MODERATING EFFECTS OF SOCIAL ENVIRONMENT ON THE RELATIONSHIP BETWEEN INDIVIDUAL COMPONENTS OF CREATIVITY AND CREATIVITY

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To my beloved parents and brother, Fatemeh, Saeed and Hamid whom my entire success is due to their love and support, I love you.

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ABSTRACT

Literature has indicated that while creativity is accepted as a salient factor of the success of organizations, it has not being given sufficient attention and it is often treated as a neglected concept. Since previous studies had identified individual components of creativity as an essential determinant of creativity, this research aims at investigating the direct, positive relationship of individual components of creativity (Domain-relevant skills, creativity-relevant processes and intrinsic task motivation), each of its component and creativity. In addition, as the significance of social environment in previous literature has been stated as an outside component, the moderating effect of social environment (Freedom, challenging work, managerial encouragement, work group support, organizational encouragement, sufficient resources, realistic workload pressure and lack of organizational impediments) on the relationship between individual components of creativity and creativity has been investigated as another objective of the research. A sample of 289 engineering students from Malaysian public universities participated in this study. The hypotheses have been evaluated using the Partial Least Squares (PLS) analysis, also known as the Structural Equation Modeling (SEM) technique. The findings reveal that 49.8 percent of the variance of creativity (R^2) is explained by individual components of creativity and social environment. They also indicate that there is a positive and significant relationship between individual components of creativity (As a whole and one of its constructs) and creativity. Furthermore, the results support three of the predicted moderating effects and the relationship between two components of individual components of creativity and creativity is positively moderated by social environment. This research has both theoretical and practical contributions to the field of creativity by elaborating the direct and moderating effects of social environment on individual components of creativity and creativity.

ABSTRAK

Kajian lepas telah menunjukkan bahawa walaupun kreativiti diterima sebagai faktor penting dalam kejayaan organisasi, ia tidak diberikan perhatian secukupnya dan sering dianggap sebagai satu konsep yang diabaikan. Oleh kerana kajian sebelum ini telah mengenal pasti komponen kreativiti individu sebagai penentu penting bagi kreativiti, kajian ini cuba menentukan hubungan langsung komponen kreativiti individu (domain kemahiran yang relevan, proses kreativiti yang berkaitan dan motivasi intrinsik tugas) dan kreativiti. Di samping itu, memandangkan kepentingan persekitaran sosial dalam kajian lepas dinyatakan sebagai komponen luar, kesan penyederhana persekitaran sosial (kebebasan, kerja yang mencabar, galakan pengurusan, sokongan kumpulan kerja, galakan organisasi, sumber yang mencukupi, tekanan beban kerja yang realistik dan kekurangan halangan organisasi) ke atas hubungan antara komponen kreativiti individu dan kreativiti telah dikaji. Sampel kajian terdiri daripada 289 pelajar kejuruteraan dari universiti awam di Malaysia. Hipotesis telah dinilai menggunakan analisis *Partial-Least Square*, juga dikenali sebagai teknik pemodelan persamaan berstruktur (SEM). Hasil penyelidikan ini mendedahkan bahawa 49.8 peratus daripada varians kreativiti dijelaskan oleh komponen individu kreativiti dan persekitaran sosial. Dapatan kajian juga menunjukkan bahawa terdapat hubungan yang positif dan signifikan antara komponen individu kreativiti (secara keseluruhan dan salah satu konstruk) dan kreativiti. Di samping itu, hasil kajian juga menyokong tiga kesan penyederhana sepertimana jangkaan dan menunjukkan bahawa hubungan antara dua komponen daripada komponen kreativiti individu dan kreativiti disederhana secara positif oleh persekitaran sosial. Kajian ini menyumbang secara praktikal dan teoretikal kepada bidang kreativiti dengan menjelas lanjut kesan langsung dan penyederhana persekitaran sosial ke atas komponen kreativiti individu dan kreativiti.

