

**ORGANISATIONAL CULTURE TO SUPPORT
INNOVATION CREATION AND ADOPTION IN
MALAYSIAN ARCHITECTURAL FIRMS**

by

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**BUDAYA ORGANISASI YANG MENYOKONG PENCIPTAAN DAN
PENGUNAAN INOVASI DI SYARIKAT-SYARIKAT SENIBINA MALAYSIA**

ABSTRAK

Industri pembinaan dan inovasi memainkan peranan penting dalam memperkukuhkan pertumbuhan negara. Namun, kebanyakan inovasi gagal dilaksanakan. Tambahan pula, inovasi dalam industri pembinaan di Malaysia telah didapati sebagai tidak mencukupi. Kajian berkenaan dengan hal ini mencadangkan bahawa inovasi wujud dalam dua orientasi, iaitu penciptaan dan penggunaan. Walau bagaimanapun, kedua-dua orientasi ini belum dibezakan dalam kebanyakan kajian inovasi. Oleh itu, trend terkini menunjukkan bahawa wujudnya keperluan untuk membezakan kedua-dua orientasi berkenaan dalam kajian organisasi dan inovasi. Syarikat-syarikat seni bina terdiri daripada organisasi yang berorientasikan inovasi dan berintensifkan ilmu pengetahuan, namun ia tidak banyak diberikan perhatian dalam kajian berbanding syarikat-syarikat besar seperti pemaju perumahan. Oleh itu, objektif pertama kajian ini adalah untuk menguji tahap orientasi inovasi (penciptaan dan penggunaan) di syarikat-syarikat seni bina. Berkenaan ‘senario mundur’ dalam industri pembinaan, budaya organisasi dikenal pasti sebagai kunci bagi memperbaiki inovasi. Namun, kajian-kajian organisasi tidak banyak memberikan usaha untuk menyuntik orientasi inovasi. Oleh itu, kajian ini menyasarkan untuk meneroka budaya organisasi di syarikat-syarikat seni bina dari segi orientasi inovasi (penciptaan dan penggunaan) sebagai objektif keduanya. Kerangka sampel diperoleh daripada Lembaga Arkitek Malaysia, dan pensampelan berstrata berkadaran dijalankan. Borang kaji selidik diserahkan kepada 1,004 buah syarikat seni bina, dan 15% kadar maklum balas direkodkan. Data berkenaan dianalisis dengan analisis deskriptif, analisis faktor penerokaan, ujian-t sampel berpasangan, dan pemodelan persamaan struktur kuasa dua terkecil separa. Keputusan menunjukkan bahawa syarikat-syarikat seni bina di Malaysia adalah berorientasikan penciptaan inovasi, dan tahap inovasi keseluruhan di negara ini adalah agak rendah. Dimensi budaya seperti ‘kebebasan’ dan ‘kerjasama/kesepasukanan’ secara positif

mempengaruhi kedua-dua penggunaan dan penciptaan. Namun, dimensi budaya lain termasuklah 'sikap menyokong inovasi' secara positif mempengaruhi penciptaan inovasi berbanding penggunaan inovasi. Dimensi budaya seperti 'individualisme' secara positif mempengaruhi penggunaan inovasi sahaja dan tidak pada penciptaan inovasi. Dapatan ini menunjukkan bahawa syarikat-syarikat seni bina perlu diberikan kebebasan untuk merancang tugas, perlu dibenarkan untuk mempertahankan pendapat mereka, perlu diperkasakan untuk membuat keputusan, dan perlu menghargai semangat kesepasukan demi berinovasi. Syarikat-syarikat seni bina yang mengamalkan penciptaan inovasi perlu menitikberatkan budaya belajar, membuka ruang kepada risiko, dan menyokong idea baru. Bagi penggunaan inovasi, tahap tertentu mengenai tanggungjawab atas diri sendiri, perkongsian luar komitmen, dan kebebasan perlu dibenarkan.

ORGANISATIONAL CULTURE TO SUPPORT INNOVATION CREATION AND ADOPTION IN MALAYSIAN ARCHITECTURAL FIRMS

ABSTRACT

The construction industry and innovation play significant roles in strengthening the growth of nations. However, innovation tends to fail at times. In fact, innovation in Malaysia's construction industry has been determined to be inadequate. The related literature suggests that innovation comes in two orientations, namely, creation and adoption. However, these orientations have not been differentiated from each other by most innovation studies. Therefore, the recent trend indicates the extensive need to distinguish such orientations in organisational and innovation studies. Architectural firms consist of innovation-oriented and knowledge-intensified organisations, yet they receive less scholarly attention compared with large companies such as housing developers. Therefore, the first objective of the current research is to examine the state of innovation orientations (creation and adoption) in architectural firms. In relation to the 'backward scenario' in the construction industry, organisational culture is recognised as the key for improving innovation. However, organisational studies have only exerted minimal efforts in incorporating innovation orientations. Therefore, the current research aimed to explore the organisational culture of architectural firms in response to innovation orientations (creation and adoption) as its second objective. A sample frame was retrieved from the Board of Architects Malaysia, and a proportionate stratified sampling was performed. A questionnaire survey was administered to 1,004 architectural firms, and a 15% response rate was recorded. The data were analysed with descriptive analyses, exploratory factor analyses, paired sample t-test, and partial least squares structural equation modelling. Results revealed that the architectural firms in Malaysia are innovation-creation oriented, and that the overall state of innovation in the country is relatively low. Cultural dimensions such as 'freedom' and 'collectivism/teamwork' positively influence both adoption and creation. Nonetheless, other cultural dimensions, including 'innovation-supportive behaviours', positively influence innovation creation

instead of innovation adoption. Cultural dimensions such as ‘individualism’ positively influence innovation adoption only and not innovation creation. These findings imply that architectural firms must be given the liberty to plan tasks, must be allowed to defend their opinions, must be empowered to make decisions, and must appreciate teamwork for them to innovate. Architectural firms that embark on innovation creation should emphasise the learning culture, allow risk tolerances, and support new ideas. For innovation adoption, a certain degree of self-entrusted responsibilities, off commitment sharing and independence should be allowed.

