

THE PERFORMANCE OF BUSINESS INCUBATION IN MALAYSIA  
POLYTECHNICS ENTREPRENEURSHIP CENTRE (MPEC)

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DIFFERENT PERSPECTIVES OF ORGANISATIONAL FACTORS IN SUPPORT  
OF KNOWLEDGE CREATION IN IRANIAN GOVERNMENT  
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To my beloved and supportive father and sister.

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## ABSTRACT

There has been an increased interest in business incubation programs due to the rapid growth of the business incubators in the developed and developing countries. Likewise, Malaysia has put forth the importance of entrepreneurship as the key driver to the nation economy development to achieve the Malaysia Vision 2020. In conjunction to this, Malaysia Polytechnics Entrepreneurship Centre (MPEC) was established to promote entrepreneurship to the Polytechnics students and business incubation program is one of the main program to realize their objectives. Therefore, 25 business incubators were established in the Polytechnics throughout Malaysia. However, there has been a lack of study towards the performance of business incubation program under the initiatives of the MPEC since its' establishment in year 2012. Thus, the aim of this study was to understand the performance of the business incubation program. A conceptual framework of the measurement for the performance of the business incubation program was built and had identified seven key indicators as the measurement indicators. A qualitative method was used in this study through documents review and in-depth interviews with the MPEC manager and three selected incubator managers. The results provided support for the conceptual framework, with the emergence of other contributing factors towards the performance of the business incubation but those other factors being secondary to the measurement of the performance. An implication for business incubation program is that the systematic measurement indicators for business incubation performance can assist in decisions on the continuation, interruption or modification of incubator activities.

## **ABSTRAK**

Terdapat peningkatan minat dalam program perniagaan inkubasi disebabkan oleh pertumbuhan pesat perniagaan inkubator di negara-negara maju. Malah, Malaysia telah mengemukakan kepentingan keusahawanan sebagai pemacu utama kepada pembangunan ekonomi negara untuk mencapai Wawasan Malaysia 2020. Sehubungan dengan ini, Pusat Keusahawanan Politeknik Malaysia (MPEC) telah ditubuhkan untuk menggalakkan keusahawanan kepada pelajar Politeknik dan program perniagaan inkubasi merupakan salah satu program utama untuk merealisasikan objektif MPEC. Dengan itu, 25 inkubator perniagaan telah ditubuhkan di seluruh Politeknik Malaysia. Walau bagaimanapun, terdapat kekurangan kajian terhadap pelaksanaan program perniagaan inkubasi di bawah inisiatif MPEC sejak ditubuhkan pada tahun 2012. Justeru itu, kajian ini bertujuan untuk memahami prestasi program perniagaan inkubasi. Satu kerangka konsep kerja telah dibina sebagai alat pengukuran bagi pelaksanaan program perniagaan inkubasi. Tujuh penunjuk utama telah dikenalpasti sebagai penunjuk pengukuran. Kaedah kualitatif telah digunakan dalam kajian ini melalui dokumen kajian dan temu bual bersama pengurus MPEC dan tiga pengurus inkubator. Keputusan memberi sokongan kepada kerangka konseptual. Terdapat kemunculan faktor lain yang menyumbang ke arah prestasi program perniagaan inkubasi. Penunjuk pengukuran yang sistematik untuk prestasi perniagaan inkubasi mampu membantu dalam mengenalpasti kesinambungan, gangguan atau pengubahsuaian aktiviti inkubator.

## TABLE OF CONTENTS

CHAPTER	TITLE	PAGE
	<b>DECLARATION</b>	ii
	<b>DEDICATION</b>	iii
	<b>ACKNOWLEDGEMENTS</b>	iv
	<b>ABSTRACT</b>	v
	<b>ABSTRAK</b>	vi
	<b>TABLE OF CONTENTS</b>	vii
	<b>LIST OF TABLES</b>	xi
	<b>LIST OF FIGURES</b>	xii
	<b>LIST OF ABBREVIATIONS</b>	xiii
	<b>LIST OF APPENDICES</b>	xiv
<b>1</b>	<b>INTRODUCTION</b>	<b>1</b>
	1.1 Introduction	1
	1.2 Research Background	2
	1.3 Problem Statement	3
	1.4 Research Aim	5
	1.5 Research Objectives	6
	1.6 Research Questions	6
	1.7 Research Scope	7
	1.8 Importance of the study	7
	1.9 Operational Definitions	8