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LIST OF ABBREVIATION

ABET	-	Accreditation Board for Engineering and Technology
ASV	-	Average Shared Square Variance
AVE	-	Average Variance Extracted
CCL	-	Center for Creative Leadership
CR	-	Composite Reliability
CRP	-	Creativity-Relevant Processes
DRS	-	Domain-Relevant Skills
HEI	-	Higher Education Institutions
ICC	-	Individual Components of Creativity
ITM	-	Intrinsic Task Motivation
KAI	-	Kirton Adaptation Innovation Inventory
MoHE	-	Ministry of Higher Education
MSV	-	Maximum Shared Squared Variance
MV	-	Multi Variant
PLS	-	Partial Least Square
RQs	-	Research Questions
SE	-	Social Environment
SEM	-	Structural Equation Modeling
SPSS	-	Statistical Package for Social Sciences
VIF	-	Variance Inflation Factor
WPI	-	Work Preference Inventory

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CHAPTER 1

INTRODUCTION

1.1 Introduction

In today's competitive business world, creativity can be named as one of the key success factors within any given organization. In chapter one, the research will take a look at the background of the study via providing an overview of creativity, individual components of creativity, outside the individual component of creativity and important factors which embed them. Furthermore, statement of the problem, research gaps, objectives, questions, purpose of the current research, research's significance and contributions, scope, operational definitions and thesis outline that are used in the current study will be discussed in this chapter.

1.2 Background of the Study

In today's fast pacing world that is highly competitive, being creative in a system or an organization can be counted as a vital criterion to make a difference. Creativity can be considered as the key to business success when a business can employ, evaluate and manage it in a proper way (Ball, 2010). Creativity is regarded as highly essential in the current society since via creativity, a line of difference can be drawn. There are various definitions on the realm of creativity. Some explanations of creativity focus on thought processes nature and intellectual activity which are used to produce new insights to problems. Other definitions concentrate on the personality traits and intellectual abilities of each individual. Additionally, some researches discuss product from the angle of

different qualities and outcomes of creative attempts (Arad *et al.*, 1997). Pryce (2005) believed that creativity can be regarded as production of new ideas which can fit the purposes of a particular business. Creativity is covering a wide spectrum of all realms. Creativity as the production of novel, appropriate ideas can be in lots of human activity areas from science, education, art and business to day to day life (Amabile, 1997). Definitions of creativity can be varied from a process in which an individual gets sensitive toward a problem to knowledge insufficiencies, gaps, existing disharmonies and so on and so forth (Torrance, 1966). These definitions can also include problem identification, solution searching, coming up with new guesses, composing hypothesis and at last, reporting the results (Kim, 2006). Creativity in the business world is playing an essential role but somehow, it has been neglected by the corporate world. Many enterprises neglect the concept of developing creative mindsets among various individuals (Amabile and Khaire, 2008). Since the growth is a prominent element in companies, getting accustomed to predictable issues can leave a company to wonder and to wander (Pink, 2005). Creativity can also be considered as a major component to initiate and to sustain emergent methods and organizational network in which creativity is considered in planning and exercising stages (Florida 2002). Therefore, creativity, from both within the individual and outside the individual need, to be further investigated.

Various researches like Hoegl and Parboteeah (2007), Jeffries (2007) and Wilpert (2008) stated that one creativity model that has been frequently used is the componential model of creativity by Amabile (1996). Two main concepts were discussed in componential theory regarding creativity. In this theory, creativity will be influenced with three components that are within the individual including domain-relevant skills, creativity-relevant processes and intrinsic task motivation. Domain-relevant skills refer to expertise or knowledge that a person has in the relevant area. Creativity-relevant processes means the process of cognitive and personality that will contribute to novel thinking. Intrinsic task motivation means the motivation which will arise from engaging in the activity which is interesting, enjoying or challenging to an individual (Amabile, 1996). Also, there is another element that needs to be taken into consideration which is outside the individual. This is referred to as the surrounding environment that is called social environment. The componential theory of creativity asserts that creativity needs a confluence of all components (either within or outside the individual) to occur (Amabile, 1996). Studies have gone further within this theory to investigate creativity. Lots of previous researches went into details of investigating on the within and outside the individual components and their effects on creativity. The componential model of

creativity stated that creativity will have a high tendency to happen when domain-relevant skills and task motivation are at hand (Jeffries, 2007). On the other hand, divergent thinking need to be mixed with relevant skills in a specific domain (Hoegl and Parboteeah, 2007). Amabile's componential model of creativity expresses a view on a creative act in a way that it is only considered creative by a person who has ample knowledge on that specific domain (Wilpert, 2008).

