

DEVELOPMENT FRAMEWORK OF WORK STRESS AND TECHNOLOGY
ABSORPTIVE CAPACITY RELATIONSHIP AMONG SMALL AND MEDIUM-
SIZED ENTERPRISES (SMEs) IN CONSTRUCTION INDUSTRY

AINA MARDIA BINTI SALLEHUDDIN

A thesis submitted in
fulfilment of the requirement for the award of the
Doctor of Philosophy Technology Management and Business

Faculty of Technology Management and Business
Universiti Tun Hussein Onn Malaysia

JUNE, 2022

DEDICATION

Pray to Allah (SWT) for giving me the strength and commitment to complete this research project. I would like to dedicate this thesis to my family members who have always been supportive and inspiring to me. I would also like to convey my true love to my parents, Sallehuddin Bin Mazali and Azela Binti Hamzah, my current supervisor, Assoc. Prof Ts. Dr Roshartini Binti Omar, my co-supervisor, Ts. Dr Norliana Binti Sarpin for helping to finish my study. My heartiest regards to all the individuals involved for allowing me to conduct my research including my colleagues, respondents and others who gave me strength, motivation, encouragement and unyielding support without which I could not be able to achieve this degree.



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ACKNOWLEDGEMENT

First of all, I would like to thank my supervisor, Assoc. Prof. Ts. Dr. Roshartini Binti Omar, my Co-supervisor, Ts. Dr. Norliana Binti Sarpin for valuable guidance, unflagging patience, discussion, support and great supervision throughout the research process. Without their untiring efforts, this special topic would not exist. Also, to the Universiti Tun Hussein Onn Malaysia (UTHM) for the financial support Geran Penyelidik Pasca Siswazah (GPPS) Vot U821. I would also like to express my heartiest thanks to my family members, friends, respondents and colleagues who had been great listeners and have given a helpful hand in my survey. All who cared and helped to boost up my confidence in completing this special topic are much appreciated.



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ABSTRACT

The urges of technology adoption and usage raised work stress level within construction workforces. Construction industry is known as the slow technology growths industry and SMEs faced difficulties in technology adoption. Thus, such issues lead to high work stress and low level of technology absorptive capacity (TACAP) in the construction industry. Both work stress and TACAP is related to technology adoption, but no previous study explores work stress and TACAP in the same research area. Hence this research would like to explore work stress and TACAP scenario among SMEs in construction projects. This research is quantitative oriented, and questionnaire was the data instrument. This research was conducted among SMEs owner from G3 and G5 contractors within, Penang, Selangor, Pahang, and Johor with 196 respondents involved and 56% respondent rate. Descriptive statistical analysis and linear regression by using Statistical Package for Social Science (SPSS) and Partial Least Squares Structural Equation Modelling (PLS-SEM) by Smart PLS 3.0 used for data analysis. The findings showed there are 5 barriers rated as major barriers faced by SMEs in technology adoption; financial issue, human capital, incompetent management, limited external relationship and policy and procedure. The SMEs in the construction industry reported experiencing a moderate level of work stress and having a high level of TACAP by using non-R&D TACAP measurements. The relationship between work stress and TACAP also shows a positive connection. The proposed research framework was constructed based on the research finding and validated by 15 professionals. The proposed research framework aims to guide for SMEs to improve TACAP and technology adoption for the future.

