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The Moderating Role of Strategic Orientations in the Relationship Between Capabilities and Product Innovativeness

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Abstract: Despite the recent progress in understanding the relationship between organizational capabilities and product innovation from Resource-Based View (RBV), little is understood about other strategic factors that may strengthen such relationship. To fill this knowledge gap, this study draws upon resource-based theory to develop and empirically test a model that examines the direct effect of marketing and technological capabilities on product innovativeness, performance outcome of product innovativeness and moderating effect of market orientation and technology orientation on marketing capability-innovativeness and technological capability-innovativeness links. Based on Structural Equation Model (SEM) analysis from Partial Least Square (PLS) approach on a survey data of 110 technopreneurial software firms in Malaysia, the results show that marketing and technological capabilities are the antecedents of product innovativeness that in turn enhances organizational performance and also that market orientation strengthens technological capability innovativeness relationship. The findings contribute both theoretically and practically in the arena of product innovation.

Key words: Marketing capability, technological capability, market orientation, technology orientation, product innovativeness, performance

INTRODUCTION

Innovation is regarded as a means to achieve competitive advantage, better organizational performance and growth. Because product innovation has become a powerful force for change in industries as well as societies, leadership in the 21st century will belong to technological firms that can capitalize the best on innovation. The technological firms owned by technopreneurs are regarded as technopreneurial firms and technopreneurs are technology entrepreneurs who do their business with technology such as ICT (Information and Communication Technology) that benefits human society. They play a vital role in economic growth as they travel less explored ways to create their products and jobs and increase national income. For their sustainable growth, technopreneurial firms need to stay ahead of competition by creating new markets with successful product innovations. However, they usually have limited resources and capabilities compared to big firms and face a challenge in taking the opportunity of market pull and technology push to translate their capabilities into product innovation that in turn create economic returns. Despite the growing body of innovation literature, it is still questionable what kind of strategic orientation would help them better in taking advantage of market opportunities and strengthen the innovation outcome of marketing and technological capabilities. This study attempts to address this research question. It is important to have clear understanding of what and how strategic orientations affect the relationship between capability and product innovativeness of the firm because strategic orientations allow the firms to take the opportunity of market pull and technology push and at the same time, take advantage of capabilities to create innovative products.

Based on Resource-Based View (RBV), researchers have linked capabilities to innovation behavior and new product development (Park and Kim, 2013; Eng and Okten, 2011; Liao *et al*., 2009). Based on RBV, organizational capabilities are viewable as one of the most important sources of competitive advantage. Danneels (2002) suggests that the two key tasks involved in product innovation are to physically make a new product (which is enabled by technological competence) and to sell that product (which is enabled by marketing competence). Therefore, marketing and technological capabilities are contended as the most crucial contributing

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factors of product innovation process that involves product ideation, development and commercialization. Eng and Okten (2011) suggest a proposition to explore the mediating role of technological capabilities between marketing and innovation capability but not the combined effect of technological and marketing capabilities on innovation behaviour, giving the opportunity for further empirical investigation into such combined effect. In view of literature findings and RBV, the first objective of this study is to investigate the effect of marketing and technological capabilities as antecedents of product innovativeness among software firms owned by technopreneurs.

Secondly, Rosenbusch *et al.* (2011) suggest that empirical findings of innovation performance research are contradictory and the effect of innovation on performance is contextual. Moreover, such effect has not been sufficiently examined particularly in the context of technopreneurial firms in the countries which are striving towards knowledge-based economy where innovation and performance of technological firms play an important role. This literature gap warrants further examination of performance outcomes of product innovativeness as the second objective of the study.

Thirdly, beside capabilities, prior literature has tested the direct effect of strategic orientations on innovation but not the moderating effect (Vega-Vazquez *et al.*, 2012; Sainio *et al.*, 2012; Atuahene-Gima, 1996). Moreover, literature indicates mixed findings with regards to the direct effect of market and technology orientations on innovation. While, the view prevails that influence of customer orientation on innovation is positive (Gatignon and Xuereb, 1997; Lukas and Ferrell, 2000) the other group of researchers (Christensen and Bower, 1996) suggest that customer orientation negatively affects the introduction of new-to-the-world products. As such, there is still a need to investigate how strategic orientation of a firm affects the impact of its capabilities on product innovativeness. According to Narver and Slater (1990), the concept of market orientation implies understanding the expressed needs and the latent needs of customers that is opportunities for customer value of which the customer is unaware. In addition, Tidd *et al.* (1997) suggest that innovation is driven by the ability to see connections to spot opportunities and to take advantage of them. Therefore, it is important that the firms have market and technology orientation to take advantage of market opportunities that can turn their capabilities into innovations. Based on this view, strategic orientations of the firms could be conceptualized as an analytical link between the external opportunities and the capabilities of the firm to exploit them for innovation.

In view of the inconsistent findings concerning the direct effect of market orientation and limited literature on moderating effect of strategic orientations on product innovativeness, this study argues that market orientation and technology orientation may have moderating effect, rather than direct effect, on the relationship between marketing and technological capabilities and product innovativeness. This argument is based on the view that better understanding of market and technological trends as the result of market and technology orientations would strengthen the firms' capabilities in developing and commercializing the commercially viable new products. Based on this argument, the third objective of this study is to explore the moderating role of marketing and technology orientation on market and technological capability-innovativeness link.

