



UNIVERSITI PUTRA MALAYSIA

**DEVELOPMENT OF PROJECT SUCCESS MODEL USING PARTIAL
LEAST SQUARES - STRUCTURAL EQUATION MODELING FOR
MALAYSIA SMES**

AHMED ALI M. KHAN

FK 2019 80



**DEVELOPMENT OF PROJECT SUCCESS MODEL USING PARTIAL
LEAST SQUARES - STRUCTURAL EQUATION MODELING FOR
MALAYSIA SMES**

By

AHMED ALI M. KHAN

**Thesis Submitted to the School of Graduate Studies, Universiti Putra
Malaysia, in Fulfillment of the Requirements for the Degree of Doctor
of Philosophy**

July 2019

COPYRIGHT

All material contained within the thesis, including without limitation text, logos, icons, photographs, and all other artwork, is copyright material of Universiti Putra Malaysia unless otherwise stated. Use may be made of any material contained within the thesis for non-commercial purposes from the copyright holder. Commercial use of material may only be made with express, prior, written permission of Universiti Putra Malaysia.

Copyright@ Universiti Putra Malaysia



Abstract of thesis presented to the Senate Universiti Putra Malaysia in fulfillment of the requirement for the degree of Doctor of Philosophy

**DEVELOPMENT OF PROJECT SUCCESS MODEL USING PARTIAL
LEAST SQUARES - STRUCTURAL EQUATION MODELING FOR
MALAYSIAN SMES**

By

AHMED ALI M. KHAN

July 2019

Chairman: Professor Mohd Khairul Anuar Mohd Ariffin, PhD, Ir
Faculty: Engineering

Globalization and hyper-competitive business environments have forced organizations, large businesses, and Small and Medium-sized Enterprises (SMEs) alike, to define and undertake organizational projects to improve their products, services, market position, or processes. Despite recent advancements in the project management practices and tools, the rate of project success among organizations, SMEs in particular, has worryingly remained low. Since SMEs play a vital role in the economic development of Malaysia, it is crucial to assist Malaysian SMEs with improving the success rate of their projects and achieving higher corporate competitiveness and survivability. Consistently, the present study attempted to address this research gap by developing a model of project success among Malaysian SMEs. In doing so, the study first benefited from the Interpretive Structural Modelling (ISM) approach to identify project success factors most critical to SMEs. The study achieved this objective by performing a content-centric review of literature that identified 11 project success factors of employee qualification, employee development and training, information and digital technology competency, knowledge management, organizational culture, organizational structure flexibility, project management competency, project performance measurement, resource allocation efficiency, risk management, and top management support and commitment. After capturing the opinions of a group of Malaysian project management experts, the ISM approach identified the precedence relationships among the 11 success factors and produced the model of project success among SMEs. This model was further statistically tested among a sample of 142 Malaysian SMEs. The

application of Partial Least Squares (PLS) structural equation modelling (SEM) for data analysis revealed the statistical significance and magnitude of the precedence relationships identified within the ISM model. The assessment of PLS model of project success among Malaysian SMEs demonstrated that complex precedence relationships exist among project success factors. The achievement of project success is not accidental, and Malaysian SMEs should strategically plan their efforts and resource in support of project success. It means achieving the highest rate of project success depends significantly on the order and quality under which SMEs develop project success factors. Findings indicated that project success accounted for more than 25 percent of the variance in business performance among surveyed SMEs. This finding shows that project success leadership, defined as excelling in project effectiveness and efficiency, has been a valuable and affordable business strategy to Malaysian SMEs, which has the potential to provide the implementing firms with superior competitiveness and business performance improvement. Finally, yet importantly, the present study develops and offers a project selection software that enables SMEs to look at their existing success factors and select the best project option that has the highest chance of success rate.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia
sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

**PEMBANGUNAN MODEL KEJAYAAN PROJEK MENGGUNAKAN
PARTIAL LEAST SQUARES - STRUCTURAL EQUATION MODELING
UNTUK SMES DI MALAYSIA**

Oleh

AHMED ALI M. KHAN

Julai 2019

**Pengerusi: Profesor Mohd Khairol Anuar Mohd Ariffin, PhD, Ir
Fakulti: Kejuruteraan**

Pengglobalisasian dan persaingan yang kompetitif telah memaksa organisasi, perniagaan besar, dan Perusahaan Kecil dan Sederhana (PKS) untuk mendefinisikan dan mengusahakan projek-projek organisasi untuk memperbaiki produk, perkhidmatan, kedudukan pasaran atau proses mereka. Walaupun terdapat kemajuan baru dalam amalan dan alat pengurusan projek, kadar kejayaan projek di kalangan organisasi, terutamanya PKS, kekal rendah dan keadaan ini amatlah membimbangkan. Memandangkan PKS memainkan peranan penting dalam pembangunan ekonomi Malaysia, dengan membantu PKS Malaysia dengan cara meningkatkan kadar kejayaan projek mereka dan mencapai daya saing korporat yang lebih tinggi dan kebolehan hidup adalah penting. Kajian ini dijalankan untuk menangani jurang penyelidikan dengan membangunkan model kejayaan projek di kalangan PKS Malaysia secara konsisten. Menerusi pendekatan Pemodelan Struktur Interpretasi (ISM) untuk mengenal pasti faktor-faktor kejayaan projek yang paling penting untuk PKS, kajian ini mula-membuahahkan hasil. Matlamat ini dapat dicapai dengan menilai semula kajian literatur kandungan yang menilai 11 faktor kejayaan projek kelayakan pekerja, pembangunan pekerja dan latihan, kecekapan teknologi informasi dan digital, pengurusan pengetahuan, budaya organisasi, fleksibiliti struktur organisasi, kompetensi pengurusan projek, projek ukuran prestasi, kecekapan peruntukan sumber, pengurusan risiko, dan sokongan dan komitmen pengurusan tertinggi. Selepas menilai informasi serta pendapat daripada kumpulan pakar pengurusan projek Malaysia, pendekatan ISM mengenal pasti hubungan di antara 11 faktor kejayaan dan menghasilkan model kejayaan projek di kalangan PKS. Model ini diuji secara statistik di kalangan 142 PKS di Malaysia.

Penggunaan pemodelan persamaan struktur sekurang-kurangnya kuadrat untuk analisis data melaporkan kepentingan statistik dan magnitud hubungan keutamaan yang dikenalpasti dalam model ISM. Penilaian model PLS kejayaan projek di kalangan PKS Malaysia, menunjukkan bahawa hubungan mendahului kompleks wujud di antara faktor-faktor kejayaan projek. Kejayaan projek yang dicapai adalah bukan secara tidak sengaja, PKS Malaysia harus merancang strategi dan sumber daya mereka untuk menyokong kejayaan projek dalam menjayakan sesuatu projek. Ia bermakna untuk mencapai kejayaan tertinggi dalam projek, ia amat bergantung pada susunan dan kualiti di mana PKS membangunkan faktor kejayaan projek. Laporan penyelidikan menunjukkan kejayaan projek menyumbang lebih daripada 25 peratus daripada varians prestasi perniagaan di kalangan PKS yang dikaji. Ini menunjukkan bahawa kepemimpinan kejayaan projek iaitu keberkesanan dan kecekapan projek, merupakan sesuatu strategi perniagaan yang penting dan amatlah berpatutan kepada PKS Malaysia untuk berpotensi menyediakan firma pelaksana dengan daya saing yang unggul dan meningkatkan prestasi perniagaan. Pada dasarnya kepentingan kajian ini adalah untuk membangunkan dan menawarkan perisian pemilihan projek yang membolehkan PKS melihat faktor kejayaan yang sedia ada dan memilih pilihan projek terbaik yang mempunyai peluang kejayaan tertinggi.

ACKNOWLEDGEMENTS

Firstly, all thanks and praise to Allah that he bless me to complete my higher education.

Then, I would like to take this opportunity to sincerely express my gratitude to Professor Dr. Mohd Khairol Anuar Mohd Ariffin for chairing my committee and advising this research. I am grateful to him for spending time with me and helping me. I am indebted to him for his whole-hearted support, enthusiasm and inspiration throughout my graduated study.

I am grateful to Professor Dr. Shamsuddin B. Sulaiman and also Assoc. Prof. Dr. Kamarul Arifin Ahmad for the valuable advice and suggestions provided to me during the progression of my study and for their participation in my committee.

I also thank all other faculty members who helped me prepare this thesis.

Finally, I dedicate my greatest love to all my family including my mother who always supplicates and asks Allah to help and bless me to fulfil the requirements of the thesis and gain the degree, my wife who encourages me to gather the PhD award and my kids who make me smile during my study, moreover, my thanks to my government for providing me the opportunity and support to obtain this degree.

THANK YOU

This thesis submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfillment of the requirement for the degree of Doctor of Philosophy. The members of the Supervisory Committee were as follows:

Mohd Khairol Anuar Mohd Ariffin, PhD

Professor, Ir
Faculty of Engineering
Universiti Putra Malaysia
(Chairman)

Shamsuddin B. Sulaiman, PhD

Professor
Faculty of Engineering
Universiti Putra Malaysia
(Member)

Kamarul Arifin Ahmad, PhD

Associate Professor
Faculty of Engineering
Universiti Putra Malaysia
(Member)

ROBIAH BINTI YUNUS, PhD

Professor and Dean
School of Graduate Studies
Universiti Putra Malaysia

Date:

Declaration by graduate student

I hereby confirm that:

- This thesis is my original work;
- Quotations, illustrations and citations have been duly referenced;
- This thesis has not been submitted previously or concurrently for any other degree at any other institutions;
- Intellectual property from the thesis and copyright of thesis are fully-owned by Universiti Putra Malaysia, as according to the Universiti Putra Malaysia (Research) Rules 2012;
- Written permission must be obtained from supervisor and the office of Deputy Vice-Chancellor (Research and Innovation) before thesis is published (in the form of written, printed or in electronic form) including books, journals, modules, proceedings, popular writings, seminar papers, manuscripts, posters, reports, lecture notes, learning modules or any other materials as stated in the Universiti Putra Malaysia (Research) Rules 2012;
- There is no plagiarism or data falsification/fabrication in the thesis, and scholarly integrity is upheld as according to the Universiti Putra Malaysia (Graduate Studies) Rules 2003 (Revision 2012-2013) and the Universiti Putra Malaysia (Research) Rules 2012. The thesis has undergone plagiarism detection software.

