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The Role of Techno Incubators in Promoting Techno based Small and Medium Enterprises in Sri Lanka

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The main objective of this research is to study the role and the contribution of the techno-incubators to promote techno based Small and Medium Scale Enterprises (SMEs) in Sri Lanka. Literature survey shows that proper incubator process and techno-SME start-up eco-system can reduce the mortality of the techno-SME start-ups. The main methodology of this research is primary data collection through sample survey of seventy one techno-SME entrepreneurs supplemented by interviews with key stake holders. The results show that lack of strong techno-SME promoting national eco-system, inconsistencies in selection process for the techno-incubator facilities, the services offered and the business support given by the techno-incubators are not in-line with incubatees current requirements. In general, incubator authorities need more focus on business support services and appropriate skills development for techno businesses.

Keywords: Techno-incubation, Small and Medium Scale Enterprises; SMEs, Technology Management, Innovation, Techno-Entrepreneurship, Sri Lanka.

Introduction

New technology-based firms (NTBFs) are important contributors to nation's economy as major source of innovation, business development and growth and new jobs. The terms like enterprise centre, business incubator, business technology centre, technology incubator and techno-innovation centre are generally used, creating challenges in distinguishing between incubators that support new small and medium scale entrepreneurship (SMEs) start-ups in general and more technology specific incubators which deal with problems associated with the start-up of technology-oriented SMEs. (Handbook of Research on Techno-Entrepreneurship- Francois Therin, 2013). To help create and grow a new start-up, business incubation can be used as a tool of economic development. Business incubation is defined as a business support process that accelerates the successful development of start-up and fledgling companies by providing entrepreneurs with an array of targeted resources and services (Kathleen, 2006). Smilor and Gill (1986) recognized, "A technology-incubating program as an innovative system designed to assist entrepreneurs in the development of new technology-based firms, both start-ups and fledglings. It seeks to effectively link talent, technology, capital and know-how to leverage entrepreneurial talent in order to accelerate the development of new companies, and thus speed the commercialization of technology".

Business incubator helps business start-ups by providing various support services such as seed funding, mentoring, process/ product development support, networking opportunities and access to the services of expertise, etc. (Sherman and Chappell, 1998). Techno incubators are playing a significant role to promote techno base of SME's from seeding start-ups to turning them to become successful and stable companies. This study tries to explore the role of techno incubators in promoting techno base SMEs in Sri Lanka.

Research Objective

The scope of the study has been narrowed down to Techno Incubators in Sri Lanka which promote techno base SMEs. In this context this paper addresses the following three objectives:

- To explore the current situation of techno incubators in Sri Lanka.
- To analyze the role of techno incubators in promoting techno based SMEs in Sri Lanka.
- To recommend policies and strategies to promote Sri Lankan techno based SMEs

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through techno incubators to sustainable growth path.

Some Techno Incubator Experiences in Sri Lanka

Disrupt Unlimited

The Brandix Group is the largest exporter of apparel in Sri Lanka. In Feb 2014, The Group invested US$1 million setting up Disrupt Unlimited, a seed Accelerator. The Brandix Group currently owns shares in this new venture. The Accelerator is currently run by three employees. The Brandix Group provided physical space for the Accelerator in exchange for monthly rental. The Incubates however are not located within this physical space but are stationed within the Strategic Business Units (SBU's) of the Brandix Group. Incubates do not pay rental for locating within the SBUs. US$ 15,000 - 50,000 is provided as seed funding for the development of the project. The Accelerator has limited itself to its domain expertise in apparel, textiles and accessories thereby differentiating itself from its competition. While some incubators, such as Y-Combinator are run on a model of 'probability of success', Disrupt Unlimited focuses its energy and resources on a small number of companies to ensure their success.

Rubber products and process development incubator

The SIL-UOM rubber products and process development incubator was established in February 2011 as an initiative between the University of Moratuwa, Samson International PLC and Samson Compound Pvt Ltd - subsidiary companies of the DSI Group. THE DSI Group of companies are leading rubber product exporters in Sri Lanka. UNI Consultancies acted as administrative body in this alliance.

Orion's Nest

Orion City, a premier IT-Park housing global companies was established in 2008. It is set on 16 acres of land in Colombo and has a projected investment of US$500million over a 5-10 year period. Virtusa, Emphasis, Pearson, Synergix and Sri Lankan airlines are among the companies that have chosen to operate here. The facilities offered here include "an underground telecommunication system with a multi-server, high speed Asynchronous Transfer Mode (ATM) backbone, high-speed point-to-point international and domestic digital leased lines and broadband switching capability that enables speed" (38). Orion's Nest, an incubation facility for start-ups was set up within Orion City.

