Developing Malaysian undergraduates' innovation orientation: The mediating role of entrepreneurial self-efficacy

Norfarah Nordin[1,] Mohd Ali Samsudin[2] and Ahmad Nurulazam Md. Zain[1]
[1]National Higher Education Research Institute (IPPTN), Universiti Sains Malaysia
[2]School of Educational Studies, Universiti Sains Malaysia

Abstract

This research examines mediation effect of entrepreneurial self-efficacy on the causal relationship between creativity, entrepreneurial orientation and innovation motivation exertion into innovation orientation among undergraduates in Malaysian public universities. This mediation analysis lends support from the Social Cognitive Theory of Self-Regulation. This research aimed to assess the significant of undergraduates' entrepreneurial self-efficacy in mediating creativity, innovation motivation and entrepreneurial orientation into innovation orientation. The mediation analysis employed model-fitting approach that estimates all parameters simultaneously and bootstrapping bias-corrected approach to test the significance of indirect effect. The significant of the indirect path between independent and dependent variable were evaluated from 5000 bootstrap samples. Bias-Corrected-Accelerated at 95% confidence interval were used to determine the significance of the indirect path. The empirical result showed that Entrepreneurial Self-Efficacy mediated the influence of Creativity, entrepreneurial orientation, and innovation motivation on Innovation Orientation. Theoretically, the Social Cognitive Theory of Self-Regulation was supported. The mediation effects of the antecedent factors posited that the causal effectiveness of the factors could be maximised by addressing undergraduates' entrepreneurial self-efficacy. In practice, the finding implies that undergraduates' innovation orientation nurturing should focus on developing their entrepreneurial self-efficacy.

Keywords: Mediation, Bias-Corrected Bootstrapped, Entrepreneurship Education

Introduction

Understanding of innovation behaviour process is the goal of most innovation researchers. This research aims to ascertain whether entrepreneurial self-efficacy have an effect on innovation motivation, creativity and entrepreneurial orientation. Based on the Social Cognitive Theory (Bandura, 1999) entrepreneurial self-efficacy has a significant mediation effect on innovation motivation, entrepreneurial orientation and creativity variables' exertion into innovation orientation. If this condition is true, in practice perceived entrepreneurial self-efficacy should be addressed to promote undergraduates' innovation orientation. Therefore, this mediation analysis aimed to uncover whether there is a mediator effect of entrepreneurial self-efficacy in the chain of relationship between the predictors and outcome. The study aimed to answer 'Does entrepreneurial self-efficacy among the Malaysian undergraduates mediate the relationship between creativity, entrepreneurial orientation, innovation motivation to innovation orientation?'

The relationship between innovation orientation and its enablers in the context of Malaysian undergraduate students is based on Stimulus-Capacity-Performance Model of Innovation (Prajogo & Ahmed, 2006; Smith et al., 2012). In this research, stimulus factors are innovation motivation and

entrepreneurial self-efficacy. Innovation stimulus offers a direction to expend effort towards realizing the potential to innovate (Smith et al, 2012). It was argued that effort directed to maximise innovation potential need to be adequate. In the absent of adequate effort, innovation potential will remain unleash. While the enabling factors to innovate is called the innovation stimuli.

Creativity and entrepreneurial orientation is referred as innovation capacity and determined innovation ability and strength. We start the proposition of creativity and entrepreneurial orientation as the innovation capacity based on the suggestion that the innovation antecedents are ones' creativity and ability to convert ideas into profitable item (entrepreneurial capability). Based on Prajogo and Ahmed (2006); Smith et al. (2012), students' ability to expand and utilize new knowledge which is similar to creativity and entrepreneurial orientation is their innovation capacity.

In turn, the extent of the capacity held by students and stimulus responses determine their performance in innovation (innovation behaviour). Students' performance in innovation in the context of higher education is measured by their affective domain (self-attribute) towards innovation behaviour, which is presented in the affective model of innovation orientation. The affective model of innovation orientation in Malaysia is defined in a dynamic state, which is to portray the present state of innovation orientation environment to produce innovative human capital in the context of undergraduate student in Malaysia.

The same model has been tested to provide relationship indication between stimuli measure, capacity and innovation performance in Australia by Smith, Courvisanos, Tuck and McEachern (2012). Based on Smith et al. (2012); and Prajogo and Ahmed (2006), innovation process begins because of the stimulus responses and ones' innovation capacity.
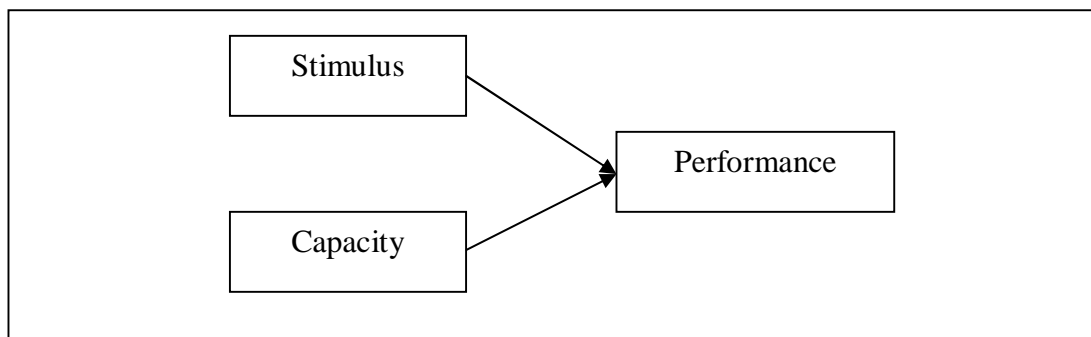

Figure 1.1   Stimulus-Capacity-Performance model of innovation (Prajogo & Ahmed, 2006)

In this framework, innovation motivation and entrepreneurial self-efficacy are regarded as the stimuli. Students' creativity and entrepreneurial orientation are regarded as ones' innovation capacity. Therefore, innovation motivation, entrepreneurial self-efficacy, creativity and entrepreneurial orientation are the antecedent factors of students' innovation orientation. The relationships between innovation orientation, creativity, entrepreneurial orientation, entrepreneurial self-efficacy, and innovation motivation is hypothesised based on the Theory of componential creativity and innovation (Amabile, 2012).