Signature: _____ Date: _____

Name and Matric No: Ahmed Ali M. Khan (GS44222)

Declaration by Members of Supervisory Committee

This is to confirm that:

- The research conducted and the writing of this thesis was under our supervision;
- Supervision responsibilities as stated in the Universiti Putra Malaysia (Graduate Studies) Rules 2003 (Revision 2012-2013) are adhered to.

Signature: _____

Name of Chairman of

Supervisory Committee: Mohd Khairul Anuar Mohd Ariffin, PhD

Signature: _____

Name of Member of

Supervisory Committee: Shamsuddin B. Sulaiman, PhD

Signature: _____

Name of Member of

Supervisory Committee: Kamarul Arifin Ahmad, PhD

TABLE OF CONTENTS

	Page
ABSTRACT	i
ABSTRAK	iii
ACKNOWLEDGEMENTS	v
APPROVAL	vi
DECLARATION	viii
LIST OF TABLES	xii
LIST OF FIGURES	xiii
LIST OF ABBREVIATION	xv
 CHAPTER	
 1 INTRODUCTION	 1
1.1 Introduction and background	1
1.2 Problem Statement	3
1.3 Research Questions	6
1.4 Objectives of the Study	6
1.5 Significant of the Study	7
1.6 Scope of the Study	7
1.7 Organization of the Thesis	8
 2 LITERATURE REVIEW	 10
2.1 Definition of Key Terms	10
2.1.1 Project	10
2.1.2 Project Management	11
2.1.3 Project Success	11
2.1.4 Project Selection	12
2.1.5 Business Performance	12
2.2 Small and Medium-Sized Enterprises	13
2.2.1 Definitions of Small and Medium-Sized Enterprises	14
2.2.2 The Role of Malaysia's SME Sector	15
2.2.3 SMEs and Project Success	15
2.3 Project Success History	16
2.4 The Analytical Modeling Tools	29
2.4.1 Interpretive Structural Modelling	29
2.4.2 Structural Equation Modeling	32
2.4.3 PLS-SEM Software Selection	32
2.4.4 Executing PLS-SEM Analysis	33
2.5 Chapter Summary	39
 3 RESEARCH METHODOLOGY	 40
3.1 Research Design Overview	40
3.2 Project Success Factors	43
3.2.1 Project Success Factors	45
3.2.2 The Theoretical Framework of Project	53

	Success among SMEs	
3.3	Sampling, Instrumentation, and Data Gathering	54
3.3.1	Determining Appropriate Sample Size	55
3.3.2	Survey Administration	57
3.3.3	Questionnaire Development	57
3.4	Specifying Measurement Models	61
3.5	Chapter Summary	62
4	RESULTS AND DISCUSSION	63
4.1	Results of Interpretive Structural Modelling	63
4.1.1	Listings the Key Project Success Factor among SMEs	63
4.1.2	Establishing Contextual Relationships	64
4.1.3	Constructing the Initial Reachability Matrix	67
4.1.4	Constructing the Final Reachability Matrix	69
4.1.5	Segregating the Reachability Matrix	71
4.1.6	Developing the Structural Model of Project Success	76
4.1.7	Assessment of Driving and Dependence Power	78
4.2	Survey Results and Descriptive Findings	81
4.2.1	Correlation Analysis	90
4.3	PLS-SEM Results	92
4.3.1	Assessment of Formative Measurement Models	92
4.3.2	Structural Path Modelling	105
4.4	Discussion	108
4.5	Project Selection Software Development	110
4.5.1	Software Requirements	111
4.5.2	Programming Tools	112
4.5.3	Database Management System	114
4.5.4	Software Design and Development	117
4.5.5	Reporting Information	126
4.6	Chapter Summary	127
5	SUMMARY, CONCLUSIONS AND RECOMMENDATIONS	128
5.1	Theoretical Contributions	128
5.2	Practical Implications	129
5.3	Fulfillment of Research Objectives	132
5.4	Limitations and Future Research Directions	133
	REFERENCES	134
	APPENDICES	148
	BIODATA OF STUDENT	176
	LIST OF PUBLICATIONS	177

LIST OF TABLES

Table		Page
3.1	Results of assessment of internal consistency reliability in pilot study	58
4.1	Project success factors and corresponding coding	64
4.2	SSIM for project critical success factors among SMEs	66
4.3	Initial reachability matrix for project critical success factors among SMEs	68
4.4	Final reachability matrix with driving power and dependence level	70
4.5	Hierarchy level for project success factor among SMEs	72
4.6	Descriptive properties of Malaysian SMEs surveyed	81
4.7	Statistical properties of items belonging to the level 1 success factor	82
4.8	Statistical properties of items belonging to level 2 success factors	83
4.9	Statistical properties of items belonging to level 3 success factors	85
4.10	Statistical properties of items belonging to level 4 success factors	87
4.11	Statistical properties of items belonging to level 5 success factors	88
4.12	Statistical properties of items belonging to business performance and project success	89
4.13	Results of Pearson correlation among latent variables of study	91
4.14	The results of collinearity issue assessment for formative measurement model of study	95
4.15	Results of assessment of statistical significance and relevance of measurement items within original model	100
4.16	Results of assessment of statistical significance and relevance of measurement items within the modified model	104
4.17	Path analysis results for the mode of project success among Malaysian SMEs	107

LIST OF FIGURES

Figure	Page
2.1 The organizational role of projects	11
2.2 The definition of SMEs in Malaysia	14
2.3 De Wit's (1988) framework of project success	17
2.4 The scope of project success and project management success during the project life cycle	18
2.5 The LFM-based hierarchy of project success objectives	18
2.6 The timeframe of project success	19
2.7 The model of project excellence	20
2.8 The conceptual framework of project success	21
2.9 The project success understating life cycle	22
2.10 The model of agile project success	24
2.11 The moderative model of project success	25
2.12 Project success analysis and knowledge management framework	26
2.13 The framework of project leadership-based project success	27
2.14 The model of project sustainability and project success	27
2.15 Steps in application of ISM approach	31
2.16 Steps for evaluation of formative measurement models	33
2.17 Convergent validity assessment via redundancy analysis	34
2.18 Process of dealing with collinearity issue for formative indicators	35
2.19 The decision process for dealing with formative indicators	37
2.20 Steps for evaluation of structural path model	38
3.1 An overview of research design	42
3.2 Steps undertaken for conducting the content-centric review of literature	44
3.3 Article exclusion criteria applied throughout the content-centric review of literature	45
3.4 Theoretical framework of project success among SMEs	54
3.5 Sample size calculation method for organizational studies	56
3.6 Reflective and formative measurement model specification	61
4.1 Interpretive structural model of project success among SMEs	77
4.2 Driving power and dependence power diagram for project critical success factors	80
4.3 Results of assessment of convergent validity for formative measurement models Part 1	93
4.4 Results of assessment of convergent validity for formative measurement models Part 2	94
4.5 The original PLS model of project success with standardized values	98
4.6 The original PLS model of project success with bootstrapping results (t values)	99
4.7 The modified PLS model of project success with standardized values	102
4.8 The modified PLS model of project success with	103

	bootstrapping results (t values)	
4.9	Project selection software development flow chart	111
4.10	Record table structure	115
4.11	User table structure	115
4.12	Answer table structure	116
4.13	Question table structure	116
4.14	Software architecture	117
4.15.	Example of Question number 1	118
4.16	Answering the selected Option	119
4.17	Description of 11 Success Factors in the Report page	121
4.18	Recommended Project in the Report Page	122
4.19	Administrator interface layer	123
4.20	User interface layer	125



LIST OF ABBREVIATIONS

AJAX	Asynchronous Java Script and XML
ANP	Analytic Network Process
API	Application Program Interface
BP	Business Performance
BS	Business Size
CB-SEM	Covariance-Based SEM
CEO	Chief Executive Officer
DEMATEL	Decision-Making Trial and Evaluation Laboratory
EFQM	European Foundation for Quality Management
EPQ	Employee Qualification
EDT	Employee Development and Training
GOFs	Goodness of Fit Indices
GUI	Graphic User Interface
HTML	Hypertext Markup Language
IDT	Information and Digital Technology
IDTC	Information and Digital Technology Competency
ISM	Interpretive Structural Modelling
IT	Information Technology
IV	Independent Variable
KM	Knowledge Management
KPI	Key Performance Indicator
LFM	Logical Framework Method
MICMAC	Matrice d'Impacts Croisés Multiplication Appliquée à un Classement
MySQL	My Structured Query Language
NGT	Nominal Group Technique
OGC	Organizational Culture
OPM	Organizational Project Management
OSF	Organizational Structure Flexibility
PJS	Project Success
PLS-SEM	Partial Least Squares Structural Equation Modeling
PMBOK	Project Management Body of Knowledge
PMC	Project Management Competency
PPM	Project Performance Measurement
R&D	Research and Development
RAE	Resource Allocation Efficiency
RM	Malaysian Ringgit
ROI	Return on Investment
RSM	Risk Management
SEM	Structural Equation Modeling
SMEs	Small and Medium-sized Enterprises
SSIM	Structural Self-Interaction Matrix
TMSC	Top Management Support and Commitment
VIF	Variance Inflation Factor

CHAPTER 1

INTRODUCTION

This chapter presents an overview of the research. It describes the study background, discusses managerial and practical gaps in the research context of interest, and offers the problem statement, and highlights the significance of the study. In addition, the chapter describes the research scope and motivations, and continues with providing the aims and objectives. The chapter concludes with an outline of the thesis structure.