<b>2</b>	<b>LITERATURE REVIEW</b>	<b>9</b>
2.1	Introduction	9
2.2	Definitions	9
2.2.1	Business Incubator	10
2.2.2	Business Incubation Program	11
2.2.3	Incubatee	11
2.3	The International Perspective	12
2.3.1	Business Incubation Generations	14
2.3.2	Business Incubator Classifications	16
2.3.3	The Stakeholder Roles	17
2.3.4	Business Incubation Phases	20
2.3.5	Life Cycle of Business Incubator	22
2.3.6	Business Incubator Models	24
2.3.7	Performance of Business Incubators	27
2.3.8	Key Outcomes of the Existing Business Incubation Models	33
2.4	The Malaysia Perspective	34
2.4.1	Business Generations in Malaysia	36
2.4.2	The Business Incubation Model	39
2.4.3	The Business Incubation Process	40
2.5	The Malaysian Polytechnics Entrepreneurship Centre (MPEC)	42
2.5.1	Special Projects on Incubation, Coaching and Entrepreneurship (SPICE)	43
2.5.2	The MPEC Business Incubation	44
2.6	Conceptual Framework	46
<b>3</b>	<b>RESEARCH METHODOLOGY</b>	<b>49</b>
3.1	Introduction	49
3.2	Research Design	49
3.3	Research Population	50
3.4	Methods of Data Collection	51
3.4.1	Interview Techniques	51
3.4.2	Interview Process	53

	3.4.3 Document Studies	54
	3.5 Data Analysis	54
	3.6 Validity and Reliability	55
	3.7 Summary	55
<b>4</b>	<b>DATA FINDINGS</b>	<b>56</b>
	4.1 Introduction	56
	4.2 Interviews	57
	4.2.1 MPEC Manager	57
	4.2.2 Incubator Managers	57
	4.3 Results	59
	4.4 Research Questions	59
	4.4.1 Research Question 1	59
	4.4.2 Research Question 2	61
	4.4.2.1 New Company Creations (Per Year)	63
	4.4.2.2 Amounts of grants / Funds received	65
	4.4.2.3 Development of Incubator in Life Cycle	67
	4.4.2.4 Occupancy Rate	68
	4.4.2.5 Average Length of Tenancy	70
	4.4.2.6 Training in Entrepreneurial Skills	71
	4.4.2.7 Strategic Alliances	73
	4.4.3 Research Question 3	75
	4.5 Other Key Findings	82
	4.5.1 Business Incubation Program in Polytechnics Malaysia	83
	4.5.2 Sectorial Distribution	86
	4.6 Summary	88
<b>5</b>	<b>DISCUSSION</b>	<b>90</b>
	5.1 Introduction	90
	5.2 Discussion of the Findings	92
	5.2.1 Key Indicators	92
	5.2.2 Performances	93
	5.2.3 Challenges of Business Incubation	97

5.3	Conclusion	100
5.4	Recommendations	102
5.5	Limitations	104
5.6	Future Research Directions	105
<b>REFERENCES</b>		106
Appendices A - E		112 - 122

## LIST OF TABLES

<b>TABLE NO.</b>	<b>TITLE</b>	<b>PAGE</b>
1.1	Diploma graduates' employment status by type of Higher Education Institutions (HEI) in 2015	4
2.1	Sponsors and desired goals	17
2.2	Sponsors and desired goals	18
2.3	Principal characteristics of the main business incubation Models	19
2.4	Life cycle of business incubator	23
2.5	The measurement of assessment towards the performance of Business Incubators	31
2.6	Number of Business Incubators in Asia Pacific Region	35
2.7	Number of Incubators and Incubatees in Malaysia	36
2.8	Percentage of Incubator according to the incubation model	38
2.9	MPEC High Impact Projects	45
2.10	The measurement of assessment towards the performance of Business Incubators	47
4.1	Demographics of case study participants	58
4.2	New Company Creations (Per Year) Proof key findings	63

## LIST OF FIGURES

FIGURE NO.	TITLE	PAGE
2.1	Number of Business Incubators Worldwide	13
2.2	Evolution of the Business Incubator Model	15
2.3	Incubation Phases	21
2.4	Business Incubation Process	22
2.5	Costa-David, Malan, Lalkaka Model	25
2.6	Formula for business incubation performance	26
2.7	Hackett & Dilts Business Incubator Model (a)	27
2.8	Hackett & Dilts Business Incubator Model (b)	27
2.9	Generation of Incubation Centres Development	37
2.10	Top 10 Most Effective Incubation Centres in Malaysia	38
2.11	The Game of Entrepreneurship	40
2.12	Performance Criteria	42
2.13	SPICE program components	43
2.14	Key Indicators for Business Incubation Performance in MPEC	48
4.1	The numbers of registered companies	64
4.2	Funds budget allocation to MPEC	67
4.3	SPICE program components	68
4.4	Comparison charts of numbers of projects and total funds allocation	73
4.5	Business Incubators based on Zones	86
4.6	Sectorial Distribution	87
4.7	Sectorial according to Zones	88
5.1	Sectors Distribution according to the North, Middle and South Zones	99