The mediation effect of entrepreneurial self-efficacy on the exertion of all predictors into innovation orientation is based on the Social Cognitive Theory (Bandura, 1999). The objective of testing the

innovation orientation model is to confirm innovation orientation positive relationship with these stimuli and capacities.
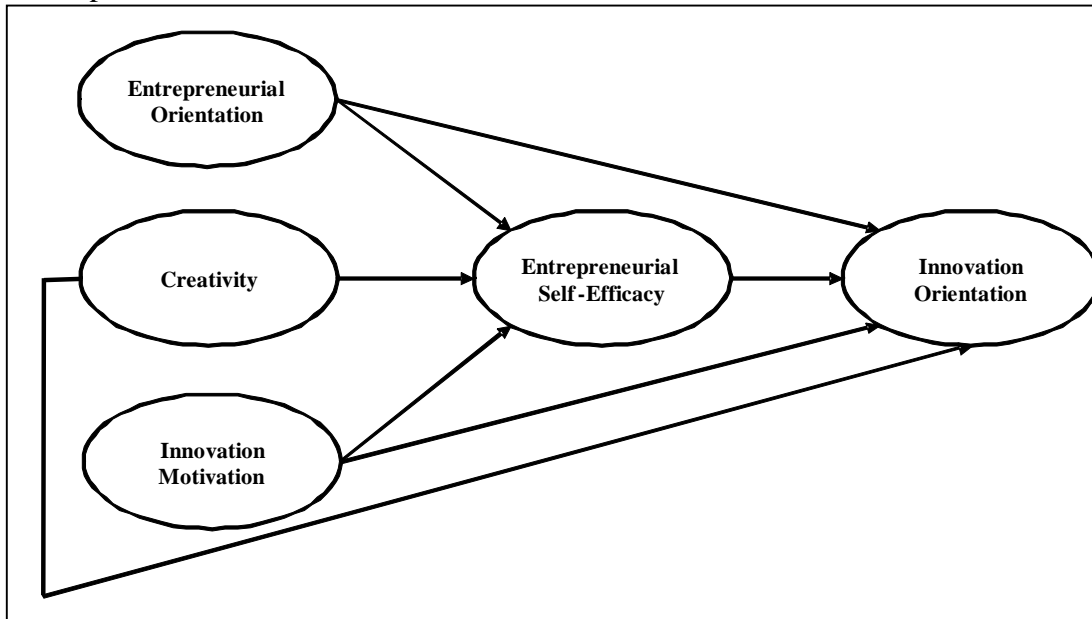

Figure 1.2   Hypothesised model

The following hypotheses are based on the hypothesised model (Figure 1.2):
Hypothesis 1: Entrepreneurial self-efficacy mediates the exertion of entrepreneurial orientation to innovation orientation.
Hypothesis 2: Entrepreneurial self-efficacy mediates the exertion of creativity to innovation orientation.
Hypothesis 3: Entrepreneurial self-efficacy mediates the exertion of innovation motivation to innovation orientation.

Significance of Research

This research is in response to the Ministry of Higher Education policies such as the Implementation Plan for Development of Innovative Human Capital Plan (2012), National Higher Education Strategic Plan (2007-2010) and National Innovation Strategy-Innovating Malaysia (2010) relating to the Malaysian undergraduates' innovation orientation. In the policy documents, the subject of nurturing innovative human capital is the focus. Therefore, this research is timely and the findings from this research allows scholars in higher education to comprehend the relationships between innovation orientations to its imperatives to develop the innovation behaviour among the Malaysian university undergraduates.

The policy to inculcate creativity, innovation orientation and entrepreneurial orientation in Malaysia higher education has been formulated in macro perspectives namely; HEIs Entrepreneurship Development Policy (2010), Entrepreneurship Strategic Plans at HEIs (2013) and Implementation Plan for Development of Innovative Human Capital Plan (2012). The policies require detailing and confirmation through authoritative research before transferring these policy recommendations into actions (Ministry of Higher Education, 2012). Therefore, the value-added of this research is on uncovering the relationship between factors concerned with the imperatives of undergraduates' innovation orientation stimuli and capacities. The research findings provide

evidence to the education stakeholder in making specific changes to foster innovation behaviour in university. Entrepreneurial self-efficacy's mediation effect on the predictor variables based on the Social Cognitive Theory (Bandura, 1999) are also tested.

Research Limitations

This research is based on the Theory of Componential Creativity and Innovation (Amabile, 2012), Social Cognitive Theory (Bandura, 1999) and Gender Constant Theory (Kohlberg, 1966). Thus, the research on the subject of innovation orientation among undergraduates will differ in terms of direction and findings if different models and theories are used.