Conceptnursery.com

This technology incubator was established in 2001, as a joint venture between the Sri Lanka Institute of Information Technology, Media Solutions, Peoples Venture Investment Company and Prudential Holdings with the aim of facilitate growth of the ICT industry and sustaining competitiveness through R&D. USAID provided a vast amount of exposure and guidance when setting up the incubator. The incubator is located alongside the SLIIT University in Malabe.

Methodology

A scientific manner of planning, executing, and discussing important results is essential for doing any study, regardless of which fields are being investigated, such as managerial and social fields. Therefore, this chapter defines the theoretical framework, population samples, instrument, data collection procedures and the techniques of data analysis for examining the role of techno incubators in promoting techno base SMEs in Sri Lanka.

Conceptual framework

Real Options Driven Theory is used to measure the performance of the techno incubator. This illustrates universal business incubation model and can be used for techno incubators. In short, it is structured as black-box: inputs of the process, process activities, and outputs of the process. The theory presented by Hackett and Dilts (2004b) defines that the performance of the techno incubator depends on its incubate selection criteria, mentoring and business support given by the incubator and the resources provided. Based on that formula mentioned Techno Incubation Performance formula is generated as under:

TIP = (SC+M&BA+RP)

Where:

TIP = techno incubation performance

SP = selection criteria

M&BA = mentoring and business support (networking with Angel networks, marketing, etc.)

RP = resources provided (i.e. business space, internet, etc.)

This theory argues that the success of a techno incubator is directly related to tenant's selection, assistance quality given by the incubator and the availability of the financial resources to service to the tenant. Selection refers to the decisions taken by Incubator management to accept/ reject a project for the incubator. Business support is the training activities conducted by incubator to develop the incubate. Mediation means process used by incubator to connect with the incubatee and to the outside world i.e. venture capital providers/Angel networks/ etc. Graduation is related to exit policies, i.e. decisions concerning under what circumstances incubatee should leave the incubator. These factors are further divided into variables and each and every variable has indicators to measure that.

Research Hypotheses

Following hypothesis are defined for this research study to check whether these relationships are applicable to study the role of techno incubators to promote techno-SMEs in Sri Lanka.

1- Hypothesis 1:

$H1_0$: There is no significant relationship between the techno-based SME start-up eco-system and the selection criteria of the techno base SMEs for the techno incubator.

$H1_1$: There is a significant relationship between the Techno-based SME start-up Eco-system and the selection criteria of the techno base SMEs and services offered in the techno incubator.

2- Hypothesis 2:

$H2_0$: There is no significant relationship between the techno-based SME start-up eco-system and the services offered and the business support given by the techno incubator.

$H2_1$: There is a significant relationship between the techno-based SME start-up eco-system and the services offered and the business support given by the techno incubator.

3- Hypothesis 3:

$H3_0$: There is no significant relationship between the techno-based SME start-up eco-system and the infrastructure facilities provided by the techno incubator.

$H3_1$: There is a significant relationship between the techno-based SME start-up eco-system and the infrastructure facilities by the techno incubator.

4- Hypothesis 4:

$H4_0$: There is no significant relationship between the techno-based SME start-up eco-system and the graduation and exit criteria of the techno base SMEs from the techno-incubator.

$H4_1$: There is a significant relationship between the techno-based SME start-up eco-system and the graduation and exit criteria of the techno base SMEs from the techno-incubator.

5- Hypothesis 5:

$H5_0$: There is no significant relationship between the commercial success of the techno-based SME start-up and the selection criteria of the techno base SMEs for the techno incubator.

$H5_1$: There is a significant relationship between the commercial success of the techno-based SME start-up and the selection criteria of the techno base SMEs for the techno incubator.

6- Hypothesis 6:

$H6_0$: There is no significant relationship between the commercial success of the techno-base SME start-up and the services offered and the business support given by the techno incubator.

$H6_1$: There is a significant relationship between the commercial success of the techno-base SME start-up and the services offered and the business support given by the techno incubator.

7- Hypothesis 7:

$H7_0$: There is no significant relationship between the commercial success of the techno-base SME start-up and infrastructure facilities provided by the techno incubator.