**LIST OF ABBREVIATIONS**

CARE	-	Coaching Towards Achieving Real Experience
DO IT	-	Develop Opportunity in Trading
ELEMENT	-	Experiential Learning to Enhance Marketability and Entrepreneurship
HEI	-	Higher Education Institutions
INVEST	-	Innovative Venture in Strategic Trade
IVM	-	Incubator Virtualization Model
KPI	-	Key Performance Indexes
MARDI	-	Malaysia Agricultural Research & Development Institute
MOHE	-	Ministry of Higher Education
MOSTI	-	Ministry of Science, Technology and Innovation
MPEC	-	Malaysia Polytechnics Entrepreneurship Centre
MSC	-	Multimedia Super Corridor
MRM	-	Majlis Rekabentuk Malaysia
NBIA	-	National Business Incubation Association
MTDC	-	Malaysian Technology Development Corporation
SIRIM	-	Standard and Industrial Research Institute of Malaysia
SME	-	Small and Medium Sized Enterprises
SPICE	-	Special Projects on Incubation, Coaching and Entrepreneurship
SSM	-	Suruhanjaya Syarikat Malaysia
TPM	-	Technology Park Malaysia Corporation Sdn Bhd

**LIST OF APPENDICES**

<b>APPENDICES</b>	<b>TITLE</b>	<b>PAGE</b>
A	List of The Polytechnic Business Incubators in Malaysia	112
B	Business Incubators based on Institutions	115
C	List of Entrepreneurship Programmes (Year 2013)	118
D	Interview Protocols for Incubator Managers	119
E	Interview Protocols for MPEC Manager	121

## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1. Introduction**

The Malaysia Vision 2020 in becoming a high-income economy has aspired the Malaysia Prime Minister in putting forth that the entrepreneurship as the key driver to the nation economy development. Thus, in the Malaysia National Higher Education Action Plan 2007-2010, it is stated that the transformation in teaching and learning entrepreneurship among the students in higher learning institutions as one of the visions to be achieved by the higher learning institutions (MOHE, 2007). In conjunction with the initiatives from the Malaysia Prime Minister, the Malaysia Polytechnics Department has formed the Malaysia Polytechnic Entrepreneurship Center (MPEC) to act as a platform to promote entrepreneurship among the Polytechnics students. One of main mechanisms used is the business incubation program (MPEC, 2013).

Business incubation is an entrepreneurship development mechanism to increase the survival of the new firms and provide to their needs during their vulnerable stage, the early period (Grimaldi and Grandi, 2005; UKBI, 2012). The business incubators are mainly to provide emerging entrepreneurs with physical resources such as facilities and intangible resources such as knowledge sharing for job creation. Studies in United States have proven that business incubation is able to strengthen the local economies through the ninety percent survival rate of the tenants and clients in the business incubators (Info Dev., 2009; Al-Mubaraki et al., 2010). There were

roughly 7000 incubators worldwide with 850 business incubators found in Western Europe (NBIA, 2016).

The key objectives of the business incubation were entrepreneurship, job creation, start-up company creations within the incubators and graduated companies (Al-Mubarak & Busler, 2011). MPEC has adopted the business incubation concept into the entrepreneurship program as a mean to encourage the Malaysia Polytechnic graduates to embrace entrepreneurship (MPEC, 2013). However, there was a lack of study on the performance of the business incubation program in MPEC. Hence, this study examines the performance of business incubation program in the Malaysia Polytechnic Entrepreneurship Center (MPEC).

## **1.2. Research Background**

Polytechnics in Malaysia have high number of students which produces high number of graduates in various specialization fields ranging from management to technical. According to the report by MOHE (2015) on the Diploma graduates in Malaysia, it is reported that Malaysia Polytechnics was ranked third in the number of graduates with the total number of 25,168 students who graduated in year 2015 and also shown an increase of 35% graduates in year 2015 since year 2006 (MOHE ,2015).