This causal relationship modeling research employs non-experimental research design, where the search for possible factors that contribute to the phenomena of innovation orientation emerge without manipulation on the variable before the fact occurs (Salkind, 2010). Non-experimental research design is suitable for an exploratory investigation of cause-effect relationships where the identified causal relationships among constructs contribute knowledge to the field of innovation orientation development, and in future, these can be tested through true experimental research designs (Salkind, 2010, p.460). Nevertheless, the research has some limitation on its findings' generalizability due to the sampling technique employed. The stratified convenient sampling technique is considered as non-random sampling, thus, the result have to be interpreted with caution (Hair et al., 2010). However, the dependent variable and independent in non-experimental design has to fulfil rigorous statistical assumptions (Hair et al., 2010). This is a counter measure for its non-random sampling limitation. One of the criteria for the data property is conformance to normality assumption (Salkind, 2010; Meyers et al., 2013).

This research identified only four antecedents of innovation orientation to explore the causal relationships. Each variables related to manifestation of innovation orientation can be adapted or altered from time to time based on the development in the undergraduate social system such as an introduction of new educational programs or the performance of the mass media. In future, it is proposed that research related to causal relationships should undertake longitudinal data collection to trace innovation orientation occurrence among the undergraduate students. The items utilized a four-point Likert scale. For each item in the instrument, the responses are tied to assignment of Likert scale. The response to the Likert scale items is heavily dependent on the respondents' honesty. The act of measuring a psychological phenomenon can alter the behaviour being assessed, thus this research acknowledge this limitation in the data collection.

Literature Review

Zhao, Seibert and Hills (2005) studied the mediating role of self-efficacy in the development of Master students' model of entrepreneurial intention. The research uses structural equation modeling with a sample of 265 postgraduates. The research shows the effects of perceived learning variable, pervious entrepreneurial experience, and risk propensity were fully mediated by one's entrepreneurial self-efficacy in the model of entrepreneurial intention. Boyd and Vozikis (1994) proposed that self-efficacy influences the development of entrepreneurial career intention. Thus, incorporating self-efficacy into the research model is justified by the literature.

Barnir, Watson and Hutchins's (2011) research on the effect of role models on career intention showed that career intention is fully mediated by self-efficacy. The findings implied that exposure to role models affected entrepreneurial intention for women primarily through self-

efficacy belief and suggests that modeling may be substituted in other ways to enhance self-efficacy.

According to Gong, Huang and Farh (2009), employee learning orientation and transformational leadership were positively related to employee creativity, and these relationships were mediated by employee creative self-efficacy. According to Chen et al. (1998), entrepreneurial self-efficacy is often includes in the research of entrepreneurship as a mediating variable in the model to explain the greater effects it carry in the relationship testing.

Baron and Kenny (1986) adopted the causal steps approach to test the mediation variable effect, a most widely used method. Baron and Kenny's causal steps approach is complementary with the product of co-efficient approach or well known Sobel test. However, this approach has a major flaw and that is it requires a normal sampling distribution of the indirect effect. The literature suggested that the best available option to analyse mediation is Bootstrapping technique (Preacher & Hayes, 2004).

Research Methodology

Mediation analyses employed Causal-Step Approach (Baron & Kenny, 1986). The constructs' path coefficients in mediation analysis were estimated employing Maximum Likelihood (ML) estimates via AMOS and the indirect effect significance test employs Bootstrapping Bias-Corrected Confidence Interval (Preacher & Hayes, 2008).

This research employed a non-experimental, also known as correlational, research design. In non-experimental research design, the search for possible factors that contribute to the phenomena of innovation orientation is studied without manipulation on the variables before the fact occurs (Salkind, 2010). In this research, treatment or control groups to the sampled population was not imposed. The research data were collected employing stratified convenient sampling. Data were collected from respondents utilizing self-administered survey in the form of questionnaire. The data from this questionnaire were analyzed utilising multivariate design that allowed more than two variables to be analysed together. The independent variables and dependent variables are related based on the Theory of Componential Creativity and Innovation (Amabile, 2012).

All of the variables of interest are latent, and therefore a number of observed variables were used to measure the latent variables. The causal relationship between variables derived from the theory is operationalised into research hypotheses. Research hypotheses are the means to achieve research objectives, guiding about what should be observed from the population if the theory is correct. The hypothesised causal relationship is based on the Theory of Componential Creativity and Innovation (Amabile, 2012). This research hypothesized that Innovation Orientation are positively related to Creativity, Entrepreneurial Orientation, Innovation Motivation and Entrepreneurial Self-Efficacy.

According to the Social Cognitive Theory of Self-Regulation (Bandura, 1999), Entrepreneurial Self-Efficacy is hypothesized to mediate the relationship between Creativity, Entrepreneurial Orientation and Innovation Motivation to Innovation Orientation. Therefore, in the hypothesized causal model, Entrepreneurial Self-Efficacy plays a dual-role, independent and dependent variables.

The hypothesised causals of Innovation Orientation are Creativity, Entrepreneurial Orientation, Innovation Motivation and Entrepreneurial Self-Efficacy. The direction or magnitude of the relationship among these latent variables is pre-determined based on the theory. The distinction between independent variables and dependent variables are also pre-determined based on theory.

Population and Sampling

The total population of undergraduate students in Malaysian public higher education are 299,179 students (Ministry of Higher Education, 2012). It is not possible to examine the entire population due to time and resource constraints, therefore this research sampled a smaller group of undergraduate students that are representative of the entire population (Yates, 1949, Kim et al., 2006; Khan et al., 2003; May et al., 2010). Based on Krejcie and Morgan's (1970) 'sample size table estimation', with a confidence level of 95%, the sufficient number of respondent needed for this research is approximately 2,000 undergraduates. Moller et al. (2009) asserted that a sample size of 1.0% to 0.5% of the population is stable and thus stability of the parameter estimates are ensured. Therefore, this research sampled 2,507 undergraduates and this represents 0.84% of the total population.