CHAPTER 1

INTRODUCTION

1.1 Research Background

The term ‘innovation’ has received considerable attention from the industry and the academe worldwide. In fact, this terminology is not new among developed countries. Innovation has been analysed from different perspectives and across various industries and fields. However, uncertainties remain because some innovation strategies have not been successfully applied in practice. This particular issue has been encountered by developing countries, including Malaysia. Innovation is responsible for the growth of a nation, for example, when Malaysia aimed to become a developed country. For developing countries, the construction industry plays an important role in shaping their economy and society. Despite the complexity of this industry, the architectural sector has received less attention compared with other key players, such as contractors, engineering firms, and housing developers. The existing innovation studies vary in terms of their purposes and arguments, ranging from the barriers to the diffusion of innovation. Consequently, the current research investigates the interaction between the socio-psychological aspects and innovation in architectural firms. The socio-psychological perspective, commonly and collectively known as organisational culture, represents the embedded culture and practice at the firm level. However, unlike most innovation studies, the current study classifies innovation into two different orientations, namely, creation and adoption.

This chapter addresses the motivation that drives the researchers to conduct the study, identifies its objectives, and highlights its significant implications. In particular, this chapter is organised into five subsections. Section 1.2 discusses the issues and demands that give credit to the investigation. Section 1.3 specifies the research objectives and scope. Section 1.4 gives the significance of the study. Section 1.5 briefly explains the research method. Section 1.6 presents the organisation of this thesis.

1.2 Problem Statement

The Malaysian authorities have drawn their attention to innovation and the country's construction industry. As specified in the Tenth Malaysia Plan (10MP), innovation is one of the primary agendas of the nation, and knowledge-based companies are designated to promote and embark on innovation (Economic Planning Unit, 2010, p.16). With regard to knowledge-based companies, Peansupap and Walker (2009) identified a design firm as a knowledge-based intensive organisation and an architectural firm to be composed of these knowledge-based characteristics within the context of the construction industry. The Construction Industry Master Plan (CIMP; 2006–2015) considers innovation as the critical success factor for meeting the vision of the industry's plan (Construction Industry Development Board, CIDB; 2007, p.10). The following issue is raised in this plan (2006–2015): '*fifth strategic thrust: innovate through R&D and adopt new construction methods*'. This issue indicates that innovation remains poorly practiced in the construction industry (CIDB, 2007, p.36). According to the '*seventh strategic thrust: benefits from globalisation including export of construction product and services*', design firms are appointed to play an important role in providing overseas projects with solutions and added value (CIDB, 2007, p.46). In the proposed 2014 Budget, the Malaysian government allocated MYR 120 million for enhancing the process of innovation in small- and medium-sized enterprises (SMEs). This particular undertaking signifies the efforts in promoting innovation (Malaysia Focus, 2013, p.4). Innovation in the construction industry may improve the nation's economic growth (Winch, 2003). For this reason, the 2014 Budget extended the agenda for improving the status of innovation in public service to the private sector through the National Blue Ocean Strategy as part of the efforts to stimulate the development in urban and rural areas (Malaysia Focus, 2013, p.6). The construction industry is also perceived as an essential contributor to the gross domestic product (GDP) of most countries (Reichstein *et al.*, 2008; Seaden and Manseau, 2001). Similar to the situation in other countries, the construction industry in Malaysia contributed at least 3% of the national economy in the past 20 years

between 1991 and 2010 (Khan *et al.*, 2014). Moreover, the construction industry is deemed as one of the essential indicators for measuring a country's performance (Memon *et al.*, 2010; Khan *et al.*, 2014). The aforementioned circumstances highlight the importance of innovation in relation to the policy and overall development of a nation, particularly in the construction industry. Architectural firms are the main driver in promoting innovation because they are recognised as knowledge-based organisations. However, innovation has not been extensively explored by the industry or the academe in relation to construction industry, particularly in terms of architectural practices (Hartmann, 2006b; Reichstein *et al.*, 2008; Filippetti, 2011). Therefore, these issues contribute to the practical need to perform more innovation studies at the firm level, particularly with regard to architectural firms.

Despite the existence of innovation studies on the construction industry, Aouad *et al.* (2010) and Poirier *et al.* (2015) echoed the need to analyse the case of stakeholders (e.g. architectural firms) to comprehensively understand the concept of innovation. Design plays an important role in innovation (Salter and Torbett, 2003; Dell'Era and Verganti, 2007; Filippetti, 2011), particularly in innovation within the construction industry (Panuwatwanich, 2008). Therefore, design and innovation interact (Dell'Era and Verganti, 2007), especially among architectural practitioners because they constitute the design features (Panuwatwanich and Steward, 2012; Walsh, 1996). Architects in Malaysia are recognised to have a significant role in designing, monitoring, constructing, and creating the built environment (Laws of Malaysia, 2006). The architectural sector in Malaysia, as the designer of the built environment, is severely challenged by innovation issues. In relation to this situation, the president of the Malaysian Institute of Architect highlighted in a local press release the importance of architects in generating designs that portray the originality of thought (The Star, 2007). According to Erbil and Akinciturk (2010), in 21st-century Turkish architecture, innovations occurred through discoveries, imitation, and adoption instead of inventions. This finding reveals that the construction industry, particularly the architectural firms, suffers from unsatisfactory innovation despite being perceived as a design-oriented

organisation. Therefore, the fundamentals of these aspects should be investigated and reviewed in response to the backward scenario of innovation in the construction industry (Koskela and Vrijhoef, 2001).

