

CONTEXTUALISED ACTION LEARNING FRAMEWORK IN DEVELOPING
ENTREPRENEURIAL SKILLS FOR CIVIL ENGINEERING STUDENTS

CHRISTIE LANJING ANAK ENTIKA

UNIVERSITI TEKNOLOGI MALAYSIA

CONTEXTUALISED ACTION LEARNING FRAMEWORK IN DEVELOPING
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CHRISTIE LANJING ANAK ENTIKA

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ABSTRACT

The changing needs of workforce and technology have demanded future engineering graduates to acquire entrepreneurial attributes to complement their mastery of scientific and technological disciplines. For future civil engineering graduates specifically, the Engineering Accreditation Council (EAC) required future civil engineering graduates to have a sound understanding of the business environment influence towards the process of industrial decision-making in design, manufacturing and application. This requirement emphasizes on the necessity for the future civil engineering graduates to acquire entrepreneurial skills. Therefore, in view of this changing needs as well as the requirement by the Engineering Accreditation Council (EAC), this study was conducted to develop an entrepreneurial skill framework of action learning for civil engineering students. The scope of the study was to identify the prominent entrepreneurial skill set for civil engineering students. The objectives of the study were; to identify the prominent entrepreneurial skill set relevant to civil engineering students, to determine the salient factor that can significantly influence the acquirement of the prominent entrepreneurial skill set and to explore how the salient factor can influence the acquirement of the prominent entrepreneurial skill set. Convergent mixed method design was adopted where both quantitative and qualitative researches were involved in the data collection. The findings from this study demonstrated that the prominent entrepreneurial skill set relevant to civil engineering students was different than the general entrepreneurial skill set reported by previous studies. In addition, the findings also demonstrated that the pattern of entrepreneurial skill acquired by the practicing civil engineers is significantly different compared to the pattern of entrepreneurial skills acquired by civil engineering lecturers and students. The significant difference was due to the salient factor that promoted the acquirement of the entrepreneurial skill set. In the context relevant to civil engineering students, the findings of this study showed that the factor of constraint or limitation was the salient factor that promoted the acquirement of the prominent entrepreneurial skill set. The factor of constraint or limitation demonstrated by the finding of this study is a rich learning source that contributes to entrepreneurial learning which consequently leading to entrepreneurial skills acquirement. Based on these findings, a contextualised framework of action learning in entrepreneurial skill development especially for civil engineering students was proposed. Thus, it is concluded that the development of entrepreneurial skill for targeted group of engineering students required the consideration of specific context. Nonetheless, this study is limited to the context of entrepreneurial skill development for civil engineering students only.

ABSTRAK

Perubahan keperluan tenaga pekerja dan teknologi telah menuntut bakal graduan kejuruteraan untuk memiliki sifat keusahawanan bagi melengkapkan penguasaan sains dan teknologi mereka. Bagi bakal graduan kejuruteraan awam, secara khususnya Majlis Akreditasi Kejuruteraan (EAC) mensyaratkan bakal graduan kejuruteraan awam untuk mempunyai pemahaman yang kukuh tentang pengaruh persekitaran perniagaan ke arah proses membuat keputusan industri dalam reka bentuk, pembuatan dan aplikasi. Syarat ini menekankan pada keperluan bagi bakal graduan kejuruteraan awam untuk memperoleh kemahiran keusahawanan. Oleh itu, memandangkan keperluan perubahan ini serta keperluan oleh Majlis Akreditasi Kejuruteraan (EAC), kajian ini telah dijalankan untuk membangunkan rangka kerja kemahiran keusahawanan bagi pelajar kejuruteraan awam. Skop kajian ini adalah untuk mengenal pasti kemahiran keusahawanan yang penting untuk pelajar kejuruteraan awam. Objektif kajian ini adalah; untuk mengenal pasti set kemahiran keusahawanan yang penting yang berkaitan dengan pelajar kejuruteraan awam, untuk menentukan faktor penting yang boleh mempengaruhi penguasaan ketrampilan keusahawanan yang penting dan untuk meneroka bagaimana faktor penting tersebut dapat mempengaruhi perolehan kemahiran keusahawanan. Reka bentuk kaedah campuran konvergen telah digunakan di mana kedua-dua penyelidikan kuantitatif dan kualitatif terlibat dalam pengumpulan data. Dapatan daripada kajian ini menunjukkan bahawa kemahiran keusahawanan yang penting yang berkaitan dengan pelajar kejuruteraan awam adalah berbeza daripada set kemahiran keusahawanan umum yang dilaporkan oleh kajian terdahulu. Di samping itu, dapatan juga menunjukkan bahawa corak kemahiran keusahawanan yang diperoleh oleh jurutera awam yang terlatih adalah jauh berbeza berbanding dengan corak kemahiran keusahawanan yang diperoleh oleh pensyarah dan pelajar kejuruteraan awam. Perbezaan yang ketara tersebut adalah disebabkan oleh faktor penting yang menggalakkan perolehan kemahiran keusahawanan. Dalam konteks yang berkaitan dengan pelajar kejuruteraan awam, dapatan kajian ini menunjukkan bahawa faktor kekangan atau batasan adalah faktor penting yang menggalakkan perolehan kemahiran keusahawanan. Faktor kekangan atau batasan yang ditunjukkan oleh dapatan kajian ini adalah sumber pembelajaran utama yang menyumbang kepada pembelajaran keusahawanan yang seterusnya akan menghasilkan perolehan kemahiran keusahawanan. Berdasarkan dapatan ini, rangka kerja pembelajaran tindakan dalam kemahiran keusahawanan terutamanya untuk pelajar kejuruteraan awam telah dicadangkan. Oleh itu, disimpulkan bahawa pembangunan kemahiran keusahawanan untuk kumpulan sasaran pelajar kejuruteraan memerlukan pertimbangan konteks yang khusus. Walau bagaimanapun, kajian ini terhad kepada konteks pembangunan kemahiran keusahawanan untuk pelajar kejuruteraan awam sahaja.