All respondents are Malaysian or a permanent residence of Malaysia. There were nine public universities involved in the research namely Universiti Sains Malaysia, Universiti Utara Malaysia, Universiti Kebangsaan Malaysia, Universiti Malaya, Universiti Teknologi MARA, Universiti Malaysia Sabah, Universiti Malaysia Pahang, Universiti Malaysia Kelantan and Universiti Pertahanan Nasional Malaysia. Based on gender fraction, 985 respondents (n=2,507) are male and they accounts 39.3% of the total respondents. Female respondents are 1,522 undergraduates and they accounts 60.7% of the total respondents. Stratified sampling plan employed but in the end, the actual gender disproportion in the population prevails.

Measures

The main dependent variable is Innovation Orientation. Since multiple relationships of dependent and independent variables are involved in this research, Structural Equation Modeling (Arbuckle, 2008) is selected. Based on the theory, the dependent variable (Innovation Orientation) is hypothesized to positively associate with Creativity, Entrepreneurial Orientation, Innovation Motivation and Entrepreneurial Self-Efficacy. All of these variables are latent and each variable are measured by a number of measured variables. These five latent variables are called constructs to differentiate them from the measured variables. In total, 24 measured variables represented the five latent constructs.

Exogenous Latent Variables

The exogenous latent variables in the hypothesised model are Entrepreneurial Self-Efficacy, Innovation Motivation, Creativity and Entrepreneurial Orientation. The independent variable is called exogenous latent variable. Exogenous latent variables are the cause of fluctuations in the values of other latent variables in a model (Gefen et al., 2000). Changes in the values of exogenous variables are not explained by the model rather, they are considered to be influenced by other factors external to the model (Ho, 2006).

Endogenous Latent Variables

Endogenous latent variables are synonymous with dependent variables. Endogenous latent variable are influenced by the exogenous variables in the model either directly or indirectly (Gefen et al., 2000). Fluctuation in the values of endogenous variables is explained by the model because all latent variables that influence them are included in the model specification (Byrne, 2010). The endogenous latent variable is Innovation Orientation. Innovation Orientation based on the Theory of Componential Creativity and Innovation (Amabile, 2012) is the focus of this study. However, based on Social Cognitive Theory of Self-Regulation (Bandura, 1999), Creativity, Entrepreneurial Orientation and Innovation Motivation are mediated by Entrepreneurial Self-Efficacy. Therefore, in this case Entrepreneurial Self-Efficacy is hypothesised to play the role of the endogenous variable.

Reliability

Preliminary data analysis of the pilot study confirmed the general reliability of the survey items. Internal consistency ensures that the individual items of a scale measure the same concept and are highly correlated (Hair et al., 2010). Cronbach's alpha, a coefficient of internal consistency was used to measure the reliability of the instrument through a score ranging from zero to one, with a score closer to one indicating higher reliability. Reliability indicates the stability and consistency by which a survey questionnaire measures the constructs and helps to assess the goodness-of-fit of a measure (Hair, Black, Babin, Anderson & Tatham, 2006; Sekaran, 2006). Hair et al., (2010) argued that preferably the coefficient should be 0.70 or higher. Ary et al. (2006) indicated that a coefficient greater than or equal to 0.50 is acceptable for exploratory research. Sekaran (2006) suggested that 0.60 is the lowest acceptable in this type of study. The Cronbach Alpha values are all above 0.7 (Hair, Black, Babin & Anderson, 2010) indicating all items have high reliability be used in the actual research.

Data analysis

Causal-Steps approach (Baron & Kenny, 1986) and Bootstrapping approach were adopted to test the significance of indirect effect (Preacher & Hayes, 2004) via AMOS. Prior to analysis, regression imputation was done on the raw data to create a single, complete dataset that are needed to convert structural model into path model, for path analysis. For each case, the unobserved values on the observed values are regressed, assuming that the population mean,μ and covariances,cov of all variables are equal to their maximum likelihood estimates (Arbuckle, 2008). In other words, the full structural model data are converted into path model by parcelling the observed variables for each latent construct into single computed variable. Regression Imputation on the raw data was done to save the estimates of scores of each observed variables on the latent constructs by imputation of the composite variables (observed variables). This technique employs weighted average based on the factor weights that are estimated in factor analysis. This technique provides datasets with values that more accurately represent the latent construct values compared to conventional technique that plainly averaged the composite variables of each latent construct. This technique is done through Regression Imputation Analysis option in AMOS. After completing this process the data sets are ready to be used in the path mediation analysis, where the presence of mediation effect in the path model are assessed.

An important aspect of path modeling is to determine the presence or absence of a mediation effect (Ho, 2014, p.327). One of the most common way to determine mediation effect is to use Ordinary Least Squares (OLS) via SPSS, but OLS parameter estimation is partial-information technique (Meyers et al., 2013, p.914). Therefore, in this research the magnitude of the direct and indirect influences that each variable was hypothesized to have on the other variables that follow it

in the presumed causal order is to run multiple regression analysis with Maximum Likelihood (ML) estimation.

Three separate regression analysis was run in AMOS, employing maximum likelihood (ML) parameter estimation to calculate the path coefficients simultaneously, and Bootstrapped Bias-Corrected at 95% confidence interval to test for significance of indirect effect. The significance of the indirect path was evaluated from 5000 bootstrap samples; a bias-corrected and accelerated confidence interval (CI) was created for significance tests of the indirect path, ab. For 95% CI, the lower limit must be both positive, or both negative to prove that the Bootstrapped CI for indirect path, ab, did not include zero (both upper and lower limit are in positive or negative region). Thus, it can be concluded that the influence of latent variable, x on Innovation Orientation is partially mediated by Entrepreneurial Self-Efficacy. The result provides evidence of empirical validation, as well as credence to the Social Cognitive Theory (Bandura, 1999) and Theory of Componential Creativity and Innovation (Amabile, 2012) to model undergraduates' innovation orientation.

