8% of the total working population is identified as an employer or business owner, compared to 11.6% in Bangladesh, 19.6% in Vietnam, and 27.5% in Thailand (Financial Times, 2017).

Majority of entrepreneurial initiatives in Sri Lanka is in traditional, low value-added sectors or products which lacks competitive advantage in international context. Value of high-tech exports (defined as those industries which are relatively intensive in their inputs of technology and human capital by OECD, 2004) have fallen from 2% 2008 to 1% in 2018 compared to 75% in Korea and over 50% in Singapore and Malaysia (https://tradingeconomics.com/, 2020). Therefore, as a country, Sri Lanka needs to promote technology-based products and start-ups and support them to enter international business.

While application of entrepreneurship concept is gaining traction in engineering and the entrepreneurship courses embedded in engineering programs increase swiftly, there is a lack of study focusing on how engineering educators enable entrepreneurial experiences in their programmes (Hagvall Svensson, Adawi, Lundqvist, & Williams Middleton, 2020). Entrepreneurship recorded considerable growth in recent years as a theme taught within engineering curricula. This growth in entrepreneurship education is due in part to technology continuing to drive inventions, innovations and developments in the economy (Huang-Saad, Bodnar & Carberry, 2020).

Many start-ups in the engineering industry are seeking for international business opportunities as well as expanding their businesses. More and more engineers and students of technology universities have become entrepreneurs making the field of engineering more multidisciplinary. Particularly with the internationalization of business, engineers-entrepreneurs have plenty of business opportunities to evaluate and pursue; yet, they tend to devalue their soft skills and entrepreneurial ability. Less research has been conducted on the demographic, psychological and behavioral aspects of engineer-entrepreneur start-ups.

Although conventional wisdom and several past studies agree that entrepreneurship education enhances entrepreneurial intent, research on some elements, such as conceptual and theoretical development, the effect of education, and the examination of regional variations, is lacking. Awareness programs, such as career options and funding sources, informal inspirational programs, such as interviews with entrepreneurs and field trips, experimentation, such as consulting with entrepreneurs and computer simulation, and skill building courses and theoretical courses offered formally by universities are all examples of Entrepreneurship education within university system of Sri Lanka.

The main objective of this research is to identify the nature of international entrepreneurial activities of engineers in Sri Lanka. This research aims to answer the following research questions.

1. What is the impact of entrepreneurial orientation on entrepreneurial intent of engineer-entrepreneurs?

2. What is the impact of entrepreneurship education on entrepreneurial intent of engineer-entrepreneurs?

3. What is the impact of entrepreneurial intent in the process of internationalization of engineer-entrepreneur?

The specific research objectives are as follows. The research objectives are derived from research questions.

1. Investigate the impact of entrepreneurial orientation on entrepreneurial intent of engineer-entrepreneurs

2. Investigate the impact of entrepreneurship education on entrepreneurial intent of engineer-entrepreneurs

3. Find out the impact of entrepreneurial intent in the process of internationalization of engineer-entrepreneur

The rest of this article is organized in several parts. In the first part, Entrepreneurship literature was reviewed to develop a conceptual framework. In this part, literature search was conducted on main variables such as entrepreneurial orientation, entrepreneurship education, entrepreneurial intention (ambition) and start-up internationalization. Next part deals with validating the conceptual framework model based on empirical data from Sri Lanka. At the end the results are discussed, corrective actions, recommendations and initiatives regarding the pedagogical content of entrepreneurship education and internationalization are proposed and limitations of the research are mentioned.

Literature Review

Entrepreneurial Orientation and Entrepreneurial Intention

The first written definition of entrepreneurship can be found in literature dating back over two centuries. Since then, several definitions of entrepreneurship have been proposed which include risk taking, capturing opportunity, and change orientation dimensions. Stevenson and Jarillo-Mossi (1986, p10) defined entrepreneurship as ''*entrepreneurship is a process of creating value by bringing together a unique package of resources to exploit an opportunity*''.