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LIST OF ABBREVIATIONS

PLS	-	Partial Least Square
PLS-SEM	-	Partial Least Square-Structural Equation Modeling
PLSc	-	Consistent Partial Least Square
RII	-	Relative Important Index
HTMT	-	Heterotrait-Monotrait
VIF	-	Variation Inflation Factor
SRMR	-	Standardised root mean square
UTM	-	Universiti Teknologi Malaysia

LIST OF SYMBOLS

R^2	-	Coefficient of determination
f^2	-	Effect size

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Entrepreneurial orientation has been positively associated with a firm's profitability and growth. A regression analysis of a survey which involved 55 Malaysian construction enterprises revealed that the influence of corporate entrepreneurship on the growth of the construction enterprises is highly significant (Abd-Hamid, Azizan and Sorooshian, 2015). This finding clearly suggests that embracing entrepreneurial orientation is important for the profitability and growth of a construction enterprise. On a larger scale, embracing entrepreneurial orientation could lead to the profitability and growth of the local construction sector which is one of the major sectors in the Malaysian economy (Khan, Liew and Chazali, 2005). According to Wiklund and Shepherd (2005), entrepreneurial orientation refers to the strategic orientation of a firm which captured specific entrepreneurial aspects of decision-making styles, methods, and practices. Therefore, it can be seen that acquiring entrepreneurial skills is a need for civil engineers to embrace entrepreneurial orientation in the construction industry practices.

In general, the necessity for engineers to acquire entrepreneurial skills in order to meet the economic and workforce needs have been widely recognised (Duval-Couetil, Reed-Rhoads, and Haghghi, 2010). This necessity causes demand for graduates who exhibit entrepreneurial behaviour and attitude to increase where graduates nowadays are being valued based on their ability to manage and apply knowledge in action within an entrepreneurial context (Collin, Hannon and Smith, 2004). In view of such phenomena, future engineering graduates have been encouraged to understand the necessity for entrepreneurship (Najafi and Kaczorowski, 1996). For this reason, competency in entrepreneurship is considered

as one of the skills-set that is important for future engineering graduates (Male, Bush and Chapmen, 2011). As a result, universities are being put under the pressure to produce engineering graduates that are not just merely competent in inventing new product but also engineering graduates that have the knowledge and skills to detect opportunities, understand influential economic factors and promote and commercialise new technologies (Besterfield-Sacre et al., 2011; Duval-Couetil, Reed-Rhoads, and Haghighi, 2010).

Nevertheless, challenges in equipping students generally with entrepreneurial competency which is commonly by means of giving students access to entrepreneurship education (Papayannakis et al., 2008; Arasti, Kiani Falavarjani and Imanipur, 2012; Maritz and Brown, 2013) are frequently highlighted. According to Galloway et al (2005) and Fayolle, Gailly and Lassas-Clerc (2006), one of the challenges in providing students with the access to learning entrepreneurship education is mainly in terms of developing courses and methodologies for teaching. In regard to this, Matlay (2008) has pointed out that such challenges are subjected to conceptual and contextual difficulties which affect the development of the body of knowledge as well as causing limited applicability. The conceptual challenges are mainly due to the diversity of theoretical positions in entrepreneurship where the theoretical position of Turgot and Say, and Cantillon and Schumpeter are believed to have laid the foundations for today's dominant theoretical positions in entrepreneurship (Bruyat and Julien, 2000). This implies that different perceptions or views towards entrepreneurship exist and such differences in perception or view may lead to difficulties in deciding the appropriate content in the body of knowledge of entrepreneurship education. Besides that, in term of contextual difficulties, entrepreneurship has been pointed out to have different meanings and foci at various time and context (Ahmad 2013).

Hence, considering the issues of conceptual and contextual difficulties face by educators when developing the body of knowledge of entrepreneurship education, it is important that these elements should be properly considered in developing entrepreneurial skills for engineering students. In addition, the appropriate method that promotes learning in entrepreneurship also should be considered as well. Thus

far, action learning has been asserted as the most appropriate method believed to be able to promote learning in entrepreneurship (Mueller et al., 2006). This is because action learning has the advantage of blending knowledge and skill in entrepreneurship education which leads to the development of both hard and soft skills (Jones-Evans, Williams and Deacon, 2000). In other words, action learning is an approach that believed to be able to promote entrepreneurial skill development. Taking the importance of the elements of conceptual and contextual as well as appropriate method in promoting entrepreneurial skills development into account, this study seeks to develop a contextualised framework of action learning process in entrepreneurial skill for future engineering graduate.

1.2 Background of Study

1.2.1 The Expectations and Demands from the Industry

In the contemporary engineering practice, the combination of different industry-specific competencies and knowledge through a good mixture of social skills, problem-solving attitudes, project-oriented mindset, and management style has gradually become a ‘must’ (Elia et al. 2011). In such phenomena, entrepreneurial orientation is taken as the foundation for developing further specialisations, based on the emerging needs and opportunities (Elia et al. 2011). The involvement of entrepreneurial orientation in the contemporary engineering practice is often associated with the conjecture that entrepreneurial activity is the impetus for innovation, especially in the rapid technological advances and global competition (Yemeni and Haddad, 2010). The rapid technological advances and global competition have made entrepreneurship to be widely recognised as a vital element in the knowledge-based economy (Cheng et al, 2009).

For that reason, it is not uncommon that engineers are expected to produce revolutionary profitable products from which the company that they are working with can gain profit from (Gross, 2000). This task presented the expectation towards engineers in playing an important role in the commercial success of any company

they will join (Besterfield-Sacre et al. 2011). Besides that, engineers are also required to play the role of the one who manages the techno-economic problems (Papayannakis et al. 2008). To some extent, engineers are required as well to play the role of shaping their environment by means of vast development and entrepreneurial activities that are predicted to generate new demand for his or her product and at the same time creating new clients (Elia et al. 2011). As a consequence, the tasks of a future engineer are becoming more formidable than before and even now, the practicing engineers have already experience the significantly different paradigm at the workplace that has begun since the mid-90s (Newport and Elms, 1997; Cheng et al., 2009).

In view of the expectations and demands toward future engineers, it is evident that there is an urgent need to equip future engineers with a hybrid skill-set in order to be competent to work in the industry of knowledge-based economy that is highly innovation-driven (Besterfield-Sacre et al., 2013). According to Besterfield-Sacre et al. (2011), to create innovations by implementing any technological inventions into the real world, engineers inevitably will have to acquire a skill-set that involve the hybridisation of engineering skills with entrepreneurial competencies. On a broader perspective, Fayolle (2007) pointed out that successful innovations require the synthesis of scientific, engineering, entrepreneurial and managerial skills with the combination of social needs. If a sustainable chain reaction is desired, Fayolle (2007) advanced that a supportive socio-political environment also one of the contributing elements to the successful commercial innovations as illustrated in Figure 1.1.