Accordingly, it has been explained that creativity occurs at its highest level when a person who is intrinsically motivated and has higher related knowledge with elevated skill of creative thinking works in an environment that supports creativity greatly. Culpepper (2010) asserted that in order to have a creative environment as a must, there is a need for assessment so that the starting point as well as the destination will be clarified. As it can be drawn, creativity is paramount both from individual perspective and outside the individual vantage point. Thus, the question remains on the relationship of all these within individual components with creativity and the moderating effect of social environment in such a relationship which needs to be answered and be further investigated. The focus of this research will be to observe the relationship between individual components of creativity, as a whole and each construct (domain-relevant skills, creativity-relevant processes and intrinsic task motivation) and creativity. Also, the current study will discover the relationship between social environment and creativity. Furthermore, the study is aiming to find out the moderating effect of social environment (as an outside the individual component) on the relationship between individual components of creativity, its components and creativity.

1.3 Problem Statement and Research Gaps

The significance of creativity has been highlighted in works of many past researchers. Creativity is important due to the new perspectives that it provides (Amabile *et al.,* 2005). It also boosts the turbulence of an environment with its flexibility and resilience according to Shalley and Gibson (2004) and that is why creativity has been the focus of researches vastly (Hauksdóttir, 2011). Background of the study has indicated that creativity is one of the most challenging dimensions in both academic world and organizations. Creativity is regarded as more complex issue than it appears and a unified general theory has not merged on it. Martins and Terblanche (2003) state that rate of

change is going up at such a rapid speed because knowledge, generation of ideas and global diffusion has been growing. Over the past decades, studying the antecedents of creativity was regarded as one of the main directions in research. Research on creativity attempts to find out the factors which enhance and facilitate the embellishment of creativity. Importance of creativity and investigating the affecting elements like environment to it has caught the attention of many researches including (Paramithaa Anggia and Nurul, 2014 ; Zhang and Gheibi, 2015).

Some researchers investigated the importance of creativity in relation to individual components of creativity (Adams, 2006; Eder and Sawyer, 2008; Hauksdóttir, 2011; Hoegl and Parboteeah, 2007) while others like (Amabile, 2012; Gehani, 2011; Inchamnan *et al.*, 2012; Kuo, 2011; Liu and Schönwetter, 2004; Strohschneider, 2009) identified social environment as an effecting factor to creativity that exist outside the individual. These studies proved the magnitude of creativity from both within and outside the individual elements.

Creativity has been tested with regards to componential theory by various researchers like (Anderson *et al.*, 2014; Birdi *et al.*, 2014). Most of the researchers who examined creativity from within the individual components chose from one path. Some of them looked at the relationship between individual components of creativity (as a whole) and creativity like (Allen and Coleman, 2011; Kazerounian and Foley, 2007; Pirola-Merlo and Mann, 2004; Zhang and Gheibi, 2015) while the others observed the relationship between one of the components of ICC and creativity. As an instance, domain-relevant skills and creativity was investigated by (Charyton *et al.*, 2011; Eder and Sawyer, 2008) while intrinsic task motivation and creativity was investigated by (Baer *et al.*, 2003; Inchamnan *et al.*, 2012). The past researches mainly focused on the relationship between one of the individual components of creativity and creativity. When a person's skill overlaps with high level of intrinsic interests, creativity will happen (Amabile, 1996). Both creativity-relevant processes and domain-relevant skills are prominent for creativity mainly because an individual is able to understand where the creative work is needed and how it can be done in a particular context (Birdi *et al.*, 2014). As it can be seen in the previous literature, a research which takes all these components into account is required. Consequently, the gap that arises from this area is a need to conduct a study to integrate all three components to observe these relationships from both perspectives: the relationship between each component of ICC and creativity along with the relationship between individual components of creativity (as a whole) and creativity.

Furthermore, another area which is in need of further investigation is social environment and its moderating effect on creativity which has also been the topic of interest for many researchers (Azizi-Nejad, 2014; Paramithaa Anggia and Nurul, 2014 ; Wan Muda, 2008). The importance of environment and its influence on creativity is blatant in many studies. Proper social environment paves the way toward prosperity of creativity (Hauksdóttir, 2011). Researchers like Cropley (2006) investigated the significance of recognizing the society's role on the quality and quantity of creativity in a particular time and place while another research by Ruiz-Moreno *et al.* (2008) also confirms the influence of environment on creativity. Previous researchers including (Amabile, 1988; Amabile, 1989; Shalley and Zhou, 2008; Sternberg, 1999; Zhang and Bartol, 2010) state that the environment which acts as stimulant plays an important role in creativity.