Past studies indicate that Entrepreneurial Orientation (EO) as a variable which is linked to the entrepreneurial behaviour. EO is defined as the "processes, practices and decision-making activities that lead to new entry" (Lumpkin & Dess, 1996). EO was defined as "the combination of a firm's innovativeness, proactiveness, and risk taking" (Miller, 1983). EO was defined as a "process which consists of action and strategies a particular firm embarks to realize its goals and aspirations" (Hult et. al. 2004). This research will adopt the three-dimensional definition of Lumpkin and Dess (1996) as it is the most widely used definition of entrepreneurship in internationalization studies (Piperopoulos & Dimov, 2015.).

According to previous research, organizations with higher EO would be able to devise marketing plans for entering new markets and cope with challenging circumstances, as well as generate profits through the use of innovative strategies (Kusumawardhani et al., 2009). Knight and Cavusgil (2004) point out that entrepreneurial orientation, technological leadership and differentiation strategies are the key factors for superior international performance in international start-ups. As per Jantunen et al., (2005), EO and resource reconfiguration capacity has a profound effect in internationalization.

Intention becomes the fundamental element towards explaining behaviour in any context. Entrepreneurial intention is defined by Krueger (1993) as "a commitment to start a new business". It

indicates "the effort that the person will make to carry out that entrepreneurial behaviour" (Liñán, 2004). It captures the three motivational factors that influence behaviour, which are as follows: Perceived behavioural control, Attitude towards the behaviour and Perceived social norms.

Perceived behavioural control is defined as "the perception of the easiness or difficulty in the fulfilment of the behaviour of interest" (in this case becoming an entrepreneur). It is about the sense of capacity regarding the fulfilment of firm creation behaviours. Attitude towards the behaviour refers to "the degree to which the individual holds a positive or negative personal valuation about being an entrepreneur". Perceived social norms would measure "the perceived social pressure to carry out -or not to carry out- that entrepreneurial behaviour".

The explanatory variables of intention would be the addition of these three factors.

Thus, based on past literature, the first hypothesis is formed as follows

H1: There is a significant positive relationship between Entrepreneurial Orientation (EO) and Entrepreneurship Intention among engineer-entrepreneurs

Entrepreneurship Education and Entrepreneurship Intention

University graduates who have taken entrepreneurship classes are more likely to pursue entrepreneurial professions and create patentable discoveries (Luthje & Franke, 2002). Entrepreneurial conduct and entrepreneurial tendency are both influenced by entrepreneurship education. Entrepreneurship Education changes the two key variables to raise the perceived desirability for entrepreneurship. To begin, Entrepreneurship Education modifies people's attitudes about entrepreneurship

by reducing their fear of failure and increasing their perception of opportunity in their environment. Second, by demonstrating a confident social image of entrepreneurs and introducing entrepreneurship as a desirable career (Farashah, 2013). It also increases self-efficacy by providing the required knowledge and abilities for starting a firm, as well as improving perceptions of entrepreneurship's viability. Izquierdo and Buelens (2011), Lüthje and Franke (2002), Peterman and Kennedy (2003) and Souitaris et al., (2007) also found that entrepreneurial education significantly contribute to the entrepreneurial education of students.

Thus, based on past literature, second hypothesis is formed as follows.

H2: Participation in the Entrepreneurship Education programs positively increase entrepreneurial intention among engineer-entrepreneurs

Entrepreneurial Intention and Intention to Internationalize

Entrepreneurial orientation and entrepreneurship education are both linked to internationalization intention as well. Table 01 lists some studies which links EO with internationalization performance of SMEs. According to Yarkin and Yesil (2016), entrepreneurship education has a strong impact on university start-ups' desire to internationalize.

On the other hand, evidence prevails to believe that entrepreneurial intent propelled by EO and entrepreneurship education goes beyond a local start-up and entrepreneurs contemplate international expansion from the inception (Rauch & Hulsink, 2015). Today's market is so dynamic, and technologies are so advanced such that internationalization has become

mandatory for survival and easier to approach.

Due to the dearth of internationalized organizations initiated by engineer-

entrepreneurs who have followed formal entrepreneurship programs, this research measures "intention for internationalization" rather than internationalization intensity.