This study empirically tests a conceptual model that lies on the tenet that firms could be able to translate their capabilities into product innovations if they are market and technology-oriented enough to recognize the market pull and technology push that trigger innovation and generate economic returns. In other words, the effect of marketing and technological capabilities on product innovativeness can be enhanced if the firms have high level of market and technology orientation.

This study focuses on software innovation and performance of software firms which are vital to nations, economies and industries as well as individual and organizational users of software products. The software sector and technopreneurial firms are important to developing nations with knowledge-based economies that depend on knowledge creation and technological innovations. Moreover, software sector provides digital solutions or computerized systems such as Enterprise Resource Planning (ERP) that facilitate business management and also enhance the efficiency and innovation of goods and services from a variety of industries.

The contribution of this work lies in advancing our theoretical and empirical understanding of antecedents, outcome and moderating factors of product innovativeness among technopreneurial firms in software industry. Practically, the findings of this paper would be useful to technopreneurial software firms in their endeavor to achieve greater business performance via product innovation by leveraging their strategic capabilities. The insights derived from this study will help the firms to take advantage of market opportunities in translating their internal capabilities to innovative products. Theoretically, this study contributes to the existing literature by advancing a new conceptual model that gives avenue for further research. The findings of

this study extends the existing theories such as RBV by showing that innovation impact of marketing and technological capabilities could be enhanced by outward looking behaviors such as market orientation. Therefore, this study fills the literature gap since, prior studies have given scant attention to moderating effect of strategic orientations on capability-innovation relationship.

Theoretical background and hypotheses: The Resource-Based View (RBV) provides a theoretical framework for determining which resources and capabilities generate sustainable competitive advantages (Barney, 1991; Wernerfelt, 1984). Resource-Based Theory (RBT) posits that resources are the primary determinants of competitive advantage. According to Barney (1991), a firm's resources include all assets, capabilities, organizational processes, firm attributes, information and knowledge that enable the firm to implement strategies and improve its efficiency and effectiveness. Innovation researchers have used RVB to explain how firms derive innovative advantage by optimizing their resources and capabilities for new product development. Teece *et al.* (1997) have extended RBV further to include the dynamic capability perspective, stressing the critical role of capabilities to integrate, build and reconfigure competencies to address rapidly changing environments. Among the capabilities that have been linked to innovation, marketing and technological capabilities are more significantly regarded as determinants of product innovation (Di Benedetto *et al.*, 2008; Daneels, 2002). Therefore, this study examines the antecedent role of marketing and technological capabilities in enhancing the product innovativeness.

Product innovativeness: The growing importance of innovation to entrepreneurship is reflected in a dramatic increase in literature that addresses the role and nature of innovation. Studies on innovation are still necessary, especially for newly emerged industries and new markets as there will be different indicators of the innovativeness of different products involved.

Innovation involves a series of scientific, technological, organizational, financial and commercial activities. Wan *et al.* (2005) defined product innovation as the production of new products and services to create new markets/customers or satisfy current markets or customers. It has been acknowledged that the terms innovation and innovativeness are prone to different interpretations and meanings, depending on the industrial sectors accounted for Garcia and Calantone (2002). Naman and Slevin (1993) define innovativeness as the willingness to innovate. According to Lippoldt and Stryszowski software innovation can be seen as a process leading to:

- Development of a novel aspect, feature or application of an existing software product or process
- Introduction of a new software product or process or an improvement in the previous generation of the software product or process

The present study defines software product innovation as "the behaviour of creating superior and useful products that meet the needs of the users by providing simple solutions and improving the prior features". Based on this definition, the present study focuses on the level of product innovativeness that measures the degree of superiority, newness and difference in terms of software products' quality and features compared to competitors' products.

Software innovation driven by market and technological opportunities needs marketing and technological capabilities to develop and commercialize new products that are commercially viable. From resource-based view, organizational capabilities have been linked to innovation in a number of studies (Zhou and Wu, 2010; Hadjimanolis, 2000; Daneels, 2002). However, empirical evidence of the link between innovation and specific capabilities such as marketing and technological capabilities is still limited. Among a number of capabilities that have been linked to innovation, marketing and technological capabilities are regarded as most relevant to the process of product innovation in particular because a firm's ability to sense what a potential market really needs and how to commercialize a new product lies in its marketing capability whereas designing and developing it needs sufficient technological skills. In support of this view, Daneelyama and Watanabe have shown that the firm's ability to succeed with its new product innovations is influenced by its existing technological and market capabilities. Likewise, Daneels (2000) also suggest that product innovation requires the firm to have competences relating to technology and relating to customers. However, the need for empirical evidence on integrated effect of marketing and technological capabilities on product innovativeness still remains. In view of literature findings, this study argues that software firms must develop the right set of capabilities marketing and technological capabilities to enhance their level of product innovativeness.

