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Agile Product Innovation

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1. Introduction

Running a sustainable business and making it future-proof in the increasingly turbulent business environment of today requires certain capabilities including operating in an agile and proactive manner so as to be able to respond to market needs and changes. Such capabilities are however needed to exist within the whole supply chain considering the accepted fact that success of any business is dependent on the effective integration of parties working together in supply chains. Future proof supply chains are believed to be those which compete and focus on innovation and new products introduction (Sharifi et al., 2006). New product introduction in turn involves innovation activities and depends strongly on coordination between organisation's functions (Nonaka and Takeuchi, 1995, Montoya-Weiss and Calantone, 1994, Alegre-Vidal et al., 2004). The literature also shows positive impact of collaboration on organisation's innovation capabilities (e.g. Miotti and Sachwald, 2003, Faems et al., 2005, Becker and Dietz, 2004, Nieto and Santamaria, 2007).

Innovation, integrated models of working and networked based business have therefore emerged and become subject of new thinking and introduction of new theories. Open innovation, as a new paradigm for the management of innovation (Gassmann, 2006, Chesbrough, 2003), is among such new developments. As a shift from a closed to an open model, open innovation paradigm is about use of purposive inflows and outflows of knowledge to accelerate internal innovation (Chesbrough et al., 2006, p. 1).

Product innovation, as a supply chain wide strategic function, needs further attention in the light of changes in business environment and emergence of new paradigms as mentioned above. This in particular finds importance considering the gaps existing in the literature of the subject. Limited study and knowledge regarding market

orientation in innovation process and product innovation (Kok and Biemans, 2009), lack of consensus in terms of supplier involvement and its impact on product development and innovation process, and relationship between supplier involvement and company capabilities are among such issues.

This research is set up to not only address some of the aforementioned gaps, but to also revisit the subject of new product innovation in the light of new theories in current dynamic business environment. Existing theories and models are reviewed to identify the dimensions which affect product innovation, and also to examine the potential interplays between them. A conceptual model is developed based on a reference model for future proof supply chain management. A number of hypotheses are derived out of the proposed model to theorise the emerging circumstances which are described in detail in the paper. This paper reports theoretical views arrived at by the research. Empirical study and results will be reported in a follow up paper.

2. Conceptual framework

Previous researches on product development and innovation have identified several factors which influence the product innovation process. These factors could be classified under three main categories: company capability (e.g. Zahra and George, 2002, Eisenhardt and Tabrizi, 1995, Branzei and Vertinsky, 2006); market orientation (e.g. Tsai et al., 2008, Sharifi et al., 2006, Kok and Biemans, 2009, Atuahene-Gima et al., 2005); and supplier involvement (Primo and Amundson, 2002, Ragatz et al., 2002, Echtelt et al., 2008). Also some earlier researches have been undertaken to examine their individual impact on product innovation process. While previous studies show the potential interplay between these factors, studies on relationship between the abovementioned factors and product innovation performance when considered as triadic integrated factors are extremely light. To address this gap, we have developed

an integrated perspective stemming from various streams of literature which is termed as “Three Dimensional Agile Product Innovation” (3D-API). We define “Agile Product Innovation process” as the process of introducing an innovative product (new or innovatively modified) which is agile by being flexible and responsive to market requirements as well as to internal and external capabilities.

Our research hypotheses posit to first identify interplay of the "Triangulation between Dynamic capability, Supplier involvement, and Market orientation" (abbreviated as TbDSM). The impacts of these factors on agile product innovation performance are studied too. Within the framework we have identified factors from the literature which moderate and/or influence the relationship between the three dimensions and "Agile Product Innovation" (API) performance. Since the three main factors receive impacts from organisational, environmental and technology factors, it is deemed necessary to study the impacts from such elements on the relationship between our three main factors and API performance. These key constituents are categorised as absorptive capacity, innovation life cycle, and environmental turbulences. Figure 1 presents the proposed conceptual framework.