Table 01: Recent research findings in internationalization involving EO as independent variable

Research	Context	Outcome
Zhang, Ma & Wang (2012)	117 Chinese SMEs	Different dimensions of EO exert different levels of influence
Ruokonen, Nummela, Puumalainen & Saarenketo (2008)	High tech SMEs in Finland	Some aspects of EO and MO (Market Orientation) affect SME internationalization
Javalgi & Todd (2011)	150 Indian High Tech SMEs	Strong link between EO and internationalization
Evers (2011)	Two new ventures in Europe	Dynamic capability of entrepreneurs, EO and external relationships determine the success in export activities
Swoboda & Olejnik (2016)	604 SMEs	International EO influences internationalization

According to recent research, traditional characteristics such as financial assets, physical assets, and infrastructure are not connected with current start-up internationalization. Instead, it appears that successful internationalization is linked to unobservable owner and company attributes that are rooted in entrepreneurship (Teece, 2014). In order to understand the international process of SMEs, in-depth insights into entrepreneur logic and reasoning are required but sufficient attention has not been paid for this factor in past research (Cavusgil & Knight, 2015). The fundamental argument

of International Entrepreneurship theory of McDougall and Oviatt (2005) is that internationalization intention of start-up is a result of entrepreneurial behaviour of the owner/entrepreneur. Several results have found that higher entrepreneurial intent results in rapid internationalization.

H3: Entrepreneurship Intention positively increase Intention to Internationalize among engineer-entrepreneurs

Based on the literature review, the following conceptual framework can be developed for this research.
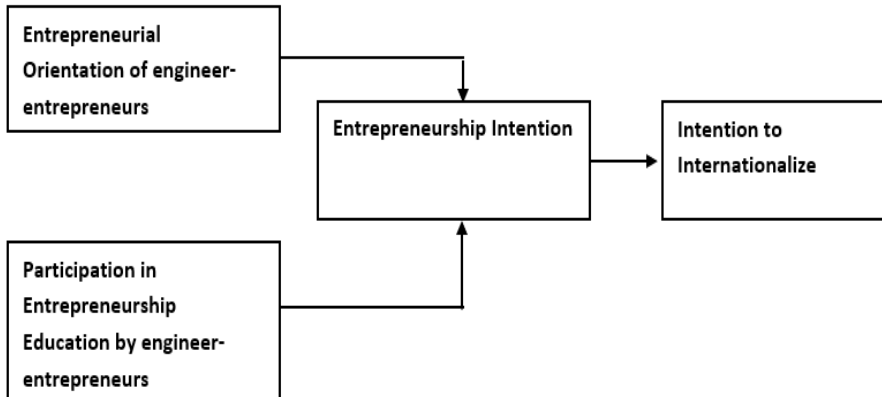
Figure 01: Conceptual Framework developed based on literature review

Methodology

Philosophical position, sampling and sample size determination

The researcher's approach to discovering what can be learned about the reality of a phenomenon is referred to as methodology. It explains the overall approach to the research process, as well as the viewpoints that support the research design, data gathering methods, and analytic procedures.

In consideration of the objectives of the study and the phenomenon itself, a positivistic paradigm was considered appropriate. There is already a substantial number of conceptual explications and qualitative work regarding EO, entrepreneurial education, entrepreneurial ambition and internationalization and theoretical frameworks are also well articulated by identifying the variables that may impact the phenomenon (Taylor & Jack, 2012). Quantitative research methodology using survey approach plays a major role in achieving the research objectives of this research. Using survey method, the researcher can pose a number of questions at a time and therefore number of variables can be measured at once that

allows for testing multiple hypotheses in one study.

The survey research strategy is used to collect primary data from engineer-entrepreneurs in Sri Lanka through administering structured questionnaires. The engineer-entrepreneurs were defined as "those who currently own a business of more than 10 employees and have an engineering degree from a recognized university as their first degree with IESL associate or full membership".

A cross-sectional design was used for this study. The population of this study is all businesses registered and owned by engineering professionals in Sri Lanka. However, there is no sampling frame. So snowball sampling method was used to collect data. The researcher contacted IESL to get information about their members who have their own business. Standard guidelines and bias tests were conducted to minimize errors that could result in due to this non-probability sampling method.