Marketing capability: Di Benedetto *et al.* (2008) defined marketing capabilities as a firm's skills that permit the firm to better implement its marketing programs such as segmentation, targeting, pricing, advertising and integration of marketing activities and knowledge of customers and competition. According to Song *et al.* (1996), marketing capability is critical in the product development stage at which time consumer needs and the competition must be assessed and information shared for comprehensive new product ideas to be advanced into the development stage. Although, technopreneurial software firms are usually good at software technology or possess software development skills, their marketing skill is still questionable.

In innovation literature, Di Benedetto *et al.* (2008) concludes that marketing capability is more significantly and positively related to innovation in the United States than in Japan. In the context of Taiwan, Su empirically shows that R&D, marketing and manufacturing capabilities have different effect on product and process innovativeness. Moreover, Song *et al.* (1996) found that marketing skills derived from marketing resources and the proficiency in conducting marketing activities are important for successfully developing new products. In view of literature findings, it is arguable that software firms with greater deployment of marketing capability could develop more innovative products due to their ability to offer marketing inputs at product development stage and carry out marketing activities strategically to commercialize the product. Therefore, this study hypothesizes as follows:

- H_1: marketing capability has a positive effect on product innovativeness

Technological capability: Moorman and Slotegraaf (1999) defined product technological capability as a firm's technological ability to formulate and develop new products and related processes. A firm can make concrete, direct investments in developing its technological capabilities through investments in R&D or strategic technology alliances (Renko *et al.*, 2009). The importance of the technological factor to innovation has been highlighted in a number of studies (Liao *et al.*, 2009; Di Benedetto *et al.*, 2008; Souitaris, 2002). Studies by Ritter and Gemunden (2004) empirically shows that technological competence had positive effects on innovation.

The software industry in particular is highly dependent on human resources with excellent technical skills in software development. The software technopreneurs and their team need to be technically savvy to develop unique products for niche markets. Their strong technological skills strengthened by market and technology orientation would expedite the development of products that either meet or exceed customers' requirements and expectations. Therefore, this study argues that technological capability is a crucial requirement for innovative software developments. In line with this argument, this study posits as follows:

- H_2: technology capability has a positive effect on product innovativeness

Performance outcome of product innovativeness: In the context of innovation, prior research has supported the positive impact of innovation on performance but not in the context of software firms (Yusr *et al.*, 2014). Deshpande *et al.* (1993)'s study indicated that innovativeness is related positively to organisational performance in terms of relative profitability, size, market share and growth rate of Japanese firms. Moreover, Romijn and Albaladejo (2002) suggest that high-tech SMEs, e.g., electronics and software demonstrated improved performance by generating new markets and industries via their innovativeness. Although, empirical studies have proven that product innovation is critical for business firms to sustain their competitive advantages, innovating firms sometimes fail to obtain economic returns from product innovation (Teece, 1986). From this perspective, a few studies suggest that product innovation may have either no or negative impacts on performance (Markham and Griffin, 1998). Therefore, reviews of the empirical findings of innovation performance research are contradictory (Li and Atuahene-Gima, 2001). In view of inconsistent literature findings, investigating whether a software firm's innovativeness enhances its performance is still necessary.

Because successful new products satisfy customers and create new markets, boosting sales and profits, innovation is one strategic way to achieve better performance and growth. Thus, customer-driven product innovation will not only offer financial returns to the firm, but also non-financial benefits such as satisfied customers, new markets, a technological edge over competitors and corporate image. Therefore, this study argues that an innovative firm with the ability to satisfy a customer's needs by offering superior products with different features will enjoy better organizational performance. Based on this argument, this study hypothesizes as follows:

- H_3: product innovativeness has a positive effect on organizational performance

In previous literature, some researchers claimed that innovation could be either market-driven or technology-driven as innovation could be triggered by "market push" or "technology pull" because firms often innovate in response to markets forces such as customer needs and competitive pressures and therefore, the strategic orientation of the firm towards market forces influence how firms take advantage of their capabilities to optimize their product innovation activities. In other words, firms' decision to innovate is contingent on their level of market orientation. Likewise, technology-oriented firms will focus on R&D and engage in innovation in response to a technology push. Given this perspective, the present study incorporates market and technology orientation as moderators on the relationship between market and technological capabilities and innovativeness.

Moderating role of market orientation: Strategic orientations facilitate a match between a firm's strategy and resource endowments and the adaptation to market conditions (Mu and Benedetto, 2011). Marketing and technology orientations are regarded as crucial factors to product innovation because it helps firms to take advantage of market and technological opportunities that trigger innovative products. From a cultural point of view, Narver and Slater (1990) defined market orientation as "the organizational culture that most effectively and efficiently creates the necessary behaviors for the creation of superior value for buyers and thus, continuous superior performance for the business". Moreover, market orientation emphasizes on the information gathering, understanding and being responsive to customers' needs, competitors' movements that may trigger the firms to develop products that meet the market need. Therefore, market orientation acts as a catalyst in translating firm's capabilities to innovative products.