The initial aim of the establishment of Polytechnics in Malaysia generally focuses on the technical education where Polytechnics are expected to produce skilled and semi-skilled workers in engineering and commerce sectors (Politeknik, 2009). However, Malaysia Polytechnics amended the education policy under the Transformation Polytechnic Education policy in building holistic graduates who are also well-versed in entrepreneurship (Politeknik, 2009). In 2013, MPEC was established to accelerate the entrepreneurship knowledge and skills to the polytechnic graduates through the comprehensive entrepreneurial activities and programs (MPEC, 2013).

This study was intended to enhance the understanding of the performance measurement of business incubation in Malaysia. The study also provided a basis for understanding the current performance of the business incubation program under the Malaysia Polytechnic Entrepreneurship Centre (MPEC) that had been implemented in 25 participating Polytechnics throughout Malaysia. The outcomes of this study are important for current and future business incubator research. Findings from this study allow the understanding of better incubation management practices that are able to help boost the entrepreneurship development in Malaysia whilst achieving the Malaysian Vision 2020.

### **1.3. Problem Statement**

In 2010, the Malaysia Ministry of Education introduced new entrepreneurship development policy to all the higher learning institutions (MOHE, 2010). Therefore, in tandem to achieve key performance indicator, the Department of Polytechnic has established MPEC to further boost the entrepreneurship program development among the Polytechnics graduates (MPEC, 2013). The Malaysia Higher Education has outlined one of the vision of producing 5% of graduates in Malaysia to pursue entrepreneurship as their chosen career (MOHE, 2015).

However, previous studies showed that the Malaysian polytechnic students were not keen towards entrepreneurship (Mohd Zahari, 2010; Warman et. al, 2010; Mom & Khadijah, 2014). The main findings were that the graduates felt uncomfortable in pursuing the career of entrepreneurs and most prefer to have a secure income with existing companies (Zahari, 2010). This is proven from the MOHE Graduates Tracer Study 2015 as shown in Table 1.1 that reported of merely 3.7% with the total of 510 Polytechnics graduates were self-employed (MOHE, 2015). This figure shows that the aim of producing 5% entrepreneurs were not met and it further proves that there is a gap in implementation of Malaysia Polytechnics entrepreneurship program.

**Table 1.1** : Diploma graduates' employment status by type of Higher Education Institutions (HEI) in 2015

Employment Status (%)	Public Universities (n=7,226)	HEI Private (n=18,527)	<b>Polytechnics (n=13,806)</b>	HEI Others (n=932)	Overall (n=40,491)
	(%)				
Permanent	32.0	41.9	47.3	40.3	41.9
Part Time	37.4	30.2	23.4	29.8	29.2
Contract	22.5	20.8	22.0	22.5	21.5
Work with family	4.4	3.9	3.6	3.4	3.9
Self-Employment	3.6	3.2	<b>3.7</b>	3.9	3.5
<b>TOTAL</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

Source: MOHE, 2015

Since the establishment of MPEC in 2013, there had not been a standard systematic measurement tools to measure the business incubation performance in Malaysia Polytechnics (MPEC, 2013). Various studies had been conducted on the entrepreneurial activities by MPEC (Indiran et. al, 2015; Mom, 2014; Isa, 2008; Nasrudin, 2012; Rahim et.al., 2015; Siti Noor et. al, 2010; Warman et. al., 2010; Zahari, 2010), however, there were a lack of study conducted solely on the business incubation program by MPEC. Therefore, this study is important to meet the gap found in literature concerning on business incubation program by MPEC and also to shed light on the entrepreneurship efforts commenced by the MPEC.

Additionally, MPEC had planned to develop a set of systematic measurement tool in measuring the business incubation performance (MPEC, 2013), therefore this study was in alignment as to propose the key indicators in measuring the performance of business incubation in Malaysia Polytechnics.

Therefore, the broad issue to be investigated is the performance of business incubation in MPEC. MPEC also has yet to have measuring tools for the

performance of the business incubation (MPEC, 2013). Therefore, this study would contribute directly to the issue by identifying the key indicators for business incubation performance in MPEC. Thus, this study has also discussed on the challenges faced by incubator manager in implementing the business incubation program to further understand the business incubation program in detail. By the end of this study, it is expected that these will have been established.