1.1 Introduction and background

In any organization, regardless of the business size, organizational tasks (works) can be divided into two different classes of organizational operations and projects (Aubry and Lavoie-Tremblay, 2018). An operation refers to the daily and repetitive organizational activities. Manufacturing tasks, routine accounting activities, and repetitive inspections are examples of organizational operations. Alternatively, Project Management Body of Knowledge (PMBOK, 2013, p. 3) defines a project as "...a temporary endeavor undertaken to create a unique product, service, or result. The temporary nature of projects indicates that a project has a definite beginning and end." Although both classes share some degree of similarity (e.g., the dependence on resources, humans, knowledge, etc.), yet, organizations are approaching their project success and effectiveness differently (Ali et al., 2008). Almost all organizations have certain tools and initiatives in place to manage and effectively perform their operations. Unfortunately, these tools are significantly inadequate when it comes to ensuring the success of organizational projects. Industrial and managerial notes indicate that project success rely on a different and much more complex set of tools, skills, knowledge, and competencies (Hyvärä, 2006). One may wonder why world-class organizations value the success and effectiveness of project so profoundly.

Organizations, large businesses and Small and Medium-sized Enterprises (SMEs) alike, are nowadays operating within turbulent and hyper-competitive business environment, where corporate competitiveness and survival are extremely challenging (Inyang and Egor, 2017). In real world, organizations use operation projects to enhance and progress existing products (e.g., new product development), processes (e.g., quality management or human resource management), infrastructure (information technology or manufacturing machines), and even services (e.g., customer management) to strengthen their competitive positions (Pollack and Adler, 2016). Organizations also use strategic projects to develop new products, create new services, and even expand their market reach or create an entirely new market for their product and services. This is why

contemporary organizations put project success (for example completing projects within budget and time limitation) as one of their major strategic priorities (Kerzner and Kerzner, 2017; Walker, 2018). Traditional organizations largely believed that the effective project management alone can ensure the success of projects. Yet, and in spite of the widespread application of project management techniques in organizations, the rate of project failure is still considerably high (Damoah et al., 2018). Unfortunately, there is no common definition of project success within the literature (Badewi, 2016; Joslin and Müller, 2015), and each organization tend to define project success differently, and based on its particularities (Serrador and Turner, 2015). After having a clear definition of project success, organizations need to understand how to facilitate it. The review of project management literature reveals that scholars have identified a wide variety of critical success factors that can potentially ensure the effectiveness and success of organizational projects (e.g., Camilleri, 2016; Hyväri, 2006; Niazi et al., 2016). However, there is no one-size-fit-all model or project success that can be applicable to all types of businesses. In reality, the right combination of project success factors for each organization considerably depends upon its characteristics such as the business environment it operates in (Aga et al., 2016; Belout and Gauvreau, 2004).

The uniqueness of project success mechanism and interaction of underlying success factors is more profound within smaller firms (Murphy and Ledwith, 2007). Contrary to the larger firms, SMEs are more limited resources-wise, and rarely attract financing from outside investors (Buonanno et al., 2005). SMEs tend to focus more on niche markets, have a less bureaucratic and hierarchical structure, and employ less formal and strategic management techniques. More importantly, SMEs are considerably more limited regarding the human resources' skills and competencies (Ghobakhloo et al., 2011). Since the majority of existing research on project success addresses larger firms, the mechanism through which SMEs can achieve the desired level of project success is even more understudied. This research and practical gap call for practical research on modelling project success among SMEs. Since SMEs are even more susceptible to the sociocultural and environmental factors (Baden et al., 2009), these studies should also be country-specific to capture the economic, business, and industrial particularities of each nation. The transitioning economies such as Malaysia are no exception, and addressing the issue of project success ratio of SME sector among these countries should also be regarded as an academic priority.

Consistently, this study aims to understand the natural process through which Malaysian SMEs can achieve a higher project success rate by introducing a model of project success among SMEs. In doing so, the study first identifies the most important project success factors and develop a framework of project success among smaller firms. By using the advanced analytical modelling tools, the study introduces an interpretive

model of project success among SMEs and further tests the applicability of this model for Malaysian SMEs by using the second-generation statistical modeling techniques.

1.2 Problem Statement

Project success has been an ongoing research stream for over a few decades. Prior studies have made a major contribution highlighting the importance of project success for organizations (Ahmed et al., 2016). The literature also introduces a variety of conditions that may act favorably in support of project success and effectiveness (Ling et al., 2006). However, and in spite major technological and managerial improvements in the area of project management, organizations worldwide are facing extremely high project failure rates, the issue that threatens corporate survivability direly. Harvard Business Review (Flyvbjerg and Budzier, 2011), for example, reported that more than 15% of Information Technology (IT) projects in organizations overrun their intended budget for 200%. The 2015 CHAOS Report regarding the worldwide survey of 50000 projects shockingly showed that 71% of organizational projects failed to deliver anticipated results (<https://www.infoq.com/articles/standish-chaos-2015/>). Experts believe most organizations fail to see the complexity of the process through which project success is delivered. To put it differently, organizations are usually unaware of the mechanism (strategic plan) that they should develop to achieve project success. Recent studies show that complex precedence relationships may exist between the critical success factors of a particular project, and organizations need to take the order of development of these success factors into consideration while pursuing the success of a particular project (Narkhede and Gardas, 2018). For example, Tripathy et al. (2013) in their study of Research and Development (R&D) project success showed that complex precedence relationships exist among the R&D project success factors, and R&D management vision and direction is the preceding success factor that organizations should facilitate first while aiming for R&D project success. Similarly, Ghobakhloo et al. (2018) showed that complex precedence relationships exist among success factors of lean manufacturing projects. Ghobakhloo et al. (2018) further demonstrated that to achieve lean manufacturing success, organizations should first facilitate management support and commitment, which is followed by financial resource availability and many other success factors, respectively. By the same logic, and through extending existing works in the corresponding research streams, the present study argues that complex precedence relationships should also exist among determinants of project¹ critical success factors. Unfortunately, little to no research has studied the precedence relationships that may exist among prevailing project success factors. This lack of knowledge, regardless of the organizational type and size, would prevent organizations to devise

¹ Project in this study is defined holistically, and includes any typical and specific projects (process, strategic, new product, new service, R&D, or any other project types) that may be defined in organizations.

effective project success strategies, and steer their resources and efforts at the right direction (Javed et al., 2018). This gap, therefore, may explain the extremely high project failure rate worldwide.

Another major theoretical and practical gap concerns the extant literature ignoring the issue of project success and business performance among SMEs. SMEs perform a major role in the economic development of any nation, as they are an important source of job creation, production, and income distribution (Garrigós Simón et al., 2017). Although developing and progressing the SME sector should be a strategic priority for any country, SMEs are still outperformed and overpowered by larger organizations (Dasilas and Papasyriopoulos, 2015). It is well-agreed that project success is idiosyncratic to each business type, and given the particularities of SMEs, business success among SMEs is not well defined (Dasari et al., 2015). Although there have been many arguments on the nature and definition of project success among larger firms, however, review of literature reveals that research has fallen short in providing a multilevel framework of project success among SMEs. The lack of project success definition, in turn, can mislead SMEs in their strategic financing and performance evaluation (Murphy and Ledwith, 2007; Phua, 2004). For example, SMEs may define the success criteria of a particular project wrongly, making the comparison between the resources invested and outcome achieved during the project life cycle extremely difficult. SMEs may also underestimate the success level of a particular project, and ignore the values that can be potentially achieved from the project. Since SMEs are generally limited resource-wise, miscalculating the success of a project can even lead them to bankruptcy and business failure.

The second concern regarding the issue of project success among SMEs involves the understudied relationship that might exist between project success and business performance. Businesses develop and implement various strategies and initiatives to gain competitive edge against their competitors (Tang and Ghobakhloo, 2013). In addition to project (success) leadership, business agility, cost leadership, differentiation, and acquisition strategy are examples of business strategies that SMEs can follow and implement (Arbussa et al., 2017; González-Cruz and Cruz-Ros, 2016; Stoian and Gilman, 2017). Larger firms can exploit their resource abundance to implement multiple business strategies simultaneously, however, most SMEs can direct their limited resources to proceed with only one particular business strategy at a time (Kerr, 2006). This means SMEs need to make a critical decision between different business strategies, and select a strategy that serves them superlatively. Although the business value of project success is well-documented among larger firms (Rivera-Ruiz and Ferrer-Moreno, 2015), yet, the nature of projects in SMEs tend to be starkly different, and it is logically unacceptable to simply infer that project success can serve SMEs the way it has served larger firms. Projects in SMEs tend to be less complex and smaller, and its success or failure may impact the competitive position of SMEs differently.

(Kermanshachi et al., 2016). Unfortunately, this lack of understanding has clouded SMEs judgment when it comes to deciding upon selection of the best business strategy. SMEs cannot firmly decide whether the value of project success leadership strategy can outweigh the proven value of other SME-friendly business strategies. Consistently, SMEs might make an improper choice of business strategy and severely suffer from the long-term negative consequences.