Narver and Slater (1990) conceptualized market orientation into three components: customer orientation, competitor orientation and interfunctional coordination. Among three components, customer orientation and competitor orientation have been widely used to represent market orientation. The concept of customer orientation emphasizes the importance of the customer need to a firm's performance in many aspects including new product development. Narver and Slater (1990) defined customer orientation as sufficient understanding of its target buyers in order to be able to create superior value for them continuously. Innovation research has long emphasized the importance of understanding user needs when developing new products and suggests that customer orientation favors innovation (Vega-Vazquez *et al*., 2012). On the other hand, some studies suggest that an overemphasis on customers could lead to trivial innovations and myopic Research and Development (R&D) which might lower the firm's innovative competence (Christensen and Bower, 1996).

Narver and Slater (1990) state that competitor orientation means a seller understands the short-term strengths and weaknesses and long-term capabilities and strategies of both key current and future potential competitors. Han *et al*. (1998) suggest that the objective of competitor-orientation is to keep pace with or stay ahead of the rest of the field and thus, competitor-oriented culture should facilitate innovations. In software industry, where the products gets obsolete fast, it is important that firms get first move advantage by being earlier and better than competitors in introducing new products. Therefore, competitor orientation is vital for software firms since it allows them to be watchful of competitors' product plans. Similar to customer orientation, inconclusive empirical findings exists for the relationship between competitor orientation and innovativeness in the literature. While, the view prevails that influence of competitor orientation on innovation is positive (Gatignon and Xuereb, 1997; Hurley and Hult, 1998), the other group of researchers (Lukas and Ferrell, 2000; Frambach *et al*., 2003) suggest that competitor orientation negatively affects the introduction of new-to-the-world products.

In view of inconclusive findings with regards to the relationship between market orientation and innovation, it is possible that market orientation have moderating effect instead of direct effect on product innovativeness of the firms. Moreover, studies have suggest that market intelligence about customers' current and future needs and preferences creates a great opportunity for a firm to introduce novel and meaningful new products to its customers (Deshpande *et al*., 1993). Therefore, this study argues that market orientation as firms' outward looking behaviour helps the firms to recognize customers' needs as market pull to develop new products that match the needs. Moreover, market-oriented firms which has a sound understanding of customer needs and competitors movements is able to make use of its technological capability to develop a product compatible with market need and also utilize of marketing capability to commercialize it. Therefore, this study argues that market orientation positively moderates the relationship between marketing and technological capabilities and product innovativeness. Based on this argument:

- H_4: market orientation strengthens the effect of marketing capability on product innovativeness
- H_5: market orientation strengthens the effect of technological capability on product innovativeness

Moderating role of technology orientation: Similar to market orientation, moderating role of technology orientation has not been addressed well in innovation literature. In some industries, firms' tendency to innovate is not directly influenced by their orientation towards market and technological opportunities. Some firms may be compelled to develop new products when market opportunity favours but they cannot possibly achieve successful innovations if they lack required capabilities to develop and commercialize them. Therefore, capabilities are regarded as major determinants of product innovation while their impact on innovativeness could be strengthened by market and technology orientations that prompt the firms to take advantage of market opportunities.

Gatignon and Xuereb (1997) defined a technology-oriented firm as one with the ability and will to acquire a substantial technological background and use it in developing new products. They further suggest that technologically-oriented firms tend to invest more in R&D and foster a commitment to the application of new technology within the organization. Their empirical study concluded that the effect of technology orientation on innovation is contingent on market uncertainty. While, some researchers have found a positive relationship between technology orientation and product innovation (Yang *et al*., 2012; Sainio *et al*., 2012; Hortinha *et al*., 2011), others found conditional relationships (Spanjol *et al*., 2012; Gatignon and Xuereb, 1997; Zhou *et al*., 2005). Interestingly, Zhou *et al*. (2005) found that technology orientation is associated positively with technology-based innovation but had no effect on market-based innovation. These inconsistent findings warrant examination of moderating effect of technology orientation on product innovativeness in the software context because significance of direct or moderating effect may depend on the industry.

Especially in software markets in which technology gets obsolete quickly, firms need to focus on advancing their technology to offer innovative products. Therefore, this study contends that technology-oriented firms are more innovative because technology orientation allows them to make best use of technology advancement in the industry and leverage on its technological capability to translate technology push into innovation while they can also take advantage of marketing capability to convert technology push into commercialized innovations. Accordingly:

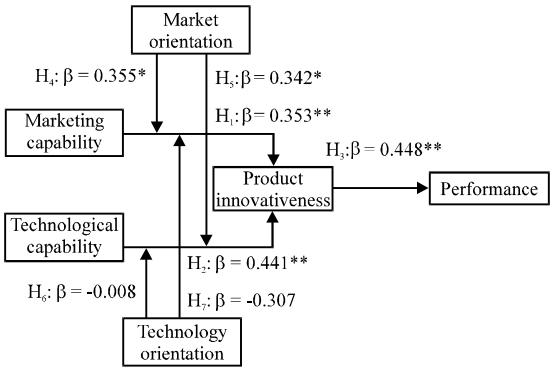

Fig. 1: Results of direct and moderation effects. *Significant at $p<0.05$

- H_6: technology orientation strengthens the effect of technological capability on product innovativeness
- H_7: technology orientation strengthens the effect of marketing capability on product innovativeness

This study empirically tests the theoretical model as shown in Fig. 1 to understand the direct effect of marketing and technological capabilities on product innovativeness, performance outcome of product innovativeness and moderating effect of market orientation and technology orientation on marketing capability-innovativeness and technological capability-innovativeness links.