The role of social environment as moderator has been investigated either only on creativity or on the relationship between one component within the individual and creativity. Kuo (2011) investigated the moderating effect of social environment on the relationship between domain-relevant skills and creativity. Other researchers like Inchamnan *et al.* (2012) looked at the effect of environment on the relationship between other two components (creativity-relevant process and intrinsic task motivation) and creativity. If the environment is supportive and a person is engaged in creativity-relevant process, intrinsic task motivation can boost creativity (Zhang and Gheibi, 2015). In spite of the fact that there are agreements on the importance of social environment and its positive effect on creativity, previous researches in the field of social environment and creativity have not benefited from each other adequately and they are mostly studied via separate areas. The relationship that exists between social environment and creativity is mutual: The environment lets creativity works its way to lead to products and innovation and creativity can make changes to the environment. Social environment can be perceived as a force with responsibility while it is also a path toward achieving self fulfillment in an individual (Cropley, 2006). As a result, another gap arises from lack of research in this area. In order to achieve the big picture, there is a need for a study that observes the positive, moderating effect of social environment on the relationship between ICC and creativity and each of its components separately.

The current study is planning to observe the components which make contributions to creativity from the perspectives of within the individual and outside the individual components in one study. In the case of the current research, the study should

go deeper to see how these components are related to creativity. Therefore, there are few questions which are in need to be answered in identifying the existing relationships between individual components of creativity, out of individual component and their relationships to creativity. Via finding the answers to these questions, the research will be able to make contributions to recognize the effective individual and environmental factors to creativity. To the knowledge of this research, there has not been a research which was conducted to observe the mentioned relationships in such a setting. Considering the importance of creativity for engineering students (which will be near future engineers), the current research is aiming to find answers to such questions via conducting a quantitative research using a questionnaire survey.

Without doubt, creativity belongs to the most vital and pervasive categories of all mankind activities (Simonton, 1999). Spender and Strong (2010) proposed that most corporations need to increase their growth along with profit and great ideas will make this possible. These fantastic ideas do not happen in laboratories over night, but they will come to reality by people who are involved in business and fighting for the growth. Furthermore, in today's competitive business world, being just a university graduate or a degree holder will not ensure an employee's success. Works of Robinson (2010) suggests that in today's economy age, lots of nations like England, is putting much effort to bring creativity into the educational system in order to pave the way toward a creative society (Allen and Coleman, 2011). In recent years, creativity among engineers has received extensive attention. Therefore, characteristics of creativity have been studied by several various researches. Felder (1987) shares an interesting point when he emphasized that producing creative engineers is within our responsibilities. The least to be done is not to extinguish the creative spark that exists within our students. Charyton and DeDios (2011) mentioned that engineers who are not creative might not be engineers.

In order to be able to participate in a competitive world, a nation needs to use advanced methods to produce innovative products as well as services, according to Porter *et al.* (2007) and this job is in hands of the nations' workforce to do so. Adapting creativity and using it to achieve this goal is what developed countries like US or Japan are doing (Majid and Dahan, 2010). It is of high priority for Malaysia as well since it was clearly stated in Malaysia's Higher Education Action Plan, 2007-2010 that these workforce need to be trained in a way to embellish their creative minds to reach these goals for Malaysian society.

In context of Malaysia per se, creativity has been obviously stated as a vital element: “knowledgeable and highly skilled, flexible and creative as well as imbued with positive work ethics and spiritual values” human capital (Ninth Malaysia Plan 2006 – 2010.2005, p. 248). Engineering realm is one of the areas that carry this burden and creativity is an essential part which needs to be implemented to get the nation towards being a developed country. The importance of creativity in engineering as mentioned at page 7 in (21st Century Skills, 2008) is a proof to this necessity: “Fueling creativity, innovation and adaptability that are the hallmarks of competitive, high-growth and emerging industries requires a highly skilled, creative and nimble workforce”.

The need for creativity and innovation in work places as a need of 21th century can be fulfilled via needed training, knowledge and global partnership. As it was also stated by Malaysian Secretary General of Higher Education ministry, Datuk Dr. Zulkefli A. Hassan, to fulfill the requirements of workplaces and to meet the needs of today‘s world, creativity of workforce should be highlighted (Majid and Dahan, 2010). This undoubtedly asserts the necessity of the presence of creativity in the environment of engineering students who will soon turn into workforce of the society. As a result, it is essential to conduct a study to observe the incentives and barriers of creativity in the environment of students to be able to plan for workforce who have creative mindsets. The emphasis of producing graduates with creative perspective was also accentuated in Higher Education Action Plan, 2007-2010 (Wan Muda, 2008). As it was stated there, graduates are in need of training that prepares them in order to produce first class human capital for Malaysia.