ABSTRAK

Desakan penggunaan teknologi meningkatkan tahap tekanan kerja dalam industri pembinaan. Tambahan pula, pertumbuhan teknologi dalam industri pembinaan agak perlahan dan perusahaan kecil dan sederhana (PKS) menghadapi pelbagai halangan dalam penggunaan teknologi. Oleh itu, isu tersebut menyebabkan masalah tekanan kerja yang tinggi dan keupayaan daya serap teknologi (KDST) yang rendah dalam industri pembinaan. Tekanan kerja dan KDST berkaitan dengan penggunaan teknologi, akan tetapi tiada sebarang kajian terdahulu yang menerangkan mengenai tekanan kerja dan KDST dalam konteks penyelidikan yang sama. Oleh itu, penyelidik ingin merungkai senario kerja dan KDST dikalangan PKS dalam projek pembinaan. Penyelidikan ini berorientasikan kuantitatif dan soal selidik adalah instrumen data. Penyelidikan ini dilakukan di kalangan pemilik PKS dari kontraktor G3 dan G5 bagi negeri; Pulau Pinang, Selangor, Pahang dan Johor dengan melibatkan 196 responden dengan kadar 56% responden. Berdasarkan hasil kajian, terdapat lima halangan utama yang dihadapi oleh PKS dalam penggunaan teknologi adalah masalah kewangan, sumber manusia, pengurusan yang tidak kompeten, perhubungan luar yang terhad dan polisi & prosedur. PKS dalam industri pembinaan dilaporkan mengalami tekanan kerja tahap sederhana dan mempunyai tahap KDST yang tinggi dengan menggunakan pengukuran KDST bukan penyelidikan dan pembangunan (P&P). Hubungan tekanan kerja dan KDST juga menunjukkan hubungan positif. Kerangka penyelidikan dibina berdasarkan penemuan penyelidikan dan disahkan oleh lima belas profesional. Kerangka penyelidikan dibangunkan bertujuan untuk memberikan panduan bagi PKS dalam meningkatkan tahap KDST dan penggunaan teknologi untuk masa depan.

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LIST OF SYMBOLS AND ABBREVIATIONS

BEM	-	Board of Engineer Malaysia
SMEs	-	Small and Medium-Sized Enterprises
TACAP	-	Technology Absorptive Capacity
CIDB	-	Construction Industry Development Board
CREAM	-	Construction Research Institute of Malaysia
CAPE	-	Canadian Associate Professional Employee
NIOSH	-	National Institute for Occupational Safety and Health
OECD	-	Organisation for Economic Co-operation & Development
NSDC	-	National SMEs Development Council
SOCISO	-	Social Security Organisation
KMO	-	Kaiser -Meyer -Olkin
EFA	-	Exploratory Factor Analysis
CFA	-	Confirmatory Factor Analysis
CR	-	Composite Reliability
AVE	-	Average Variance Extracted
HTMT	-	Heterotrait-Monotrait Ratio of Correlation
VIF	-	Variance Inflation Factor
R^2	-	Relevance Level
f^2	-	Effect of Size
Q^2	-	Predictive Relevance
CI	-	Critical Index
HR	-	Human Resource

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LIST OF DEFINITION

- Work Stress : Strain and stressful events that occurred at the workplace due to the mismatch of work demands placed on employees that do not match the capabilities, resources, or needs.
- Technology : Firm ability and capability to recognized and capture external information that is related to all modern technology through acquisition, assimilation, transformation and exploitation.
- Absorptive Capacity : Firm ability and capability to recognized and capture external information that is related to all modern technology through acquisition, assimilation, transformation and exploitation.
- Technology Adoption : Process acceptance of new innovation, product or technology
- SMEs : Categorisation for contractors based on their operational activities, tendering capacity, and paid-up capital. SMEs in the construction industry comprising G1 to G5
- Technology : Technology as all the knowledge, product, processes, tools, methods and system employed in the creation of goods and in providing services



PTT AKADMI TEKNIK TURKUMINAH
PERPUSTAKAAN

CHAPTER 1

INTRODUCTION

1.1 Overview

The government keeps promoting technology in construction projects, as technology adoption is one of the best alternatives to increase organisational performance. Technology is proven to promote efficiency, safe working environment and reduce the number of labours. However, technology adoption is a challenging process to a particular group of contractors such as the small and medium-sized enterprises (SMEs) in construction projects. The issue happened due to multiple complex technical, cultural, and socio-economic factors that may raise work stress issues and subsequently lead to the technology absorptive capacity (TACAP) difficulties among construction SMEs.

TACAP refers firm ability and capability to recognised and capture external information. However, the connection between work stress and TACAP has never been revealed in previous research. Hence, this research aims is to examine the relationship between work stress and TACAP among SMEs in the construction industry. This chapter discussed the beginning part and research precisely. The research details and research methodology were outlined for better understanding and appropriate research path. This chapter concludes by discussing the overall structure of the thesis.