More importantly, exploring the SME-specific project success critical factors, identifying the interrelationships among them, and even proving the positive impact of project success and business value may not necessarily warrant the appropriateness of a full-blown project success leadership strategy for SMEs. In the real world, every small or medium-sized enterprise is unique in nature. Each may have the ability to develop a particular set of project success factor, and may approach project success differently (Lawson et al., 2006). In most situations where SMEs have the ability to choose between multiple project options, SMEs should select the projects that they already have the necessary success tools for. To put it differently, SMEs need to benefit from a project selection model that enable them to make an informed decision when it comes to choosing between multiple project options (Murphy and Ledwith, 2007). This selection model should obviously perform a mathematical comparison, commonly referred to as Constrained Optimization Method, regarding the compatibility level of existing project options and allow SMEs to select the project that they already have the necessary conditions for its success in place. Unfortunately, such a project model selection tools is missing for SMEs. Organizations should possess a deep applied mathematics and modelling knowledge to define a variety of objective functions and find the best value for them to develop such models. In the real life, however, SMEs rarely possess such level of knowledge, and it is common for them to make poor decisions when it comes to choosing between multiple project options.

Taking the aforementioned practical and managerial research gaps into consideration, the key problems in the context of project success among SMEs is listed as follows:

1. There is a lack of common definition of project success among SMEs, which in turn, may cause the miscalculation of costs and benefits associated with each project;
2. The process through which SMEs can ensure the success of ongoing projects is unclear and understudied, the issue that may threaten the competitiveness of SMEs;
3. Little has been done to understand the relationships between project success and business performance. It is not well-documented whether project success leadership strategy is a suitable business strategy for SMEs and whether it can compete with other well-known and SME-friendly business strategies;

4. Little research has been done to list the key project success factors critical to SMEs, and further understand their functionalities;
5. The precedence interrelationships among project success factors is unclear and understudied. This gap, in turn, limits SMEs' capability in their planning for development of facilitators of project success;
6. Overall, there is no statistically proven project success model that can assist Malaysian SMEs with improving their project success rate;
7. There is a lack of analytical tool to help Malaysian SMEs with making the best choice between multiple project options.

1.3 Research Questions

Considering the aforementioned practical and theoretical gaps in the context of project success among Malaysian SMEs, the present study aims to offer detailed explanations for each of the following research questions:

1. What are the most important project success factors within Malaysia SME sector, and how they exactly function?
2. Has project success been directly related to the business performance improvement for Malaysian SMEs?
3. How useful project success leadership strategy has been for Malaysian SMEs, and how this strategy competes with other business strategies?
4. How Malaysian SMEs can facilitate the development of project success factors and at what order these factors should be developed?

1.4 Objectives of the Study

To address the theoretical and practical gaps discussed and the issues raised, the present study attempts to fulfill following research objectives:

1. To identify the most important project success factors and explore their functionality;
2. To develop a mathematical model of project success among SMEs and to further statistically analyze how well this model explains project success among Malaysian SMEs;
3. To demonstrate the extent to which project success has been associated with business performance improvement among Malaysian SMEs;
4. To develop and test an automatic decision-making software application based on the project success identified and their interrelationships to assist Malaysian SMEs with better project selection with the ultimate goal of project success and performance improvement.

1.5 Significance of the Study

Organizations undertake projects to gain value from them. Therefore, projects should successfully deliver their predefined outcome to contribute to the corporate survivability. This means organizations should, first and foremost, understand the level of their project success and value generation. Yet, the determination of project success has been highly challenging among organizations, SMEs in particular. The present study has the competence to make a significant contribution to the context of 'project success business value' by exploring and future explaining the process through which Malaysian SMEs can improve their project success rate and translate it into financial and non-financial performance. Scholars nowadays benefit from advanced analytical modelling technique to structure the success process of a particular phenomenon. For example, scholars have been increasingly using Interpretive Structural Modelling (ISM) approach to assess the success of various phenomena such as food logistic system (Shankar et al., 2018), lean manufacturing (Chaple et al., 2018; Ghobakhloo et al., 2018), or sustainability and performance in e-learning (Ahmad et al., 2018). Extending this research scheme to context of project success, this research is among the first studies to use ISM technique to mathematically model the process of achieving project success among SMEs. In addition, the study would offer considerable theoretical contribution by transforming the ISM model of project success into a reliable and practically proven model of project success, which is done by performing a cross-sectional survey of Malaysian SMEs and assessing the statistical significance of the relationships identified by the ISM methodology. This model could serve the future research as reliable and rigorous theoretical basis for assessment of project success among SMEs. More importantly, the study would analyze the value generation capacity of project success leadership strategy and potentially make a significant contribution to the strategic management background.

Finally, yet importantly, the study could offer significant practical and socio-industrial contribution by introducing the project selection software that would enable Malaysian SMEs to select project options that are most compatible with the project success factors already available within each SME unit. This contribution can be further translated into the higher project success rate as well as higher competitiveness among Malaysian SMEs.

1.6 Scope of the Study

The present study is mainly concerned with the process of ensuring project success and value generation among Malaysian SMEs. Since the study should first identify the key success factors, the primary major step in achieving the main research objectives would be to perform a state-of-the-art and content-centric review of literature on organizational project success and effectiveness. To develop a graphical representation of project success process, the study will apply ISM approach and identify the

interrelationships among key project success factors. Since ISM relies on the input from experts, the study would benefit from the council of a group of Malaysian project management experts. To further understand the statistical significance of the relationships that will be identified within the ISM phase, the study will perform a questionnaire-based survey of Malaysian SMEs and analyze the data via Partial Least Squares Structural Equation Modeling (PLS-SEM). This study also includes a software development phase within which a project selection software will be developed using PHP and Java Script programming languages.

For the purpose of analytical modelling and data analysis, the study will benefit from different software packages. ISM is first performed manually and with the use of MS Excel software. The ISM model will be further constructed using Widows ISM Software developed by Broome and Hogan (<https://www.jnwarfield.com/ism-software.html>) to eliminate any potential modelling errors. The study will use IBM SPSS V. 22 to performing descriptive statistics as well as statistical tests concerning pilot study and collinearity analysis. PLS-SEM analysis is further conducted via the SmartPLS version: 2.0.M3 developed by Ringle et al. (2005). In performing PLS-SEM and developing the final model of project success among SMEs, the study will follow the standard steps introduced in application of PLS-SEM method available within the literature (e.g., Hair et al., 2017; Hair et al., 2013; Petter et al., 2007; Ringle and Sarstedt, 2016).

1.7 Organization of the Thesis

The present thesis is organization by five chapters. In chapter one, the study argues about the practical and theoretical gaps that exists within the context of project success among Malaysian SMEs. After introducing research questions, the study lists the main research objectives and the way they would be fulfilled. The study continues chapter 1 with briefly discussing the contributions that the study can potentially make. Chapter 1 further concludes with explaining the scope of study.

Chapter 2 first provides detailed explanations about the key terms of the study, project success in particular. After discussing about the importance of SMEs and reviewing the characteristics of Malaysian SMEs, this chapter continues with reviewing the previous studies that addressed issues such as project and project management success, success factors, and business value of project success. Chapter 2 ends with providing a detailed explanation regarding the properties and application of analytical techniques used in this study including ISM and PLS-SEM.

Chapter 3, research methodology, comprehensively discusses about the steps taken and methods applied for fulfilling the research objectives of the study. After offering a holistic graphical representation of research methods

applied, chapter 3 introduces the content-centric review of literature applied, and discusses the functionality of project success factors identified. After introducing the theoretical framework of project success among SMEs, this chapter elaborates on sampling, instrumentation, and data gathering processes undertaking all throughout this thesis. Chapter 3 ends with detailed explanations on the appropriate measurement mode specification.

In chapter four, the study offers the result of application of ISM and introduces the ISM model of project success among SMEs. This chapter further reviews the demographic properties of participating Malaysian SMEs and assesses the statistical properties of the measurement items used for measuring critical success factors, project success, and business performance. Chapter 4 continues with offering the PLS-SEM results and the statistical assessment of project success model for Malaysian SMEs. Chapter 4 ends with a comprehensive discussion of the process of development of project selection software, and further explaining the functionality of this software application.

In chapter 5, discussion and conclusion, the study first interprets the result of PLS-SEM analysis, and provides a detailed guideline for project success based the model of project success among SMEs. After discussing about the practical and theoretical contributions that the study offers, chapter 5 ends with reviewing the limitations of this study and presenting the opportunities that this study holds for future research.

REFERENCES

- Aga, D. A., Noorderhaven, N., & Vallejo, B. (2016). Transformational leadership and project success: The mediating role of team-building. *International Journal of Project Management*, 34(5), 806-818.
- Ahlan, A. R., Kartiwi, M., & Sukmana, H. T. (2015). Measurement of information system project success based on perceptions of the internal stakeholders. *International Journal of Electrical and Computer Engineering (IJECE)*, 5(2), 271-279.
- Ahmad, N., Quadri, N., Qureshi, M., & Alam, M. (2018). Relationship Modeling of Critical Success Factors for Enhancing Sustainability and Performance in E-Learning. *Sustainability*, 10(12), 4776.
- Ahmed, R., Mohamad, N. A. B., & Ahmad, M. S. (2016). Effect of multidimensional top management support on project success: an empirical investigation. *Quality & Quantity*, 50(1), 151-176.
- Alavipour, S. R., & Arditi, D. (2019). Time-cost tradeoff analysis with minimized project financing cost. *Automation in construction*, 98(1), 110-121.
- Ali, A. S. B., Anbari, F. T., & Money, W. H. (2008). Impact of organizational and project factors on acceptance and usage of project management software and perceived project success. *Project Management Journal*, 39(2), 5-33.
- Altinay, L., Madanoglu, M., De Vita, G., Arasli, H., & Ekinci, Y. (2016). The interface between organizational learning capability, entrepreneurial orientation, and SME growth. *Journal of Small Business Management*, 54(3), 871-891.
- Anantatmula, V. S. (2010). Project manager leadership role in improving project performance. *Engineering Management Journal*, 22(1), 13-22.
- Anantatmula, V. S., & Kanungo, S. (2010). Modeling enablers for successful KM implementation. *Journal of Knowledge Management*, 14(1), 100-113.
- Anantatmula, V. S., & Rad, P. F. (2018). Role of Organizational Project Management Maturity Factors on Project Success. *Engineering Management Journal*, 30(3), 165-178.
- Arbussa, A., Bikfalvi, A., & Marquès, P. (2017). Strategic agility-driven business model renewal: the case of an SME. *Management Decision*, 55(2), 271-293.
- Aubry, M., & Hobbs, B. (2011). A fresh look at the contribution of project management to organizational performance. *Project Management Journal*, 42(1), 3-16.
- Aubry, M., & Lavoie-Tremblay, M. (2018). Rethinking organizational design for managing multiple projects. *International Journal of Project Management*, 36(1), 12-26.
- Azevedo, S. G., Sequeira, T., Santos, M., & Mendes, L. (2019). Biomass-related sustainability: A review of the literature and interpretive structural modeling. *Energy*, 171(1), 1107-1125.