Looking for engineers and their creativity needs a step backward to have a glance at creativity among engineering students. The methodology towards teaching creativity to engineering students has received noteworthy concerns due to its significance (Simpson *et al.*, 2008). Some researchers looked at the engineering creativity from individual aspects. Usefulness and novelty can be named as central themes that are specifically related to engineering creativity (Charyton *et al.*, 2011). Some others took the outside of individual elements into consideration when they studied creativity in engineering realm. Researches like Brown (2007) accentuate the fact that the environment of engineering students is inadequate when it comes to their creativity. Despite the fact that there are lots of approaches in teaching creativity to engineering students, many still hold the belief that engineering education system does not get the engineering students ready for real problem

solving in the career world sufficiently (Charyton and DeDios, 2011). As it can be clearly seen in the past literature, the importance of creativity in the engineering realm is apparent and engineering students are the place to begin with. Researchers including Blashki *et al.* (2007) and even most recent literature like Charyton *et al.* (2011) looked at the importance of creativity among upcoming engineers. Additionally, there is a higher focus on increasing creativity among the future engineers mainly because creativity is significant in engineering realm.

This study is seeking to discover whether or not; there is a positive relationship between ICC and creativity. Looking at each separate construct of ICC, the findings of this research can make significant contributions to the importance of knowledge, creativity process and intrinsic motivation to the realm of creativity of engineering students. The research is planning to discover if an engineering student who has ample knowledge and motivation can carry out the task and think in a creative way exhibit creativity or not. The results of this study contribute to the body of creativity knowledge of engineering students by observing the relationship between individual components of creativity and creativity. This research also makes contributions to the importance of each dimensions of ICC by investigating the relationship of domain, creative process and intrinsic task motivation to creativity separately.

Furthermore, observing the positive moderate role of environment on knowledge, creativity process and task motivation will draw a clearer picture of creativity. The contribution of these findings will provide assistance to recognizing and improving the positive relationships and their effects toward creativity. The research results will make significant contributions to engineering schools. Having this body of knowledge enables the universities to encourage the stimulant and to discourage the blocks that affect their students' creativity. This will make significant differences in the creativity of engineering students who will soon enter the workforce. The results will also benefit the corporate world on creativity of their new engineers whom are going to be hired soon.

1.4 Research Questions (RQs)

In this research, in order to address the above mentioned objectives and to provide solutions to the research problems, three main research questions and six sub-question will be identified and will be formulated as it can be observed below:

RQ1. Is there a positive relationship between individual components of creativity and creativity?

$RQ1_A$. Is there a positive relationship between domain-relevant skills and creativity?

$RQ1_B$. Is there a positive relationship between creativity-relevant processes and creativity?

$RQ1_C$. Is there a positive relationship between intrinsic task motivation and creativity?

RQ2. Is there a positive relationship between social environment and creativity?

RQ3. Does social environment positively moderate the relationship between individual components of creativity and creativity?

$RQ3_A$. Does social environment positively moderate the relationship between domain-relevant skills and creativity?

$RQ3_B$.Does social environment positively moderate the relationship between creativity-relevant processes and creativity?

$RQ3_C$. Does social environment positively moderate the relationship between intrinsic task motivation and creativity?

1.5 Purposes of the Study

Researchers like Florida (2004) and Yu *et al.* (2006) highlight the fact that a country's economic compositeness has a direct tie to its ability to mobilize and to harness the creative energies of its people. Market demands which exist in the 21st century globally created the need for employees who can present critical thinking skills that are combined with creativity and innovation. Also, Allen and Coleman (2011) focused on the increasing attention which is being paid to creativity in higher education systems. In order to conduct a successful future in professional life, creativity is an important attribute to graduates. Malaysia should be a part of this perspective as well. Ninth Malaysia plan which was stated in the year 2005 puts emphasis on the importance of creativity and

innovation hand in hand with knowledge in order to achieve “first class mentality”. In order to accomplish this aim, recognition of human capital and its significance should be taken into account. The Malaysian government is determined to take some actions to bring prominent improvements to the education system, from pre-school to tertiary and vocational institutions ("Ninth Malaysia Plan 2006 -2010," 2005).