$H7_1$: There is a significant relationship between the commercial success of the techno-base SME start-up and infrastructure facilities provided by the techno incubator.

8- Hypothesis 8:

$H8_0$: There is no significant relationship between the commercial success of the techno-base SME start-up and graduation and exit criteria of the techno base SMEs from the techno-incubator.

$H8_1$: There is significant relationship between the commercial success of the techno-base SME start-up and graduation and exit criteria of the techno base SMEs from the techno-incubator.

Conceptualization of Variables

Conceptualization is the process by which researcher define what is being attempted to study as precisely as possible. . In this study four main independent variables, moderating variable and dependent variable are identified as shown in the conceptual model.

Extraneous Variable

Techno-base SME start-up eco-system

- Techno-base SME promotion
- Position of the techno incubator as a tool of techno-base SME start-ups
- Regulations to promote techno-base SME
- Regulations to promote techno-base SME start-ups through techno-incubators

Independent Variable

Selection criteria of the techno base SMEs for the techno-incubator

- Viability of the techno-base SME start-up
- Competence of the Incubatee

Services offered and the business support given by the techno incubator.

- Techno-incubator configuration
- Incubatee capacity building
- Capital sources
- Product & process development support
- Business introduction support at early stages of the business

Infrastructure provided by the techno incubator

- Facilities provided by the techno-incubator

Graduation and exit criteria of the techno base SMEs from the techno-incubator

- Graduation and exit criteria from the techno-incubator

Dependent Variables

Commercial success of the techno-base SME start-up

- Incubator success
- Incubatee outcome status

Operationalisation of Variables

Operationalisation of variables refers to the process of figuring out how to measure the concepts based on its variables (moderating, independent and dependent variables) by finding a measurable, quantifiable and valid index of indicators. Indicators for the each variable are founded on literature reviewed.

Table 3.1: Operationalisation of variables

Variable type	No	Concept	Variable	Indicator/s	Source	Measurement
EV	1	Techno-SME start-up eco system	Techno-SME promotion	Techno entrepreneurship awareness	Colin Mason & Ross Brown, (2014)	Likert
				Techno entrepreneurship training / education	Colin Mason & Ross Brown, (2014)	Likert
				Techno entrepreneurship mentoring / couching	Colin Mason & Ross Brown, (2014)	Likert
				Start-up financing (debt /equity)	Colin Mason & Ross Brown, (2014)	Likert
				Network initiatives for Techno-base SMEs	Colin Mason & Ross Brown, (2014)	Likert
			Position of the techno incubator as a tool of techno-SME start-up	Encourage (by government/corporate sector) techno-SME start-ups through techno-incubators	Sharma,(2014)	Likert
				Encourage (by government /corporate sector) techno-SME start-ups through techno-incubators	Sharma,(2014)	Likert

Variable type	No	Concept	Variable	Indicator/s	Source	Measurement
				Encourage (by government /corporate sector) the public-private partnerships in techno-incubation creation	Sharma,(2014)	Likert
				Equal distribution of techno-incubators across geography	Sharma,(2014)	Likert
			Regulations to promote techno-SMEs	Ease of techno-base SME registration process	Sharma,(2014)	Likert
				Tax free period for Techno-SME start-ups	Sharma,(2014)	Likert
				Competition policies to promote techno-SMEs	Sharma,(2014)	Likert
				Technology policies to promote techno-SMEs	Sharma,(2014)	Likert
			Regulations to promote techno-base SME start-ups through techno incubators	Ease of engagement process of techno-SME start-ups with techno-incubators	Sharma,(2014)	Likert
				Tax free period for techno-base SME start-ups coming through techno-incubators	Sharma,(2014)	Likert
				Tax reductions to angel investors who invest in incubators	Sharma,(2014)	Likert
				Tax reductions in importing equipment for techno-incubators	Sharma,(2014)	Likert
				Technology policies	Sharma,(2014)	Likert
I	2	Selection criteria of the techno-SMEs for the techno incubator	Selection criteria of the techno-SMEs for the techno incubator is based on	Business idea	Bergek & Norrman, (2008)	Likert
				Entrepreneur	Bergek & Norrman, (2008)	Likert
				Technology industry	Bergek & Norrman, (2008)	Likert
			Viability of the techno SME start-up	Comprehensive business plan	Sharma, (2014)	Likert
				Marketability of the product	Sharma, (2014)	Likert
				Fast growth potential	Sharma, (2014)	Likert
				Sustainability	Halcyon, (2015)	Likert
				Job creation potential	Sharma, (2014)	Likert
				Local ownership	Sharma, (2014)	Likert
			Competence of the incubate	Industry knowledge	Campbell, Kendrick, & Samuelson (1985) Nacu & Avasilcai,(2013)	Likert
				Technology management skills	Oakey (2003)	Likert
				Business management skills	Oakey (2003)	Likert
				Techno-entrepreneur skills	Nicholas & Armstrong, (2003)	Likert