MATERIALS AND METHODS

Sample and data collection: The sample consists of 110 Malaysian Technopreneurial Software firms that develop their own products. In Malaysia, technopreneurs are owner or founder of most of the software firms of small to medium size. Malaysia was deemed appropriate for a research setting for two compelling reasons. One reason is that Malaysia is striving to develop a knowledge-based economy which should be innovation-driven and in which technopreneurs play a catalytic role. Another reason is that the innovation aspect of software firms is under-researched to date, indicating a need to investigate the contributing factors as well as performance outcomes of innovativeness. The particular focus on software sector is due to the presence of higher levels of product innovation in that sector compared to the hardware sector which is more prone to trading. Moreover, software sector lies at the heart of the modern economy, serving as a driver, an enabler and a diffuser of innovation across all sectors and industries.

The selection criteria for potential responding firms were that the firm must be a software developer, owned by a technopreneur and located in Malaysia. Therefore, the unit of analysis in this study was the "organization". Target respondents were the business owner, partner or the management staff, who had access to required information concerning the topics of interest.

The data were collected primarily by means of a web-based survey because the target respondents were from software firms who are generally IT savvy and regular users of computer and email. Contact information for respondents was obtained from directory of ICT SMEs obtained from the website of Technopreneur and Development Division (TEDD). TEDD was under Multimedia Development Corporation (MdeC), a government-owned institution responsible for the management of the Multimedia Super Corridor (MSC Malaysia) in Malaysia as a technology industry and commerce zone. First, phone calls were made to identify potential respondents from the firms and to get their emails. Next, emails with a cover letter and the link to the survey website were sent to the potential respondents. Out of 312 potential firms contacted, only 110 firms responded to the survey for a response rate of 35% within the period of four months. Most respondents answered the survey after one or two follow-ups. Only five respondents responded after three rounds of follow-ups. Therefore, response-bias analysis was deemed unnecessary due to the negligible number of late responses.

Measures: After conducting a pretest with five practioners, some items were reworded to make sure they were clear, easy to understand and suit the software context. Practitioners were asked to answer the draft survey questions and to comment on the suitability to software context and their understanding. To measure product innovativeness, this study adapted the measures by Paladino (2007) to incorporate the important dimensions such as superiority and differentiation of product features that suit software innovation. There were six items using a five-point Likert-like scale ranging from 1 = "strongly disagree" to 5 = "strongly agree". Based on feedback from pretest, six of the Paladino's seven items was used, except the item 5 ("Our new products (services) incorporate a large new body of technological knowledge") based on construct validity test results.

To measure marketing capability, this study adapted the measures by Morgan *et al.* (2009). There were six items with a five-point Likert-like scale ranging from 1 = "very low" to 5 = "very high" to self-assess the respondent firm's marketing capabilities. For technology capability, this study adapted the measures by Zhou and Wu (2010). There were five items for technology capability, measured by similar Likert-like scale to self-assess the respondent firm's technological capability in five areas.

To measure market orientation, Narver and Slater (1990)'s MKTOR scale was adopted with a focus on two components: customer orientation and competitor orientation. There were six items for customer orientation and four items for competitor orientation, all measured by five-point Likert-like scale. As for technology orientation, this study adapted the measures by Zhou *et al.* (2005) who adapted the original measures by Gatignon and Xuereb (1997). The items assess a firm's proactivity in using state-of-the-art technologies in new product development. There were four items for technology orientation, measured by five-point Likert-like scale.

This study adapted the measures of financial (sales, net profit and cash flow) from Chandler and Hanks (1994) and non-financial measures (customer satisfaction, market share and employee satisfaction) from Hoque (2004).

Profile of responding companies: In this study, a total of 110 software companies responded to the survey. The majority of the responding firms (75.7%) were private limited. Notably that 48.6% of them were located in Kuala Lumpur followed by 28.8% in Selangor and 16.2% in Penang. As for the firm size, 91.8% had <50 employees. Only 4 firms had >100 employees. Of those surveyed, 46.8% had been in operation for between 6-10 years. Responding firms offered a variety of software products meant for industries such as manufacturing, retail, insurance, banking, education, hospitality and healthcare. POS (Point of sales system) for retail industry and ERP (Enterprise Resource Planning) for manufacturing were slightly more common among the products offered. The majority of the respondents were found to be either business owners (32.4%) or business partners (29.7%). The rest of the respondents were found to be at managerial level such as head of IT department, general manager and operation manager.