The existing concepts of innovation may potentially address these problems (Davidson, 2013; Koskela and Vrijhoef, 2001). Kimberly and Evanisko (1981) identified innovation as the first use of an idea in a given industry. This definition signifies that innovation has a certain degree of novelty; that is, the implementation and introduction of products can be new or unfamiliar to the industry. Kerin *et al.* (1992) suggested that a firm could be considered capable of generating innovation if it has developed a novel idea ahead of its competitors. By contrast, innovation adoption uses or absorbs idea from a firm's competitors (Naranjo-Valencia *et al.*, 2011). Slaughter (1998) claimed that innovation refers to the act of making and implementing changes perceived by the adopting party or organisation as something new. This definition implies that innovation is not necessarily new to the industry, and that it portrays the nature of innovation adoption than innovation creation. The definition provided by Slaughter is commonly accepted by the academe in the context of the construction industry (Blayse and Manley, 2004). Nonetheless, both definitions have been recognised to a certain extent. This inconclusive conception of innovation was addressed by Ravichandran (1999), who specified that innovation is interchangeable with adoption, and that it refers to the total number of adoption. However, innovation significantly varies from adoption as the former pertains to the creation of a novel idea, whereas the latter refers to the absorption of a concept (Ravichandran, 1999). Therefore, innovation can be categorised into two different forms, namely, innovation creation and innovation adoption (e.g. Kirton, 1984; Ravichandran, 1999; Damanpour and Wischnevsky, 2006; Zhou, 2006; Naranjo-Valencia *et al.*, 2011; Perez-Luno *et al.*, 2011). In spite of such a categorisation, some scholars questioned the significance of distinguishing creation from adoption because these forms are interchangeable and equal to innovation (e.g. Rogers, 1983; Zaltman *et al.*, 1973; Panuwatwanich *et al.*, 2008; OECD, 1997; Drejer, 2004). Naranjo-Valencia *et al.* (2011) and

Robinson *et al.* (1992) emphasised that the forms of innovation should be differentiated because, although they are interchangeable, they present different skills and approaches that could shape an entire organisation. Moreover, the differences between these forms of innovation are significant to developing countries, such as Malaysia, which heavily relies on innovation for sustaining its competitive advantages (Dell'Era and Verganti, 2007). Therefore, due to these uncertainties, the first gap in the literature refers to the necessity to classify innovation creation and innovation adoption despite the fact that they are interchangeable or equal. To address this gap, the current research aims to address the question 'What is the status of innovation in relation to innovation creation and innovation adoption in the context of architectural firms?' By addressing such a query, this study may provide empirical evidence to support the theoretical literature in stipulating that innovation creation and innovation adoption are two distinct forms of innovation.

Innovation's important roles, which potentially contribute to the economy of a country, in the construction industry have been recognised. However, questions emerge when such a process fails (Ahmed, 1998; Martins and Terblanche, 2003), particularly in the construction industry (Reichstein *et al.*, 2008; Crabtree and Hes, 2009; Blayse and Manley, 2004; Winch, 2003; Barlow, 2000). In response to these queries, the organisational culture holds the key that shapes and determines the overall performance of a system or a business (Cheung *et al.*, 2012; Alas *et al.*, 2009; Ankrah and Langford, 2005; Ritchie, 2000). The firms that try to shape and maintain a culture, which influences their performance, may improve their own efficiency (Gordon and DiTomaso, 1992). Moreover, the construction firms that enhance their organisational culture potentially give new hope to the aging and failing business (Ankrah and Langford, 2005; Cheung *et al.*, 2012). Nevertheless, why is organisational culture important to innovation despite its undeniable significance in the overall performance of firms? Organisational culture is considered one of the key elements for unlocking the failure of innovation (Milne and Leifer, 1999; Naranjo-Valencia *et al.*, 2011; Yusof and Zainul-Abidin, 2011; Erbil and Akinciturk, 2010; Panuwatwanich *et al.*, 2008). However,

organisational culture in the context of the construction industry, particularly in terms of architectural firms, has yet to be extensively analysed by the academe despite its importance (Ankrah and Langford, 2005). Moreover, the design or architectural practices are significant to either innovation or the construction industry (Walsh, 1996; Panuwatwanich, 2008; Salter and Torbett, 2003; Filippetti, 2011). Only a few organisational cultural studies have explored innovation creation and innovation adoption (Naranjo-Valencia *et al.*, 2011). Uncertainties also remain because of the inadequate understanding on the distinction between these innovation orientations (Yusof *et al.*, 2014; Perez-Luno *et al.*, 2011). The existing organisational culture may even turn innovation into failure (Martins and Terblanche, 2003).

The literature review provides a larger picture of the scenario to further address the existing research gap. Several studies have examined innovation and organisational culture in the context of the construction industry. For instance, Panuwatwanich *et al.* (2008) investigated the organisational culture portrayed in Australian design firms with regard to the development of innovative climate and examined its relationship with innovation outcomes and performances. Erbil and Akinciturk (2010) analysed the factors affecting the diffusion of innovation in Turkish architectural firms. Cheung *et al.* (2012) examined the interaction between organisational culture and the overall performance of construction organisations in Hong Kong. In particular, these researchers considered the innovation variables as the predictor and indicator of firm's performance. Lloyd-walker *et al.* (2014) emphasised that a greater collaboration among the key players could help develop a 'no-blame culture', which could potentially predict innovation, in the Australian construction industry. Nevertheless, these studies did not specify the distinctions between innovation creation and innovation adoption. In particular, this substantial research perceived the orientations of innovation (creation and adoption) as interchangeable or even compromised their differences. Although innovation and organisational culture have been investigated in the context of the construction industry, a convincing model and a standard rationale about innovation have yet to be established (Zairi, 1994). Only a few studies have explored the innovation and

organisational culture of architectural firms. Such an insufficiency in the number of empirical research to justify the distinction between innovation creation and innovation adoption indicates the need to perform further innovation and organisational studies on architectural firms. Moreover, most innovation studies were conducted in the Western context (Jantan *et al.*, 2003). Cho *et al.* (1998) questioned the competence of Western theories if applied in the Asian context. Zhou *et al.* (2005) consequently verified that Western theories might be seriously challenged if applied in the Asian context because of the pending uncertainties, such as the distinction between innovation creation and innovation adoption echoed in the current research.