According to Wijesinghe, Foreman, and Ten (2011), the usable response rate in South Asian SME research is typically less than 30%. In the Asian setting, low response rates in SME-related studies have been observed regularly (Afsharghasemi et

al., 2013). Personal interview is the best approach in SME research due to the low response rate witnessed in past studies consist of SMEs (Chen, Zou & Wang, 2009).

In this study, 300 questionnaires were emailed to possible respondents, but only 22 responses were received after three months, resulting in an electronic mail response rate of 8%. Simultaneously, the researcher used a "Research Assistant" to personally administer the questionnaire to respondents and 70 responses were collected by distributing self-administered questionnaire in person or during zoom meetings as per the sampling strategy. Data was collected during July, August and September months of 2021. Due to Covid-19 pandemic many issues were encountered in data collection. There were many cancellations of in person appointments and zoom meetings.

Total number of responses collected in both methods is 92. Overall response rate is 24%. Bartlett, Kotrlik and Higgins (2001) suggest minimum sample size of 119 for a population frame between 4000 – 10,000 firms. The number of engineer-entrepreneur firms can be assumed to be in between this range. This sample size can be further justified since it satisfies rules of thumb proposed by Sekaran (2003).

1. Most studies require sample sizes of greater than 30 but fewer than 500.

2. Sample size should be several times (preferably 10 times or more) as large as the number of variables in the study in multivariate research.

Questionnaire Development and Distribution

A structured non-disguised questionnaire was developed to test the conceptual framework. In developing the instrument,

previous researchers' suggestions were taken into account, such as gathering demographic and organizational data first, placing highly related questions to study objectives on the earlier part of the questionnaire, logical flow of questions, grouping of similar questions, and ensuring that the first questions are applicable to all and simple to answer. (Dillman, 2007).

Some preliminary work was necessary to validate the research instrument before incorporating the instrument into the main research to increase reliability and validity of the research. Although all scales are adopted from past studies, the instrument is novel and also the context is different from most of past research that used these scales.

The questionnaire was refined in two stages, as suggested by Ismail and King (2005): pre-testing with academic staff and pre-testing with SMEs managers. Experts consulted included one Professor from University of Moratuwa and one senior lecturer at Open University of Sri Lanka who have conducted substantial amount of research on SMEs in Sri Lanka. Three engineer-entrepreneur managers were consulted to comment on the questionnaire before distribution. The questionnaire was slightly revised with the feedback of these persons.

The following guidelines were used to operationalize and measure the variables of the construct. The structured questions and statements in the study's questionnaire were derived from earlier empirical investigations (i.e. on the priori basis). The same metrics were utilized if previous research had yielded satisfactory measurement quality (e.g. the scale is widely cited and used, showed good R^2 value in previous studies, validated cross-culturally, a recently developed scale). Some assessment scales were adapted from previous studies and tweaked to fit the study's current constructs and variables.

Some scales had modest wording changes to make them more applicable to engineer-entrepreneur SME research (e.g. entrepreneurial orientation scale had gone through very minor wording changes to suit SME context). All structured questions were measured on a five (5) point Likert scale similar to the original scale.

Table 02: Selection of measurement scales for variables

Variable	Selected measurement scale	Number of Items
Entrepreneurial Orientation	Bolton and Lane (2012)	10
Entrepreneurial Ambition (Entrepreneurial Intention)	Linan and Chen (2009)	6
Participation in Entrepreneurship Education	Adopted from Rauch and Hulsink (2015)	4

Piloting the instrument is the next step in the refinement process. Pilot testing helps assess the instrument's accuracy and dependability in addition to projecting survey response rate. As a result, the respondents in the pilot testing were chosen to closely resemble the actual respondents. The number of samples necessary for pilot testing should range from 12 to 100. (Cooper & Schindler, 2003). Following the suggestion of Cooper and Schindler (2003), this study decided to use 12 responses for the pilot test, and the instrument was distributed to 12 engineer-entrepreneurs by personally visiting them.

The results of the pilot study was merged with the final analysis later on.

Various methods are available for testing reliability of a scale. However, the most widespread method used by researchers to test the inter-item consistency and reliability is the Cronbach's alpha coefficient (Sekaran & Bougie, 2010). The reliability statistics of the instrument was investigated with Cronbach's alpha values. The results showed adequate values (i.e. over 0.7) to proceed to large scale survey as per Nunnaly (1978).