#### **1.4. Research Aim**

Due to the significance of entrepreneurship in shaping the future, the Ministry of Higher Education recently has outlined in the Malaysia's Higher Education Blueprint (2015 to 2025) that the higher education institutions were to produce graduates with entrepreneurial mindset (MOHE, 2015). However, various studies (Zahari, 2010; Siti Noor et. al.,2010; Nasrudin, 2010; Isa, 2008; Warman et. al, 2010; Mom, M., & Khadijah, S., 2014) had conducted on entrepreneurship in Malaysia Polytechnics but there were lack of understanding on the business incubation program in Polytechnics. Therefore, this study is mainly dedicated on the business incubation programs that were conducted by Polytechnics in Malaysia under the initiatives of MPEC.

The aim of this study was to understand the performance of the business incubation in Malaysia Polytechnics. This study has also measured on the performance of the business incubation by MPEC. Thus, this study had identified the key indicators to measure the performance of business incubation program. The challenges in the business incubation programs were also discussed for a better understanding of the program.

## 1.5. Research Objectives

The business incubation program in Malaysia Polytechnics was supported by MPEC in the effort to boost the entrepreneurship among the graduates from Polytechnics in Malaysia (MPEC, 2013). This study focuses on the performance of the business incubation program in polytechnics initiated by MPEC. The MPEC manager and the Polytechnic business incubator managers were contacted prior the study and were agreeable to participate in this study.

The research objectives will be:

- (a) To identify the key indicators used to measure the performance of business incubation program by MPEC
- (b) To evaluate the performances of the business incubation program by MPEC.
- (c) To identify the challenges of business incubation program in Malaysia Polytechnics.

## 1.6. Research Questions

The research questions developed for this study were:

*RQ 1: What are the key indicators used to measure the performance of business incubation program by MPEC?*

*RQ 2: What are the performances of the business incubation program by MPEC?*

*RQ 3: What are the challenges of business incubation program in Malaysia Polytechnics?*

### **1.7. Research Scope**

The main focus of this study is on the performance of the business incubation in MPEC. This study focuses only on the business incubation programs initiated by MPEC. Therefore, the data gathered for this study consists of the 25 business incubation programs in Malaysia Polytechnics as shown in Appendix 2. This is to generate a more comprehensive view on the business incubation program by MPEC that is being implemented in the participating Malaysia Polytechnics. This study relies heavily on the data collected based on personal interviews, observations and personal research due to the lack of complete data from MPEC and the business incubators.

### **1.8. Importance of the Study**

This study is a crucial part of the research process which ensures and reflects gaps and the significance of the study. This study starts with how the study will bridge the gaps, and followed by contribution to practitioner.

This study suggested that the main indicators of number new companies, number of grants/ funds, incubator development, occupancy rate, average length of tenancy, number of entrepreneurial trainings and numbers of strategic alliances between incubatees with other parties.

By measuring the performance of incubator activities, systematic measurement indicators for business incubation performance can assist in decisions on the continuation, interruption or modification of incubator activities.

Therefore, this study gives three main contributions:

- (a) The research provides basic understanding on the incubation measurement used in Malaysia Polytechnic, and propose a better

monitoring model which can be applied by policy maker of entrepreneurship which is MPEC

- (b) Structured measurement criteria/indicators can assist agencies in allocating award incentives. A lack of structured criteria may result in reduced award incentives and/or reduced nongovernment financial support, which can affect the motivation in entrepreneurship activities in a long run.
- (c) It provides awareness on the importance of performance measurement of incubators.

## 1.9. Operational Definitions

Definitions of key terms for study include the following:

- a. **Business Incubator** refers to the facilities that provide shared resources for young businesses to successfully produce independent incubatees (InBIA, 2016).
- b. **Incubatee** was adopted in reference to the client and the tenant of the business incubators.
- c. **Business Incubation Program** refers to the program that hasten the development of the incubatees through the resources found in business incubator (Lewis, Harper-Anderson & Molnar, 2011).
- d. **Performance** is defined as “behaviors and actions that are relevant to the goals of the organization” (McCloy et. al., 1994).