Innovation and organisational studies have been conducted in the context of the Malaysian construction industry. For example, Yusof *et al.* (2010a) examined the tendency of housing developers in Malaysia to embark on innovation. Kamaruddeen (2011) investigated the interaction between the internal (comprised firm structure, culture, and resources) and external factors of a firm in firm innovativeness in the context of Malaysian housing developers. Yusof and Zainul-Abidin (2011) explored the relationship between the organisational culture and innovation of publicly listed housing developers in Malaysia. Comparable with other innovation and organisational studies in the Malaysian context, the abovementioned studies perceived creation and adoption as interchangeable and defined them as equal to innovation. Nonetheless, a few innovation studies have distinguished innovation based on its type or characteristic. For instance, Kong-Seng *et al.* (2011) investigated the status of innovation in the context of housing developers in Malaysia based on the type and dimension of innovation. Kamaruddeen *et al.* (2011) explored the level of innovativeness of housing developers in terms of four criteria (i.e. product, process, business, and information technology (IT)) and incorporated it with the Roger's diffusion of innovation. However, these studies are dissimilar to the notion of the current research, which proposes the distinct existence of innovation creation and innovation adoption. Yusof *et al.* (2014) classified the status of innovation in relation to its two orientations in the context of

construction organisations in Malaysia. These research efforts are encouraging but are not enough to support the scope and complexity of the construction industry. Moreover, the number of innovation and organisational studies that analysed the distinct existence of innovation creation and innovation adoption remains insufficient. These existing studies did not deal with organisational culture and innovation, as most of them only focused on large players such as housing developers. Accordingly, Hardie and Newell (2011) claimed that the majority of the innovation studies on the construction industry focused on large companies. Consequently, SMEs and construction firms (e.g. architectural firms) received insufficient attention. Maria (2000), Jantan *et al.* (2003), and Kamaruddeen *et al.* (2011) argued that the number of innovation studies in the context of Malaysian private organisations is also limited. The above discussion provokes the second question intended to be addressed by the current research: ‘What particular organisational culture could potentially predict innovation creation and innovation adoption in the context of architectural firms?’ The subsequent section elaborates the research objectives and scope of the study.

1.3 Research Objectives and Scope

With the identified research questions, this study aims to achieve the following objectives:

- 1) To identify the status of innovation in relation to innovation creation and innovation adoption among architectural firms
- 2) To identify the causal relationship of organisational culture with innovation creation and innovation adoption

Accordingly, this research involved only the architectural firms registered under the Board of Architects Malaysia and considered the entire Malaysia as its sample. This research was founded on the widely accepted concepts of innovation and focused on the classification of innovation, namely, creation and adoption. This study addressed the socio-psychological factors at the firm level and in the daily working hemisphere, but it did not deal with any on-

going projects. More importantly, this study presented its own hypotheses and did not only confirm what had been determined by previous studies.

1.4 Significance of the Study

The significance of this research can be viewed from the theoretical and practical perspectives. In terms of the theoretical perspective, this research extends the knowledge of innovation in response to the distinction between innovation creation and innovation adoption as highlighted by Ravichandran (1999) and Damanpour and Wischnevsky (2006). By focusing on this aspect, this study may provide empirical evidence to justify the distinct existence of innovation creation and innovation adoption. This study also expands the existing literature, which stipulates that creation and adoption are interchangeable. Moreover, this research fills in the gap with regard to the insufficient number of innovation studies on the context of the construction industry in Malaysia. As previously discussed, the architectural sector has not been extensively explored by the academe despite its important role as a designer that can be highly correlated with innovative works. Moreover, the existing innovation and organisational studies have exerted inadequate efforts in response to the identification of the distinction between innovation creation and innovation adoption or examination of the organisational culture that could predict the forms of innovation, particularly in the context of architectural firms. Accordingly, this study is significant in filling in this research gap by investigating the simultaneous interaction of organisational culture with the two distinct forms of innovations. Through this process, an empirical model is developed and validated throughout the statistical analysis. This empirical model sheds lights on the literature of innovation and organisational culture.

This study aims to determine the current status of innovation in architectural firms. By accessing the embedded working cultures, actions toward new ideas, and mechanisms for handling innovation, this study identifies whether Malaysian architectural firms are more

oriented towards innovation creation or innovation adoption. The theoretical significance of this study lies on providing a direction for future investigations.

Aside from providing theoretical implications, this study is also significant to the construction industry as it identifies the distinction between innovation creation and innovation adoption. This study reveals the current status of innovation in the context of architectural firms. Determining the status of innovation is important to the management or principal of an architectural firm so that improvements or enhancements can be realised. Moreover, such information can serve as a guide for making or implementing future policies and business directions. By distinguishing innovation creation from innovation adoption, this study may also provide the necessary features or characteristics of these forms. This distinction also specifies the direction to which a particular architectural firm is headed. The empirical model, which consists of the organisational culture and forms of innovation, may offer information on how the organisation's working culture can be efficiently managed and improved to fit the nature of innovation. From a broader perspective, this study responds to the 10MP, CIMP (2006–2015), and 2014 Budget of Malaysia. With the current state of innovation in architectural firms, the effects of such a process extend to the construction industry, which is the key driver that designs and creates the built environment of Malaysia. The findings of this research may provide policy makers and the construction industry with novel ideas about innovation process.

1.5 Research Method Overview

The design of this study was mainly guided by the positivism paradigm. The rationale and reason for adopting such a paradigm have been well established (e.g. Neuman, 2011, p.91; Panuwatwanich, 2008, p.93; Easterby-Smith *et al.*, 2012, p.17). A hypothetico-deductive method was also incorporated in the study. The research process was improved by integrating the positivism paradigm approach with the methodologies proposed by Neuman (2011), Cooper and Schindler (2001), Sekaran and Bougie (2009), and Hair *et al.* (2008).