Variable type	No	Concept	Variable	Indicator/s	Source	Measurement
				Required resource level for the start-up	Campbell, Kendrick, & Samuelson, (1985)	Likert
				Incubatee' s capabilities on required resources	Campbell, Kendrick, & Samuelson, (1985)	Likert
	3	Services offered and the business support is given by the techno incubator	Techno incubator configuration	Techno-incubator incubator- Landlord model	Lalkaka, (2011) Chandra & Silva, (2012)	Likert
				Techno-incubator configuration-Equity base model	Lalkaka, (2011) Chandra & Silva, (2012)	Likert
				Techno-incubator configuration - Sponsor Funding based model	Lalkaka, (2011) Chandra & Silva, (2012)	Likert
			Capital sources	By government banks	Lalkaka, (2007)	Likert
				By private banks/ financial companies	Lalkaka, (2007)	Likert
				By venture creations	Lalkaka, (2007)	Likert
				By angel networks	Lalkaka, (2007)	Likert
				By government grants	Lalkaka, (2007)	Likert
			Product and process development support	Techno-expertise support	Hackett &Dilts, (2004)	Likert
				Access to R&D institutions/ universities	Sharma,(2014)	Likert
				Product/ process innovation support	Gregor Harter, Klaus Hölbling, Steffen Leistner, Lazarowich & Wojciechowski (2002).	Likert
				Technology development support	Costa-David, Malan, Lalkaka (2002)	Likert
				Technology evaluation support	Costa-David, Malan, Lalkaka (2002)	Likert
				Assistant to obtain/ acquire patens and product license	Malecki &, Nijkamp (1988)	Likert
			Business introduction support	Business needs diagnosis	Campbell, Kendrick, & Samuelson (1984)	Likert
				Business mentoring	Costa-David, Malan & Lalkaka (2002), Hackett & Dilts (2004)	Likert
				Assistant to finance/ account management	Metibtikar, (2012)	Likert
				Assistant to general administration	Smilor, (1987)	Likert
				Market survey/ Marketing assistance	Sharma, (2014)	Likert
				Networking opportunities	Carter &Jones-Evans (2000), Carayannis. & Zedtwitz (2005)	Likert
				Other legal services (business registration, etc.)	Malecki & Nijkamp (1988), Smilor, (1987b).	Likert
				Incubatee capacity building	Costa-David, Malan, Lalkaka (2002)	Likert

Variable type	No	Concept	Variable	Indicator/s	Source	Measurement
I	4	Infrastructure facilities provided by the techno incubator	Facilities provided by the techno incubator	Office/ factory space below market rate	Abetti, (2004)	Likert
				Machinery workshops	Abetti, (2004)	Likert
				Telephones	Carayannis & Zedtwitz, (2005)	Likert
				Analytical service facility	Sharma, (2014)	Likert
				Internet	Carayannis & Zedtwitz, (2005)	Likert
				Meeting / conference room(s)	Carayannis & Zedtwitz, (2005)	Likert
				Vehicle parking space	Carayannis & Zedtwitz, (2005)	Likert
				Showcasing area/ Area for exhibits	Carayannis & Zedtwitz, (2005)	Likert
I	5	Graduation and exit criteria of the techno -SMEs from the techno-incubator	Graduation and exit criteria of the techno -SMEs from the techno-incubator	Acquisition of start-ups by large corporate	ISBA (2013)	Likert
				Start-up grows in size in terms of revenue	ISBA (2013)	Likert
				Start-up is able to develop an innovative technology	ISBA (2013)	Likert
				Start-up is able to raise angel investment/venture capital/private equity	ISBA (2013)	Likert
				Completion of the incubation period	Sharma, (2014)	Likert
				Due to closure of the start-up	Sharma, (2014)	Likert
D	6	Commercial success of the techno-SME start-up	Incubator success	Number of firms exiting the incubator	Allen and Weinberg (1988).	Likert
				Number of firms discontinuing incubator operations while still a tenant	Allen & Weinberg,(1988).	Likert
			Incubatee success	Graduated incubatee is surviving and growing profitably	Hackett & Dilts, (2004)	Likert
				Graduated incubatee is surviving and growing and it is on a path toward profitability	Hackett & Dilts, (2004)	Likert
				Graduated incubatee is surviving but it is not growing and it is not profitable or it is only marginally profitable	Hackett & Dilts, (2004)	Likert

Sample of the Study

Researcher has accessed the techno-SME data base of Techno Incubation Centre (TIC) in Pitipana, Homagama as summed up in Table 3.2. Stakeholders of the sample study are listed in Table 3.3.