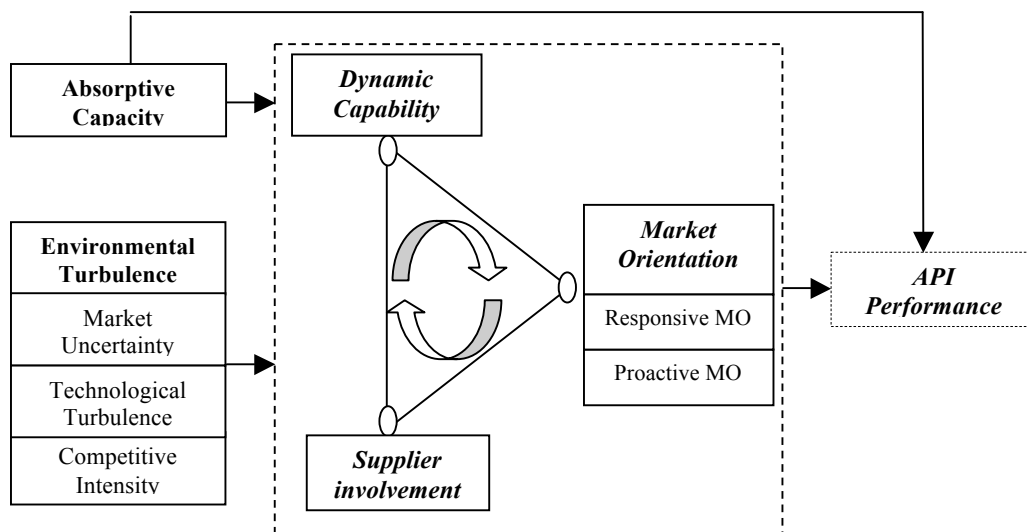


Figure 1: Conceptual Framework

2.1. Supplier involvement in product innovation process

While "Open Innovation" is receiving more attention from businesses it can be said that companies have already been involving suppliers in their internal activities in areas of design, development and engineering of products in order to better leverage supplier's technological capabilities and consequently to improve product development efficiency and effectiveness (Wynstra et al., 2001). The level of this involvement may be varied from simple exchange of ideas in design stage with suppliers to complete delegation of responsibility to them for the design of products, parts or components (Ragatz et al., 2002). Review of relevant literature (e.g. Wynstra et al., 2001) shows that early and close relationship with supplier may be critical for a company in product innovation/development process.

Recent research by academics (e.g. Wagner, 2003, Song and Di Benedetto, 2008) claimed that successful innovation depends intensely on the interaction with suppliers. Early and close supplier involvement in product development process may present constructive effect on key firm's performance criteria such as product costs and quality, and faster time to market (Ragatz et al., 1997, Clark and Fujimoto, 1991). Also, close relationship with supplier can enable companies to employ supplier's capabilities from various points of view with the aim of improving and re-boosting their product development strategies (Eisenhardt and Tabrizi, 1995, Bonaccorsi and Lipparini, 1994).

However, prior studies had shown a lack of consensus on the impact of supplier involvement on company's situation. While scholars have found positive impact of supplier involvement on turnover (Miotti and Sachwald, 2003, Faems et al., 2005) and product innovativeness (e.g. Nieto and Santamaria, 2007), some have rejected or

approached cautiously to agree with such remarks (Sanchez and Pérez, 2003, Ledwith and Coughlan, 2005, Freel, 2003, Belderbos et al., 2004).

2.2. Company capability and product innovation process

Sustained innovativeness depends on each firm's set of dynamic capabilities, which helps it to "integrate, build, and reconfigure internal and external competencies to address rapidly changing environments" (Teece et al., 1997, P.516). The company's dynamic capabilities embraces both tangible and intangible assets, and the knowledge and processes required to discover new business opportunities and to organise its resource portfolio in volatile environment (Zahra and George, 2002, Teece et al., 1997, Helfat, 1997). Eisenhardt and Martin (2000, p.1107) discussed that "dynamic capabilities are the organizational and strategic routines by which firms achieve new resource configurations as markets emerge, collide, split, evolve, and die". Teece (2007) further elaborated the concept by defining three main categories for company's dynamic capability namely as: sensing, seizing, and reconfiguring.