The synthesis approach was used in the literature review, proposal of studied variables, development of conceptual model, and development of measurement to serve the nature of the investigation. This predominant approach is suitable for innovation studies (e.g. Gallouj and Savona, 2009; Coombs and Miles, 2000; Gallouj and Weinstein, 1997; Preissl, 2000). Similar to other innovation and organisational studies on the construction industry, the current study adopted the survey method through questionnaires to examine the study-related variables (e.g. Kamaruddeen, 2011; Yusof *et al.*, 2014; Panuwatwanich *et al.*, 2008). The questionnaire survey was delivered by post, covering all states of Malaysia. The use of a postal survey is considered adequate in organisational studies because it offers many advantages compared with other methods (e.g. Walonick, 1997; Williams, 2003; Cooper and Schindler, 2001, Sekaran and Bougie, 2009). The quantitative data were initially validated by performing data screening, descriptive analysis, and assessment of reliability and validity. Two major statistical analyses (i.e. paired samples t-test and partial least squares of structural equation modelling (PLS-SEM)) were also used to achieve the research objectives.

1.6 Organisation of the Thesis

This paper is divided into five main chapters. Chapter 1 discusses the problems and issues that inspired the realisation of this study. The problems are discussed from the theoretical and practical points of view. This chapter also enumerates the objectives and scope of the study, highlights its theoretical and practical significances, and provides an overview of the research methodology. In sum, Chapter 1 lists the contents of the entire research.

Chapter 2 presents the literature review. This chapter elaborates the relevant literature related to innovation and organisational studies, particularly in the context of the construction industry. This chapter begins with the discussion on the existing types and approaches adopted by innovation studies, and it elucidates the patterns of the literature review for the entire study. Considering that this study is about innovation and organisational culture, the discussion on the related literature begins from a broad perspective and narrows down to the

specific aspects related to innovation and organisational culture, particularly to the construction industry and architectural firms. Moreover, the concepts of innovation are critically reviewed to highlight the inconclusive aspects that constitute the aims of this study. This chapter also examines the empirical innovation and organisational studies. Integration and synthesis are conducted across this critical value to identify the strengths and weaknesses of the existing studies. The interaction among the concepts of design, architectural, innovation, and construction is also discussed. Moreover, this chapter illustrates the statistical data that indicate the contribution of architectural and construction industries to the growth of a nation to specify their practical importance. Finally, this chapter proposes the conceptual model that consists of cultural dimensions, which predict the innovation orientations (creation and adoption). The research hypotheses are formulated in this chapter.

Chapter 3 elaborates each step and process involved in this investigation, from the beginning to the statistical analysis, and emphasises the rationale and reason for each decision made. This chapter also presents the types of research paradigms that guided the research design before the remaining decisions can be made. These decisions include the sampling techniques, development of the research instrument, and method to execute the survey. This chapter explains the rationale for performing a pre-test instead of a pilot test. All field works for the survey are presented in this chapter. The obstacles, timeframe, and remedies for improving the response rate are specified. Finally, this chapter discusses the assumptions and data fitness that must be fulfilled for each statistical analysis.

Chapter 4 presents the statistical analyses. It illustrates the process involved in screening the raw data to guarantee that these data are ready for analysis. Descriptive analysis is performed to determine the pattern of the data and the demographic profiles of the respondents. Frequency tables are used to illustrate the results. This chapter also presents the analysis for validating the assumptions, such as the analysis of the missing value, outliers, distribution of data, and common method variances. Moreover, each process, decision, and result is

presented from the major statistical analyses, including the exploratory factor analysis (EFA) and PLS-SEM. The hypotheses are tested, and the results are presented.

Chapter 5 summarises the statistical results presented in Chapter 4. As the final section of the thesis, this chapter provides an overview of the entire investigation. It explains and reviews the empirical findings from both the theoretical and practical perspectives. The initial findings are highlighted, the research questions are addressed, and the research objectives are fulfilled. The theoretical contributions and practical implications of the study are also presented. Finally, this chapter discusses the limitations of the study and provides suggestions for future research.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter discusses the related literature on the organisational and innovation studies to develop the theoretical framework of the current study. In particular, this chapter is organised into nine subsections. Section 2.1 begins with the introduction of the types of and approaches for executing the innovation study. Section 2.2 discusses the concepts of innovation that include the general definition, different dimensions, and innovation orientations. Section 2.3 discusses the criteria that differentiate innovation creation from innovation adoption. This section also specifies the differences between the two orientations, which are considered the predicted variables in the study. Given that this study focuses on the construction industry, Section 2.4 presents the overview of the construction industry and architectural services in Malaysia. Section 2.5 explains the concept of design and the effects of firm size and age on innovation. Section 2.6 reviews the cultural traits and typologies in different disciplines and in construction firms with regard to innovation. Section 2.7 introduces the cultural dimensions used in the study. Six cultural dimensions are proposed to serve as the predictors in this research. Once the predicted and predictors are determined, the theoretical framework and hypotheses are developed in Section 2.8. Finally, Section 2.9 summarises the chapter.

2.1.1 Types of and Approaches for Innovation Research

Innovation research can generally be classified into descriptive and normative studies (Ravichandran, 1999). Normative innovation study addresses the issues of how and in what conditions can organisational innovation be improved. Conversely, descriptive innovation study explains the characteristics based on the researched matters in organisations, such as the relationships among organisational factors for innovation. Aside from these two types, innovation studies may also undertake the following research focuses: 1) innovation

adoption, 2) innovation characteristics, 3) characteristics of innovative organisation, 4) correlations/determinants of innovation, 5) innovation sources, 6) innovation process, 7) and innovation typology (Ravichandran, 1999). Table 2.1 illustrates the nature of innovation research as a whole with different intentions. The current study is descriptive in nature, and it focuses on innovation typology (i.e. creation and adoption) and on the characteristics of innovative organisations (i.e. organisational culture).