Research Findings

The Direct and Indirect Effect of Creativity on Innovation Orientation through Entrepreneurial Self-Efficacy

The total effect of Creativity on Innovation Orientation denoted by $c=0.516$ is significant. The unstandardized regression coefficient for the prediction of Entrepreneurial self-efficacy from Creativity, path coefficient denoted by $a=0.491$ is significant by Critical Ratio test, $CR=28.224$, $p< .001$. The unstandardized regression coefficient for prediction of Innovation orientation from Entrepreneurial self-efficacy, path coefficient denoted by $b=0.137$ is significant by Critical Ratio test, $CR=7.531$, $p< .001$. The unstandardized regression coefficient for prediction of direct or remaining effect of Creativity on Innovation when the mediating constructs are included in the analysis, denoted by $c'=0.445$ is significant by Critical Ratio test, $CR=23.193$, $p< .001$. Because both the a-path and b-path were significant, mediation analyses were tested using bootstrapping method with bias-corrected confidence interval estimates. The significance of the indirect path was evaluated from 5000 bootstrap samples; a bias-corrected and accelerated confidence interval (CI) was created for significance tests of the indirect path, c'. For 95% CI, the lower limit was 0.052 and the upper limit was 0.092. The results show that the Bootstrapped CI for path c' did not include zero (both upper and lower limit are in positive region). Thus it is concluded that the influence of Creativity on Innovation Orientation is partially mediated by Entrepreneurial Self-Efficacy (Figure 1.3).
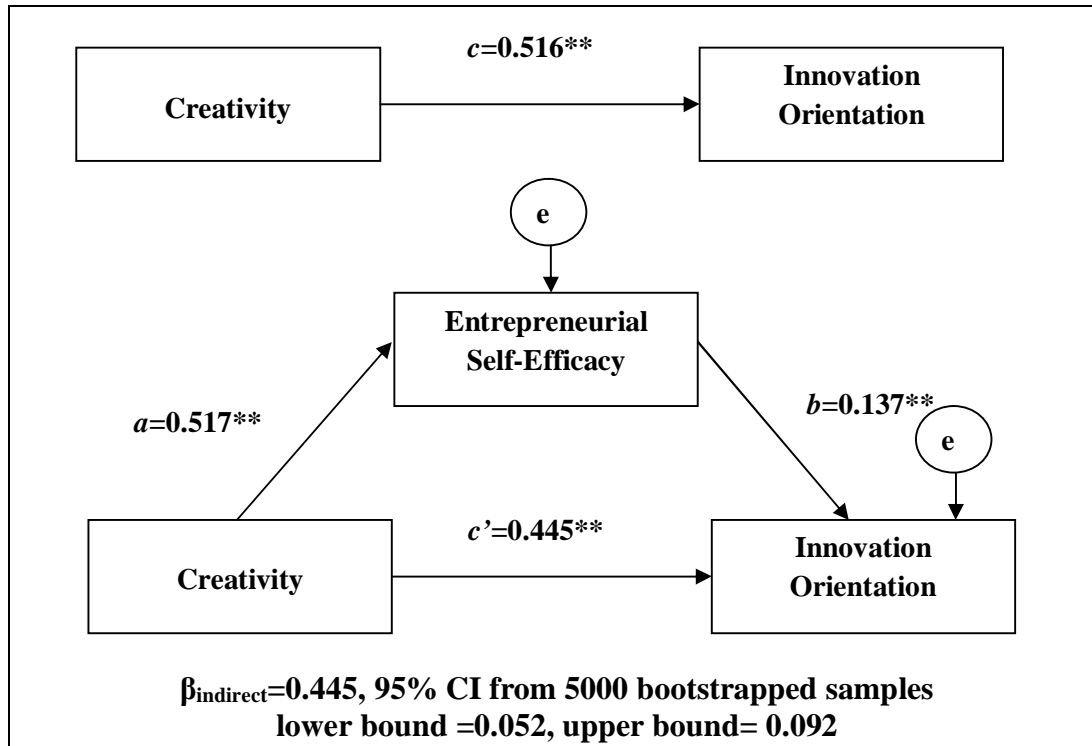
Figure 1.3 Path Coefficients for Creativity, Entrepreneurial Self-Efficacy and Innovation Orientation Mediation Analysis

The Direct and Indirect Effect of Entrepreneurial Orientation on Innovation Orientation through Entrepreneurial Self-Efficacy

