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Title: Connecting strategic thinking with product innovativeness to reinforce NPD support process

Year: 2016

Version: Publisher's PDF

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Please cite the original version:

Kazmi, S. A. Z., Naaranoja, M., Kytölä, J. & Kantola, J., (2016). Connecting strategic thinking with product innovativeness to reinforce NPD support process. *Procedia : Social and Behavioral Sciences* 235, 672-684. <http://dx.doi.org/10.1016/j.sbspro.2016.11.068>



12th International Strategic Management Conference, ISMC 2016, 28-30 October 2016, Antalya, Turkey

Connecting strategic thinking with product innovativeness to reinforce NPD support process

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Abstract

Strategic thinking is considered a significant business process by management experts due to its appeal to strengthen organizational performance management and its effectiveness. Furthermore, new product development is regarded as the crucial operation of each and every industrial concern. Grounded in such rationality, the current study presents an attempt to connect the concept of strategic thinking with product innovativeness to formulate a diagnostic approach to reinforce NPD support process. The idea behind formulating such a research framework is to offer industrial leaders, a mechanism, that can offer connectivity among various aspects of operations linked to corporate strategy and product innovativeness. The research survey is conducted on 30 team member's representing new product development (NPD) operations at three selected work locations of a European multinational company. The study results highlighted the proposed theoretical connection between the two business operational areas; strategic thinking and product innovation. According to the study results, the key variables that have shown positive linkage among them were, early client involvement (product innovation) to target reach (strategic thinking); customer value (product innovation) to target reach (strategic thinking); early client involvement (product innovation) to customer value (Product innovation); management initiatives (product innovation) to collaboration (strategic thinking); management initiatives (product innovation) to communication (strategic thinking); and idea generation (product innovation) to responsiveness (strategic thinking).

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Peer-review under responsibility of the organizing committee of ISMC 2016.

Keywords: Strategic thinking, product innovation, corporate goals, diagnostic approach, multinational company, management initiatives, customer value

1. Introduction

The interest to implement lean, rapid and profitable new product development processes has never been greater. To deal better with shorter product life cycles (Griffin, 1997), intense market competition and more demanding customers, companies are struggling to innovate knowing that market failure is not an option and winning with new products is not easy. According to surveys conducted in 1997 (Griffin, 1997; Ozer, 1997), new products introduced during the period of five years from 1992 to 1997, contributed as much as 50% of the total revenues and profits, though at the same time, the new product failure rate remained high. To be more specific, an estimated 46% of the

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resources that companies devote to the conception, development and launch of new products go to projects that do not succeed and either fail in the market place or never make it to the market (Ottum, and Moore, 1997).

The search for new product ideas to design and manufacture unique products initiates with an in-depth understanding about the customers' needs and wishes. In addition, the traditional NPD framework, in which companies are exclusively responsible for coming up with new product ideas or manufacturing decisions linked to product innovativeness, is gradually being challenged by innovation management academics and practitioners (Fuchs and Schreier, 2011; Cone, 2006; Lakhani, 2006; Pitt et al., 1996; Chesbrough, 2003; Von Hippel and Katz, 2002). It is strongly desired that a new product or service must hold a "wow" factor or 'aha moment' (Dorst, and Cross 2001) by proposing something which is currently missing from the range of available products in the market. The above necessitates the involvement of the entire new product development teams - technical, marketing, in addition to the organization's operational workforce to strategically collaborate, design and lead the new product development strategic plan internally while additionally interacting with real customers/users, and learn their desires, problem areas, needs as well as challenges, instead of merely relying on sales and marketing teams' output. Keeping in view of above, this study holds evaluative information on a research survey that has attempted to explore the significance of strategic thinking and product innovativeness capacity building initiatives in a Finnish energy sector multinational company. This transformational process was evaluated through the feedback received from the subject company's product development teams or associated operational workforce with reference to new product development idea generation process. The current research study is an effort to formulate the interconnection between the concepts of strategic thinking and product innovativeness to harnessing new product idea generation capability of the workforce in modern enterprises. Following the research theme of developing a linking tool of strategic thinking to support new product idea generations capability in work teams, our study commences by a literature review of product innovation and strategic thinking, then will proceed to the development of study hypotheses. Later, the paper will through light on selected research methodology and proposed theoretical model. The study will be concluded with an in-depth analyses and discussion on the study results, in addition to the recommendations for industrial managers and researchers.