Dynamic capabilities in product development and innovation process has been looked at by researchers (e.g. Marsh and Stock, 2003, Verona and Ravasi, 2003). Deeds et al. (2000, p.212) asserted that "the ability to consistently generate new products is dependent on a firm's scientific and technological capabilities. These capabilities must be as dynamic as the environment in which they exist". A typology of dynamic capability for successful product innovation is proposed by Branzei and Vertinsky (2006) who presented four groups of dynamic capabilities namely as Acquisition (emergent-potential), Assimilation (extant-potential), Transformation (emergent-realized), and Deployment (extant-realized).

Based on dynamic capabilities concept, the accumulated knowledge, expertises, and skills, which are driven from organisational learning chain, enable companies to

improve their activities' performance. The organisational learning not only stems from in-house activities but also originates from assimilating and utilising knowledge which is created outside of the firm's boundaries (Deeds et al., 2000). Zahra and George (2002) discussed that in order to achieve dynamic organisational capability, companies need to initiate processes and routines to acquire, assimilate, transform, and utilise knowledge which is defined as absorptive capacity.

2.3. Market oriented product innovation

While literature review shows a number of studies on the product innovation context with considering different points of view some studies shed more light on product innovation as a market-driven process. Market orientation was defined by Kohli and Jaworski (1990, P.6) as "the organization-wide generation of market intelligence pertaining to current and future customer needs, dissemination of the intelligence across departments, and organization-wide responsiveness to it". According to Narver et al. (2004) market orientation has two essential scopes, namely as responsive and proactive. In responsive market orientation behaviour, a business endeavours to realise and meet the expressed needs of customers (Narver et al., 2004). In other words, responsive market orientation described some skills and routines to create, spread and employ market intelligence concerning existing customer's requirements in the market (Tsai et al., 2008, Narver et al., 2004, Atuahene-Gima et al., 2005). On the other hand, in proactive market orientation a business put some efforts to expose and satisfy the latent needs of customers (Narver et al., 2004). Furthermore, market-oriented companies attempt to gain new information and knowledge in order to gratify hidden customer's expectations (Tsai et al., 2008).

Previous studies introduced market orientation as a key driver of new product success (Atuahene-Gima et al., 2005, Narver et al., 2004, Langerak et al., 2004, Han et al.,

1998). Sharifi et al. (2006) discussed that common product development strategy in a market oriented business competition is recognised as initially discovering product features to satisfy all or most market needs. Researches have been undertaken in order to integrate market orientation and innovation such as the adoption of tools and techniques, role of the marketing department, marketing–R&D interface, (virtual) customer input, and cross-functional collaboration (Kok and Biemans, 2009). It is believed that, market orientation is an essential antecedent of product innovation process behaviours, activities, and performance (e.g. Slater and Narver, 1994, Atuahene-Gima, 1996). However, some scholars (e.g. Tsai et al., 2008) claimed that responsive and proactive market orientations can increase the potential negative effects on the product development/ innovation process and they may be detrimental to its performance if they surpass some certain level. Furthermore, by considering the potential risks and costs associated with each aspect of market orientation (responsive and proactive), which can restrict product innovation, market orientation strategy may need different organizational conditions in order to guarantee positive impact on new product performance (Atuahene-Gima et al., 2005).

3. Research hypotheses

As mentioned earlier the three main factor of our conceptual framework are believed to receive impacts from three key constituents namely absorptive capacity, innovation life cycle, and environmental turbulences. In the following section we build up our hypothesis through reviewing the relevant literature on these topics, and discuss the hypotheses to some detailed level.

3.1. Absorptive capacity

The original idea of absorptive capacity (AC) stems form macroeconomics, where it refers to the potential ability of an economy to employ and absorb external

information and resources (Adler, 1965). Cohen and Levinthal (1990) suggested that home-grown absorptive capacity facilitates organisations to recognise and take benefits from existent external technologies and knowledge. They defined absorptive capacity as the ability of firm to obtain, assimilate, and utilize external knowledge for its commercial ends. Zahra and George (2002) discussed that in order to achieve dynamic organisational capability, companies need to initiate processes and routines to acquire, assimilate, transform and utilise knowledge. Furthermore, Stock et al. (2001) consider absorptive capacity as a superior capability to recognise, gain and employ external information which would direct to further effective new product development. They asserted a nonlinear relationship between new product development performance and absorptive capacity.