The total effect of Entrepreneurial Orientation on Innovation Orientation denoted by c=0.574 is significant. The unstandardized regression coefficient for the prediction of Entrepreneurial self-efficacy from Entrepreneurial Orientation, path coefficient denoted by a=0.593 is significant by Critical Ratio test, CR=29.650, p< .001. The unstandardized regression coefficient for prediction of Innovation Orientation from Entrepreneurial self-efficacy, path coefficient denoted by b=0.127 is significant by Critical Ratio test, CR=6.866, p< .001. Because both the a-path and b-path were significant, mediation analyses were tested using bootstrapping method with bias-corrected confidence interval estimates. The unstandardized regression coefficient for prediction of direct or remaining effect of Entrepreneurial Orientation on Innovation Orientation when the mediating constructs included in the analysis, denoted by c'=0.498 is significant by Critical Ratio test, CR=23.204, p< .001. The significance of the indirect path was evaluated from 5000 bootstrap samples; a bias-corrected and accelerated confidence interval (CI) was created for significance tests of the indirect path, c'. For 95% CI, the lower limit was 0.052 and the upper limit was 0.100. The results show that the Bootstrapped CI for path c' did not include zero (both upper and lower limit are in positive region). Thus it is concluded that the influence of Entrepreneurial Orientation on Innovation Orientation is partially mediated by Entrepreneurial Self-Efficacy (Figure 1.4).
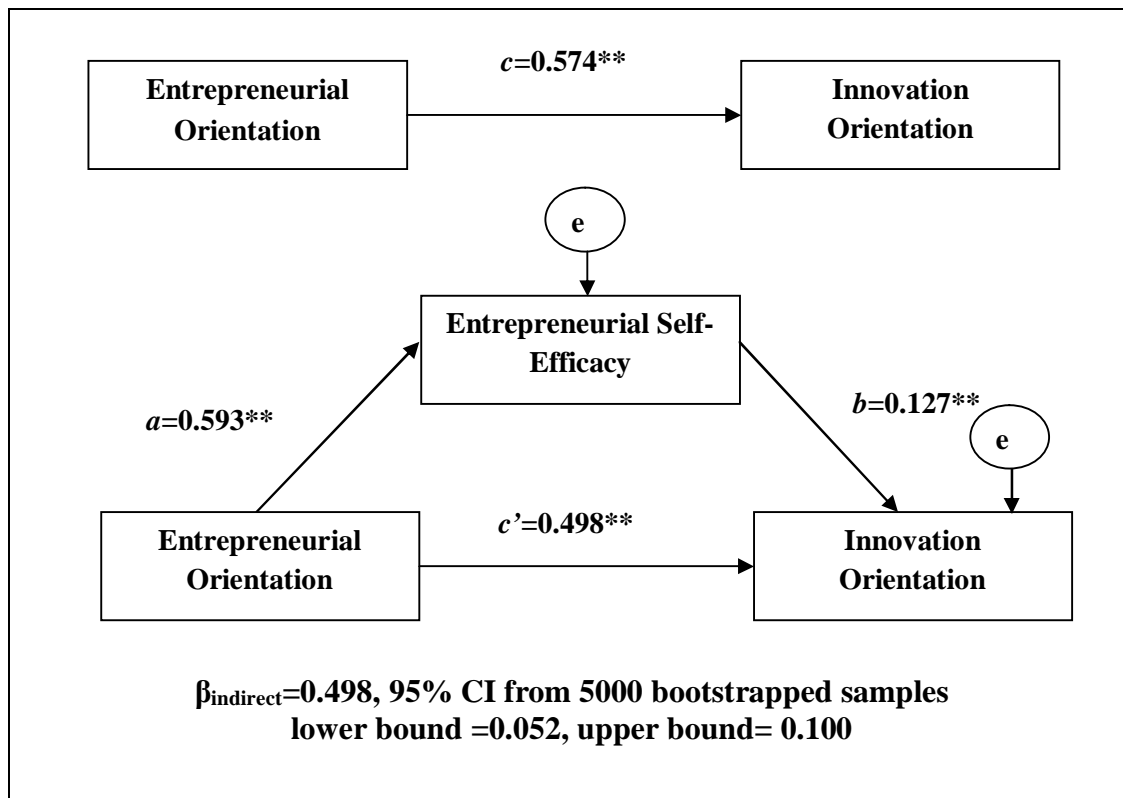
Figure 1.4 Path Coefficients for Entrepreneurial Orientation, Entrepreneurial Self-Efficacy and
Innovation Orientation Mediation Analysis

The Direct and Indirect Effect of Innovation Motivation on Innovation Orientation through Entrepreneurial Self-Efficacy