1.2 Research Background

Construction industry is one of the dominant sectors that contribute great income to sustain and improve the national economy (Lee, 2016). The industry is considered a significant contributor to the development of both developed and developing nations, as the industry plays a prominent role in providing necessary public utilities and private physical structures (Wibowo, 2014). According to DoSM (2020), construction industry contributes 48.7% in GDP performance on 2020. Kamal *et al.* (2021) outlined, most economies driver towards industrial development depends on the development of small and medium-sized enterprises (SMEs), as 90% of the industry is conquered by them.

Construction industry is known as a high demand industry (Bowen *et al.*, 2014). The demands for construction are hike form days to days with all vary and challenging client sophisticated demands and involves with technology usage raises the work stress among the players (Barnett *et al.*, 2011). According to Poon *et al.* (2013), the tense environment in the industry lead to work stress issue such as, complicated conflict of work, multi-backgrounds of construction projects, communication issues, and unrealistic demands from the client. According to Holden & Sunindijo, (2018) technology availibitily brings drastic demand in the sector and lead to pressure among construction players.

Recent studies mentioned that technology usage in organisation would triggers work stress issue in the construction industry (Bo Xiong *et al.*, 2014). This is happened due to the modification of the project process, shorter project pace and frequent client demand due especially in the construction phase (Ibem *et al.*, 2011; Poon *et al.*, 2013). Moreover, the industry is known as one of the slowest industries in technology adoption because project's milestone becomes priority and made TACAP is low (Omar, 2012). Moreover, construction industry reported to have lowest investment in technology and machinery with 3.9% (DoSM, 2020).

Nowadays, technology is part of government and client requirement in the projects. Technology is considered best alternative to solve manpower issue, financial issue and project abandoned (CIDB, 2020). Technology can be in software and hardware (Li-Hua & Khalil, 2006). According to Ministry of Housing and Local Government (2022) only 25% project abandoned is currently saved by contractor in Malaysia and 89% number SMEs involved in the saved project as main and sub-

contractors (MHLG,2022). This number shows the importance on technology among SMEs in the industry.

SMEs is the focus target as the industry is conquered by them (CREAM, 2014). Moreover, the flexibility and strong chain of command in the organisation made them the most suitable medium to enhance technology adoption in the industry (Lagunes, 2016). However, SMEs faced many barriers and made the technology adoption is impossible (Nowotarski & Paslawski, 2017). In addition, the work environment in the industry made the technology adoption is such a challenging and complicated process which subsequently may lead to work stress and TACAP issue in the industry (Holden & Sunindijo, 2018; Kamal *et al.*, 2021).

Work stress within construction industry usually shows the negative pattern towards organisation job performance (Bickford, 2005; Lingard *et al.*, 2014). However, there were many models had been established to prove the work stress and performance relationship in various previous researches too (Ibem *et al.*, 2011, Enshassi *et al.*, 2015). Controlled work stress in organisation leads to creativeness, innovation and learning process with may lead to performance improvement (Dopkeen & Dubois, 2014). Meanwhile, TACAP is known as learning process too (Gray, 2006; Omar *et al.*, 2011; Wales *et al.*, 2013). However, there is no redundant study on work stress and TACAP in previous research. Hence this research aims to explore the relationship of work stress and TACAP among SMEs in construction industry.

1.3 Problem Statement

In Malaysia work stress is considered a peculiar and rare research area (Heong, 2016). However, Malaysian had no excuse from work stress, and depression problems (Idris *et al.*, 2010). According to Bernama (2021) 85.5% of the 145,173 calls received by government agencies from March 25, 2020 to May 20, 2021 were involving mental health issues in Malaysia. Work stress is very contagious and cannot be diminished and can be transferred from one person to another (Dewe *et al.*, 2012). According to Joshi *et al.* (2020) the characteristic and nature of work of construction industry escalated work stress issue among personnel. Moreover, previous studies proved that work stress exists in the industry and positively lead to accidents (Enshassi *et al.*, 2015).