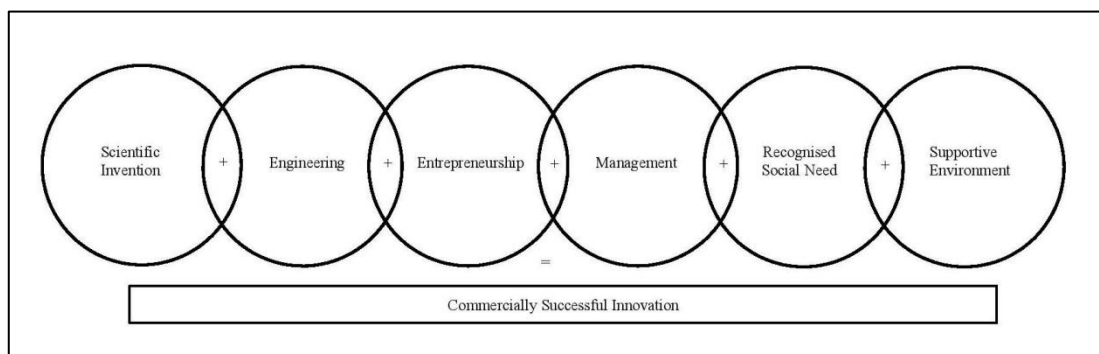


Figure 1.1 The innovation chain equation (Fayolle, 2007)

1.2.2 Shortcomings in Equipping Engineering Students with Entrepreneurial Competency

The changing needs of workforce and technology in the global knowledge economy have dramatically challenged the conventional nature of engineering practice where future engineers are required to be equipped with additional skills in compliment to the mastery of scientific and technological disciplines especially in term of being entrepreneurial (Liebenberg and Mathews 2012). According to Elia et al. (2011), the challenges in the twenty-first century demand a different response from engineers where it is critical for engineers to be alert of the paradigm shift that changes the “simple” search solution into a pro-active identification of market opportunities driven by technology and scientific advancements. In response to the changing needs of workforce and technology, engineering schools have been reported to have mainly offered entrepreneurship programme to engineering student compared to other schools in higher learning institutions (Bell et al. 2004; Duval-Couetil et al. 2015).

Nevertheless, despite such effort made by engineering schools in the higher learning institutions, there are a few issues that have been highlighted by several studies. According to Gross (2000), the conventional academic training given to engineering students has been found of not equipping engineering students directly with entrepreneurial skills competency. Moreover, it was also being reported that even though, there were courses or curricula offered focus on innovation and entrepreneurship, it is frequently limited within the scope of starting a new business and of limited percentage within the student body (Kriewall and Mekemson 2010). Besides that, it is also being reported that many engineering faculty have been found to have no experience with or interest to deliver entrepreneurial concepts or activities to students (Duval-Couetil et al. 2015). In fact, to date, there is still no formal research has been conducted on the body of knowledge for technological-based entrepreneurship despite the widespread need for entrepreneurship within the engineering curricula (Besterfield-sacre et al. 2013).

In addition to that, Schultz et al. (2002) also pointed out that, even though engineering and business are two inseparable entities in the corporate culture, it is always the case that it occurs in the opposite on the university ground. This is clearly implying that the environment in the university did not stimulate the actual situations that future engineers will face in their future workplace especially with regard to the close relationship between business and engineering. Besides that, it is very often, the main concern of the engineering educators has always been directed towards the development of the technical skills-set among engineering students (Blumenthal and Grothus 2008). Furthermore, the rigidity and the dysfunctional nature of higher learning culture also has caused necessary changes hardly can happen (Czuchry, Yasin, and Gonzales 2004). In fact, it has been claimed that higher learning institutions are slow in providing the skills required by technology-based business start-ups and skills required by the internal research and development (R&D) of existing technology companies (Czuchry, Yasin, and Gonzales 2004). These shortcomings cannot be denied to be capable of causing a gap between the industry's expectation and the skills acquirement of engineering graduates to occur.

1.2.3 Action Learning As the Best Method for Entrepreneurship Education

According to Jones-Evans, Williams, and Deacon (2000), action learning is a method of developing intellectual, emotional or physical which require involvement in real, complex and stressful problem in order to achieve desired changes of the students especially in terms of improving observable behaviour according to the selected problem field. It is a non-traditional method for delivering entrepreneurship education where the students played the primary role as participants and the teachers function as coaches or facilitator of learning (Maritz and Brown 2013). The usage of action learning is for the purpose of replicating the 'real world' into the entrepreneurship programme (Jones-Evans, Williams, and Deacon, 2000) wherein this sense entrepreneurship is view as a process, not an event (Maritz and Brown 2013). The application of action learning in entrepreneurship education is due to the finding that entrepreneurial practice is learned experientially which is highlighted in the literature review of this study. Taatila (2010) pointed out that in order to

encourage experiential learning in entrepreneurship education, learning by doing which is emphasised by action learning is a method that is deemed to have great potential to support experiential learning. This is due to the claim that principles only become meaningful when they are put into practice (Leitch and Harrison 1999). Adding to that, it is also being claimed that the process that embodied the action-oriented learning is a process that provides the best avenue in mixing skills and behaviour which is similar to the nature of entrepreneurial skills (Jones and English 2004). Furthermore, the said process also deemed as able to promote learning through new insights that are acquired through an individual's involvement in a process. The process takes place when the individual involved make reflections on their attitudes and actions, as well as on their work and beliefs when solving real organisational problems in real-time that can be in an environment that is either supportive or confrontational (Anderson and Thorpe, 2004; Cho and Egan, 2009). Besides that, action learning method teaching style also believed by experts will encourage problem-solving, project-based learning and creativity which imply added advantage to the application of action learning (Wade and Hammick 1999; Jones and English, 2004).