- Aziz, S. A., & Mahmood, R. (2011). The relationship between business model and performance of manufacturing small and medium enterprises in Malaysia. *African Journal of Business Management*, 5(22), 8918-8932.
- Baccarini, D. (1999). The logical framework method for defining project success. *Project Management Journal*, 30(4), 25-32.
- Baden, D. A., Harwood, I. A., & Woodward, D. G. (2009). The effect of buyer pressure on suppliers in SMEs to demonstrate CSR practices: an added incentive or counter productive? *European management journal*, 27(6), 429-441.
- Badewi, A. (2016). The impact of project management (PM) and benefits management (BM) practices on project success: Towards developing a project benefits governance framework. *International Journal of Project Management*, 34(4), 761-778.
- Banihashemi, S., Hosseini, M. R., Golizadeh, H., & Sankaran, S. (2017). Critical success factors (CSFs) for integration of sustainability into construction project management practices in developing countries. *International Journal of Project Management*, 35(6), 1103-1119.
- Baptista Nunes, M., Annansingh, F., Eaglestone, B., & Wakefield, R. (2006). Knowledge management issues in knowledge-intensive SMEs. *Journal of Documentation*, 62(1), 101-119.
- Bassi, A. (2014). Human and Organizational Knowledge in a Project Management Context. *Publishing House of Rzeszow University of Technology*, 21(3), 7-19.
- Belassi, W., & Tukel, O. I. (1996). A new framework for determining critical success/failure factors in projects. *International Journal of Project Management*, 14(3), 141-151.
- Bell, E., Bryman, A., & Harley, B. (2018). *Business research methods*: Oxford university press.
- Belout, A., & Gauvreau, C. (2004). Factors influencing project success: the impact of human resource management. *International Journal of Project Management*, 22(1), 1-11.
- Bernerth, J. B., & Aguinis, H. (2016). A critical review and best-practice recommendations for control variable usage. *Personnel Psychology*, 69(1), 229-283.
- Berssaneti, F. T., & Carvalho, M. M. (2015). Identification of variables that impact project success in Brazilian companies. *International Journal of Project Management*, 33(3), 638-649.
- Brettel, M., Chomik, C., & Flatten, T. C. (2015). How organizational culture influences innovativeness, proactiveness, and risk-taking: Fostering entrepreneurial orientation in SMEs. *Journal of Small Business Management*, 53(4), 868-885.
- Brière, S., Proulx, D., Flores, O. N., & Laporte, M. (2015). Competencies of project managers in international NGOs: Perceptions of practitioners. *International Journal of Project Management*, 33(1), 116-125.
- Buonanno, G., Faverio, P., Pigni, F., Ravarini, A., Sciuto, D., & Tagliavini, M. (2005). Factors affecting ERP system adoption: A comparative

- analysis between SMEs and large companies. *Journal of Enterprise Information Management*, 18(4), 384-426.
- Byrne, B. M. (2016). *Structural equation modeling with AMOS: Basic concepts, applications, and programming*: Routledge.
- Camilleri, E. (2016). *Project success: critical factors and behaviours*: Routledge.
- Cao, Z., Huo, B., Li, Y., & Zhao, X. (2015). The impact of organizational culture on supply chain integration: a contingency and configuration approach. *Supply Chain Management: An International Journal*, 20(1), 24-41.
- Carvalho, M. M., & Rabechini Jr, R. (2017). Can project sustainability management impact project success? An empirical study applying a contingent approach. *International Journal of Project Management*, 35(6), 1120-1132.
- Carvalho, M. M. d., & Rabechini Junior, R. (2015). Impact of risk management on project performance: the importance of soft skills. *International Journal of Production Research*, 53(2), 321-340.
- Chan, A. P., Scott, D., & Chan, A. P. (2004). Factors affecting the success of a construction project. *Journal of Construction Engineering and Management*, 130(1), 153-155.
- Chang, W., Franke, G. R., & Lee, N. (2016). Comparing reflective and formative measures: New insights from relevant simulations. *Journal of Business Research*, 69(8), 3177-3185.
- Chaple, A. P., Narkhede, B. E., Akarte, M. M., & Raut, R. (2018). Modeling the lean barriers for successful lean implementation: TISM approach. *International Journal of Lean Six Sigma*.
- Chatman, J. A., & O'Reilly, C. A. (2016). Paradigm lost: Reinvigorating the study of organizational culture. *Research in Organizational Behavior*, 36(1), 199-224.
- Chin, W. W. (1998). The partial least squares approach to structural equation modeling. *Modern methods for business research*, 295(2), 295-336.
- Chow, I. H. S., & Liu, S. (2009). The effect of aligning organizational culture and business strategy with HR systems on firm performance in Chinese enterprises. *The International Journal of Human Resource Management*, 20(11), 2292-2310.
- Chuang, H.-M., Lin, C.-K., Chen, D.-R., & Chen, Y.-S. (2013). Evolving MCDM applications using hybrid expert-based ISM and DEMATEL models: an example of sustainable ecotourism. *The Scientific World Journal*, 2013.
- Cohen, J. F., & Olsen, K. (2015). Knowledge management capabilities and firm performance: A test of universalistic, contingency and complementarity perspectives. *Expert Systems with Applications*, 42(3), 1178-1188.
- Correa, J. A. G., Castañeda, S. L. S., Quintero, D. A. V., & Giraldo, G. E. (2018). Identification and Analysis of Project Management Success Factors in Information Technology SMEs. *International Journal of Information Technology Project Management (IJITPM)*, 9(4), 73-90.

- Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *psychometrika*, 16(3), 297-334.
- Cronbach, L. J., & Shavelson, R. J. (2004). My current thoughts on coefficient alpha and successor procedures. *Educational and psychological measurement*, 64(3), 391-418.
- Dainty, A., Cheng, M.-I., & Moore, D. (2005). A comparison of the behavioral competencies of client-focused and production-focused project managers in the construction sector. *Project Management Journal*, 36(2), 39-48.
- Damoah, I. S., Akwei, C. A., Amoako, I. O., & Botchie, D. (2018). Corruption as a source of government project failure in developing countries: Evidence from Ghana. *Project Management Journal*, 49(3), 17-33.
- Darus, N. M., Yunus, A. R., & Rahman, N. W. (2017). Factors enhancing the performance of SMEs' services sectors: A conceptual framework. *International Journal Of Advanced And Applied Sciences*, 4(3), 160-166.
- Dasari, S., Jigeesh, N., & Prabhukumar, A. (2015). Analysis of project success issues: The case of a manufacturing SME. *IUP Journal of Operations Management*, 14(1), 32.
- Dasilas, A., & Papasyriopoulos, N. (2015). Corporate governance, credit ratings and the capital structure of Greek SME and large listed firms. *Small Business Economics*, 45(1), 215-244.
- Davis, K. (2014). Different stakeholder groups and their perceptions of project success. *International Journal of Project Management*, 32(2), 189-201.
- De Bakker, K., Boonstra, A., & Wortmann, H. (2010). Does risk management contribute to IT project success? A meta-analysis of empirical evidence. *International Journal of Project Management*, 28(5), 493-503.
- De Carvalho, M. M., Patah, L. A., & de Souza Bido, D. (2015). Project management and its effects on project success: Cross-country and cross-industry comparisons. *International Journal of Project Management*, 33(7), 1509-1522.
- De Wit, A. (1988). Measurement of project success. *International Journal of Project Management*, 6(3), 164-170.
- Demirgüç-Kunt, A., Maksimovic, V., & Beck, T. (2005). Financial and legal constraints to growth: Does firm size matter? *The Journal of Finance*, 60(1), 137-177.
- Diamantopoulos, A., & Siguaw, J. A. (2006). Formative versus reflective indicators in organizational measure development: A comparison and empirical illustration. *British Journal of Management*, 17(4), 263-282.
- Dodevska, Z. A., & Mihić, M. M. (2018). Augmented reality and virtual reality technologies in project management: what can we expect? *European Project Management Journal*, 8(1), 17-24.
- Doom, C., Milis, K., Poelmans, S., & Bloemen, E. (2010). Critical success factors for ERP implementations in Belgian SMEs. *Journal of Enterprise Information Management*, 23(3), 378-406.