## REFERENCES

- Aaboen, L., Lindelof, P., & Lofsten, H. (2008). Incubator performance: an efficiency frontier analysis. *International Journal of Business Innovation and Research*, 2(4), 354-380.
- Abduh, M., D'Souza, C., Quazi, A., & Burley, H. T. (2007). Investigating and classifying clients' satisfaction with business incubator services. *Managing Service Quality: An International Journal*, 17(1), 74-91.
- Allen, D. N. (1988). Business incubator life cycles. *Economic Development Quarterly*, 2(1), 19-29.
- Allen, D.N., McCluskey, R., 1990. Structure, policy, services, and performance in the business incubator industry. *Entrepreneurship: Theory and Practice* 15 (2), 61-77
- Abdul Khalid, F., Gilbert, D., & Huq, A. (2014). THE WAY FORWARD FOR BUSINESS INCUBATION PROCESS IN ICT INCUBATORS IN MALAYSIA. *International Journal of Business and Society*, 23-33.
- Aernoudt, R. (2004). Incubators: tool for entrepreneurship?. *Small business economics*, 23(2), 127-135.
- Al-Mubarak, H., Al-Karaghoul, W., & Busler, M. (2010). The creation of business incubators in supporting economic developments. In *European, Mediterranean & Middle Eastern Conference on Information Systems* (pp. 12-13).
- Al-Mubarak, H., & Busler, M. (2011). The incubators economic indicators: Mixed approaches. *Journal of Case Research in Business and Economics*, 4, 1-12.
- Al-Mubarak, H. M., & Busler, M. (2013). Business incubation as an economic development strategy: a literature review. *International Journal of Management*, 30(1), 362.

- Amezcuca, A. S. (2010). *Performance Analysis Of Entrepreneurship Policy: Which Business Incubators Generate The Highest Levels Of Economic Performance?*. *Frontiers of Entrepreneurship Research*, 30(18), 1.
- Amezcuca, A. S. (2010). *Boon Or Boondoggle? Business Incubation As Entrepreneurship Policy*. Syracuse University.
- Bergek, A., & Norrman, C. (2008). Incubator best practice: A framework. *Technovation*, 28(1), 20-28.
- Bøllingtoft, A., & Ulhøi, J. P. (2005). *The Networked Business Incubator—Leveraging Entrepreneurial Agency?*. *Journal of business venturing*, 20(2)
- Chandra, A. (2007). 'Approaches to Business Incubation: A Comparative Study of the United States, China and Brazil'. Working Paper 2007-WP-29. Indianapolis: Networks Financial Institute
- Costa-David, J., Malan, J., & Lalkaka, R. (2002). Improving business incubator performance through benchmarking and evaluation: lessons learned from Europe. *Materialy*, 16, 28-04.
- Dee, N., Gill, D. E., Livesey, T. F., & Minshall, T. H. W. (2011). *Incubation for growth: A review of the impact of business incubation on new ventures with high growth potential*.
- EPU (2015). *Eleventh Malaysia Plan 2016-2020*. Economic Planning Unit, Prime Minister's Department.
- Grimaldi, R., & Grandi, A. (2005). *Business incubators and new venture creation: an assessment of incubating models*. *Technovation*, 25(2), 111-121.
- Hackett, S. M., & Dilts, D. M. (2004). A systematic review of business incubation research. *The Journal of Technology Transfer*, 29(1), 55-82.
- Hackett, S. M., & Dilts, D. M. (2004). A real options-driven theory of business incubation. *The Journal of Technology Transfer*, 29(1), 41-54.
- Hamdani, D. (2006). *Conceptualizing and Measuring Business Incubation*. Statistics Canada, Science, Innovation and Electronic Information Division.
- InBIA. (2017). *Operational Definitions: Entrepreneurship Centers (Incubators, Accelerators, Coworking Spaces and Other Entrepreneurial Support Organizations)*. Retrieved March 25, 2017, from <https://inbia.org/wp-content/uploads/2016/09/InBIA-Industry-Terms.pdf?x84587>