Table 2.1: Summary of the foci on innovation research

No.	Focus	Descriptions
1	Innovation adoption	Adoption or diffusion of innovation covers the rate and process of innovation
2	Innovation characteristics	Attributes of innovation and adoption; most of the cases focus on the individual level
3	Characteristic of innovative organisation	Characteristics of the organisation such as culture, climate, and structural factors
4	Correlations/determinants of innovation	Identification of factors that help/inhibit organisation innovation such as firm size, members, and age
5	Innovation sources	Internal and external factors that influence innovation
6	Innovation process	Explanation of the development and evolution of innovation over time, either at the individual or organisation level
7	Innovation typology	Types and dimensions of innovation

Innovation research can be categorised into two approaches, namely, process and variance research (Subramanian and Nilakanta, 1996). The process research approach measures and explains the development of innovation over time (Panuwatwanich, 2008). It defines innovation as a complex process that mainly focuses on the timeline of adopting new ideas (Subramanian and Nilakanta, 1996). Moreover, this approach focuses on the dispersion and dissemination of ideas, products, and processes (Gopalakrishnan and Damanpour, 1994). Conversely, the variance research approach, which is used in the current study, addresses the relationship of innovation with other factors (e.g. structural and external factors) (Subramanian and Nilakanta, 1996). This approach raises the following issues: 1) predicting and examining the organisational factors of innovation, and 2) measuring the effects of innovation on organisational performances (Panuwatwanich, 2008). The current study focuses on the first issue that is, identifying and examining the organisational factors (i.e. organisational culture) that predict innovation. The variance research approach may explain

the relationships among organisational cultures that predict/inhibit innovation creation and innovation adoption at the firm level (Panuwatwanich, 2008). The explained variances between the dependent (i.e. innovation orientations) and the independent variables (i.e. organisational culture) demonstrate the strengths of the relationship among organisational cultures (Subramanian and Nilakanta, 1996). The synthesis approach has become necessary for verifying innovation studies in which inconclusive results were obtained (Gallouj and Savona, 2009). This approach refers to the integration of different methodologies that provide comprehensive explanations on an issue (Whittemore and Knafl, 2005). Instead of depending only on one approach, the current study also adopts the synthesis approach as a secondary method. In innovation research, the synthesis approach requires the similarity across different industries to be analysed (Coombs and Miles, 2000). Therefore, the current study should synthesise and integrate a wider scope of literature that shows similarity and overlaps across different disciplines. The synthesis approach has been reported in several innovation studies in the context of the service and manufacturing industry, such as in the works of Gallouj and Weinstein (1997) and Preissl (2000). A similar approach was also adopted in innovation studies in the context of the construction industry (e.g. Panuwatwanich, 2008; Yusof and Zainul-Abidin, 2011; Kong-Seng *et al.*, 2011). The subsequent subsection discusses the concepts of innovation.

2.2 Concepts of Innovation

Since the early 1980s, scholars have begun to conduct innovations studies. However, the concept of innovation has remained inconclusive up to this day. Innovation is defined in different ways based on various interests and objectives, such as definition, dimension, and type. Therefore, the existing concepts of innovation have become important to discuss in innovation research.

2.2.1 Definitions of Innovation

Innovation carries different connotations and concepts across different disciplines (Damanpour and Wischnevsky, 2006). The initial idea of innovation can be traced back to the early 20th century when Joseph Schumpeter first highlighted its importance (Rogers, 1998). Schumpeter (1934) argued that innovation is a new combination that changes the manner of doing things. Later, Jong and Hartog (2003) specified that this new combination involves creation and implementation. This rationale indicates that innovation refers to disruptive ideas and creation rather than adoption. This new combination, or known simply as 'innovation', occurs in different ways. Thus, Schumpeter introduced five types of innovation: 1) introduction of new products or improvements to the existing product, 2) introduction of new ways of doing things that are new to an industry, 3) production of a novel market, 4) development of new sources of supply for raw materials or other inputs, and 5) making changes to the organisation in the industry (Schumpeter, 1934, p.66; OECD, 1997; 2005). The above discussion clearly shows that innovation can either be a set of ideas/products that are entirely new to the market (radical innovation) or an accumulation of a few changes that improve existing products/processes (incremental innovation) (OECD, 1997; Drejer, 2004).

Innovation has also been interpreted on the basis of its process of dissemination, which is also known as the diffusion of innovation. This interpretation was introduced by Everett M. Rogers in 1962 (G.J. Doyle *et al.*, 2014; Panuwatwanich, 2008). Diffusion is a chain of reactions that occur when innovation begins to disseminate through time and through certain communication media among groups of members (Rogers, 1995). Communication media refer to mass media or interpersonal communication (Ting-Ting, 2004). Therefore, the diffusion of innovation is intensified by the dissemination of new ideas, and the risks are expected by the unit of adoption (Rogers, 2002). From this perspective, innovation pertains to any ideas, products, or processes that are new to the individual but not necessarily to the industry or market (Rogers, 2002; Rogers, 1983, p.11). Therefore, innovation is a process of

disseminating new ideas across the social system. This process takes time, requires negotiation efforts, and is followed by uncertainties. Given that diffusion is a chain of processes, two sets of processes have been introduced for adopting new ideas at the individual and organisational levels. At the individual level, Rogers (2003) introduced five stages: knowledge, persuasion, decision, implementation, and confirmation (Rogers, 2003, p.199). Conversely, the stages of initiation, decision, and implementation constitute the organisational level (Rogers, 1983; 1995). From this point of view, diffusion is more likely to portray the process of adopting new ideas than creating entirely novel ones (Panuwatwanich, 2008). Thus, five different characteristics denoting their position in adopting new ideas were established: innovator, early adopters, early majority, late majority, and laggards (Rogers, 2002; 2003).

Innovation is also defined as any ideas, routines, or objects that are new to the adopting organisation (Zaltman *et al.*, 1973). Zaltman *et al.* (1973) claimed that the concept of innovation could differ among members of an organisation, and that it involves a broader scope (i.e. organisation level) than incorporating only the perspective of an individual. Despite the various connotations of innovation, innovation referring to ideas, processes, or products that are considered new to the individual or to the adopting organisation remains similar across the studies. Moreover, the concept of innovation still remains at the individual and the organisational levels. Thus, Van de Ven (1986) characterised innovation as '*a new idea that may be a recombination of old ideas, a scheme that challenges the present order, a formula, or a unique approach which is perceived as new by the individuals involved*'. From this interpretation, innovation can be perceived as the adoption of a new idea or the improvement of an existing one, and it remains the same process as long as the idea is new to those who are involved. In sum, the perspectives of an individual matter the most in realising innovation rather than those from the wider scope, such as from the organisation, industry, and market.