RESULTS AND DISCUSSION

In this study, SPSS Version 20 was used for data screening, demographic profiling of respondent firms and the common method variance whereas SmartPLS Software, developed by Ringle was used for hypotheses testing by means of Structural Equation Model (SEM) from the Partial Least Square approach. Basically, this study chose PLS approach due to its advantages compared

to first generation techniques. PLS-SEM is a combination of multiple regression and factor analysis as it allows testing the relationships between the variables and also the validity and reliability of the measures. It also enables the researcher to simultaneously examine a series of interrelated dependence relationships among the measured variables and latent constructs as well as between several latent constructs. Chin (2010) recommended using the two-step approach to analyze results of the study by examining the measurement model first followed by the structural model.

Before assessing the models, it is important to identify constructs as reflective or formative which tells the way measurement indicators are related to their respective constructs. Based on Jarvis, original measures in this study are deemed to be reflective because indicators have the same or similar content, indicators share a common theme and the indicators are not the direct causes of the constructs. In formative constructs, indicators do not have the similar content do not share a common theme and are the direct causes of the constructs.

In addition, common method bias in this study was examined by Harman's single factor test in SPSS. Results indicated that common method bias is not a concern in this study where 37 distinct factors accounted for 73.4% of the variance and the first factor only captured 32.2% of the variance.

Measurement model: To validate the measurement model, convergent and discriminant validity of the measures were assessed as suggest by Fornell and Larcker (1981) and Hair *et al.* (2013).

Convergent validity: Convergent validity indicates the degree to which a measure correlates positively with alternative measures measuring the same construct (Hair *et al.*, 2013). In this study, all the constructs were modeled as reflective construct, hence the indicators should share a high proportion of variance. Hair *et al.* (2011) recommended two criteria indicator reliability and Average Variance Extracted (AVE) to establish convergent validity for reflective constructs.

To validate indicator reliability, factor loading as shown in Table 1 was assessed. Factor loading is the correlation between the original variables and the factors and indicates internal consistency of the measurement items. Based on the results of factor loadings, Inno5, Inno6, MC1 and MC6 were deleted as the loadings were below 0.5 (Hair *et al.*, 2013). The rest of the items were deemed to have significant loadings well above 0.5. The exclusion of low-loading items remarkably increased the

Table 1: Summary of construct validity and reliability of all construct

Constructs	Items	Factor loading	AVE[a]	CR[b]
Marketing capability	MC2	0.722	0.638	0.875
	MC3	0.848		
	MC4	0.787		
	MC5	0.831		
Technological capability	TC1	0.845	0.655	0.904
	TC2	0.807		
	TC3	0.882		
	TC4	0.799		
	TC5	0.692		
Product innovativeness	Inno1	0.816	0.566	0.837
	Inno2	0.861		
	Inno3	0.643		
	Inno4	0.665		
Performance	Pfm1	0.747	0.558	0.881
	Pfm2	0.874		
	Pfm3	0.776		
	Pfm4	0.722		
	Pfm5	0.814		
	Pfm6	0.490		
Technology orientation	TO1	0.867	0.683	0.896
	TO2	0.845		
	TO3	0.786		
	TO4	0.806		
Customer orientation	CusO1	0.806	0.613	0.904
	CusO2	0.842		
	CusO3	0.760		
	CusO4	0.855		
	CusO5	0.698		
	CusO6	0.725		
Competitor orientation	ComO1	0.756	0.621	0.867
	ComO2	0.840		
	ComO3	0.800		
	ComO4	0.753		

[a]AVE = (summation of squared factor loadings)/{(summation of squared factor loadings)+(summation of error variances)}; [b]Composite reliability = (square of the summation of the factor loadings)/{(square of the summation of the factor loadings)+(square summation of the error variances)}

AVE of the respective constructs. AVE is the mean variance extracted for the items loading on a construct and is a summary indicator of convergence (Fornell and Larcker, 1981). AVEs of all constructs were above 0.5, indicating adequate convergent validity, meaning that a latent variable is able to explain more than half of the variance of its indicators on average (Hair *et al.*, 2013).

Discriminant validity: Hair *et al.* (2013) suggest that discriminant validity is the extent to which a construct is fully distinct from other constructs. As shown in Table 2, the correlations for each construct were less than the square root of the AVE by the indicators measuring that construct, indicating adequate discriminant validity (Fornell and Larcker, 1981; Chin, 2010).

Market orientation as a second order construct: Market orientation was conceptualized as a second-order construct which comprised two first order reflective construct (competitor orientation and customer orientation). By using second order construct, number of paths in the model can be reduced, making the model more

parsimonious and easier to grasp. Based on the repeated indicator method recommended by Hair *et al.* (2013), the first order factor (customer orientation and competitor orientation) with reflective indicators were modeled into second-order construct with the two first order constructs as formative indicators.

Since, market orientation is conceptualized as a formative second order, the goodness of measure for this construct was ascertained by assessing two criteria: weight and Variance Inflated Factor (VIF). Table 3 shows that all the formative measures fulfill the criteria where the weights are significant $p<0.05$ and VIF values are <5 as recommended by Hair *et al.* (2013). This demonstrates the goodness of measure for formative construct. Figure 1 depicts the results of the moderating effect with market orientation as a second order formative construct.