- Indiran, L., Na, U. E., & Indiran, P. S. (2015). *Exploring The Potential of Malaysian Polytechnics Towards Entrepreneurship Development Among Students: A Perception-Based Analysis*. Editors, 60.
- Indiran, L., Khalifah, Z., & Ismail, K. (2015). *A Historical Review of Business Incubation Models*. Editors, 733.
- Indiran, L., Khalifah, Z., Ismail, K., & Ramanathan, S. (2017). *Business Incubation in Malaysia: An Overview of Multimedia Super Corridor, Small and Medium Enterprises, And Incubators In Malaysia*. In *Handbook of Research on Small and Medium Enterprises in Developing Countries* (pp. 322-344). IGI Global.
- InfoDev (2009), Annual Report, infoDev, available at: [www.infodev.org/highlights/infodev-2009-annual-report-published](http://www.infodev.org/highlights/infodev-2009-annual-report-published).
- InfoDev (2016). *Business Incubation, Definitions and Commonly Used Terms*. [www.idisc.net/en/DocumentArticle.38688.html](http://www.idisc.net/en/DocumentArticle.38688.html)
- Hackett, S. M., & Dilts, D. M. (2004). A systematic review of business incubation research. *The Journal of Technology Transfer*, 29(1), 55-82.
- Hackett, S. M., & Dilts, D. M. (2004). A real options-driven theory of business incubation. *The Journal of Technology Transfer*, 29(1), 41-54.
- Hackett, S. M., & Dilts, D. M. (2008). Inside the black box of business incubation: Study B—scale assessment, model refinement, and incubation outcomes. *The Journal of Technology Transfer*, 33(5), 439-471.
- Hamdani, D. (2006). *Conceptualizing and measuring business incubation*. Statistics Canada, Science, Innovation and Electronic Information Division.
- Hansen, M.T., Chesborough, H.W., Nohira, N., Sull, D.N., 2000. Networked incubators hothouses of the new economy. *Harvard Business Review* 78 (5), 74–84.
- Isa, A. M. (2008). *The Effectiveness of the Implementation of Entrepreneurship Studies at Polytechnics In Malaysia*. Unpublished Master's Thesis, University of Stirling.
- Lalkaka, R. (2000). Assessing the performance and sustainability of technology business incubators. *New Economy & Entrepreneurial Business Creation in Mediterranean Countries (International Centre for Science & High Technology, International Centre for Theoretical Physics, and Third World Academy of Sciences), Trieste, Italy*.

- Lalkaka, R. (2001, November). Best practices in business incubation: Lessons (yet to be) learned. In *International Conference on Business Centers: Actors for Economic & Social Development*. Brussels, November(pp. 14-15).
- Lalkaka, R. (2003). Business incubators in developing countries: characteristics and performance. *International Journal of Entrepreneurship and Innovation Management*, 3(1-2), 31-55.
- Lazarowich, M., Wojciechowski, M.J. (2002) *Russian Business Incubator Program, Phase One: Prospect Development and Strategic Plan*. Waterloo, Ontario, Canada: School of Planning, University of Waterloo.
- Lewis, D. A., Harper-Anderson, E., & Molnar, L. A. (2011). *Incubating Success. Incubation Best Practices That Lead to Successful New Ventures*. Ann Arbor: Institute for Research on Labor, Employment, and Development, 1-144.
- MAD (2017). MAD Business Incubation Program. <http://www.incubator.com.my/mad-programs/mad-business-incubation-program/>
- Mansor, M., & Othman, N. (2011). *CoBLAS: Inculcating Entrepreneurial Culture among Higher Education Institutions' Students*. *International Journal of Social Science and Humanity*, 1(1), 86.
- Markman, G. D., Phan, P. H., Balkin, D. B., & Gianiodis, P. T. (2005). Entrepreneurship and university-based technology transfer. *Journal of Business Venturing*, 20(2), 241-263.
- Martin, F. (1997). Business incubators and enterprise development: Neither tried or tested?. *Journal of Small Business and Enterprise Development*, 4(1), 3-11.
- Co, M. J., Groenewald, J., Mitchell, B., Nayager, T., Van Zyl, J., Visser, K,& Emanuel, B. (2006). *Entrepreneurship. Fresh perspectives*. Cape Town: Pearson.
- MOHE (2007). *National Higher Education Action Plan 2007-2010/Pelan Tindakan Pengajian Tinggi Negara 2007-2010*. Ministry of Higher Education.
- MOHE. (2010). *Entrepreneurship Development Policy Institutions of Higher Learning / Dasar Pembangunan Keusahawanan Institusi Pengajian Tinggi*. Putrajaya: Ministry of Higher Education.
- MOHE (2015). *Institutions of Higher Education Entrepreneurship Action Plan 2016-2020 /Pelan Tindakan Keusahawanan Institusi Pendidikan Tinggi 2016-2020*. Ministry of Higher Education.