Table 3.2: Population of the research

Group	Total Sample	Per SME
Techno-SME entrepreneurs	100	1

Table 3.3: Sample of the stakeholders of the techno-incubators

Group	Total Sample	Per Institution
Research Institutes- SME support divisions	8	2
Angle Networks	4	1
Venture Capital providers / Banks	5	1
Policy makers in Techno base SME promotion	4	N/A
Techno incubation facility providers	4	1
Expertise in techno incubation	4	1

Data Collection Method

More weight has been placed on face-to-face interviews with the techno- entrepreneurs and the other parties of the population of the research. Interviews are conducted through telephone, Skype and web surveys.

Data Analysis Method

The data was analysed by using Statistical Package for the Social Sciences (SPSS) to get the outcome of the result of descriptive statistics

Data analysis and discussion

This section presents the findings of the study as well as all the findings obtained through statistical analysis. This research is based on descriptive study and hypothesis testing. It begins with preparation, data screening, and profiles of respondents which give an idea of how the data looks like.

Characteristics of Respondents

Data collection was conducted among; Techno-SME entrepreneurs, Venture capital providers, Bankers, Policy makers in techno base SME promotion, Techno-incubation facility providers, Expertise in techno-incubation, Representatives of Research Institute SME support division. Majority of the techno entrepreneurs who participated to the survey were from information technology field. But there were significant numbers of the entrepreneurs from electronics & electrical, polymer-technology, nanotechnology, automobile, aeronautical (drones & autonomous aircrafts) sectors as well.

Reliability

The reliability and the validity of the indicators and the variables were checked before using them to confirm whether the indicators were capable enough to measure variables. For measuring reliability, Cronbach's Alpha is used to measure the reliability.

Techno- SME start-up eco-system

There are four variables with eighteen indicators to measure the techno- SME start-up eco-system. The reliability of the four main variables is analyzed separately.

Table 4.2: Reliability statistics for the techno-SME promotion

Cronbach's Alpha	N of Items
.742	5

Combined reliability of the five indicators in Table 4.3 shows Alpha value of 0.742 in Table 4.2 which is higher than 0.50. , hence it is acceptable.

Table 4.3: Total statistics for indicators of the techno-SME promotion

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Techno-SME promotion_1	9.62	6.610	.558	.677
Techno-SME promotion_2	9.68	7.165	.312	.777
Techno-SME promotion_3	9.79	6.655	.556	.678
Techno-SME promotion_4	9.79	5.855	.722	.608
Techno-SME promotion_5	10.08	7.536	.427	.723

Position of the techno incubator as a tool of techno- SME start-ups

There are four indicators to measure the position of the techno incubator as a tool of techno- SME start-ups. Results of the reliability analysis are shown in Table 4.4.

Table 4.4: Reliability statistics for the position of the techno incubator as a tool of techno- SME start-ups

Cronbach's Alpha	N of Items
.856	4

Regulations to promote techno-SMEsII

There are four indicators to measure the regulations to promote techno-SMEs. Result of the reliability analysis is shown in Table 4.5

Table 4.5: Reliability statistics for the regulations to promote techno-SMEs

Cronbach's Alpha	N of Items
.623	4

Regulations to promote techno-based SME start-ups through techno-incubators

There are five indicators to measure the regulations to promote techno-based SME start-ups through techno-incubators. Results of the reliability analysis is shown in Table 4.6

Table 4.6: Reliability statistics for the regulations to promote techno-based SME start-ups through techno-incubators

Cronbach's Alpha	N of Items
.853	5

Selection criteria of the techno- SMEs for the techno-incubator

There are three main variables to measure the selection criteria of the techno- SMEs for the techno-incubator. Each variable analyzed separately for reliability and validity.

Selection criteria of the techno-start-ups

There are three indicators to measure selection criteria of the techno-start-ups. Reliability is checked and results are shown in the table 4.7. According to the Alpha value, it shows a low reliability.