In brief, innovation pertains to the idea, process, product, technology, and combination new to the involved individual, group of people, adopting organisation, industry, and market. The justifications of innovation depend on a wide range of perceptions, ranging from the perception of an individual to a broader acceptance at the market level. However, the abovementioned definitions indicate that the perception of an individual weighs more than that of the public. With all the existing definitions of innovation, two consensuses were formed: the generation and the adoption of novelty. The term ‘generation of novelty’ echoes the notion of ‘new to market’, which influences the organisation itself and the market/industry. Conversely, the ‘adoption of novelty’ implies the notion of ‘creative imitator’, which internally affects the organisation. This consensus is similar to the argument raised by Ravichandran (1999), Damanpour and Wischnevsky (2006), and Perez-Luno *et al.* (2007). The current study adopts the definition of Damanpour and Wischnevsky (2006), in which innovation refers to the creation and utilisation of new ideas or norms by an organisation and consists of two distinct terminologies, namely, ‘new to the adopting organisation’ and ‘new to the market/industry’. These distinctions in innovation are acknowledged in the literature, but they are perceived as equal or interchangeable in innovation studies, particularly in the context of the construction industry (e.g. Slaughter, 1998; Panuwatwanich *et al.*, 2008; Yusof and Zainul-Abidin, 2011; Cheung *et al.*, 2012; Lloyd-walker *et al.*, 2014). Consequently, after years of debate, innovation remains inconclusive (Manley and Mcfallan, 2006; Damanpour and Wischnevsky, 2006; Tidd, 2001; Damanpour and Gopalakrishnan, 1998; Ravichandran, 1999; Wolfe, 1994). Therefore, the current study argues the distinction between innovation creation and innovation adoption in relation to organisational culture, which promotes them. The succeeding section explores the dimensionality of innovation to understand its concept, which may reveal the tail-to-tail signs of innovation creation and innovation adoption. These orientations of innovation are then discussed.

2.2.2 Dimensions of Innovation

The dimensions of innovation can be traced back to the introduction of its five types by Schumpeter (1934). These types of innovation, which are product, process, market, input, and organisational innovations, are currently integrated into various dimensions (Drejer, 2004). According to Oslo Manual (OECD, 1997; 2005), the innovation described by Schumpeter portrays two different natures of new combination: 1) major disruptive innovation/huge changes (disruptive innovation) and the continuous process of changes/accumulation of changes (incremental innovation).

Daft (1978) developed dual-core theory, which explains innovation from the two dimensions of administrative and technical. The technical core refers to the integration of resources between the input and the output of an organisation (e.g. products and services) (Daft, 1978). The administrative core focuses on the structure, administrative systems, and working culture of firms (Daft, 1978). Therefore, technical innovation is relevant to the main activities of an organisation, including its products, processes, or services that represent the product and process of innovation (Daft, 1978; Damanpour and Evan, 1984; Mishra and Srinivasan, 2005). Product innovation refers to the new generation of products, but it rarely occurs. Process innovation is the continuous development towards improving organisational processes, and it requires a long period of time to achieve (Mishra and Srinivasan, 2005). Administrative innovation pertains to the changes made in the organisational structure and administration system, and they directly affect the organisational system (Daft, 1978; Damanpour and Evan, 1984). The effects on organisational systems may include management expenditures, working culture, and external stakeholders (e.g. implementation of a new system for executing routine works) (OECD, 2005, p.51).

Innovation can also refer to the degree of radical and incremental changes (Damanpour and Gopalakrishnan, 1998; Perks *et al.*, 2005; Lloyd-walker, 2014). In accordance with the concept introduced by Schumpeter, innovation can either be disruptive (radical innovation)

or incremental (incremental innovation) in nature (OECD, 2005). Radical changes may refer to the reconfiguration and redesigning of an element within or among systems (Lloyd-walker, 2014). Radical innovation may also pertain to the departure from fundamental activities that result in obvious changes (Dewar and Dutton, 1986; Ettlie *et al.*, 1984; Perks *et al.*, 2005). The fundamental changes with regard to radical innovation should be new to the adopting organisation and market (Herrmann, 1999; Sandberg, 2007). Incremental innovation represents the familiarity and improvements in strengthening existing products, processes, and services (Tushman and Anderson, 1986; Herrmann, 1999). Therefore, this innovation involves improvements and changes to existing products, processes, and services (Leifer *et al.*, 2000; Perks *et al.*, 2005; Mishra and Srinivasan, 2005). From the synthesised and integrated point of view, radical and incremental innovations may imply the distinct existence of innovation creation and innovation adoption (e.g. Min *et al.*, 2006; Garcia and Calantone, 2002; Urban *et al.*, 1996; Song and Montoya-Weiss, 1998; Wu, 1997; Saint-Paul, 2002, Wu *et al.*, 2009; Gopalakrishnan and Damanpour, 1997; Ravichandran, 1999). This distinct existence is the initial argument of the current study.

A multi-dimensional framework of innovation was proposed by Cooper (1998) by synthesising the literature across different disciplines. Cooper (1998) argued that innovation better serves as a multi-dimensional than a one-dimensional model. The multi-dimensional model of innovation suggested by Cooper comprises six types of innovation: product, process, radical, incremental, administrative, and technological innovation. Figure 2.1 illustrates the multi-dimensional framework of innovation adapted from Cooper (1998, p.500). It is used in the current study to summarise the above discussions.