- Dvir, D., Raz, T., & Shenhar, A. J. (2003). An empirical analysis of the relationship between project planning and project success. *International Journal of Project Management*, 21(2), 89-95.
- Engwall, M., & Jerbrant, A. (2003). The resource allocation syndrome: the prime challenge of multi-project management? *International Journal of Project Management*, 21(6), 403-409.
- Etemadinia, H., & Tavakolan, M. (2018). Using a hybrid system dynamics and interpretive structural modeling for risk analysis of design phase of the construction projects. *International Journal of Construction Management*, 1-20.
- Falkner, E. M., & Hiebl, M. R. (2015). Risk management in SMEs: a systematic review of available evidence. *The Journal of Risk Finance*, 16(2), 122-144.
- Fawad Latif, K. (2012). An integrated model of training effectiveness and satisfaction with employee development interventions. *Industrial and Commercial Training*, 44(4), 211-222.
- Fedor, D. B., Ghosh, S., Caldwell, S. D., Maurer, T. J., & Singhal, V. R. (2003). The effects of knowledge management on team members' ratings of project success and impact. *Decision Sciences*, 34(3), 513-539.
- Fisher, G. G., Matthews, R. A., & Gibbons, A. M. (2016). Developing and investigating the use of single-item measures in organizational research. *Journal of Occupational Health Psychology*, 21(1), 3.
- Flyvbjerg, B., & Budzier, A. (2011). Why your it project may be riskier than you think. *HARVARD BUSINESS REVIEW*, 89(11), 22-22.
- Forsman, H. (2008). Business development success in SMEs: a case study approach. *Journal of Small Business and Enterprise Development*, 15(3), 606-622.
- Fuller, C. M., Simmering, M. J., Atinc, G., Atinc, Y., & Babin, B. J. (2016). Common methods variance detection in business research. *Journal of Business Research*, 69(8), 3192-3198.
- Gan, X., Chang, R., Zuo, J., Wen, T., & Zillante, G. (2018). Barriers to the transition towards off-site construction in China: an interpretive structural modeling approach. *Journal of cleaner production*, 197(1), 8-18.
- Garavan, T., Watson, S., Carbery, R., & O'Brien, F. (2016). The antecedents of leadership development practices in SMEs: The influence of HRM strategy and practice. *International small business journal*, 34(6), 870-890.
- Garrigós Simón, F. J., González-Cruz, T., & Contreras-Pacheco, O. (2017). Policies to enhance social development through the promotion of SME and social entrepreneurship: a study in the Colombian construction industry. *Entrepreneurship & Regional Development*, 29(1-2), 51-70.
- Ghobakhloo, M. (2018). The future of manufacturing industry: A strategic roadmap toward Industry 4.0. *Journal of Manufacturing Technology Management*, 29(6), 910-936.
- Ghobakhloo, M., Arias-Aranda, D., & Benitez-Amado, J. (2011). Adoption of e-commerce applications in SMEs. *Industrial Management & Data Systems*, 111(8), 1238-1269.

- Ghobakhloo, M., Azar, A., & Tang, S. H. (2019). Business value of enterprise resource planning spending and scope: A post-implementation perspective. *Kybernetes*, 48(5), 967-989.
- Ghobakhloo, M., Fathi, M., Fontes, D. B. M. M., & Tan Ching, N. (2018). Modeling lean manufacturing success. *Journal of Modelling in Management*, 13(4), 908-931.
- Goni, F. A., Chofreh, A. G., & Sahran, S. (2011). Critical success factors for enterprise resource planning system implementation: a case study in Malaysian SME. *International Journal on Advanced Science, Engineering and Information Technology*, 1(2), 200-205.
- González-Cruz, T. F., & Cruz-Ros, S. (2016). When does family involvement produce superior performance in SME family business? *Journal of Business Research*, 69(4), 1452-1457.
- Gonzalez-Loureiro, M., Sousa, M. J., & Pinto, H. (2017). Culture and innovation in SMEs: the intellectual structure of research for further inquiry. *European Planning Studies*, 25(11), 1908-1931.
- Guo, H., & Cao, Z. (2014). Strategic flexibility and SME performance in an emerging economy: a contingency perspective. *Journal of Organizational Change Management*, 27(2), 273-298.
- Hair, J. F. (2006). *Multivariate data analysis*: Pearson Education India.
- Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., & Thiele, K. O. (2017). Mirror, mirror on the wall: a comparative evaluation of composite-based structural equation modeling methods. *Journal of the Academy of Marketing Science*, 45(5), 616-632.
- Hair Jr, J. F., Matthews, L. M., Matthews, R. L., & Sarstedt, M. (2017). PLS-SEM or CB-SEM: updated guidelines on which method to use. *International Journal of Multivariate Data Analysis*, 1(2), 107-123.
- Hanisch, B., Lindner, F., Mueller, A., & Wald, A. (2009). Knowledge management in project environments. *Journal of Knowledge Management*, 13(4), 148-160.
- Hanna, A. S. (2016). Benchmark performance metrics for integrated project delivery. *Journal of Construction Engineering and Management*, 142(9), 04016040.
- He, Q., Wang, T., Chan, A. P., Li, H., & Chen, Y. (2019). Identifying the gaps in project success research: A mixed bibliographic and bibliometric analysis. *Engineering, Construction and Architectural Management*, *Forthcoming*.
- Hinkin, T. R. (1998). A brief tutorial on the development of measures for use in survey questionnaires. *Organizational research methods*, 1(1), 104-121.
- Ho, R. (2006). *Handbook of univariate and multivariate data analysis and interpretation with SPSS*. New York: CRC Press.
- Hornstein, H. A. (2015). The integration of project management and organizational change management is now a necessity. *International Journal of Project Management*, 33(2), 291-298.
- Hughes, D. L., Dwivedi, Y. K., Rana, N. P., & Simintiras, A. C. (2016). Information systems project failure—analysis of causal links using interpretive structural modelling. *Production Planning & Control*, 27(16), 1313-1333.

- Hyväri, I. (2006). Success of projects in different organizational conditions. *Project Management Journal*, 37(4), 31-41.
- Ika, L. A. (2009). Project success as a topic in project management journals. *Project Management Journal*, 40(4), 6-19.
- Inkinen, H. (2016). Review of empirical research on knowledge management practices and firm performance. *Journal of Knowledge Management*, 20(2), 230-257.
- Inyang, B. J., & Egor, F. E. (2017). The relevance of strategic analysis and control in managing corporate organizations to gain competitive advantage. *The Business & Management Review*, 9(2), 253-253.
- Ives, M. (2005). Identifying the contextual elements of project management within organizations and their impact on project success. *Project Management Journal*, 36(1), 37-50.
- Javed, S. A., Syed, A. M., & Javed, S. (2018). Perceived organizational performance and trust in project manager and top management in project-based organizations: Comparative analysis using statistical and grey systems methods. *Grey Systems: Theory and Application*, 8(3), 230-245.
- Jena, J., Fulzele, V., Gupta, R., Sherwani, F., Shankar, R., & Sidharth, S. (2016). A TISM modeling of critical success factors of smartphone manufacturing ecosystem in India. *Journal of Advances in Management Research*, 13(2), 203-224.
- Jonas, D., Kock, A., & Gemünden, H. G. (2012). Predicting project portfolio success by measuring management quality—a longitudinal study. *IEEE Transactions on Engineering Management*, 60(2), 215-226.
- Joslin, R., & Müller, R. (2015). Relationships between a project management methodology and project success in different project governance contexts. *International Journal of Project Management*, 33(6), 1377-1392.
- Jugdev, K., & Müller, R. (2005). A retrospective look at our evolving understanding of project success. *Project Management Journal*, 36(4), 19-31.
- Kabir, G., Sadiq, R., & Tesfamariam, S. (2014). A review of multi-criteria decision-making methods for infrastructure management. *Structure and Infrastructure Engineering*, 10(9), 1176-1210.
- Kashiramka, S., Sagar, M., Dubey, A. K., & Mehndiratta, A. (2019). Critical success factors for next generation technical education institutions. *Benchmarking: An International Journal*, Forthcoming.
- Kermanshachi, S., Dao, B., Shane, J., & Anderson, S. (2016). An empirical study into identifying project complexity management strategies. *Procedia Engineering*, 145, 603-610.
- Kerr, I. R. (2006). Leadership strategies for sustainable SME operation. *Business Strategy and the Environment*, 15(1), 30-39.
- Kerzner, H., & Kerzner, H. R. (2017). *Project management: a systems approach to planning, scheduling, and controlling*: John Wiley & Sons.
- Khan, A. S., & Rasheed, F. (2015). Human resource management practices and project success, a moderating role of Islamic Work Ethics in Pakistani project-based organizations. *International Journal of Project Management*, 33(2), 435-445.

- Khan, S., Haleem, A., Khan, M., Abidi, M., & Al-Ahmari, A. (2018). Implementing traceability systems in specific supply chain management (SCM) through critical success factors (CSFs). *Sustainability*, 10(1), 204.
- Knight, G. (2000). Entrepreneurship and marketing strategy: The SME under globalization. *Journal of international marketing*, 8(2), 12-32.
- Kock, N. (2015). Common method bias in PLS-SEM: A full collinearity assessment approach. *International Journal of e-Collaboration (IJeC)*, 11(4), 1-10.
- Kopmann, J., Kock, A., Killen, C. P., & Gemünden, H. G. (2015). Business case control in project portfolios—an empirical investigation of performance consequences and moderating effects. *IEEE Transactions on Engineering Management*, 62(4), 529-543.
- Kristiansen, J. N., & Ritala, P. (2018). Measuring radical innovation project success: typical metrics don't work. *Journal of Business Strategy*, 39(4), 34-41.
- Krosnick, J. A. (2018). Questionnaire design *The Palgrave Handbook of Survey Research* (pp. 439-455): Springer.
- Lahiri, S., & Kedia, B. L. (2009). The effects of internal resources and partnership quality on firm performance: An examination of Indian BPO providers. *Journal of International Management*, 15(2), 209-224.
- Lawson, C. P., Longhurst, P. J., & Ivey, P. C. (2006). The application of a new research and development project selection model in SMEs. *Technovation*, 26(2), 242-250.
- Levasseur, R. E. (2010). People skills: Ensuring project success—A change management perspective. *Interfaces*, 40(2), 159-162.
- Levy, M., Loebbecke, C., & Powell, P. (2003). SMEs, co-opetition and knowledge sharing: the role of information systems. *European Journal of Information Systems*, 12(1), 3-17.
- Liikamaa, K. (2015). Developing a project manager's competencies: a collective view of the most important competencies. *Procedia Manufacturing*, 3(1), 681-687.
- Lindhard, S., & Larsen, J. K. (2016). Identifying the key process factors affecting project performance. *Engineering, Construction and Architectural Management*, 23(5), 657-673.
- Ling, F. Y., Ibbs, C. W., & Hoo, W. Y. (2006). Determinants of international architectural, engineering, and construction firms' project success in China. *Journal of Construction Engineering and Management*, 132(2), 206-214.
- Lo, M. C., Wang, Y. C., Wah, C. R. J., & Ramayah, T. (2016). The critical success factors for organizational performance of SMEs in Malaysia: a partial least squares approach. *Revista brasileira de gestão de negócios*, 18(61), 370-391.
- Love, J. H., & Roper, S. (2015). SME innovation, exporting and growth: A review of existing evidence. *International small business journal*, 33(1), 28-48.
- Lun, Y. V., & Quaddus, M. A. (2011). Firm size and performance: A study on the use of electronic commerce by container transport