The total effect of Innovation Motivation on Innovation Orientation denoted by c=0.530 is significant. The unstandardized regression coefficient for the prediction of Entrepreneurial self-efficacy from Innovation Motivation, path coefficient denoted by a=0.525 is significant by Critical Ratio test, CR=28.190, p< .001. The unstandardized regression coefficient for prediction of Innovation Orientation from Entrepreneurial self-efficacy, path coefficient denoted by b=0.134 is significant by Critical Ratio test, CR=7.395, p< .001. The unstandardized regression coefficient for prediction of direct or remaining effect of Innovation Motivation on Innovation Orientation when the mediating constructs included in the analysis, denoted by c'=0.459 is significant by Critical Ratio test, CR=23.633, p< .001. Because both the a-path and b-path were significant, mediation analyses were tested using bootstrapping method with bias-corrected confidence interval estimates. The significance of the indirect path was evaluated from 5000 bootstrap samples; a bias-corrected and accelerated confidence interval (CI) was created for significance tests of the indirect path, c'. For 95% CI, the lower limit was 0.051 and the upper limit was 0.091. The results show that the Bootstrapped CI for path c' did not include zero (both upper and lower limit are in positive region). Thus it is concluded that the influence of Innovation Motivation on Innovation Orientation is partially mediated by Entrepreneurial Self-Efficacy (Figure 1.5).
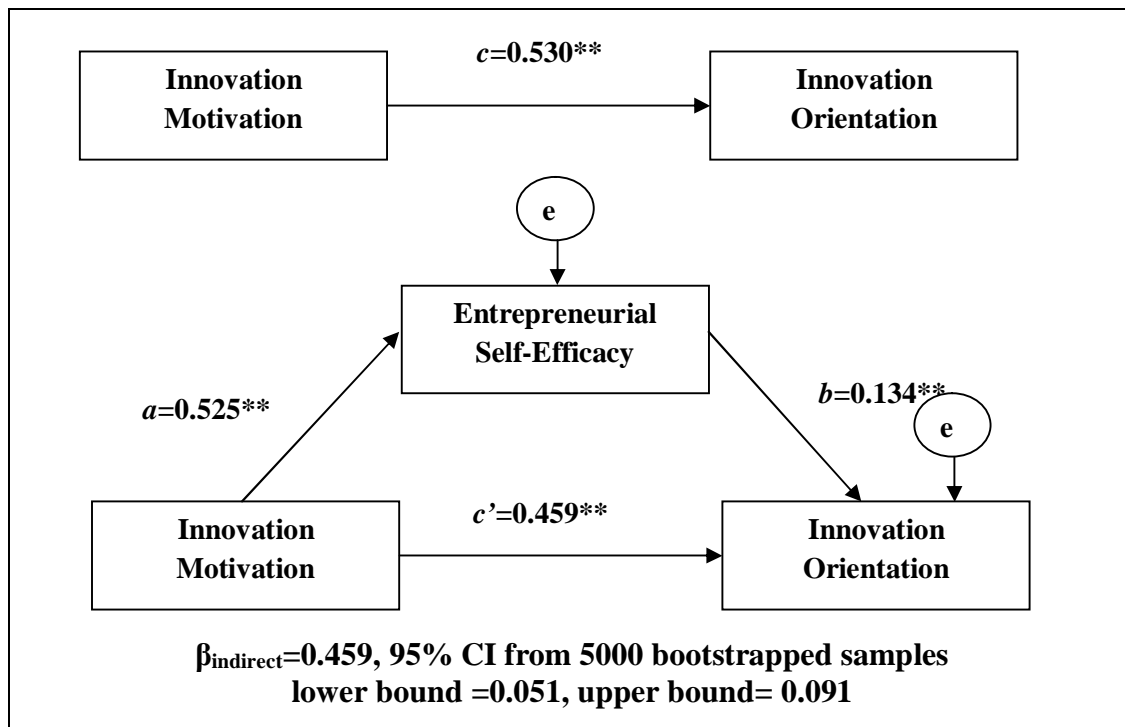
Figure 1.5 Path Coefficients for Innovation Motivation, Entrepreneurial Self-Efficacy and
Innovation Orientation Mediation Analysis

Discussion

The results maximize the indirect effect that was transmitted through hypothesized mediator and minimize any remaining direct effect of independent variable. These mediation relationship tests lend support for the Social Cognitive Theory (Bandura, 1999). It was found entrepreneurial self-efficacy partially mediates the relationship between the Innovation Motivation, Entrepreneurial Orientation and Creativity to Innovation Orientation.

Theoretically, it meant Entrepreneurial Self-Efficacy operated by taking small inputs from Innovation Motivation, Entrepreneurial Orientation and Creativity, and translated them into Innovation orientation. The mediator construct - entrepreneurial self-efficacy further explained the causal relationship between the two original constructs. It were interpreted undergraduates' perceived Innovation Motivation, Creativity and Entrepreneurial Orientation factors were translated into Innovation orientation through mediation of their perceived Entrepreneurial self-efficacy.

In practice, this finding enables us to focus on the effective components of treatments, develop ones' entrepreneurial self-efficacy to build the causal mechanism responsible for promoting their innovation behaviour. When there is mediator in the chain of relationship between predictor and outcome, addressing only the predictor-outcome link in the chain may limit the causal effectiveness, whereas sequential interventions that address each link (constructs) may be more successful. Individuals' innovation motivation, creativity and entrepreneurial orientation translates into innovation orientation partially because they also exhibit more entrepreneurial self-efficacy. The finding for the mediation analysis assessment showed the causal relationships are significant. The results are consistent with the pattern of relationships as stated by the Social Cognitive Theory.

The explanatory function of entrepreneurial self-efficacy as the mediating variable is most evident for the intervening variable since it operationalized the hypothesized causal mechanism that theoretically produce the observed association. Entrepreneurial self-efficacy clarifies how the independent constructs affects the dependent construct. Entrepreneurial self-efficacy was used to decompose the remaining relationship into two components: an indirect effect that is transmitted through entrepreneurial self-efficacy, and direct effect, which is the relationship that remains after the mediator construct is taken into account.

The Social Cognitive Theory for example, partially predicts that the relationship between innovation motivation, creativity, and entrepreneurial orientation leading to entrepreneurial self-efficacy provide greater innovation orientation. In this causal sequence, entrepreneurial self-efficacy mediates the influence of innovation motivation, creativity, and entrepreneurial orientation on innovation orientation since it describes one of the ways in which innovation motivation, creativity, and entrepreneurial orientation lead to higher innovation orientation. The indirect effect corroborates a causal interpretation of the focal relationship, validates the underlying process that is thought to connect the independent variables to the dependent variable. The independent variables was partially explained by entrepreneurial self-efficacy, however, some direct effect remains, a result that enhances the validity of the Social Cognitive Theory.

In summary, entrepreneurial self-efficacy as a mediator makes partial/small but statistically significant contribution to explain the relationships. However, the direct effect of the independent constructs on the dependent variable is larger than the indirect effects.

Implication

Entrepreneurial self-efficacy as mediator makes partial, but statistically significant contribution to explain the predictors-outcome relationships. Therefore, the indirect model of innovation orientation gives credence to the Social Cognitive Theory (Bandura, 1999). These results documented to a limited degree the theoretical rationale for entrepreneurial self-efficacy to explain how innovation orientation detracts from innovation motivation, creativity and entrepreneurial orientation. Policy on higher education needs to focus on nurturing entrepreneurial self-efficacy. In the context of Malaysian public university, entrepreneurial self-efficacy was nurtured through the Core Entrepreneurship Co-Curriculum. In this co-curriculum, the focus is on nurturing undergraduates' entrepreneurial self-efficacy. Practically, focus on undergraduates' entrepreneurial self-efficacy is essential to produce innovation oriented graduates.