Table 4.7: Reliability statistics for the selection criteria of the techno-start-ups

Cronbach's Alpha	N of Items
.446	3

Item total statistic showed that by removing second indicator, the reliability will increases. After removing the second indicator, reliability is analyzed and the Table 4.8 shows high reliability.

Table 4.8: Reliability statistics for the selection criteria of the techno-start-ups (removing second indicator)

Cronbach's Alpha	N of Items
.828	2

Viability of the techno- SME start-up

There are six indicators to measure the validity of the techno-SME start-ups. Reliability is checked and results are shown in the Table 4.9.

Table 4.9: Reliability statistics for the validity of the techno-SME start-ups

Cronbach's Alpha	N of Items
.586	6

Above analysis also showed that by removing fifth indicator the Alpha value is increased. Further reliability was checked by removing indicator three, indicator six and indicator one to get a higher value of Alpha. as shown in the Table 4.10

Table 4.10: Reliability statistics for the validity of the techno-SME start-ups (final result)

Cronbach's Alpha	N of Items
.802	2

Competence of the Incubatee

There are six indicators to measure the competence of the incubatee. Reliability is checked and results are shown in the Table 4.11.

Table 4.11 Reliability statistics for the competence of the incubatee

Cronbach's Alpha	N of Items
.583	6

Services offered and the business support given by the techno-incubator.

To measure the "Services offered and the business support given by the techno-incubator.", four variables are used. Reliability and the validity is analyzed for all of them.

Techno-incubator configuration

There are three indicators are used to measure the techno-incubator configuration. Reliability analysis for them is shown in the Table 4.12.

Table 4.12: Reliability statistics for indicators of the techno-incubator configuration

Cronbach's Alpha	N of Items
.469	3

Capital sources

There are five indicators are used to measure the capital sources. Reliability analysis for them is shown in Table 4.13.

Table 4.13: Reliability statistics for indicators of the capital sources

Cronbach's Alpha	N of Items
.882	5

Product & process development support

There are five indicators are used to measure the product & process development support. Reliability analysis for them is shown in the Table 4.15.

Table 4.15: Reliability statistics for indicators of the product & process development support

Cronbach's Alpha	N of Items
.928	6

Business introduction support at early stages of the business

There are eight indicators are used to measure the business introduction support at early stages of the business. Reliability analysis is shown in the Table 4.17.

Table 4.17: Reliability statistics for indicators of the business introduction support at early stages of the business

Cronbach's Alpha	N of Items
.902	8

Table 4.14: Total variance explained for the indicators of the capital sources

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.406	68.112	68.112	3.406	68.112	68.112
2	.980	19.602	87.714			
3	.324	6.476	94.190			
4	.206	4.123	98.312			
5	.084	1.688	100.000			

Table 4.16: Item-total statistics for indicators of the product & process development support

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Product & process development support_1	15.93	13.066	.865	.925
Product & process development support_3	16.20	14.218	.802	.937
Product & process development support_4	16.03	12.999	.905	.918
Product & process development support_5	15.83	12.857	.867	.925
Product & process development support_6	15.73	13.942	.788	.939

Above analysis in the table 4.16 shows the alpha value of 0.943 with high reliability.

Infrastructure facilities provided by the techno incubator

There are eight indicators are used to measure the infrastructure facilities. Reliability analysis is shown in Table 4.18.

Table 4.18: Reliability statistics for indicators of the infrastructure facilities

Cronbach's Alpha	N of Items
.911	8

Graduation and exit criteria of the techno - SMEs from the techno-incubator

There are six indicators are used to measure the graduation and exit criteria of the techno –SMEs. Reliability analysis for them is shown in Table 4.19.

Table 4.19: Reliability statistics for the graduation and exit criteria of the techno –SMEs

Cronbach's Alpha	N of Items
.574	6

Commercial success of the techno-SME start-up

There are two variables under commercial success of the techno-SME start-up.

Incubator success

There are two indicators used to measure the incubator success. Reliability analysis is shown in Table 4.20.

Table 4.20: Reliability statistics for the incubator success

Cronbach's Alpha	N of Items
.083	2

Incubatee success

There are three indicators are used to measure the incubatee success. Reliability analysis is shown in Table 4.21.

Table 4.21: Reliability statistics for the incubatee success

Cronbach's Alpha	N of Items
.465	3

Hypothesis Testing

Hypothesis testing for Techno-SME start-up ecosystem and processes in techno-incubators

There are four hypothesizes for techno-SME start-up ecosystem and processes in techno-incubators.