The workface also ought to be intellectually active and adaptable and they should be able to speak their minds and opinions. Ministry of Higher Education Strategic Plan Report stated that Malaysian higher education institutions are carrying the responsibilities to make sure that the mentioned criteria should be met among employees that are receiving the education. Producing employees that are innovative and creative are among the challenges of 21st century. It is the job of Ministry of Higher Education to come up with strategies and plans to assist achieving these goals (Taurasi, 2007). As it can be observed, there is a need for such a research in the realm of engineering students that can pave the way to produce more creative and prosperous engineers as employees for the near future as privileged workforce. Looking to the future, the only way to ensure that the Malaysian education system continues to be relevant in a constantly changing world is to integrate a spirit of innovation and creativity into the system itself” ("Malaysia Education Blueprint, 2013-2025," 2013).

Various researchers in the past looked at the components which influence the creativity of engineering students. Researchers like Kazerounian and Foley (2007) identified the factors that either help or block creativity of engineering students. Also, When it comes to engineering education in creativity, as Brown (2007) observed, in -the-box thinking, which is not close to the real world, does not provide enough room for creativity (Charyton *et al.*, 2011).

What this study will do differently is to have a deeper look at the relationship between individual components of creativity and creativity. Via observing the relationship between each individual component of creativity (including domain-relevant skills, creativity-relevant processes, and intrinsic task motivation) and creativity, this research will fulfill the purpose of observing creativity from both within the individual and outside the individual elements. Finding out how individual components of creativity contributes to creativity by itself and taking all three ICC components and their relationships into accounts separately will accomplish the goal of conducting a comprehensive research in this realm.

In addition, this research seeks to find out the moderating effects of social environment (as out of individual component) on the relationship between individual components of creativity and creativity. Since most of previous researches looked at the moderating effect of social environment on one component (Csikszentmihalyi, 2000; Inchamnan *et al.*, 2012; Moghimi and Devi Subramaniam, 2013), this research will differentiate itself from previous studies via observing the moderating effect of social environment on the relationship between ICC and creativity while it also observes the same moderating effect on each construct of ICC as well.

Regarding the current study, the research is conducted as an empirical one in the educational system. On the contrary of previous researches which mainly focused on engineers in an organization, the research will go one step backward to observe those relationships in universities. The contributions will provide some insights toward creativity in university students and provide more knowledge of the subject for engineering students whom are being prepared to step into real working environment with a creative point of view. The empirical contribution of the current study will be the research's perspective of creativity from an individual point of view (engineering students) within a system they function at (their universities).

1.6 Research Objectives

In this part of the research, the research is determined to set three main objectives and six sub-objectives based on statements of problem which are related to the current study:

1. To identify the relationship between individual components of creativity and creativity
    - 1_A. To identify the relationship between domain-relevant skills (as a within individual component) and creativity
    - 1_B. To identify the relationship between creativity-relevant processes (as a within individual component) and creativity
    - 1_C. To identify the relationship between intrinsic task motivation (as a within individual component) and creativity
2. To identify the relationship between social environment and creativity

3. To measure the moderating effect of social environment (as an out of individual component) on the relationship between individual components of creativity and creativity
   - 3_A. To measure the moderating effect of social environment (as an out of individual component) on the relationship between domain-relevant skills and creativity
   - 3_B. To measure the moderating effect of social environment (as an out of individual component) on the relationship between creativity-relevant processes and creativity
   - 3_C. To measure the moderating effect of social environment (as an out of individual component) on the relationship between intrinsic task motivation and creativity

1.7 Significance and Contribution of the Study

Since knowledge as well as information is the key factor for a nation to be prosperous, it should be highly acceptable for the society to be composed of individuals who can be creative as well as critical. Researchers like Baillie (2002) investigated the importance of creativity of engineering students in universities. There are higher expectations on universities these days to provide more chances to support and to encourage creativity among engineering students (Liu and Schönwetter, 2004). Several researchers like Hardman (2008) and Majid and Dahan (2010) have been conducted several studies to examine the experiences of graduates while in the university. That will be an evidence for how important this kind of research is. Results of researches like Kazerounian and Foley (2007) showed that engineering students do not experience maxims of creativity in their academic experiences. Practice of creativity in engineering education is an obvious matter. Blashki *et al.* (2007) even stated that creativity which is in the engineering education ought to be practiced via various methods like immersive learning both in an individual and group level (Charyton *et al.*, 2011). It can act as a proof that there is a lack of research on this area. There is a rampant need to have a society that can function creatively. The need for creativity has been obviously asserted by the Malaysian Education Blueprint published in 2013 since there is a high demand for creativity. Malaysia should turn into thinking society and since it was a part of “Human Capital” plan proposed by Tun Abdullah Ahmad Badawi (prime Minister of the time).