Conclusion

In future, it is worthwhile to conduct similar research using different research design to examine the causal relationships between constructs in innovation orientation model, for example true experimental research design. True experimental research designs provide more insights on the hypothesized relationships and confirm the sequenced causal relationship of the mediating variable that is treated as the treatment/intervening variable in experimental research. This research model can be the baseline to probe on the antecedent factors in greater depth and breadth through qualitative research, for example by employing interview. Interviews will complement and allow further explanation of constructs: innovation orientation, entrepreneurial orientation, creativity, entrepreneurial self-efficacy and innovation motivation. In conclusion, entrepreneurial self-efficacy partly mediates the effects of Entrepreneurial Orientation, Creativity and Innovation Motivation exertion into Innovation Orientation based on the causal-steps approach (Baron & Kenny, 1986) and Bootstrapped Bias-Corrected approach (Preacher & Hayes, 2008).

References

Amabile, T. (2012). *Componential theory of creativity*. Harvard Business School.

Arbuckle, J. L. (2008). 17.0 user's guide. In Crawfordville, FL. *Amos Development Corporation*.

Ary, D., Jacobs, L., Razavieh, A., & Sorensen, C. (2006). *Introduction to Research in Education*. Thomson Wadsworth. Belmont, CA.

Bandura, A. (1999). Social cognitive theory: an agentic perspective. *Asian Journal of Social Psychology*, *2*(1), 21–41.

Barnir, A., Watson, W. E., & Hutchins, H. M. (2011). Mediation and moderated mediation in the relationship among role models, self-efficacy, entrepreneurial career intention, and gender. *Journal of Applied Social Psychology, 41*(2), 270-297.

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of personality and social psychology, 51*(6), 1173.

Boyd, N. G., and Vozikis, G. S. (1994). The influence of self-efficacy on the development of entrepreneurial intentions and actions. *Entrepreneurship Theory and Practice*, *18*, 64-77.

Byrne, B. M. (2010). *Structural equation modeling with AMOS: Basic concepts, applications, and programming*. CRC Press.

Gefen, D., Straub, D. W., & Boudreau, M. C. (2000). Structural equation modeling and regression: Guidelines for research practice. In *Communications of the Association for Information Systems*.

Gong, Y., Huang, J. C., & Farh, J. L. (2009). Employee learning orientation, transformational leadership, and employee creativity: The mediating role of employee creative self-efficacy. *Academy of Management Journal, 52*(4), 765-778.

Hair Jr, J., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2006). *Multivariate Data Analysis*. Pearson Prentice Hall: Upper Saddle River.

Hair,J.F., Black, W.C., Babin, B., & Anderson, R. & Tatham, R. (2010). *Multivariate Data Analysis*. New Jersey: Pearson Education.

Ho, R. (2006). *Handbook of Univariate and Multivariate Data Analysis and Interpretation with SPSS*. Chapman and Hall/CRC 2006. Pages 281–356.

Kahn, P. E., & Hoyles, C. (1997). The changing undergraduate experience: a case study of single honours mathematics in England and Wales. *Studies in Higher education*, *22*(3), 349-362.

Kim, J. K., Navarro, A., & Fuller, W. A. (2006). Replication variance estimation for two-phase stratified sampling. *Journal of the American Statistical Association, 101*(473), 312-320.

Kohlberg, L. (1966). Moral education in the schools: A developmental view. *The School Review*, 1-30.

Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educ Psychol Meas*.

May, R. J., Maier, H. R., & Dandy, G. C. (2010). Data splitting for artificial neural networks using SOM-based stratified sampling. *Neural Networks, 23*(2), 283-294.

Meyers, L. S., Gamst, G., & Guarino, A. J. (2013). *Applied Multivariate Research-Design and Interpretation*. Sage.

Ministry of Higher Education Malaysia (2012). *MOHE Implementation Plan for Development of Innovative Human Capital at Tertiary Level*. Putrajaya, Malaysia: Ministry of Higher Education.

Möller, J., Pohlmann, B., Köller, O., & Marsh, H. W. (2009). A meta-analytic path analysis of the internal/external frame of reference model of academic achievement and academic self-concept. *Review of Educational Research, 79*(3), 1129-1167.

Prajogo, D.I. & Ahmed, P.K. (2006). Relationships between innovation stimulus, innovation capacity and innovation performance. *R&D Management*, *36*(5), 499-515.

Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior research methods, instruments, & computers, 36*(4), 717-731.

Preacher, K. J., & Hayes, A. F. (2008). Assessing mediation in communication research. *The Sage sourcebook of advanced data analysis methods for communication research*, 13-54.

Salkind, N. J. (Ed.). (2010). *Encyclopedia of research design* (Vol. 1). Sage.

Sekaran, U. (2006). *Research methods for business: a skill building approach*. John Wiley & Sons.

Smith, A., Courvisanos, J., Tuck, J. & McEachern, S. (2012). Building the capacity to innovate: the role of human capital, *NCVER*, Adelaide

Yates, F. (1949). Sampling methods for censuses and surveys. *Sampling methods for censuses and surveys*.

Zhao, H., Seibert, S. E., & Hills, G. E. (2005). The mediating role of self-efficacy in the development of entrepreneurial intentions. *Journal of Applied Psychology*, *90*, 1265-1272.