Table 03: Cronbach's Alpha Values for Pilot Test

Construct	Notation	Cronbach's Alpha
Entrepreneurial Orientation	EO	0.965
Entrepreneurial Intention	EI	0.990
Participation in Entrepreneurship Education	PEE	0.961
Intention to Internationalize	II	0.843

The questionnaire was given to the respondent with a covering letter explaining the purpose of the study (Sample questionnaire with the covering letter in the annexure). To establish credibility, the respondent was shown the University of Moratuwa staff ID card on all occasions. The respondent was first assured of the survey's anonymity and confidentiality, as well as the fact that it was being conducted solely for academic purposes. The first page of questionnaire is outlining the study's purpose and providing instructions on how to complete the survey.

The questionnaire was in English. The respondents were given adequate time to fill the questionnaire and some respondents requested to collect the filled questionnaire on a later date so that they can fill it unhurried, and it was granted. As a gesture of thanks, the researcher presented a pen and a plastic file cover with the visiting card to the respondent. The researcher agreed to share the summary of the results of the survey with them through email. Although some respondents were hesitant to set aside time for the meeting when reached over the phone to schedule an appointment, they showed great excitement in supporting the research at the meeting both online and physical.

Within three months the researcher collected 92 completed questionnaires.

Selection of Data Analysis Method

The next most significant component of this research is the selection of a appropriate data analysis approach after a carefully developed conceptual framework and a questionnaire, and a three-month data collection process. As most academics have pointed out, there is no single best data analysis method; it all depends on the research design, complexity, research goal, sample size, and data structure, among other factors. (Hair et al., 2010).

Since this research has multiple variables, the data analysis method should use multivariate data analysis methods. It has been stated that Structural Equation Modelling (SEM), which is a second generation multivariate analysis method has several advantages over more traditional multiple regression analysis. While regression does not assume measurement error, SEM accounts for measurement error. SEM approach is preferred because of its ability to test casual relationships between constructs with multiple measurement items (Wold, 1982).

SMARTPLS software was used to carry out the data analysis.

Data Analysis and Findings

Data Preparation, Purification and Testing for Multivariate Assumptions

Only valid cases were entered into the SPSS software. The research assistant examined the data for inaccuracies after it was entered into the SPSS 20 software from the questionnaire. To ensure that analysis is conducted on authentic data, data was purified for the analysis by detecting missing data and identifying outliers. The multivariate statistical assumptions underlying the data set were then tested in order to select the most appropriate data analysis tool and to get an idea of the data's quality.

Since the percentage of missing data is less than 5%, it was assumed that missing data is not a major concern and imputation methods were not adopted for missing data (Schafer, 1999). The missing data was denoted by "000" in the SPSS 20 software and was treated as "missing data" throughout the analysis.

Univariate outliers are cases in which a single variable has an extraordinary value. Most researchers recommend starting with visual tools like Box Plots before moving on to quantitative methods like standard deviation analysis or percentage analysis. Given the prominence of the dependent variable in the model, most previous studies used the univariate outlier test for it only. The absolute value of Z should be more than 3.29 to be confirmed as univariate outliers (Miocevic & Crnjak-Karanovic, 2011). There are no uni-variate outliers in indicators of dependent variable.

Histograms can be used to detect non-normality by visual inspection especially when sample size is large. The histogram

plots indicate that although the data is not perfectly normal, there is no serious violation of the normal distribution assumption. Past research indicates that concern of non-normal data is not surprising in social sciences (Osborne, 2010). However, PLS-SEM approach is still useful against non-normal data (Hair et al, 2014).

Multicollinearity was tested for IVs by observing VIF values for all IVs as seen in Table 04. Multicollinearity indicators are acceptable for multivariate analysis (i.e. All VIF values are less than 5 and close to 1).

Table 04: Results of multicollinearity tests

Collinearity Statistics	
Construct	VIF
EO	1.806
EI	1.441
PEE	1.800
II	1.489

Descriptive Statistics

Descriptive statistics are used to describe the basic features of the data in this study. They provide simple summaries about the sample and the measures.