Based on Department of Safety and Health Malaysia 2018 report (DOSH), Malaysia's construction industry recorded the highest number of deaths at workplace. However, most construction personnel in Malaysia do not aware of work stress issue existence and refuse to take as a serious matter (Abas, 2021). Work stress study also does not get much attention from researchers (Hueng, 2016). In addition, DOSH also claimed there are no form of documentation and tabulation of data regarding work stress issues in Malaysia for the industry (DOSH, 2017). Nowadays few researcher highlighted that technology usage in the industry also trigger to work stress issue (Hueong 2016; Joshi *et al.*, 2020).

Technology is known as all the knowledge, products, process, tools, methods and system employed in the creation of goods and in providing services which can be in software and hardware technology (Li Hua & Khalil, 2006). Hardware technology refers any type of technology that can be seen and touch by personnel including; machineries, equipment, tools and devices (Cheng *et al.*, 2017). Meanwhile, soft technology refers to non-tangible technology that can not be seen and touch including; knowledge, procedure, skills, method and process (Cheng *et al.*, 2017). Technology may ease a personnel task however, technology may induce to multiple work scope changes, vagueness and short demand of time (Abas, 2021). Thus, it may create work stress in technology usage and adoption in Malaysia's construction industry.

Work stress in technology usage and/or adoption is known as technostress. Work stress in technology usage raises due to the inability to cope with organisations' demand for technology usage at the workplace either in hardware, software and both (Barnett *et al.*, 2011). According to Salanova *et al.* (2013), work stress in technology usage can be experienced during adaption and usage phases. The issue becomes more complicated when the industry itself struggles to apply technology due to the number of barriers especially among construction SMEs including, lack of technical worker, misfit skill provided by an institution, lack of alliances, financial crisis, natural disaster and global crisis (OECD, 2014; Kamal & Flanagan 2014).

Moreover, several complex technical, cultural and socio-economic factors also became part of factors that technology adoption and TACAP has not always been successful among them (Gunto & Alias, 2013). According to Kamal *et al.*, (2021) level of technology adoption in the construction industry is relatively low compared to other sectors. According to Raman (2015), Malaysia construction industry usually associated with limited funding for technology scope and R&D. According to DoSM

(2021), Malaysia's construction industry has small amount of invest in technology and machinery with only 3.9%. Moreover, non-promising technology usage in improving SMEs contractor grades made them not interested in technology (Kamal & Flanagan 2014). Based on CIDB (2019) only 1.7% improvement made from G3 to G4 and 1.8% improvement made from G5 to G6.

Thus, there is no surprising that technology adoption for both soft and hard technologies among SMEs in construction industry such as challenging process that not only may escalate work stress issues in the industry and lead to low TACAP at the same time due to low acceptance of technology, unpromising result and numbers of barriers faced (Salanova *et al.*, 2013 and Bilau *et al.*, 2015). However, there is no redundant study on work stress and TACAP in previous research. Many previous research also highlights work stress bring impact performance aspect (Joshi *et al.*, 2020). Meanwhile, TACAP also bring direct impact on performance too (Wang *et al.*, 2020).

Moreover, previous studies outlined that work stress may trigger; positive & negative manner, learning process meanwhile TACAP is a learning process too (Montani *et al.*, 2020; Lagunes *et al.*, 2016). Hence, this research aims to explore the relationship between work stress and TACAP among SMEs in construction industry. This relationship is important as it may help to improve the current effort in technology adoption. This research also would like to review work stress and TACAP level among SMEs in the construction industry.

1.4 Research Questions

Based on the problem statement discussed, few research questions had been established which are;

1. What is the major barrier in technology adoption among SMEs in construction industry?
2. What is the level of work stress among SMEs in construction industry?
3. What is the level of technology absorptive capacity among SMEs in construction industry?

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Award

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2. Framework of Work Stress and Technology Absorptive Capacity among Small and Medium Sized Enterprises in Construction Projects. The International Research and Symposium and Exposition (RISE) Poster Competition 2020 – Gold Medal.