- operators in Hong Kong. *Expert Systems with Applications*, 38(6), 7227-7234.
- Luo, P., Wang, H., & Yang, Z. (2016). Investment and financing for SMEs with a partial guarantee and jump risk. *European Journal of Operational Research*, 249(3), 1161-1168.
- Malach-Pines, A., Dvir, D., & Sadeh, A. (2009). Project manager-project (PM-P) fit and project success. *International Journal of Operations & Production Management*, 29(3), 268-291.
- Mangla, S. K., Govindan, K., & Luthra, S. (2016). Critical success factors for reverse logistics in Indian industries: a structural model. *Journal of cleaner production*, 129(1), 608-621.
- Maqbool, R., Sudong, Y., Manzoor, N., & Rashid, Y. (2017). The impact of emotional intelligence, project managers' competencies, and transformational leadership on project success: An empirical perspective. *Project Management Journal*, 48(3), 58-75.
- Marcelino-Sádaba, S., Pérez-Ezcurdia, A., Lazcano, A. M. E., & Villanueva, P. (2014). Project risk management methodology for small firms. *International Journal of Project Management*, 32(2), 327-340.
- Martinez-Conesa, I., Soto-Acosta, P., & Carayannis, E. G. (2017). On the path towards open innovation: Assessing the role of knowledge management capability and environmental dynamism in SMEs. *Journal of Knowledge Management*, 21(3), 553-570.
- Marzagão, D. S. L., & Carvalho, M. M. (2016). Critical success factors for Six Sigma projects. *International Journal of Project Management*, 34(8), 1505-1518.
- Mauerhoefer, T., Strese, S., & Brettel, M. (2017). The impact of information technology on new product development performance. *Journal of Product Innovation Management*, 34(6), 719-738.
- Meskendahl, S. (2010). The influence of business strategy on project portfolio management and its success—A conceptual framework. *International Journal of Project Management*, 28(8), 807-817.
- Mir, F. A., & Pinnington, A. H. (2014). Exploring the value of project management: linking project management performance and project success. *International Journal of Project Management*, 32(2), 202-217.
- Mishra, P., Dangayach, G., & Mittal, M. (2011). An empirical study on identification of critical success factors in project based organizations. *Global Business and Management Research*, 3(3/4), 356-368.
- Mor, R. S., Bhardwaj, A., & Singh, S. (2018). Benchmarking the interactions among Performance Indicators in dairy supply chain: An ISM approach. *Benchmarking: An International Journal*, 25(9), 3858-3881.
- Mueller, J. (2015). Formal and informal practices of knowledge sharing between project teams and enacted cultural characteristics. *Project Management Journal*, 46(1), 53-68.
- Müller, R., Packendorff, J., & Sankaran, S. (2017). Balanced leadership: A new perspective for leadership in organizational project

- management. *Cambridge handbook of organizational project management*.
- Müller, R., & Turner, R. (2007). The influence of project managers on project success criteria and project success by type of project. *European management journal*, 25(4), 298-309.
- Munns, A. K., & Bjeirmi, B. F. (1996). The role of project management in achieving project success. *International Journal of Project Management*, 14(2), 81-87.
- Murphy, A., & Ledwith, A. (2007). Project management tools and techniques in high-technology SMEs. *Management research news*, 30(2), 153-166.
- Muruganantham, G., Vinodh, S., Arun, C., & Ramesh, K. (2018). Application of interpretive structural modelling for analysing barriers to total quality management practices implementation in the automotive sector. *Total Quality Management & Business Excellence*, 29(5-6), 524-545.
- Musa, H., & Chinniah, M. (2016). Malaysian SMEs development: future and challenges on going green. *Procedia-Social and Behavioral Sciences*, 224, 254-262.
- Nah, F. F.-H., & Delgado, S. (2006). Critical success factors for enterprise resource planning implementation and upgrade. *Journal of Computer Information Systems*, 46(5), 99-113.
- Narkhede, B. E., & Gardas, B. B. (2018). Hindrances to sustainable workforce in the upstream oil and gas industries-interpretive structural modelling approach. *International Journal of Business Excellence*, 16(1), 61-81.
- Navimipour, N. J., & Charband, Y. (2016). Knowledge sharing mechanisms and techniques in project teams: Literature review, classification, and current trends. *Computers in Human Behavior*, 62, 730-742.
- Nguyen, H. T., & Hadikusumo, B. (2017). Impacts of human resource development on engineering, procurement, and construction project success. *Built Environment Project and Asset Management*, 7(1), 73-85.
- Niazi, M., Mahmood, S., Alshayeb, M., Qureshi, A. M., Faisal, K., & Cerpa, N. (2016). Toward successful project management in global software development. *International Journal of Project Management*, 34(8), 1553-1567.
- Palanimally, Y. R. (2016). The growth of small and medium enterprises in Malaysia: a study on private limited companies in Perak Malaysia. *IOSR Journal of Economics and Finance*, 7(3), 55-60.
- Paquin, J.-P., Gauthier, C., & Morin, P.-P. (2016). The downside risk of project portfolios: The impact of capital investment projects and the value of project efficiency and project risk management programmes. *International Journal of Project Management*, 34(8), 1460-1470.
- Petrou, P., Demerouti, E., & Schaufeli, W. B. (2018). Crafting the change: The role of employee job crafting behaviors for successful organizational change. *Journal of Management*, 44(5), 1766-1792.
- Petter, S., Straub, D. W., & Rai, A. (2007). Specifying formative constructs in information systems research. *Mis Quarterly*, 34(1), 623-656.

- Phua, F. T. (2004). Modelling the determinants of multi-firm project success: a grounded exploration of differing participant perspectives. *Construction Management and Economics*, 22(5), 451-459.
- Pinto, J. K., & Slevin, D. P. (1988). *Project success: definitions and measurement techniques*.
- PMBOK (2013), *A guide to the project management body of knowledge* (5th ed), Project Management Institute, Newtown Square, Pennsylvania.
- Pollack, J., & Adler, D. (2016). Skills that improve profitability: The relationship between project management, IT skills, and small to medium enterprise profitability. *International Journal of Project Management*, 34(5), 831-838.
- Pratono, A. H. (2016). Strategic orientation and information technological turbulence: Contingency perspective in SMEs. *Business Process Management Journal*, 22(2), 368-382.
- Qazi, A., Quigley, J., Dickson, A., & Kirytopoulos, K. (2016). Project Complexity and Risk Management (ProCRiM): Towards modelling project complexity driven risk paths in construction projects. *International Journal of Project Management*, 34(7), 1183-1198.
- Rahman, N. A.; Yaacobb, Z. & Radzi, R. M. (2015) "An Overview of Technological Innovation on SME Survival: A Conceptual Paper" 6th International Research Symposium in Service Management, IRSSM-6 2015, 11-15 August 2015, UiTM Sarawak, Kuching, Malaysia.
- Ramazani, J., & Jergeas, G. (2015). Project managers and the journey from good to great: The benefits of investment in project management training and education. *International Journal of Project Management*, 33(1), 41-52.
- Raut, R., Priyadarshinee, P., Jha, M., Gardas, B. B., & Kamble, S. (2018). Modeling the implementation barriers of cloud computing adoption: an interpretive structural modeling. *Benchmarking: An International Journal*, 25(8), 2760-2782.
- Raut, R. D., Gardas, B. B., Jha, M. K., & Priyadarshinee, P. (2017). Examining the critical success factors of cloud computing adoption in the MSMEs by using ISM model. *The Journal of High Technology Management Research*, 28(2), 125-141.
- Raz, T., Shenhar, A. J., & Dvir, D. (2002). Risk management, project success, and technological uncertainty. *R&D Management*, 32(2), 101-109.
- Reed, A. H., & Angolia, M. (2018). Risk management usage and impact on information systems project success. *International Journal of Information Technology Project Management (IJITPM)*, 9(2), 1-19.
- Ringle, C. M., & Sarstedt, M. (2016). Gain more insight from your PLS-SEM results: The importance-performance map analysis. *Industrial Management & Data Systems*, 116(9), 1865-1886.
- Ringle, C. M., Sarstedt, M., Mitchell, R., & Gudergan, S. P. (2018). Partial least squares structural equation modeling in HRM research. *The International Journal of Human Resource Management*, Forthcoming, 1-27.