This illustrates how important the concept of creativity is within a society (Majid and Dahan, 2010).

The significance of the current study would be that the results will help the universities and educational systems by pinpointing the stimulants and obstacles creativity face in universities among engineering students. The findings of this research will enable the educational system to observe what the significant components to creativity are, specially the effect of environment. Possessing this kind of knowledge will enable future engineering graduates to be more conscious about components which influence their creativity when they are carrying out their projects. That will be one of the ways to prognosticate the similar circumstances and elements in their near future projects. Additionally, the results of this research will open the ways toward having more knowledge of effective individual and out of individual components on creativity of engineering students. That can be utilized as a way for universities to act on creativity elements to encourage the stimulants and discourage the obstacles to pave the way for their today's engineering students and tomorrow's engineers. Furthermore, the results of this research will provide benefits to the corporate world as well. The findings of this study will point out the elements which companies can take into consideration as hindrance or help to creativity among their brand new engineers.

1.8 Scope of the Study

Due to the fact that today's society is going through changes which are complex and rapid, enhancing creativity is needed in order to increase the level of competition. Thus, universities ought to be unique places to create knowledge (Strohschneider, 2009). Considering the essentiality of creativity and its role in engineering field today; there is a need for further investigation of creativity in the engineering students' realm. Researches done by Blashki *et al.* (2007) has shown that upcoming engineers are going through the trend of increasing the level of their creativity, because creativity plays a significant role in engineering as a career (Charyton *et al.*, 2011). The scope of the current research will be on individual level. Yu *et al.* (2006) state that before the students focus on their class projects that highlight innovative ideas, they need to learn about the significance of creativity in the knowledge-based economy. Researchers like Aghayere *et al.* (2012), looked at how engineering and engineering technology view creativity and the methods

creativity will be embellished among them. Also, Reisman (2013) declare that universities are interested in the concept of creativity for years and they try to offer courses that deal with creativity. Consequently, there is a need to explore the processes that are involved when students reach that level of creativity.

1.9 Operational Definitions of Variables

In this section, definitions of variables will be presented as follows:

1.9.1 Creativity

Creativity: "Creativity is the production of a novel and appropriate response, product, or solution to an open-ended task" (Amabile, 2012). In this regard, the study measures the level of creativity that each individual engineering student presents while doing their projects/assignments using KEYS instrument developed by (Amabile *et al.*, 1996).

1.9.2 Domain-Relevant Skills (DRS)

Domain-Relevant Skills: "Domain-Relevant skills include knowledge, expertise, technical skills, intelligence, and talent in the particular domain where the problem-solver is working" (Amabile, 2012). Accordingly, this research will measure the level of expertise, technical skills, knowledge, talent and intelligence in domain of engineering students (more specifically, the extent to which each individual is certain about how to perform his or her task within the realm of domains by the instrument developed by (Sawyer, 1992).

1.9.3 Creativity-Relevant Processes (CRP)

Creativity-relevant processes: "Creativity-relevant processes include a cognitive style and personality characteristics that are conducive to independence, risk-taking, and taking new perspectives on problems, as well as a disciplined work style and skills in generating ideas" (Amabile, 2012). This study measures the extent in which engineering students seek to finish an assignment or to solve a problem that they are involved with via an instrument developed by Amabile (1983), Reiter-Palmon and Illies (2004) and Perry-Smith (2006).

1.9.4 Intrinsic Task Motivation (ITM)

Intrinsic task motivation: "Intrinsic task motivation is the motivation to undertake a task or solve a problem because it is interesting, involving and personally challenging" (Amabile, 2012). In this study, the motivation to carry out an assignment/project or to solve a problem for engineering students will be measured by an instrument developed by Amabile (1985) and Tierney *et al.* (1999).