Table 05: Descriptive Statistics of Ownership, Exports, and Industry of Entrepreneur

Variable	Category	Percentage (%)
Own a Business	Yes	34%
	No	66%
Engage in exports	Yes	11%
	No	89%
Owner	Sole Trading	55.0
	Partnership	15.2
	Pvt (Ltd)	29.8
	Public	0
Industry	Manufacturing	70.6
	Retail/Wholesale	14.2
	Service	15.2

Table 05 summarizes the main descriptive statistics of this study.

Reliability Analysis of the Scales

Internal consistency refers to the extent to which all of the items in a test measure the same construct and is thus linked to the test's inter-relatedness. The most essential and ubiquitous statistic in research involving internal consistency measurement is the coefficient alpha established by Cronbach in 1951. According to Lance et al. (2006), it should be greater than 0.7 for fundamental

research. Crobanch's alpha values for all construct pieces exceeded the threshold value of 0.7, confirming the construct's reliability.

Table 06: Reliability statistics for the scales

Construct	N of Items	Reliability Statistics - Cronbach's Alpha
EO	9	0.935
EI	7	0.968
PEE	7	0.905
II	4	0.913

Analysis of Data Using PLS-SEM (SMARTPLS)

All indicators and first order constructs were conceptualized as the reflective measures of the latent constructs of the study rather than the formative measures that cause the latent constructs as per operationalization in the related past studies.

Minimum factor component loadings of 0.70 or higher are normally considered significant for outer measurement model (Hair et al., 2010). Loading value of 0.5 is regarded as acceptable, the manifest variables with loading value of less than 0.5 should be deleted (Chin, 1998). (Note t

>1.96 at p < 0.05). All the indicators (i.e. manifest variables) of the outer measurement model of this research fulfilled this criteria of minimum 0.5. The maximum loading reported was from

Fornell and Larcker (1981) stated that if Average Variance Extracted (AVE) is greater than 0.5 that is a necessary and sufficient condition for convergent validity of the instrument. AVE is a measure of the shared or common variance in a Latent Variable (LV). The amount of variance that is captured by the LV in relation to the amount of variance due to its measurement error (Fornell & Larcker, 1981). As seen from Table 07, all AVEs are above 0.5 for the constructs.

Table 07: AVE for the constructs

Variable	Num of items	AVE
EO	8	0.6657
EI	3	0.8066
PEE	1	0.8087
II	7	0.6413

The number of bootstrap samples was set to 500 to run the SMARTPLS program.

Table 08: Summary of structural model testing

	Path	Path Coefficient	Standard Error	t	Significance
H1	EO>EI	0.4450	0.0567	7.778	Significant
H2	PEE>EI	0.4310	0.0971	4.465	Significant

H3	EI>II	0.1909	0.0737	2.585	Significant

R^2 is also called the coefficient of determination because it assesses the proportion (which is converted to percentage by multiplying by 100) of the variance of the endogenous construct that can be explained by its predictor constructs (Hair et al., 2014).

There is no threshold for R^2 values as it is highly dependent on the research context (Hair et al., 2010). Falk and Miller (1992) suggest 0.10 as a threshold to identify a minimum level of prediction that can be practical significance. A R^2 0.1 does not add considerable value to the predicting power of the model.

Table 09: Summary of coefficient of determination values for the structural model

Endogenous Latent Variable	R^2
II	38.9

Entrepreneurial Intention accounts for 38.9% of the variance of Internationalization Intention. This is a substantial significance in explaining the dependent variable. This implies that if an entrepreneurial intention can be instilled in the engineers, then most of these engineers are likely to become global entrepreneurs.

Discussion

Sri Lanka is facing a foreign exchange crisis as not faced in any time of its history (CBSL, 2021). Long term lax policies on non-essential imports and less attention to export entrepreneurship promotion has created a dire situation for Sri Lanka as a country. In a deeper insight of Sri Lankan economy and its business entrepreneurship, the business entrepreneurs as a percentage of population in a country is less than 1% where similar countries such as Thailand and Vietnam report values over 13%. SME contribution to employment and value-addition to GDP has declined considerably from 1983 to 2012 (Department of Census and Statistics, 2021). Similarly, export contribution in terms of value by SMEs in Sri Lanka is around 5%.