Absorptive capacity is viewed in other ways including as an accumulation of five capabilities which are recognition, acquisition, assimilation, transformation, and exploitation (e.g. Zahra and George, 2002, Todorova and Durisin, 2007). Some researchers (e.g. Veugelers, 1997, Stock et al., 2001, Schoenmakers and Duysters, 2006) have suggested that absorptive capacity is operationalized by R&D intensity. Zahra and George (2002) categorised absorptive capacity similar to Arora and Gambardella (1994) into two main subsets: potential and realized. “Potential absorptive capacity (PAC) enables a firm’s receptiveness to external knowledge; realized absorptive capacity (RAC) reflects a firm’s capacity to leverage absorbed knowledge and transform it into innovation outcome” (Fosfuri and Tribó, 2008, p.174).

As it is clear from the above discussion, most definitions of absorptive capacity concentrate on a process view of it. In contrast some studies focused on organisational mechanisms which may guide to higher absorptive capacity. Tu et al. (2006, p. 694)

defined absorptive capacity as "the organizational mechanisms that help to identify, communicate, and assimilate relevant external and internal knowledge. The elements of absorptive capacity are considered to be the firm's existing knowledge base, the effectiveness of systems that scan the environment, and the efficacy of the firm's communication processes".

We employ the definition of absorptive capacity introduced by Tu et al. (2006) in order to build up our first hypothesis. Absorptive capacity is suggested as a vital dynamic capability with different components embedded in specific organizational processes in knowledge based competition (Zahra and George, 2002). Also, relevant literature shows that the dynamic capability is playing a significant role as an antecedent of achieving sustained innovation (Teece et al., 1997). Therefore, absorptive capacity facilitates firms to effectively achieve and employ external and internal knowledge which affects their abilities of innovation (Daghfous, 2004). Hence, we would expect that greater absorptive capacity, which provides greater organizational mechanisms to identify, communicate, and assimilate relevant external and internal knowledge, would lead to more effective product innovation process. At this point we will be able to present our first proposition of the study as:

H1: the greater the absorptive capacity of the firm's supply chain, the greater the API performance

Some evidences were recognised in literature regarding the potential association between absorptive capacity and collaborative networks. In the concept of absorptive capacity internal and external collaboration are considered as complementary (Cohen and Levinthal, 1990). Expanding connections and networking and relationship with key suppliers and customers is essential for companies to gain competitive advantage in uncertain market environment. This is in line with the concept of "open innovation"

which companies do not just rely on internal sources, but also always look for linking with source of external new knowledge technology.

Kim and Song (2007) discussed that absorptive capacity might be able to help organisations to generate new technology through collaborative activities with other firms. "Companies can improve their relationship learning to facilitate the information exchange with their suppliers and customers, to develop knowledge-learning from external actors, and to update their R&D capabilities" (Chen et al., 2009, p.153).

By considering the definition of absorptive capacity adopted above it can be concluded that firms with a greater absorptive capacity can provide stronger organisational mechanisms in terms of recognising, communicating and assimilating relevant external and internal knowledge which would allow them to have well-built communications with their main suppliers through the knowledge-exchanging process. This communication process, in turn, may inspire new ideas for product designs and consequently may assist companies to integrate these new ideas into their product innovation process (Tsai, 2009). Consequently, we would expect that the absorptive capacity can moderate the relationship between supplier involvement and agile product innovation performance, in which the higher absorptive capacity, the stronger the relationship between the API performance and supplier involvement. This leads to our second proposition:

H2: The positive impact of supplier involvement on API performance is increasingly manifested as the absorptive capacity increases.

3.2. Innovation life cycle

Innovation life cycle is another factor in our conceptual framework which affects TbDSM and particularly the relationship between supplier involvement and API performance. There are number of studies regarding the life cycle theories of

innovation (Utterback, 1994, Tidd et al., 2005, Powell and Moris, 2004). Abernathy and Utterback (1978) describe the pattern of industrial innovation in terms of three phases: the fluid stage, the transitional phase, and the specific phase.