Structural model

Controlled variable: In this study, age and size of the firm are controlled. PLS path coefficients between product innovativeness and age as well as size of firm were found insignificant, indicating that the age and size are not predictors of product innovativeness in this research setting. Direct effects and moderating effect results will be discussed next for hypothesis testing.

Direct effect: Structural model was assessed to test the direct effect as hypothesized by H_1, H_2 and H_3. As depicted in Fig. 1 and Table 4, results show that marketing ($\beta = 0.353$, $p<0.01$) and technology capabilities ($\beta = 0.441$, $p<0.01$) are positively related to innovation. Moreover, product innovation is also positively related to performance ($\beta = 0.448$, $p<0.01$). Thus, H_1, H_2 and H_3 of this study are supported. The R^2 value of 0.46 for product innovativeness and 0.2 for performance suggest that 46% of the variance explained in product innovativeness is explained by marketing and technological capability while 20% of the variance in performance is explained by product innovativeness.

Moderating effect: To assess the interaction effects of moderators f or H_4, H_5, H_6, H_7, the two-stage approach was applied to create the interaction terms as the moderator or exogenous variable have formative measurement as recommended by Henseler and Chin (2010). As per Table 4 and Fig. 1, market orientation positively moderates the relationship between marketing capability and product innovativeness ($\beta = 0.355$, $p<0.01$) as well as technological capability and product innovativeness ($\beta = 0.342$, $p<0.01$), providing support for H_4 and H_5. To further evaluate this moderating effect of market orientation, F-value was calculated using the following formula ($F^2 = R^2$ Model with moderator-R^2 Model without moderator effect/1-R^2 Model with moderator effect) by Cohen. Based on the calculation, F^2 value is 0.6 (0.665-0.458/1-0.665), indicating a large effect. No statistical support was found for H_6 and H_7 suggesting that technology orientation is not a moderator.

Managerial implications: The objective of this study is three fold: to examine the effect of marketing and technological capabilities as antecedents of product innovativeness; to examine the performance outcomes of product innovativeness; to test the moderating role of marketing and technology orientation on the relationship between product innovativeness and capabilities of the firms.

First, the result shows that marketing and technological capabilities are crucial antecedents of product innovativeness. This finding supports RBT as

Table 2: Discriminant validity

Parameters	1	2	3	4	5	6	7
Competitor orientation	**0.788**						
Customer orientation	0.356	**0.783**					
Product innovativeness	0.437	0.602	**0.752**				
Marketing capability	0.528	0.332	0.549	**0.799**			
Performance	0.507	0.341	0.445	0.419	**0.747**		
Technological capability	0.483	0.531	0.600	0.446	0.449	**0.809**	
Technology orientation	0.456	0.452	0.588	0.521	0.549	0.554	**0.827**

Diagonals (in bold) represent the square root of Average Variance Extracted (AVE) while the other entries represent the correlations

Table 3: Competitor orientation and customer orientation as second order construct

Construct	Type	Items	Weights of Items	VIF
Market orientation	Formative	CusO	0.389**	1.151
		ComO	0.779**	1.151

**Significant at $p>0.01$; *Significant at $p<0.05$

Table 4: Structural model results

Hypotheses	Path coefficient	t-stats	Decision
Direct effect			
H_1: marketing capability has a positive effect on product innovativeness	0.353**	4.411	Supported
H_2: technology capability has a positive effect on product innovativeness	0.441**	5.042	Supported
H_3: product innovativeness has a positive effect on organizational performance	0.448**	6.651	Supported
Moderating effect			
H_4: market orientation strengthens the effect of marketing capability on product innovativeness	0.355*	2.188	Supported
H_5: market orientation strengthens the effect of technological capability on product innovativeness	0.342*	1.908	Supported
H_6: technology orientation strengthens the effect of technological capability on product innovativeness	-0.008	0.029	Not supported
H_7: technology orientation strengthens the effect of marketing capability on product innovativeness	-0.307	1.213	Not supported

*Significant at $p<0.05$

well as previous literature with similar findings (Renko *et al*., 2009; Di Benedetto *et al*., 2008). It implies that a strong marketing and technological capabilities are vital requirements of the firm in developing commercially viable innovative products. Higher level of technological capability will enable the firms to develop superior products whereas that of marketing capability will enable the firm to commercialize those products. Therefore, software firms need to foster, develop and enhance their marketing and technological capabilities by investing in skill training, recruiting experienced staffs with a strong marketing and technological expertise and promoting talented software programmers in order to enhance their level of product innovativeness. Alternatively, software firms may maximize their inherent capabilities by outsourcing or having alliances or joint ventures with reputable partners with stronger technological skills in order to boost their innovation capacity.

Second, the result of this study shows that product innovativeness contributes to organizational performance. This gives empirical support to the previous findings (Yusr *et al*., 2014). It suggests that technopreneurial firms should try to differentiate their products by enhancing their level of innovation in order to boost up their economic returns. Many firms lack the initiative to innovate due to ignorance of performance benefits associated with product innovation. This study encourages software firms to innovate by highlighting the importance of product innovation in achieving superior performance. If a firm is fully aware of the outcomes of innovation, it may put the utmost effort into overcoming innovation barriers or invest more in R&D.