1.3 Problem Statement

The Malaysian Ministry of Education is aiming to transform the higher learning institution by making shifts in the higher education system that begins with the shift to produce holistic, entrepreneurial and balanced graduates (Ministry of Education, 2015). For that reason, the Malaysian Qualification Agency (MQA) expected that all engineering-based programme as mentioned in the Malaysian Qualification Framework (MQF) to develop the future engineering graduates' entrepreneurial skills where entrepreneurial competency is expected to be demonstrated in selected projects (Malaysian Qualification Agency, 2017). In order to achieve this goal, enhancing experiential learning has been recommended by the Malaysian Ministry of Education as outlined in the Malaysian Education Blue Print for Higher Education (Ministry of Education, 2015). Enhancing experiential learning for entrepreneurial skill development is important because entrepreneurial skills are

found to be experientially acquired (Ismail and Ahmad, 2013). Entrepreneurial skill which is commonly defined as the proficiency to perform profitable functioning (Kaur and Bains, 2013; Mohamad, Hussin and Buang, 2014) is often cultivated among students through giving access to entrepreneurship education (Maritz and Brown, 2013) as a way to provide entrepreneurial education to students.

Nevertheless, as opposed to the recommendation to use experiential learning in entrepreneurship education in order to make entrepreneurship education effective (Rahim et. al, 2015), the Malaysian entrepreneurship education has been found still using the traditional method of teaching which normally uses lectures, handouts, materials and video presentations (Rengiah, 2013). This approach in entrepreneurship education has been perceived by students has failed to match the entrepreneurial skills acquirement in entrepreneurship education with the actual entrepreneurial skills related to their field of study (Cheng et. al, 2009). For civil engineering students in particular, it has been reported that the projects given to them in entrepreneurship education did not guide them to understand entrepreneurship in civil engineering practice (Entika et. al, 2016) although it has been reported that fifty-three percent of Malaysian higher learning institutions have successfully incorporated more than fifteen percent practical elements when teaching entrepreneurship to higher learning students (Rahim et al., 2015). This contradiction is pointing out that the practical elements in teaching entrepreneurship for civil engineering students may not match the practical elements needed for entrepreneurship related to their field of study and hence leading to the failure to match the entrepreneurial skills acquirement in entrepreneurship education with the entrepreneurial skills that are relevant for civil engineering students. The Malaysian Engineering Accreditation Council (2017) has addressed that civil engineering graduates need to have a sound understanding of the influence of business environment towards the process of industrial decision-making in design, manufacturing, and use which expounds the necessity to match the entrepreneurial skills acquirement in entrepreneurship education with the entrepreneurial skills that are relevant for civil engineering students. According to the Malaysian Qualification Agency (2017), entrepreneurial skills need relevant knowledge, skills, and expertise in the key areas of an enterprise.

In retrospect of the occurring problem in the existing entrepreneurship education, it can be seen that a shift in pedagogy for entrepreneurship education is obviously needed (Ahmad, 2013). For this reason, a study has been conducted to develop a framework that support learning that is important for entrepreneurial skill development by taking into account the entrepreneurial skillset that is relevant for civil engineering students, the salient factor that potentially can promote the development of such entrepreneurial skillset and how the salient factor can potentially promote the development of such entrepreneurial skillset. The framework that has been developed proposes a contextualised process for civil engineering students to experience learning that is important for entrepreneurial skillset development which at the moment absent from the entrepreneurship education offered to civil engineering students. The scope of this study covers only the investigation and exploration of entrepreneurial skills set acquirement in the context of the Malaysian construction industry that is relevant to civil engineering students.

1.4 Aim and Objectives of the Study

The aim of this research is to develop a contextualised framework of action learning process for the entrepreneurial skills development of the future civil engineering graduates with the following objectives:

1. To identify the prominent entrepreneurial skillset relevant to civil engineering students.
2. To determine the salient factor that can significantly influence the acquirement of the prominent entrepreneurial skillset relevant to civil engineering students.
3. To explore how the salient factor can significantly influence the acquirement of the prominent entrepreneurial skillset relevant to civil engineering students.

1.5 Research Questions

In order to achieve the objectives of this research, answers to the following questions will be investigated;

1. What is the prominent entrepreneurial skillset relevant to civil engineering students?
2. What is the salient factor that can significantly influences the acquirement of the prominent entrepreneurial skillset relevant to civil engineering students?
3. How does the salient factor can significantly influence the acquirement of the prominent entrepreneurial skillset relevant to civil engineering students?

1.6 Theoretical Framework

This section explains the relevant theories that form the theoretical background of this study. The theoretical background of the study forms the foundation of the theoretical framework which is illustrated in Figure 1.2. The theoretical background took into account the entrepreneurship and learning theories relevant to entrepreneurial skill development for civil engineering students.