This research outcomes serve as valuable inputs to the above scenario and factors leading to this context. It explains that EO, and participation in entrepreneurial education can make a significant impact on the ambition to incept a new business and these variables further instil the mindset of international entrepreneurship.

Firstly, it shows that EO, plays a key role in entrepreneurial intention. Although such studies were conducted in many countries, this study confirms the link in Sri Lankan engineer-entrepreneur. Promoting risk-taking, proactive and innovative behaviour must be reinforced from primary education. We must allow students to pursue their dream careers in business and entrepreneurship and set the foundation from secondary education. It has been found from research that children shape their career ambitions from this developmental stage which are mainly derived from their role models (Gibson, 2003). These role models can be from their family or a well-known character in the field. Entrepreneurial mindset can be purposefully developed at any stage of life (Murnieks, Mosakowski & Cardon, 2014). The research carried out by Jayath and Mudalige (2019) indicated that entrepreneurial education influences the

perception of benefits of entrepreneurship and entrepreneurial ambition among secondary students in Western Province of Sri Lanka. Workshops involving the previously mentioned "business role models" can be embedded in the curriculum to give them motivation for entrepreneurial venture. This will shape the entrepreneurial orientation of future generation from the secondary school.

Secondly, this study reveals the pivotal role of entrepreneurial education in creating entrepreneurial mindset among engineers. University education can make graduates capable of thinking out of the box and innovative, which can lead to successful entrepreneurial activities. Developing an entrepreneurial culture within universities of Sri Lanka is essential as the technologically knowledgeable graduates of these universities can contribute immensely to high-tech start-ups and export sector with competitive products and services.

Recent studies have confirmed that entrepreneurship-specific education actually instil students with the entrepreneurial alertness and risk-taking characteristics required to pursue entrepreneurial careers which is required in internationalization prospects (Solesvik, Westhead, Matlay & Parsyak, 2013). Educational programs which promote self-directed learning and skills development are found to increase entrepreneurial characteristics and entrepreneurial performance of managers (Tseng, 2013). A study by Altinay and Wang (2011) demonstrate that educational accomplishment of an entrepreneur in entrepreneurial educational programs makes a positive impact on a firm entrepreneurial orientation. Hence this shows that in order to increase change capabilities of the firm, the entrepreneur must be directed correctly. Abdul Kalam, the former president of India elaborated the

need of entrepreneurial education. As per his sentiments, "Educationists should build the capacities of the spirit of inquiry, creativity, entrepreneurial and moral leadership among students and become their role model".

Both private and public universities and technical colleges in Sri Lanka where engineers are produced must start well planned entrepreneurial education programs. In addition to formal learning these programs should include informal learning components of entrepreneurship such as:

- Case teaching method and interactive session with entrepreneurs in class
- Biography analysis; Applying theory and research to life course of actual entrepreneurs
- Studying pre-start, start-up, and growth stages of multiple successful/unsuccessful young ventures to understand discrepancies between theory and practice

As for the SME managers, this model highlights the importance of their own role in entering and expanding to export markets and export success is contingent on SME key manger's personal engagement (Dietmar et al., 2013). According to the findings, businesses should cultivate an entrepreneurial culture within their organizations. Employee empowerment, less formal control, performance-based awards, acknowledgment for innovative projects, and open door policies are all examples of ways to instil an entrepreneurial mindset within a company.

Furthermore, appreciating and rewarding initiative-taking and innovation and establishing property-rights protection for successful SMEs are a must for reinforcing entrepreneurial behavior of engineer incepted SMEs. Government can prioritize

their assistance and limited resources to those engineer-entrepreneurs who have already initiated innovative ideas in supporting internationalization and also those with international business experience.

Conclusion

The objective of research was to investigate the influence of entrepreneurial orientation and entrepreneurship education on entrepreneurial intention and internationalization intent of engineer entrepreneurs in Sri Lanka. Three hypotheses related to above links were tested using a validated questionnaire through a survey of 92 engineer-entrepreneurs. The results show that there is a significant positive relationship between entrepreneurial orientation and entrepreneurship education on entrepreneurial intention and internationalization intent of engineer entrepreneurs in Sri Lanka.

Acknowledgement

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