Third, results show that market orientation has a positive moderating effect on the relationship between product innovativeness and marketing capability as well as technological capability. This positive moderating effect of market orientation implies that market orientation strengthens the effect of both marketing and technological capabilities on product innovativeness. In other words, firms could be more innovative if they have a better understanding of market need and take advantage of it to turn their technological capability into innovative products and take advantage of their marketing capability to commercialize the products. Moreover, market orientation allows the firms to get the viable product idea based on market information so that the idea will be well-translated into innovative products if the firms have high level of technological and marketing capabilities. Therefore, it is important that software firms create a market-oriented culture that would encourage the staffs to focus on customer needs and competitor's movements at new product ideation stage as well as commercialization stage. They should also turn customers' problems and complains about their software systems into solutions which give opportunity to develop new products that solve customers' operational problems. Technopreneurs should also take note that market orientation closes the gap between innovation and commercial need since, there are many new products that cannot be commercialized due to mismatch between customer need and product feature. Therefore, market orientation can help in matching the product with market need so that marketing and technological capabilities are well-channeled into innovations.

Interestingly, the results did not give empirical support for the moderating role of technology orientation on capability-innovativeness link. In support of this finding, Hortinha *et al*. (2011) suggest that technological firms usually focus on acquiring sophisticated technologies but there is no guarantee of success for innovation and also that firms need to maintain high level of customer orientation. In this study, technology orientation was measured as a firm's tendency to accept and use advanced technologies. Presumably, keeping up with advanced technology and technology push is not critical in a software firm's innovation process that mainly requires technological capability to develop the product and marketing capability to commercialize it. Based on the findings of moderating effect, it is possible that market pull is the major trigger of innovation, rather than technology push as market orientation is found to moderate the effect of capabilities on product innovativeness. The reason behind this finding could be that most of the software systems are used by different enterprises that need their systems to be customized according to their operational needs. Therefore, it makes sense that software innovations are accentuated by market orientation but not technology orientation.

In summary, the findings suggest that software firms enhance their level of market orientation and boost up their marketing and technological capabilities to enhance their level of product innovativeness and performance outcome.

Theoretical implications: This study makes three major theoretical contributions to innovation and RBV literature. First, it advances a new conceptual model that embraces market and technology orientation as moderators on capability-innovation link. Since, this is one of the first attempts to do so, it gives opportunities for further research.

Second, this study adds knowledge to existing literature as to what key capabilities technopreneurs can channel to successful product innovation while

maximizing their commercial returns. Importantly, this finding adds theoretical understanding of the innovation process by enhancing the validity of RBV in explaining product innovation as a theoretical contribution. By considering both marketing and technological capabilities simultaneously as two crucial antecedents, this study presents a new perspective on synergistic roles of these two capabilities in the development of firms' innovativeness.

Third, this study fills a literature gap on the moderating role of market orientation by empirically showing that the effect of marketing and technological capabilities on innovativeness is conditional on market orientations. The moderating role of market orientation also extends the existing theories such as RBV by adding that innovation impact of internal capabilities could be enhanced by outward looking behaviors such as market orientation. Because moderating role of market orientation has not been explored with regards to capability and innovation, this study adds a new knowledge on a contingent factor that deserves more attention in innovation studies.

CONCLUSION

Findings of this study generally are consistent with the findings of other studies on capability-innovation link for example by Renko *et al.* (2009). However, prior studies have not paid sufficient attention in analyzing how the impact of capabilities on innovation could be conditional on market and technology orientation. To fill this gap, this study identifies the key strategic orientation that strengthens the effect of capabilities on product innovativeness in answering the research question.

In a nutshell, this study delivers two key insights. Firstly, innovation is fostered by internal factors such as marketing and technological capabilities and further strengthened by having market orientation. The insight derived from this finding is that marketing and technological capabilities are vital to enhance the level of successful innovations whereas, their contribution to innovation could be further enhanced by market orientation that translates market pull and technology push into innovative products. This study adds to existing literature that market orientation plays an important role in recognizing both explicit and implicit customer needs and requirements that suit their business operations, since software products need to be tailored to meet the heterogeneous needs of customers in different industries.

Secondly, this study provides insight that technopreneurs could benefit from improved economic returns from their product innovations. Many technopreneurial firms which are striving to survive are usually tied up with their daily operations and often fail to prioritize new product developments or to think what new features or functions would better expedite their customers' business operations. It is possible that awareness of commercial returns of product innovation would encourage them to prioritize innovation at forefront of their agenda. In conclusion, this study helps technopreneurs in developing strategic pathways by leveraging on their strengths and market opportunities to uplift their innovativeness for further commercial success.

LIMITATIONS

Although, this study contributes theoretically and practically, it is not free of limitations. The first limitation is the generalizability of the findings. This study focuses on a single industry, namely, the software industry in a single country, Malaysia. However, this limitation creates an opportunity for future researchers to test the same model in different contexts and industries. Moreover, this study focuses on the organizational capabilities at the firm level. Future studies may examine the technopreneurial skills and competencies at the individual level to determine if any differences exist.

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