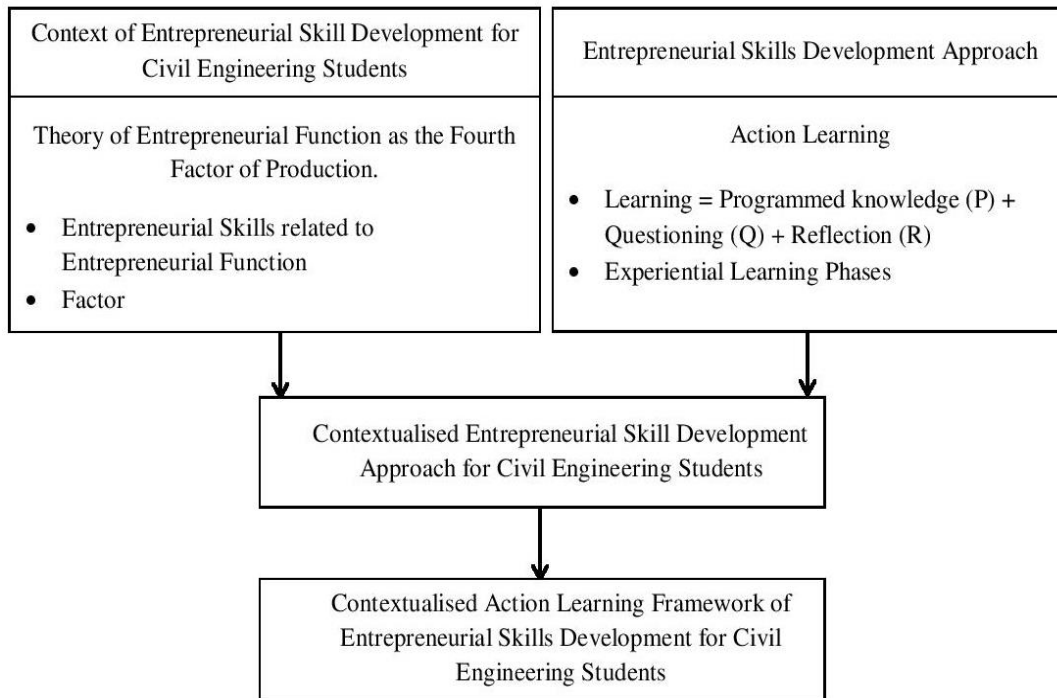


Figure 1.2 The theoretical framework of the study

Entrepreneurship Theory. In civil engineering practice, the challenges that await the future civil engineering graduates relate closely with their ability to contribute to the successful completion of a construction project. According to Chan and Chan (2004), a successful construction project is measured based on eight criteria as shown in Figure 1.3. The criteria listed in the framework for measuring the success of construction projects advanced by Chan and Chan (2004) are clearly indicating the need for a robust means of construction project delivery. For that reason, in practice, civil engineers have been reported to work more in the management aspect of the construction project where the role of a civil engineer is inclusive of managing construction projects and business contract and working with both public and private sectors (Grigg, et. al, 2001). This role clearly dictates the main task that the civil engineer needs to perform, which is to perform the task of a manager. In view of this, it is important for civil engineering students to understand his or her future role in the production system of a construction project. The production system in a construction project illustrated by Grigg, et. al (2001) is as shown in Figure 1.4.

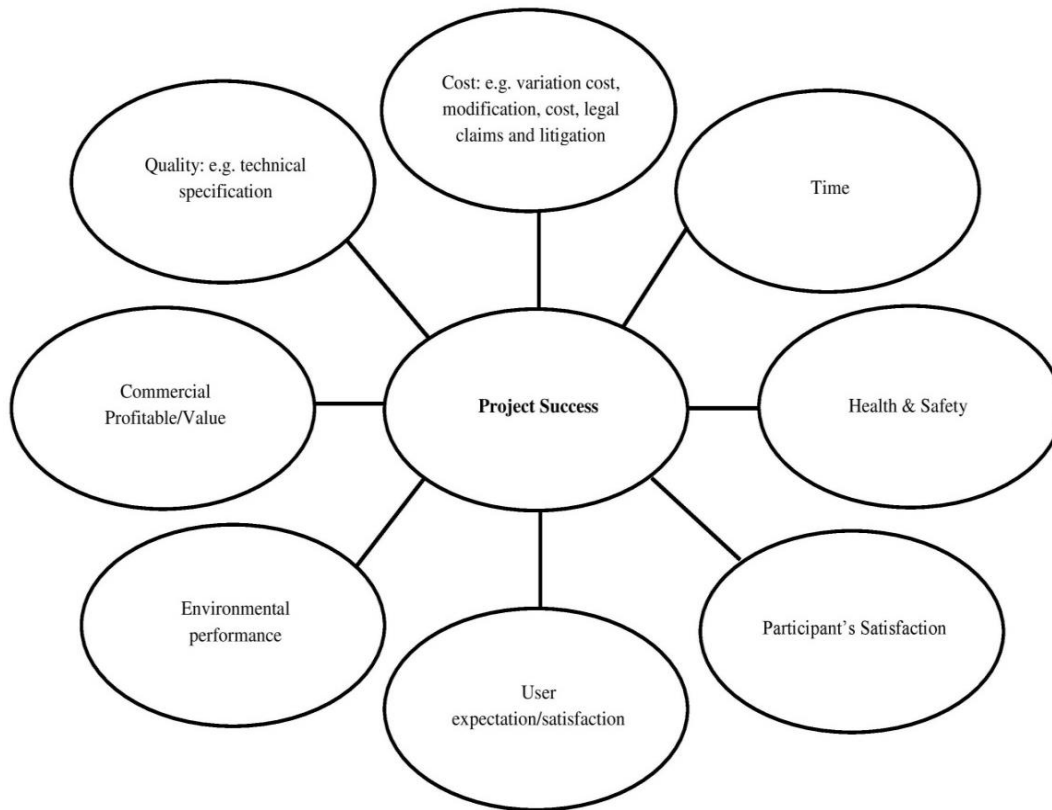


Figure 1.3 The framework for measuring success of construction projects (Chan and Chan, 2004)

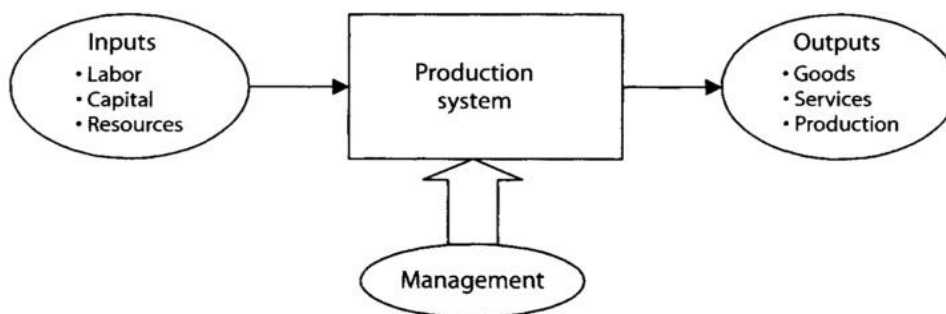


Figure 1.4 The production system of a construction projects (Grigg, et. al, 2001)

Considering the future role of the civil engineering students in the production system of a construction project, it can be noticed that the theory of entrepreneurial function as the fourth factor of production is the entrepreneurship theory that is relevant to the focus of this study. This is because the theory of entrepreneurial

function as the fourth factor of production advanced that the tasks perform by entrepreneurs are equivalent to the tasks perform by a manager (Veciana, 2007), which is also the same future task to be played by civil engineering students in the production system of a construction project. According to Veciana (2007), the theory of entrepreneurial function as the fourth factor of production advanced that the function of an entrepreneur is to organise the production of good or services where land, capital, and labour together with entrepreneurial function are the important factors for the production of good or services. In other words, the future functions that civil engineering students have to play in the production system of a construction project are similar to the entrepreneurial function of a Marshallian entrepreneur which is the organiser of the production of good or services (Karayiannis, 2009). The detail of the Marshallian entrepreneur is discussed in chapter 2 of this study.