However, Johnsen et al. (2006) discussed lack of positioning the supplier involvement process on the innovation life cycle (ILC) in most supplier involvement models. They claimed that understanding of the position of supplier involvement in ILC may be essential to find out the level of supplier involvement required for a particular technology or product/service application. As a result they proposed that “the relevance of customer and supplier relationships depends on the nature and maturity of the technology being developed” (Johnsen et al., 2006, p. 671) and therefore they examined the potential variation in customer-supplier interaction through different stages of the innovation life cycle.

In our study we employed the theory of innovation life cycle (Utterback, 1994, Tidd et al., 2005, Powell and Moris, 2004, Johnsen et al., 2006) as one of the drivers for our 3D-API model which has certain impacts on the relationship between supplier involvement and API performance. Despite this plethora of recent studies intend to investigate the impact of product life cycle on the relationship between product development and supplier involvement, there is a lack of appropriate studies in literature regarding the role of innovation life cycle on the above-mentioned relationship.

While Johnsen et al.(2006) claimed that “supplier and customer relationships may be less important factors in the innovation process in fluid and emerging contexts than in mature and specific contexts” (Johnsen et al., 2006, p. 676), we tend to think that there may be a positive influence from supplier involvement on API performance at all stages of innovation life cycle. The rational behind this view is rooted in the

concept of "open innovation" (Chesbrough, 2003) which emphasises on networking and collaborative approaches through out the innovation process. For instance, in terms of technological collaboration Nietoa and Santamaria (2007) asserted that continuity and diversity of different partners will impact positively on product innovation process. Collaboration may offer valuable solutions to problems related to possible lack of resources and capabilities within the company which are required to implement successful innovation process (Nieto and Santamaria, 2007, Das and Teng, 2000, Belderbos et al., 2004). Therefore, to examine our framework, other proposition of this study regarding the ILC and supplier involvement is originated as follow:

H3: The supplier involvement has positive impact on API process in all stages (emerging, growth, mature) of innovation life cycle.

3.3. Environmental turbulence factors

As mentioned earlier, the agile product innovation concept is based on concepts of agility and future-proof supply chain. "The concept of agile supply chain is advocated as a new way forward for business networks to succeed in the highly changing and turbulent business environments" (Sharifi et al., 2006, p.1078). Being responsive to business environmental turbulences is one of the main characteristics of agile product innovation concept.

In the context of new product development, several studies claim that the environmental factors can moderate the success of product innovation and possible strategic orientations linked to the new product development process (e.g. Zhou, 2006, Lukas and Ferrell, 2000, Li and Calantone, 1998, Gatignon and Xuereb, 1997). For instance, Atuahene-Gima and Li (2004) argued that the difficulties and costs to gain new product success might be increased due to several environmental uncertainties which can not be analysed effortlessly. We consider environmental

uncertainty context as another set of factors that moderate the relationship between TbDSM and agile product innovation performance. We have categorized these factors as: market uncertainty, technological turbulence, and competitive intensity.

3.3.1. Technology turbulences

Technological turbulence has been widely studied in pertinent literature as an influential factor, which moderates the relationship between causal factors and product innovation/development performance. Lee et al. (2009) discussed this in regard to the companies which rely on technology to survive, and suggested that changes in technology can be a key factor that influences their ability to forecast the future. In our research technology uncertainty is playing a moderator role in the relationship between API performance and two main dimensions of our framework, namely, supplier involvement, and market orientation. These will be discussed in the following.