1- Hypothesis 1:

$H1_0$: There is no significant relationship between the techno-based SME start-up eco-system and the selection criteria of the techno base SMEs for the techno incubator.

$H1_1$: There is a significant relationship between the Techno-based SME start-up Eco-system and the selection criteria of the techno base SMEs and services offered in the techno incubator.

Since this analysis consisted of scale data regression analysis is used to check the significant of the variables. According to the analysis, p-value for techno-based SME start-up eco-system is 0.144. For testing it is used the 0.05 significant level at 95% confident interval. The value of this variable is higher than the significant level. Because of that the null hypothesis cannot be rejected. There is no significant relationship between the techno-based SME start-up eco-system (Policies and Strategies to promote techno-incubators for SMEs) and the selection criteria of the techno base SMEs for the techno incubator.

2- Hypothesis 2:

$H2_0$: There is no significant relationship between the techno-based SME start-up eco-system and the services offered and the business support given by the techno incubator.

$H2_1$: There is a significant relationship between the techno-based SME start-up eco-system and the services offered and the business support given by the techno incubator.

Table 4.22: Variable for hypothesis testing for selection criteria of the techno base SMEs

	Variables	SPSS Variable Name	Measure
Independent	Techno-SME start-up eco-system	TICeco_1	Scale
Dependent	Selection criteria of the techno base SMEs	Selection_2	Scale

According to the analysis, p-value for techno-based SME start-up eco-system is 0.272. For testing it is used the 0.05 significant level at 95% confident interval. The value of this variable is higher than the significant level. Because of that the null hypothesis cannot be rejected. There is no significant relationship between the techno-based SME start-up eco-system (Policies and Strategies to promote techno-incubators for SMEs) and the services offered and the business support given by the techno incubator.

3- Hypothesis 3:

$H3_0$: There is no significant relationship between the techno-based SME start-up eco-system and the infrastructure facilities provided by the techno incubator.

$H3_1$: There is a significant relationship between the techno-based SME start-up eco-system and the infrastructure facilities by the techno incubator.

According to the analysis, p-value for techno-based SME start-up eco-system is 0.018. For testing it is used the 0.05 significant level at 95% confident interval. The value of this variable is lower than the significant level. Because of that the null hypothesis can be rejected. There is a significant relationship between the techno-based SME start-up eco-system (Policies and Strategies to promote techno-incubators for SMEs) and the infrastructure facilities provided by the techno incubator.

4- Hypothesis 4:

$H4_0$: There is no significant relationship between the techno-based SME start-up eco-system and the graduation and exit criteria of the techno base SMEs from the techno-incubator.

$H4_1$: There is a significant relationship between the techno-based SME start-up eco-system and the graduation and exit criteria of the techno base SMEs from the techno-incubator.

According to the analysis, p-value for techno-based SME start-up eco-system is 0.030. For testing it is used the 0.05 significant level at 95% confident interval. The value of this variable is lower than the significant level. Because of that the null hypothesis can be rejected. There is a significant relationship between the techno-based SME start-up eco-system (Policies and Strategies to promote techno-incubators for SMEs) and the graduation and exit criteria of the techno base SMEs from the techno-incubator.

Hypothesis testing for the processes in techno-incubators and commercial success of the techno-based SME start-up

There are four hypothesizes for processes in techno-incubators and the commercial success of the techno-based SME start-up.

5- Hypothesis 5:

$H5_0$: There is no significant relationship between the commercial success of the techno-based SME start-up and the selection criteria of the techno base SMEs for the techno incubator.

$H5_1$: There is a significant relationship between the commercial success of the techno-based SME start-up and the selection criteria of the

Table 4.23: Variable for hypothesis testing for the services offered and the business support given by the techno incubator.

	Variables	SPSS Variable Name	Measure
Independent	Techno-SME start-up eco-system	TICeco_1	Scale
Dependent	Services offered by the techno incubator.	Serivicesoff_3	Scale

Table 4.24: Variable for hypothesis testing for the infrastructure facilities provided by the techno incubator.

	Variables	SPSS Variable Name	Measure
Independent	Techno-SME start-up eco-system	TICeco_1	Scale
Dependent	Infrastructure facilities provided by the techno incubator.	Inf_44	Scale

Table 4.25: Variable for hypothesis testing for the graduation and exit criteria of the techno base SMEs from the techno-incubator.