Although the production system illustrated by Grigg, et. al (2001) as shown in Figure 1.4 does not specifically state the list of resources required in a construction project but it cannot be denied that land is one of the most important resources for a construction project especially in term of acquiring good location in order to avoid poor site location that has negative impact toward the progress of the construction (Alaghbari et. al., 2007). This clearly revealed that there are similar elements that can be found in both of the production systems of a construction project and the production system of the theory of entrepreneurial functions as the fourth factor of production even though the later was founded by means of economic approach. The similarities are particularly in term of function and factors. In view of these similarities, the element of function and factor in both of the theory of entrepreneurial function as the fourth factor of production and the production system of a construction project are highlighted in Figure 1.5.

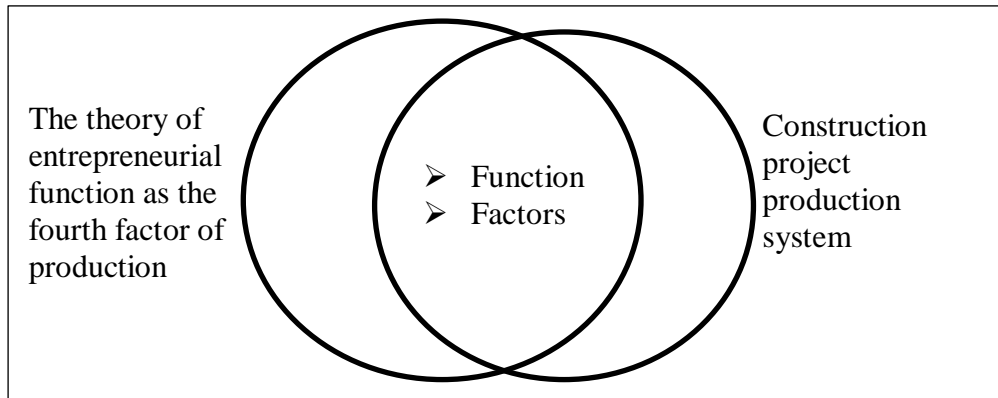


Figure 1.5 The common elements

Therefore, based on the highlighted similarities, the focus of this study has been directed towards identifying entrepreneurial skills associated with the future function that civil engineering students will play in their future practice and exploring the contextual factors that are important for the consideration of civil engineering students in their future practice. These common elements also inform the research objectives and questions of this study.

Action Learning Theory. As discussed in section 1.2.3, action learning has great potential in supporting the occurrence of experiential learning which is important for entrepreneurial skill development. According to Marquardt and Waddil (2004), the action learning approach consists of six components; (1) a problem or challenge of importance to the group; (2) a group of 4–8 members, preferably of diverse backgrounds; (3) a process that concentrates on questions and reflection; (4) the capacity to take action on strategies developed; (5) commitment to learning at the individual level and commitment to the team; and (6) action learning coach who make certain that time and energy of all of the group members are devoted to capturing the learning and improving the skill level of the group. The action learning approach employs the learning formula of $L = P + Q + R$ where P is the element of programmed knowledge or knowledge currently available in book, in one's thinking, in an organization memory, lectures or even in case studies, Q is the elements of questioning where fresh insights are expected to be acquired into what is yet to be known and R is the element of reflection where the activities of recalling, thinking about, pulling apart, making sense and trying to understand will take place (Marquardt and Waddil, 2004). According to Cusins (1996), the process of reflection

will turn any events or experience into a learning experience that takes place in several phases. These phases of experiential learning as illustrated in Figure 1.6, form the natural sequence for structure and flow of action learning (Cusins, 1996). Without the occurrence of the experiential learning process in the action learning approach, many exciting and interesting activities will only remain a mere event without any effect (Cusins, 1996). Hence, the experiential learning process is a very important component of the action learning approach.

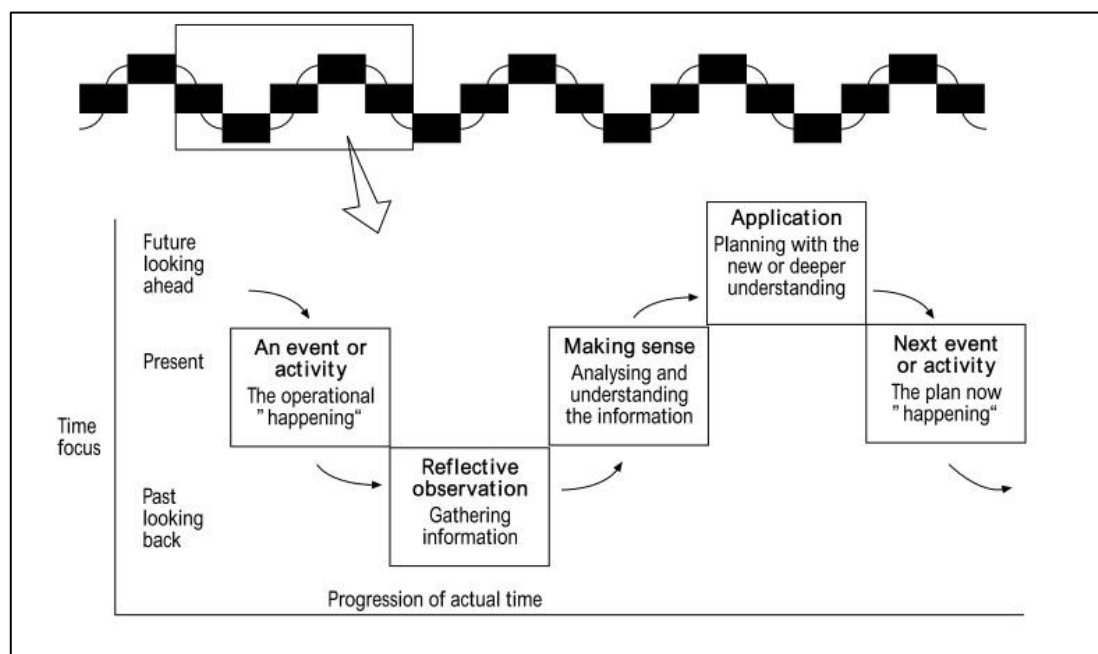


Figure 1.6 The experiential learning phases (Cusins, 1996)