Supplier involvement and technology turbulence

Scholars have studied the role of technology uncertainty on supplier involvement in the context of new product development and product innovation. Eisenhardt and Tabrizi (1995) claimed that low degree of supplier involvement may stem from the technological uncertainty factor. Furthermore, Wasti and Liker (1997) asserted that the accumulation of technology uncertainty and suppliers technical capabilities will positively affect on supplier involvement. They also claimed that earlier supplier involvement in product development process will improve company's performance. More recent research on the role of technology uncertainty has focused on different aspects of product innovation and development (e.g. Song and Di Benedetto, 2008, Ragatz et al., 2002, Primo and Amundson, 2002, Petersen et al., 2005, Petersen et al., 2003). However lack of consensus exists in prior studies. As Ragatz et al. (2002,

p.393) stated "Prior work examining the degree to which technology uncertainty affects the outcomes of supplier involvement is fragmented and confusing".

For instance, research on Japanese firms proved that technological uncertainty can result in closer relationships with main suppliers and consequently improve the company's performance through early involvement in product development process (Wasti and Liker, 1997). In contrast, the study of Primo and Amundson (2002) shows that high technology uncertainty condition may lead to hindrance in the product development process. Hence, due to the lack of consensus of prior research and the importance of the technology uncertainty effects on the relationship between supplier involvement and product development and innovation, it will be considered as a moderator factor in our research. It is expected that when business is surrounded by rapid and unforeseen technological changes, greater opportunities for innovative companies may occur to improve product innovation process by taking advantages from employing supplier technical capabilities/knowledge in product innovation process (i.e. product design). Based on the above arguments, one can expect:

H4: The positive impact of supplier involvement on API performance is increasingly manifested as the technological turbulence increases.

Market orientation and technology turbulence

According to Atuahene-Gima et al. (2005), market orientation is considered as a key variable in successful innovation and that the association between market orientation and innovation is fairly complex. There are a number of factors moderating this complex relationship, one important of which is technology turbulence.

In examining the moderating effects of technology turbulence on the relationship between market orientation and product development/innovation, Han et al. (1998) asserted that the level of innovation in companies differ with market orientation which

depends on the intensity of technological turbulence and also market uncertainty. They emphasized that in a condition of high technological turbulence, customer competitor orientation and also inter-functional coordination will smooth the progress of technological innovations. More recently Tsai et al. (2008) argued that the curvilinear relationship between the two dimensions of market orientation (responsive and proactive) and new product performance is moderated by external environmental characteristics such as technology turbulence.

As mentioned earlier, according to Tsai et al. (2008) market-oriented companies approach innovation in their products by effective integration of knowledge. Having said that alternative avenues such as technology exist for companies to achieve competitive advantage which may diminish the importance of market orientation (Jaworski and Kohli, 1993). In addition Atuahene-Gima et al. (2005) discussed that companies which try to fulfil the customer needs may face familiarity trap that decreases attractiveness of alternative directions. From the discussion above it can be suggested that:

H5: The relationship between responsive market orientation and API performance is decreasingly manifested as the technological turbulence increases.

On the other hand, market-oriented companies endeavour to search and gain new information and knowledge in order to gratify hidden customer's expectations (Tsai et al., 2008). Such highly proactive market-oriented firms may gain radical innovations leading to exclusive benefits. Therefore high technological turbulence may bring favourable condition for proactive oriented company to employ new technology and knowledge to gain competitive advantage. The next proposition is formulated on this basis as:

H6: The relationship between proactive market orientation and API performance is increasingly manifested as the technological turbulence increases.

3.3.2. Market uncertainty and competition intensity

Apart from technology turbulence, market uncertainty and competition intensity are the most common environmental characteristics mentioned in relevant literature. Market uncertainty has been identified as an influential variable which affects the relationship between company's strategic orientation and level of innovation (e.g. Han et al., 1998). In addition studies have identified that the relationship between market orientation and performance may rely on environment variables such as market turbulence (e.g. Harris, 2001, Greenley, 1995, Atuahene-Gima, 1995). There is, however, a lack of consensus in these studies as appeared in other related areas. For instance while some scholars (e.g. Pulendran et al., 2000, Greenley, 1995) found the role of market turbulence influential, other scholars (e.g. Slater and Narver, 1994, Jaworski and Kohli, 1993, Han et al., 1998) did not find any critical role for it.