	Variables	SPSS Variable Name	Measure
Independent	Techno-SME start-up eco-system	TICeco_1	Scale
Dependent	Graduation and exit criteria of the techno base SMEs from the techno-incubator.	Gardexit_55	Scale

techno base SMEs for the techno incubator.

6- **Hypothesis 6:**

$H6_0$: There is no significant relationship between the commercial success of the techno-base SME start-up and the services offered and the business support given by the techno incubator.

$H6_1$: There is a significant relationship between the commercial success of the techno-base SME start-up and the services offered and the business support given by the techno incubator.

7- **Hypothesis 7:**

$H7_0$: There is no significant relationship between the commercial success of the techno-based SME start-up and infrastructure facilities provided by the techno incubator.

$H7_1$: There is a significant relationship between the commercial success of the techno-based SME start-up and infrastructure facilities provided by the techno incubator.

8- **Hypothesis 8:**

$H8_0$: There is no significant relationship between the commercial success of the techno-based SME start-up and graduation and exit criteria of the techno base SMEs from the techno-incubator.

$H8_1$: There is significant relationship between the commercial success of the techno-based SME start-up and graduation and exit criteria of the techno base SMEs from the techno-incubator.

According to the analysis, p-value for Selection criteria of the techno base SMEs is 0.013 and the p-value for the services offered by the techno incubator. For testing it is used the 0.05 significant level at 95% confident interval. The value of this variable is lower than the significant level. Because of that both null hypothesis can be rejected.

There is a significant relationship between the commercial success of the techno-based SME start-up and the selection criteria of the techno base SMEs for the techno incubator. There is a significant relationship between the commercial success of the techno-based SME start-up and the services offered and the business support given by the techno incubator.

Also according to the analysis, p-value for the infrastructure facilities provided by the techno incubator is 0.736 and the p-value for the graduation and exit criteria of the techno base SMEs from the techno-incubator is 0.225. For testing it is used the 0.05 significant level at 95% confident interval. The value of this variable is higher than the significant level. Because of that the null hypothesis cannot be rejected. There is no significant relationship between the commercial success of the techno-based SME start-up and infrastructure facilities provided by the techno incubator.

There is no significant relationship between the commercial success of the techno-based SME start-up and graduation and exit criteria of the techno base SMEs from the techno-incubator.

Summery of the hypothesis testing

Table 4.26: Variable for hypothesis testing for the commercial success of the techno-based SME

	Variables	SPSS Variable Name	Measure
Independent	Selection criteria of the techno base SMEs	Selection_2	Scale
	Services offered by the techno incubator.	Serivicesoff_3	Scale
	Infrastructure facilities provided by the techno incubator.	Inf_44	Scale
	Graduation and exit criteria of the techno base SMEs from the techno-incubator.	Serivicesoff_3	Scale
Dependent	Commercial success of the techno-base SME start-up	Commer_6	Scale

Table 4.27: Summary of Hypothesis Testing for the commercial success of the techno-SME start-up

Variable	p-value	Relationship
Selection criteria of the techno base SMEs	0.013	Yes
Services offered by the techno incubator	0.005	Yes
Infrastructure facilities provided by the techno incubator	0.736	No
Graduation and exit criteria of the techno base SMEs from the techno-incubator	0.225	No

Conclusions and Recommendations

In the past 60 years Sri Lanka has been able to boast only 'one' world class initiative that achieved global market share -"LOADSATR". Most of the techno entrepreneur highly technical people and some are serial inventers. Although they are capable in the technology, majority of them do not have soft skills of general management, marketing and finance management. Due to that most of the techno start-ups are being closed down. Therefore business mentoring should be one of the key services provided by the techno incubator. Establishing proper selection mechanism for the techno-SME start-ups to the techno-incubators are more critical. That can be help full to select most suitable techno-start-ups for the available resources and the capabilities of the techno incubator. Getting funds from the angel networks, venture capital providers there are expectation mismatch between output of the incubator/ techno-SME start-up and the angel investor expectation. Technology updating and upgrading is an important factor for the sustainability of the techno-SME start-ups, so giving access to universities to expertise is very important to be aware about new technologies, new inventions, etc. In Sri Lanka, most of the techno-SMEs are followers and most techno-SMEs fail due to being late adapters of the technology because of lack of information. Links with universities and research organizations can fill that gap and techno-SMEs can become early adapters or pioneers of new technologies.

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