In this study, the framework of action learning process will be based on the experiential learning phases proposed by Cusins (1996) where action learning set which is the basic unit in action learning process will follow the action learning set proposed by Johnson (1998). Johnson (1998) proposed that the action learning set consists of 4 to 6 fellow learners and a facilitator. Besides that, the element of responses to action learners is also included which is based on the action learning conceptual framework proposed Cho and Egan (2009). Nevertheless, in the process of adopting this approach to action learning, it is noteworthy to pay attention to the criticism saying that action learning is antithetical to theory and at the same time to take note of the justification that such method did not separate theory from practice (Leitch and Harrison 1999). This is because, such opposing opinions is somehow

addressing the need to strike a balance between knowledge and action in the process of using action learning approach as a method of teaching (Jones-Evans, Williams and Deacon, 2000). Hence, if action learning is to be adopted as the method to be used as a mean to develop entrepreneurial skills among students, careful thought of striking a balance between knowledge and action should be kept as a reminder. To date, action learning has been reported to have been effectively implemented worldwide in organisations such as Boeing, Constellation Energy, Fairfax Public Schools, Samsung, the United States (US) Department of Agriculture, Mauritius Business School, and Sodexo (Marquardt and Waddil, 2004).

1.7 Significance of Study

This study is important due to the contributions that it can make to the body of knowledge. Firstly this study will particularly contribute to the body of knowledge in the field of engineering education as these findings will show how entrepreneurial skills which are one of the entrepreneurial attributes, being put into practice in the specific context of engineering practice. By having these findings, it is anticipated that the understanding of the characteristics of entrepreneurial practice in the engineering field can be developed. This understanding is important especially to the effort of developing entrepreneurial attributes among future engineering graduates that are expected to meet the economic and workforce need as highlighted in the introduction section of this chapter. Besides that, the finding of this study also will contribute to the effort that has been carried out by researchers in the field of entrepreneurship study. This finding which is with regard to specific context is important as there has been insufficient attention given to studies that explore what entrepreneurs do and how they function (Chell, 2013).

Secondly, as the findings of this study will present a contextualised prominent entrepreneurial skillset relevant for civil engineering students, hence, these findings will provide a specific and clear description of the dimension of entrepreneurial skills set relevant for civil engineering students. This includes the underpinning theory of the dimension of entrepreneurial skills within the context of

interest which is anticipated by the researcher will cater to the issues of the insufficient description of the dimension of entrepreneurial skill as reported by Mohamad, Hussin and Buang (2014). By having a specific and clear description which includes the theory that underpinned the dimension of entrepreneurial skills within the context of interest, a tangible strategy on entrepreneurial skills development can be drawn out. Furthermore, as the findings of this study also provide information on the contextual factors in the specific context of interest, the issues of contextual and conceptual difficulties as reported in the introduction section of this chapter also can be catered to especially in regard to drawing out a strategy that is relevant to the engineering student context.

Besides that, the framework of action learning in this study has the potential to bridge formal entrepreneurship education in engineering school to vocational training which has been addressed as necessary for skill development. According to Chell (2013), skill development requires the consideration of non-formal and extracurricular studies in order to bridge formal education to vocational training. By having the platform for vocational training, important experience can be acquired by engineering students and through such platform, experiential learning that leads to entrepreneurial skills development can be promoted. The occurrence of experiential learning is important as learning that occurs in the entrepreneurial setting was found much to be experiential in nature (Elia et al, 2011).

In retrospect of the presented significance of the study, the researcher anticipated that the application of the proposed contextualised framework of action learning will be able to gradually encourage engineering students to acquire entrepreneurial skills. As this effort continues the researcher believes that a successful and sustainable entrepreneurial ecosystems in the campus can be developed in the future as what has been institutionalised by world-leading institutions such as Massachusetts Institute of Technology (MIT), Stanford University and University of Pennsylvania, Tempere Institute of Technology, Fraunhofer Institute and several Universities in the United Kingdom (Elia et al. 2011).

1.8 Scope of Study

This study was conducted to develop the contextualised framework of action learning process for entrepreneurial skill development for civil engineering students. This study seeks to look into the entrepreneurial skillset which is relevant to civil engineering students, the salient factor that has influence towards the acquirement of the said entrepreneurial skillset and how the salient factor influence towards the acquirement of the said entrepreneurial skillset. These aspects which are important for the development of the said framework were observed and identified from practicing civil engineers who were the alumni of the school of civil engineering, University of Technology Malaysia (UTM). In addition, the pattern of the entrepreneurial skillset acquirement of civil engineering students and lecturers from the school of civil engineering, University of Technology Malaysia (UTM) were also have been looked into in order to observe similarities and differences of the pattern of the entrepreneurial skillset acquirement. Thus, this study covers entrepreneurial skill development which is contextualised to a context relevant to civil engineering students. This study does not cover other context which may have effects on the development of entrepreneurial skillset.

1.9 Limitation

This study is restrained due to the conditions as stated below:

1. The context of this study is particularly based on the context of the civil engineering field where all of the respondents were those who are from the civil engineering background. Hence the information in this research may not be applicable to other context and it is very much advisable to stay in a specific context of application (Elia et al. 2011). This is because skills for entrepreneurship are likely to be specific to those activities and anticipated to produce particular outcome Chell (2013).

2. The entrepreneurship perspective of this study is specifically based on the perspective of the theory of entrepreneurial function as the fourth factor of production as discussed in Section 1.6. Thus, the perspective of entrepreneurship in this study can be found different than other studies that took different the perspective of entrepreneurship. It is important to take note of the entrepreneurship perspective used in this study in order is to avoid the possibility of conceptual and contextual confusion as there are diverse perspectives exist in entrepreneurship due to the existence of various schools of thought in the theory of entrepreneurship.

3. The limited availability of participants for the main data analysis has led to the need to use the partial least square structural equation modeling (PLS-SEM) analysis, which produces predictive outcome instead of the generalised outcome. Hence, the main finding of this study cannot be generalised except for finding from the second and third group of participants.

1.10 General Idea of the Study

In order to conduct this study, the researcher adopted the convergent parallel mixed method design where both quantitative and qualitative data were collected and analysed. The detail of the convergent parallel mixed method design used in this study is reported in Chapter 3. In this section Figure 1.7 presented the general idea of the study.