Literature review shows a dearth of theoretical and empirical study aiming at clarifying effects of market turbulence/uncertainty on the interplay between market orientation and product innovation performance. In responsive market orientation behaviour, a business endeavours to realise and meet the expressed needs of customers (Narver et al., 2004). Therefore, in high market turbulence environment, companies may have greater opportunities to exceed end consumer satisfaction by employing market intelligence concerning existing customer's requirements in the market through product innovation process, which in turn may lead to increase in the importance of a responsive market orientation. Based on the above arguments, one can expect:

H7: The relationship between responsive market orientation and API performance is increasingly manifested as the market uncertainty increases.

On the other hand, in proactive market orientation a business puts in efforts to expose and satisfy the latent needs of customers (Narver et al., 2004). Thus, highly market turbulence may lead to reduction in the importance of a proactive market orientation due to the large number of potential existing customer needs. Therefore, the next proposition is formulated as:

H8: The relationship between proactive market orientation and API performance is decreasingly manifested as the market uncertainty increases.

As mentioned earlier, competitive intensity is introduced as another common environmental characteristic in the relevant literature. There are number of studies in relevant literature which considered competitive intensity as a moderator in relationship between market orientation and business performance (Wong and Ellis, 2007, Kwon and Hu, 2000)Kohli and Jaworski, 1990; Slater and Narver, 1994; Atuahene-Gima, 1995; Kwon and Hu, 2000, Wong and Ellis, 2007). However, in the context of product development and innovation, according to Atuahene-Gima (1995), empirical studies on the affect of competitive intensity on new product success are in conflict. For instance, while Cooper and Kleinschmidt (1987) did not find strong association between new product success and competitive intensity in market some other scholars (Zirger and Maidique, 1990, de Brentani, 1989) declared existence of negative relationship.

Furthermore, literature review shows limited number of relevant researches (e.g. Tsai et al., 2008) to address the potential interplay between dimensions of market orientation (responsive and proactive), new product performance, and competitive

intensity. Due to the lack of consensus and the limited empirical study on this topic, we consider competitive intensity as a moderating factor.

In a harsh competitive environment, quickly satisfying customers seems to be essential for companies to gain competitive advantage. Because of the nature of responsive market orientation, differentiation of companies through product development against their competitors may be infeasible when they are highly responsive in intense competitive environment (Tsai et al., 2008). Therefore, it may result in decrease in the positive impact of responsive market orientation on product innovation:

H9: The relationship between responsive market orientation and API performance is decreasingly manifested as the competitive intensity increases.

Conversely, in high competition environments, proactive market oriented firms may gain valuable competitive advantage through the product innovation process due to its nature (which is always searching for new information and knowledge). Therefore, high competitive intensity is likely to be an influential factor on the relationship between responsive market orientation and product innovation process. Hence, the last proposition of this paper is formulated as:

H10: The relationship between proactive market orientation and API performance is increasingly manifested as the competitive intensity increases.

4. Conclusion and future research

Innovation and new products have become increasingly important as competitive factors for companies to achieve long-term and sustainable advantages. However, escalating uncertainty and complexity in business environment impose the development of new vision, and appropriate approaches such as integrated models in order to shed more light on successful product innovation paradigms.

Review of extant literature showed three main dimensions (company capability, market orientation, and supplier involvement) to be factors affecting the process of product innovation. However, it is noticed that there is a dearth of examination and research on the effect of these factors on product innovation process when they are considered as the triadic integrated factors.

The “Three Dimensional Agile Product Innovation” (3D-API) developed is expected to open the way for study into the perceptions and realities of manufacturing organisations regarding the concept of future-proof supply chain. Three main factors of the conceptual framework are found analytically to receive impacts from three key constituents namely absorptive capacity, innovation life cycle, and environmental turbulences. The new perspectives projected through the model provide the ground for understanding of the new emerging circumstances in the approach to product innovation. Impact from supplier involvement is expected to be high which works hand in hand with other triangulated issues as well as under the influence of moderating factors. Sustained market leadership and future proof supply chain require a different set of capabilities at the core of which lie innovation in collaboration with suppliers.

To examine and validate the developed conceptual framework for agile product innovation and the hypotheses formulated in the research further empirical studies will be accomplished in the next step.

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