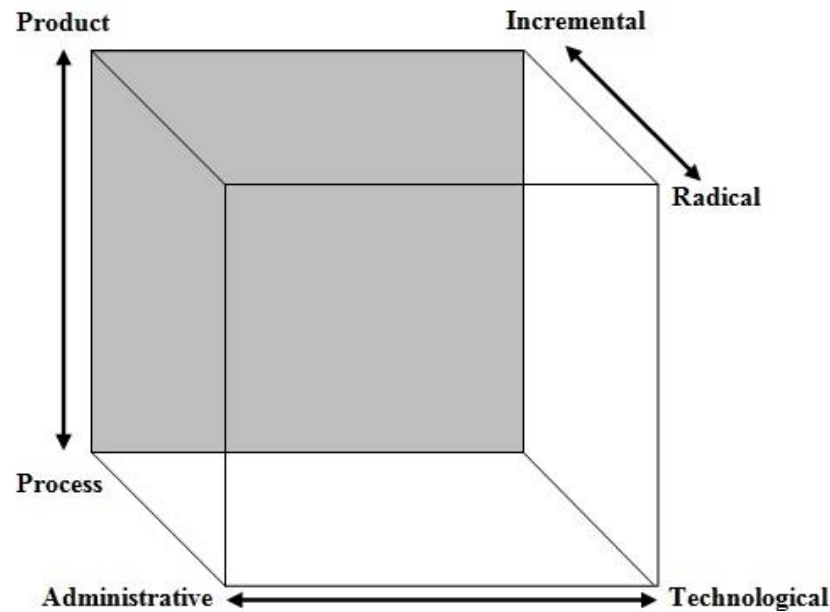


Figure 2.1: Multi-dimensional model of innovation adapted from Cooper (1998, p.500)

2.2.3 Justifications of Creativity and Changes

Besides its extensive conception and multi-dimensional framework, innovation also embodies creativity and change. These variables are addressed by Amabile *et al.* (1996) and Oslo Manual (OECD, 2005). Innovation refers to the implementation of creative ideas at the firm level (Amabile *et al.*, 1996), and it can hardly be realised without creativity (Howard *et al.*, 2008). Therefore, creativity refers to the creation of new and useful ideas within a group of individuals (Woodman *et al.*, 1993, p.23; Amabile *et al.*, 1996). Creativity is a personal characteristic posed by an individual at the individual level, whereas innovation is a characteristic posed by a group of individuals at the organisational level (McLean, 2005). However, the condition of a working environment is the major challenge that may help or inhibit creativity (Amabile and Conti, 1999). Creativity also pertains to the incremental improvement and changes made within an organisation (Borghini, 2005) despite the interaction between creativity and discovery/implementation of new ideas (Anderson *et al.*, 2004). Therefore, innovation refers either to the discovery of new ideas or to the accumulation of improvements associated with the working environment at the individual, group, and organisational levels.

Regardless of its different conceptions, all forms of innovation involve changes, but not all changes are innovation (Barrett and Sexton, 2006). Oslo Manual (OECD, 2005, p.56) proposed a few guidelines in distinguishing changes that should not be considered innovation. These changes include the following: 1) changes that stop/terminate a routine process, method, or strategy; 2) changes that involve replacement, extension, updates, or minor correction to the existing products or services; 3) changes that involve the growth or reduction of costs; 4) changes that induce customisation, unless they portray a clear degree of difference from the existing input and output variables; 5) changes that imply market trends, seasonal, or cyclical changes; and 6) changes that sell or introduce new products/designs that are previously familiar in the market. In sum, the current study integrates and synthesises the relevant literature (e.g. innovation, creativity, and changes) across different disciplines that show similarity without relying only on one source. Innovation is classified into two common orientations because of its extensive concept. These orientations are identified and discussed in the following below section.

2.2.4 Innovation Orientations

Innovation has received considerable attention from the academe, industry, and business fields, but the concept remains inconsistent (Damanpour and Wishnevsky, 2006; Wolfe, 1994; Tidd, 2001). Innovation should be comprehensively understood because of its complexity, and the innovative phenomenon should be precisely described to solve the inconsistencies (Hollenstein, 2003). The argument addresses the question raised by Fagerberg (2005): if 'a' is the first variable that introduces an innovation in a given context, but 'b' introduces the same innovation afterwards in another context, should both of them be recognised as the innovator? Fagerberg responded that both 'the first that introduced' and 'the one that follows' should be recognised as the innovator. This statement relatively conforms to the conceptions of innovation introduced in the early 1980s (e.g. Schumpeter, 1934; Zaltman *et al.*, 1973; Rogers, 1983; Van de Ven, 1986). Although both variables are considered innovators, they have two distinct orientations of innovation. These differences

can be traced through the distinction of ‘really new’ and ‘incrementally new’ (Min *et al.*, 2006; Garcia and Calantone, 2002; Urban *et al.*, 1996; Song and Montoya-Weiss, 1998), primary and secondary innovations (Wu, 1997; Saint-Paul, 2002, Wu *et al.*, 2009), innovation and adoption (Gopalakrishnan and Damanpour, 1997; Ravichandran, 1999), and innovation and imitation (Zhou, 2006; Naranjo-Valencia *et al.*, 2011). Therefore, the subsequent discussion focuses on the distinction between innovation creation and innovation adoption. Damanpour and Wischnevsky (2006) explored the inconsistencies in the definition of innovation across the literature and suggested two orientations of innovation (i.e. innovation generation and innovation adoption). Arundel *et al.* (2007) proposed that the lead innovators, technology modifiers, and technology adopters are the three drivers of innovation. Filippetti (2011) identified five types of innovation that incorporate the role of research and development (R&D) and design. These types of innovation are 1) outward-oriented non-technological innovation, 2) cost-saving innovation, 3) R&D-focus with strong basic collaboration, 4) inner-oriented non-technological innovation, and 5) outward-oriented multifaceted innovation.

On the basis of the arguments of newness, Damanpour and Wischnevsky (2006) suggested that innovation generation introduces new outcomes to the industry, and that innovation adoption assimilates changes that are new to the organisation. The distinction between innovation generation and innovation adoption lies on the perspectives of newness. Moreover, Damanpour and Wischnevsky (2006) developed a four-cell figure to justify the roles of these two orientations of innovation in four different types of organisation (Figure 2.2). If the firm is highly involved in both generating and adopting innovation, it is considered an innovative organisation (cell A). Cell B pertains to an innovation-generating organisation that is highly involved in innovation generation instead of innovation adoption. Cell C involves the reserved condition. Cell D represents a non-innovative organisation that displays low involvement in both innovation generation and innovation adoption. Despite the distinct existence of innovation generation and innovation adoption, Damanpour and