- MOHE (2015). *Malaysia's Higher Education Blueprint 2015-2025 (Higher Education) – Executive Summary*. Ministry of Higher Education.
- MOHE (2015). *Laporan Kajian Pengesanan Graduan 2015*. Ministry of Higher Education. <http://graduan.mohe.gov.my/skpg-report/Penerbitan/Terbitan.aspx>
- Mom, M., & Khadijah, S. (2014). *Critical success factor bagi program keusahawanan di Jabatan Perdagangan Politeknik* (Doctoral dissertation, Universiti Tun Hussein Onn Malaysia).
- Mutambi, J., Byaruhanga, J. K., Trojer, L., & Buhwed, K. B. (2010). Research on the state of business incubation systems in different countries: lessons for Uganda. *African Journal of science, technology, innovation and development*, 2(2), 190-214.
- MPEC (2013). *Malaysian Polytechnics Entrepreneurship Centre*. Malaysian Polytechnics Entrepreneurship Centre. Ministry of Higher Education.
- MTDC (2017). Introduction - MTDC Technology Centre. [www.mtdc.com.my](http://www.mtdc.com.my). <https://www.mtdc.com.my/index.php/en/introduction-6/>
- Nasrudin, N., & Othman, N. (2012). *Evaluation of Polytechnic Entrepreneurship Programs in Malaysia*. *International Journal of Trade, Economics and Finance*, 3(5), 356.
- NBIA (2015). Resource Library - National Business Incubation Association. [www2.nbia.org](http://www2.nbia.org). [http://www2.nbia.org/resource\\_library/history/index.php](http://www2.nbia.org/resource_library/history/index.php)
- Nieman, G., & Nieuwenhuizen, C. (2009). *Entrepreneurship: A South African Perspective*. Van Schaik.
- OECD (2017). *Enhancing Productivity for Inclusive Growth*. OECD Observer. <http://dx.doi.org/10.1787/c67f9005-en>
- Perdomo Charry, G., Arias Pérez, J. E., & Lozada Barahona, N. E. (2014). *Business Incubator Research: A Review and Future Directions*. *Pensamiento & Gestión*, (37), 41-65.
- Peters, L., Rice, M., & Sundararajan, M. (2004). The role of incubators in the entrepreneurial process. *The Journal of Technology Transfer*, 29(1), 83-91.
- Phan, P. H., Siegel, D. S., & Wright, M. (2005). Science parks and incubators: observations, synthesis and future research. *Journal of business venturing*, 20(2), 165-182.
- Politeknik, J. P. (2009). *Hala Tuju Transformasi Politeknik*. Putrajaya, Malaysia: Ministry of Higher Education.

- Politeknik, J. P. (2014). *Informasi Politeknik Malaysia*. Putrajaya, Malaysia: Ministry of Higher Education.
- Rahim, H. L., Kadir, M. A. B. A., Abidin, Z. Z., Junid, J., Kamaruddin, L. M., Lajin, N. F. M., ... & Bakri, A. A. (2015). *Entrepreneurship education in Malaysia: A critical review*. *Journal of Technology Management and Business*, 2(2).
- Rice, M.P., 2002. Co-production of business assistance in business incubators: an exploratory study. *Journal of Business Venturing* 17 (2), 163–187.
- Scaramuzzi, E. (2002). Incubators in developing countries: Status and development perspectives. *Washington DC: The World Bank*.
- Şehitoğlu, Y., & Özdemir, O. C. (2013). *The Impact of Business Incubation On Firm Performance During Post Graduation Period-Turkey Example*. *British Journal of Arts and Social Sciences*, 12(1), 171-190.
- Smilor, RW and Gill, M (1986), “The new business incubator: Linking talent technology, capital and know-how”. Lexington, MA, Lexington
- Siti Noor, A., Noor Hanisa, A. H., & Salwuan, A. H. (2010), *Keberkesanan Proses Pembelajaran Modul Keusahawanan dan Aktiviti Keusahawanan Kepada Niat untuk Memilih Kerjaya Dalam Bidang Keusahawanan: Kajian Kes Politeknik Kota Bharu*. In: *Proceedings Transformation Technical Education Seminar* (pp. 22-27). Sungai Petani: CeTMA, UUM, Jabatan Pengajian Politeknik.
- UKBI (2012), *Best Practice in Business Incubation*, Business Incubation, Birmingham
- Warman, S., Roddin, R., Esa, A., Awang, H., Mohamed, M., & Ab Rahman, A. (2010). Penerapan kemahiran keusahawanan dalam kalangan pelajar di politeknik.
- Wong, A. (2012). *NINA 3-Year Incubator Development Blueprint 2009-2012*. Presentation, Malaysia.
- Venter, R., Urban, B., & Rwigema, H. (2009). *Entrepreneurship: a theory in practice*. 2nd Ed. Cape Town: Oxford University Press Southern Africa
- Mohd Zahari, I. (2010). *Developing entrepreneurship education: Empirical findings from Malaysia Polytechnics* (Doctoral dissertation, PhD dissertation, University of Hull, UK, available at <http://www.pbu.edu.my/pbu4/images/files/entrepreneurship%20education.pdf>)