1.9.5 Social Environment (SE)

Social Environment: "The component outside the individual realm is the work environment or, more generally, the social environment. This includes all of the extrinsic motivators that have been shown to undermine intrinsic motivation, as well as a number of other factors in the environment that can serve as obstacles or as stimulants to intrinsic motivation and creativity" (Amabile, 2012). In this study, components of social environment (i.e. freedom, challenging work, managerial encouragement, work group support, organizational encouragement, sufficient resources, realistic workload pressure and lack of organizational impediments) are as follows:

A. Freedom:

*Freedom: "*Freedom in deciding what work to do or how to do it; a sense of control over one's work" (Amabile, 2012). In this study, freedom that engineering students posses to do their assignments/projects will be measured using KEYS instrument developed by Amabile *et al.* (1996).

B. Challenging Work:

Challenging work: "A sense of having to work hard on challenging tasks and important projects" (Amabile, 2012). This research will measure the challenges engineering students face in carrying out their projects via KEYS instrument that is developed by Amabile *et al.* (1996).

C. Managerial Encouragement:

*Managerial encouragement: "*A boss, who serves as a good work model, sets goals appropriately, supports the work group, values individual contributions, and shows confidence in the work group" (Amabile, 2012). In this study, the encouragement students receive from a lecturer to do their projects/assignments will be accessed via KEYS instrument that is developed by Amabile *et al.* (1996).

D. Work Group Support

Work group support: "Diversely skilled work groups, in which people communicate well, are open to new ideas, constructively challenge each other's work, trust and help each other, and feel committed to the work they are doing" (Amabile, 2012). This research will measure the support that is among the groups in which engineering students work at will be tested using via KEYS instrument that is developed by Amabile *et al.* (1996).

E. Organizational Encouragement

*Organizational encouragement:"*An environmental culture that encourages creativity through the fair, constructive judgment of ideas, reward and recognition for creative work, mechanisms for developing new ideas, and active flow of ideas, and a shared vision of what the organization is trying to do" (Amabile, 2012). This study will assess the supportive environment of engineering students for doing their work via KEYS instrument that is developed by Amabile *et al.* (1996).

F. Sufficient Resources

*Sufficient resources:"*Access to appropriate resources, including funds, materials, facilities, and information" (Amabile, 2012). The adequacy of available resources for engineering students to carry out their assignments and projects will be measured using via KEYS instrument that is developed by Amabile *et al.* (1996).

G. Realistic Workload Pressure

*Realistic workload pressure: "*Absence of extreme time pressures, unrealistic expectations for productivity, and distractions from creative work" (Amabile, 2012). The pressure that engineering students take when they are carrying out their projects/assignments will be tested with via KEYS instrument that is developed by Amabile *et al.* (1996).

H. Lack of Organizational Impediment

*Lack of organizational impediment: "*An environmental culture that does not impede creativity through internal political problems, harsh criticism of new ideas, destructive internal competition, an avoidance of risk, and an overemphasis on the status quo" (Amabile, 2012). An environment which will not prevent creativity of engineering students when they are busy with their work because its internal problems will be assessed using via KEYS instrument that is developed by Amabile *et al.* (1996).

1.10 Outline of the Thesis

The current thesis is organized in five chapters. Chapter 1 of the study presents the background of the study. It also discusses the importance of creativity and the components related to it. The relationship between creativity, individual components of creativity and social environment were briefly discussed. Research objectives, research significance and scope of the study are also identified. Chapter 2 includes an extensive literature review on creativity, individual components of creativity and social environment to develop the theoretical framework of the study based on the research gaps. Chapter 3 introduces the research methodology including the research design, data collection, sampling and data analysis procedure. Chapter 4 discusses data analysis and its quantitative results. The final chapter, chapter 5, summarizes the research findings and it discusses the relevance of study based on the provided literature. Chapter five also includes the conclusion and it explains the recommendation for the future research areas.

As it was mentioned before, the role of creativity is obvious in today's world and it is also vital for Malaysia as well since Malaysia is planning to be a developed country by 2020. "The idea of lifelong learning is emphasized by the Malaysian government" as it was stated in the Ninth Malaysia Plan. It is paramount for higher education institutions to produce "holistic, knowledgeable and highly skilled, flexible and creative as well as imbued with positive work ethics and spiritual values" human capital"("Malaysia Education Blueprint, 2013-2025," 2013). Engineers are playing a significant role in assisting a country to achieve prosperity: therefore, knowing that educational environment of engineering students is helpful to creativity can enable Malaysia to go toward being prosperous in a faster pace.

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