- Ringle, C.M., Wende, S. and Will, A. (2005), SmartPLS 2.0.M3 (beta), University of Hamburg, Hamburg, available at: www.smartpls.de.
- Rivera-Ruiz, I., & Ferrer-Moreno, E. (2015). The relationship between strategic leadership, human IT infrastructure, project management, project success, and firm performance. *International Journal of Information, Business and Management*, 7(2), 77.
- Sai Hong, T., & Ghobakhloo, M. (2013). IT investments and product development effectiveness: Iranian SBs. *Industrial Management & Data Systems*, 113(2), 265-293.
- Sarstedt, M., Diamantopoulos, A., Salzberger, T., & Baumgartner, P. (2016). Selecting single items to measure doubly concrete constructs: A cautionary tale. *Journal of Business Research*, 69(8), 3159-3167.
- Sarstedt, M., Ringle, C. M., Smith, D., Reams, R., & Hair Jr, J. F. (2014). Partial least squares structural equation modeling (PLS-SEM): A useful tool for family business researchers. *Journal of Family Business Strategy*, 5(1), 105-115.
- Serrador, P., & Pinto, J. K. (2015). Does Agile work?—A quantitative analysis of agile project success. *International Journal of Project Management*, 33(5), 1040-1051.
- Serrador, P., & Turner, J. R. (2014). The relationship between project success and project efficiency. *Procedia-Social and Behavioral Sciences*, 119, 75-84.
- Serrador, P., & Turner, R. (2015). The relationship between project success and project efficiency. *Project Management Journal*, 46(1), 30-39.
- Shahu, R., Pundir, A. K., & Ganapathy, L. (2012). An empirical study on flexibility: a critical success factor of construction projects. *Global Journal of Flexible Systems Management*, 13(3), 123-128.
- Shankar, R., Gupta, R., & Pathak, D. K. (2018). Modeling critical success factors of traceability for food logistics system. *Transportation Research Part E: Logistics and Transportation Review*, 119, 205-222.
- Shenhar, A. J., Dvir, D., Levy, O., & Maltz, A. C. (2001). Project success: a multidimensional strategic concept. *Long range planning*, 34(6), 699-725.
- Shrnhur, A. J., Levy, O., & Dvir, D. (1997). Mapping the dimensions of project success. *Project Management Journal*, 28(2), 5-13.
- Shukla, M., Todorov, I., & Kapletia, D. (2018). Application of additive manufacturing for mass customisation: understanding the interaction of critical barriers. *Production Planning & Control*, 29(10), 814-825.
- Stoian, C., & Gilman, M. (2017). Corporate social responsibility that “pays”: A strategic approach to CSR for SMEs. *Journal of Small Business Management*, 55(1), 5-31.
- Streukens, S., & Leroi-Werelds, S. (2016). Bootstrapping and PLS-SEM: A step-by-step guide to get more out of your bootstrap results. *European management journal*, 34(6), 618-632.

- Tadeu de Oliveira Lacerda, R., Ensslin, L., & Rolim Ensslin, S. (2011). A performance measurement framework in portfolio management: A constructivist case. *Management Decision*, 49(4), 648-668.
- Tan, T., Chen, K., Xue, F., & Lu, W. (2019). Barriers to Building Information Modeling (BIM) implementation in China's prefabricated construction: An interpretive structural modeling (ISM) approach. *Journal of cleaner production*, 219(1), 949-959.
- Tang, S. H., & Ghobakhloo, M. (2013). IT investments and product development effectiveness: Iranian SBs. *Industrial Management & Data Systems*, 113(2), 265-293.
- Thier, M., & Mason, D. P. (2018). Breaking ranks? Differentiating nominal group technique scoring approaches for consensus and prioritization. *International Journal of Research & Method in Education*, Forthcoming, 1-14. doi: 10.1080/1743727X.2018.1533938
- Todorović, M. L., Petrović, D. Č., Mihić, M. M., Obradović, V. L., & Bushuyev, S. D. (2015). Project success analysis framework: A knowledge-based approach in project management. *International Journal of Project Management*, 33(4), 772-783.
- Tripathy, S., Sahu, S., & Ray, P. K. (2013). Interpretive structural modelling for critical success factors of R&D performance in Indian manufacturing firms. *Journal of Modelling in Management*, 8(2), 212-240.
- Turner, R., & Ledwith, A. (2018). Project Management in Small to Medium-Sized Enterprises: Fitting the Practices to the Needs of the Firm to Deliver Benefit. *Journal of Small Business Management*, 56(3), 475-493.
- Valaei, N. (2017). Organizational structure, sense making activities and SMEs' competitiveness: An application of confirmatory tetrad analysis-partial least squares (CTA-PLS). *VINE Journal of Information and Knowledge Management Systems*, 47(1), 16-41.
- Venkatraman, N., & Ramanujam, V. (1986). Measurement of business performance in strategy research: A comparison of approaches. *Academy of management review*, 11(4), 801-814.
- Viswanathan, S. K., Tripathi, K. K., & Jha, K. N. (2019). Influence of risk mitigation measures on international construction project success criteria—a survey of Indian experiences. *Construction Management and Economics*, Forthcoming, 1-16.
- vom Brocke, J., & Lippe, S. (2015). Managing collaborative research projects: A synthesis of project management literature and directives for future research. *International Journal of Project Management*, 33(5), 1022-1039.
- Walker, D. (2018). Cambridge Handbook of Organizational Project Management. *International Journal of Managing Projects in Business*, 11(1), 222-230.
- Webster, J., & Watson, R. T. (2002). Analyzing the past to prepare for the future: Writing a literature review. *Mis Quarterly*, xiii-xxiii.
- Wei, Z., Yi, Y., & Guo, H. (2014). Organizational learning ambidexterity, strategic flexibility, and new product development. *Journal of Product Innovation Management*, 31(4), 832-847.

- Westerveld, E. (2003). The Project Excellence Model®: linking success criteria and critical success factors. *International Journal of Project Management*, 21(6), 411-418.
- Wiewiora, A., Trigunarsyah, B., Murphy, G., & Coffey, V. (2013). Organizational culture and willingness to share knowledge: A competing values perspective in Australian context. *International Journal of Project Management*, 31(8), 1163-1174.
- Wong, K. K.-K. (2013). Partial least squares structural equation modeling (PLS-SEM) techniques using SmartPLS. *Marketing Bulletin*, 24(1), 1-32.
- Wu, W.-S., Yang, C.-F., Chang, J.-C., Château, P.-A., & Chang, Y.-C. (2015). Risk assessment by integrating interpretive structural modeling and Bayesian network, case of offshore pipeline project. *Reliability Engineering & System Safety*, 142, 515-524.
- Xiong, B., Skitmore, M., & Xia, B. (2015). A critical review of structural equation modeling applications in construction research. *Automation in construction*, 49(1), 59-70.
- Yadav, D. K., & Barve, A. (2015). Analysis of critical success factors of humanitarian supply chain: An application of Interpretive Structural Modeling. *International journal of disaster risk reduction*, 12(1), 213-225.
- Yang, L.-R., Chen, J.-H., & Wang, H.-W. (2012). Assessing impacts of information technology on project success through knowledge management practice. *Automation in construction*, 22, 182-191.
- Yazici, H. J. (2009). The role of project management maturity and organizational culture in perceived performance. *Project Management Journal*, 40(3), 14-33.
- Yazici, H. J. (2018). Role of Organizational Project Maturity on Business Success: Last Five Years' Outlook and Beyond *Developing Organizational Maturity for Effective Project Management* (pp. 43-54): IGI Global.
- Zins, C. (2007). Conceptual approaches for defining data, information, and knowledge. *Journal of the American society for information science and technology*, 58(4), 479-493.
- Zwikael, O. (2008). Top management involvement in project management: A cross country study of the software industry. *International Journal of Managing Projects in Business*, 1(4), 498-511.

BIODATA OF STUDENT



Ahmed Ali M. Khan was born on January 10th 1982, at Makkah, Kingdom of Saudi Arabia. He is currently a PhD student of Project Management at Faculty of Engineering, Universiti Putra Malaysia (UPM). He has a bachelor's degree (2007) of Electrical Engineering from Umm Al-Qura University at Makkah, Kingdom of Saudi Arabia and master's degree (2015) of Engineering Management from Universiti Putra Malaysia (UPM) at Selangor State, Malaysia. His PhD research interests about how to select the better project between multi-projects and implement the best practice in the area of project management.

LIST OF PUBLICATIONS

1. Khan, A.A., M.K.A. Ariffin , S. Sulaiman & F. Mustapha. (2018). Factors influencing project selection for SMEs. International Journal of Recent Technology and Engineering. 7. 15-18.





UNIVERSITI PUTRA MALAYSIA

STATUS CONFIRMATION FOR THESIS / PROJECT REPORT AND COPYRIGHT

ACADEMIC SESSION : Second Semester 2018/2019

TITLE OF THESIS / PROJECT REPORT :

DEVELOPMENT OF PROJECT SUCCESS MODEL USING PARTIAL LEAST SQUARES -
STRUCTURAL EQUATION MODELING FOR MALAYSIAN SMEs

NAME OF STUDENT: AHMED ALI M. KHAN

I acknowledge that the copyright and other intellectual property in the thesis/project report belonged to Universiti Putra Malaysia and I agree to allow this thesis/project report to be placed at the library under the following terms:

1. This thesis/project report is the property of Universiti Putra Malaysia.
2. The library of Universiti Putra Malaysia has the right to make copies for educational purposes only.
3. The library of Universiti Putra Malaysia is allowed to make copies of this thesis for academic exchange.

I declare that this thesis is classified as :

*Please tick (✓)

☐

CONFIDENTIAL

(Contain confidential information under Official Secret Act 1972).

☐

RESTRICTED

(Contains restricted information as specified by the organization/institution where research was done).

☐

OPEN ACCESS

I agree that my thesis/project report to be published as hard copy or online open access.

This thesis is submitted for :

☐

PATENT

Embargo from _____ until _____
(date) (date)

Approved by:

(Signature of Student)
New IC No/ Passport No.:

Date :

(Signature of Chairman of Supervisory Committee)
Name:

Date :

[Note : If the thesis is CONFIDENTIAL or RESTRICTED, please attach with the letter from the organization/institution with period and reasons for confidentiality or restricted.]