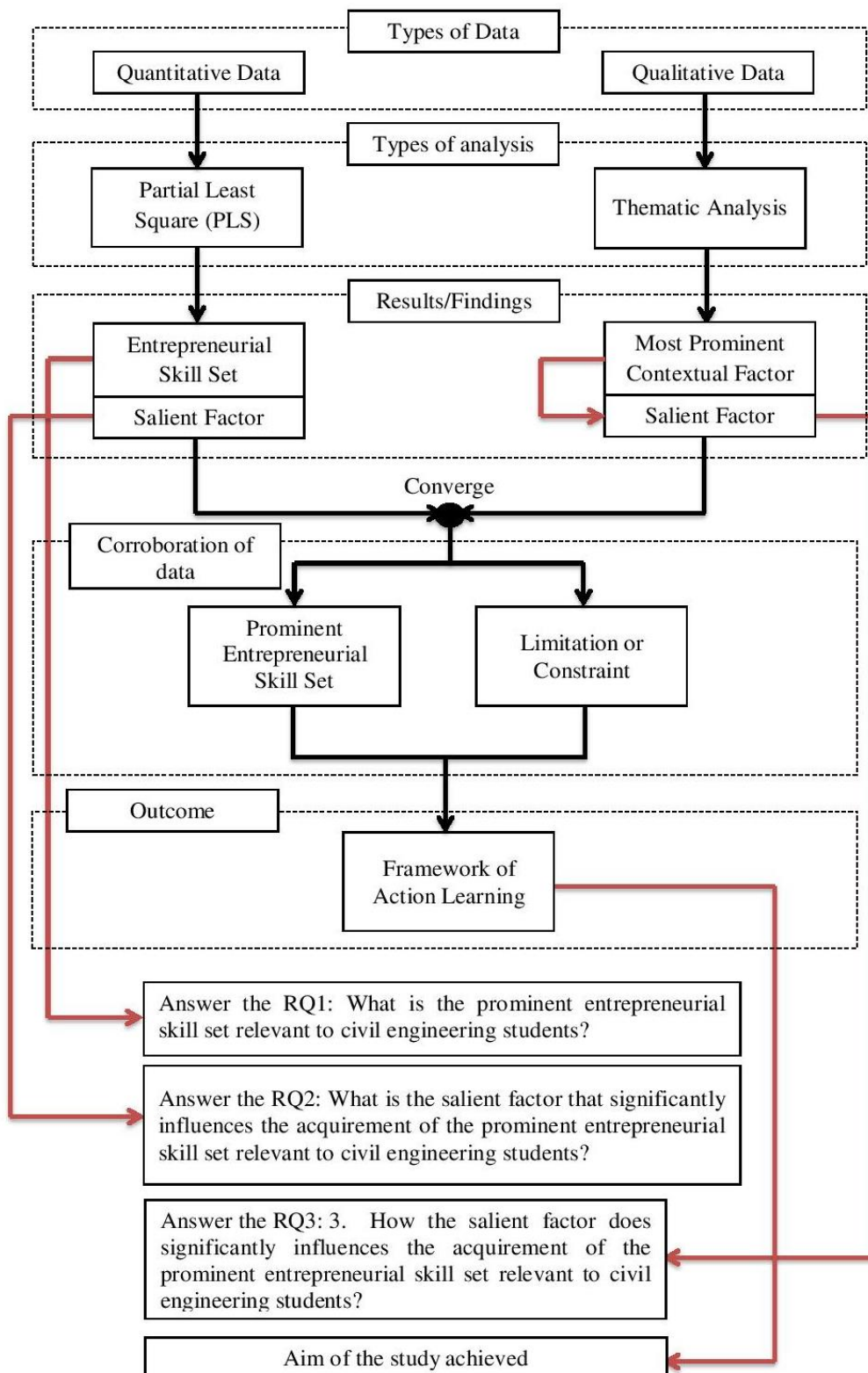


Figure 1.7 General idea of the study

1.11 Definition of Terms

Entrepreneur: Refers to Marshallian entrepreneur whose functions are to organise or coordinate production activity using the least cost method in order to achieve possible higher profit and to arrange the agent of production to achieve the highest profit in every usage (Karayiannis, 2009).

Entrepreneurship: Refers to organisational function that acts as the centre of the great industrial wheel (Karayiannis, 2009)

Entrepreneurial Behaviour: Refers to individual behaviour and not firm behaviour (Bird and Schjoedt, 2009).

Behaviour: Refers to actions which also imply activities of the individuals (Bird and Schjoedt, 2009).

Performance: Refers to results achieved by action and frequently it is an aggregation of many behaviours (Bird and Schjoedt, 2009).

Ability: Refers to maximum performance which possibly includes various forms of intelligence and physical attributes such as strength or height (Bird and Schjoedt, 2009).

Skills: Refers to proficiency in performance or ability to perform specific tasks which can be either narrowly or broadly construed and possibly can be enhanced via practice and training (Chell 2013: Bird and Schjoedt, 2009).

Action Learning: Refers to a method that encourages the learning process that will support skills development, through given problems or challenge, that will require the persons involved, to take action and to make reflection on one's work or action in order to gain new insights and to solve problem or the challenge given (Jones-Evans, Williams, and Deacon, 2000; Cho and Egan, 2009; Anderson and Thorpe, 2004).

Entrepreneurial Skills: Refers to certain strategic skills for profitable functioning (Kaur and Bains, 2013; Mohamad, Hussin, and Buang, 2014).

Entrepreneurial Skill Set: Refers to a set of strategic skills for profitable functioning (based on the definition of entrepreneurial skills) generated from this study.

1.12 Summary

This chapter discusses the importance and necessity of acquiring entrepreneurial skills in the engineering practice and also presented the expectations and demands from the industry towards future engineering graduates. Besides that, the shortcomings in equipping engineering students with entrepreneurial competency and the postulation that action learning has been deemed as the best method for entrepreneurship education were also highlighted in this chapter. This chapter also includes the problem statement of this study which was formulated on the basis of the findings from various studies, postulation advanced by experts and also by taking into account issues reported in the earlier sections of this chapter. In this regard, the aim of the study and the three research objectives and research questions have been drawn out. Adding to that, this chapter also presented the theoretical framework which explains the entrepreneurship school thought and the action learning theory that underpinned the theoretical framework of this study. The significance of the study, as well as the scope and limitation of this study, were also included in this chapter.

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