2. Literature Review And Hypotheses

2.1. Product innovation

Duggan (1970) defines industrial design as a multifaceted activity, and though not easy to define comprehensively, it can be understood as an industrial design activity (Heskett, 2001; Sparke, 1983, Jevnaker, 1998; Leenders et al., 2007; Murray and O'Driscoll, 1996), generally linked to product development in the manufacturing context. It can be any factor or the combination of more than one among creation of products (Cooper and Kleinschmidt, 1995) or services that reach beyond style, integration and application of new technology, activities that enhance or create new markets or the activities that enhance and guard brands (Jevnaker, 2005; Brockhoff, 1994; Cooper and Kleinschmidt, 1995).

Industrial design is considered inextricably a part of innovation that can make a contribution in three broad categories of overall industrial innovation activity (Jevnaker, 2005), for example, in the case of incremental innovation - it can be reflected through industrial product improvement; in the case of variety innovation - it can be viewed as product styling or restyling; and finally, in the case of a radical innovation - new capability it can be seen as the introduction of a new version of the product or service.

Being innovative is significant in generating new ideas in product development. In short, the ideas for new products can be obtained from (Hill, and Westbrook, 1997; Chermack, and Bernadette 2007; Westhues, Lafrance and Schmidt, 2001; Chiesa, Coughlan, and Voss, 1996) basic research using the SWOT analysis (i.e. evaluating the strengths, weaknesses, opportunities, and threats involved in a project or in a business venture). Factors such as market and consumer trends, R&D departments, competitors, focus groups, etc. are ingredients for obtaining insight into new product lines or product features (Jevnaker, 2005; Brockhoff, 1994; Cooper and Kleinschmidt, 1995).

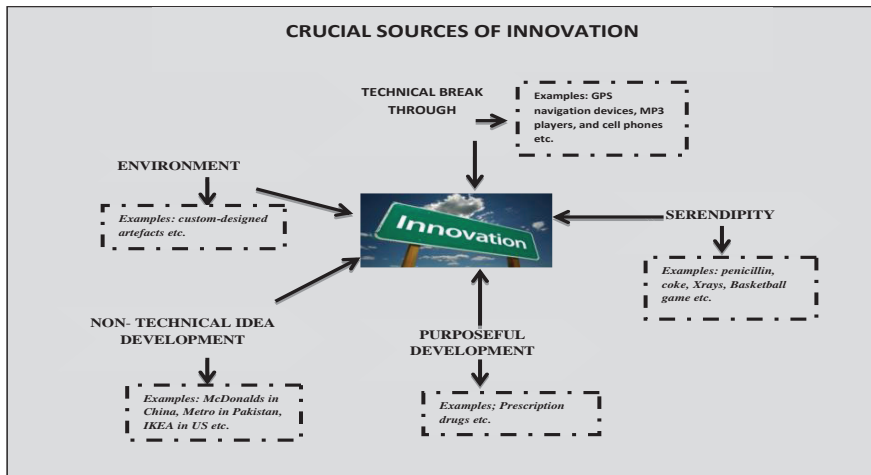


Figure 1. List of crucial sources of innovation

Figure 1 above, presents the main sources of innovation along with their examples. Whatever category an innovation activity belongs to, the process of new idea generation is always connected to an individual’s knowledge base (Weisberg, 1999; Dorst and Cross, 2001) and it is also possible that a designer (or, perhaps, an observer during the overall product design phase) will identify a new area of research while focusing on his own. To comprehend the phenomena of new product development, it is significant to understand the NPD stage and gate process in the light of theoretical support.

2.1.1 New product development (NPD) stage and gate process

New product development is defined as a vital function for the success, survival and renewal of organizations (Brown and Eisenhardt, 1995). According to several independent research studies (Jaruzelski, Kevin, and Rakesh, 2005) i.e. Product Development and Management Association, AMR Research, Booz-Allen and Hamilton (1982) around 70-85% of leading companies in the United States follow the stage-gate model to drive their new products to the market and there is almost the same trend in the rest of the world. The stage-gate system is a cutting-edge operational road map for the implementation of a new-product project from idea to launch stage (Shahid and Nabeshima, 2007).



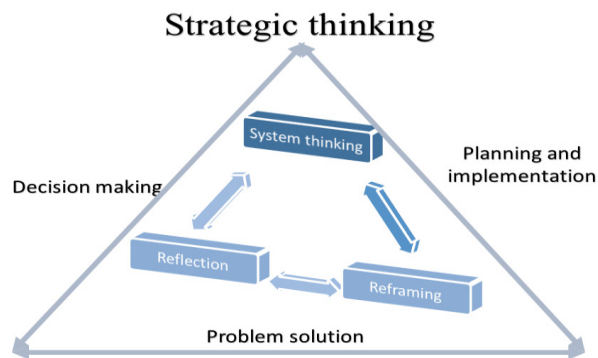
Figure 2. Reflection of stage gate process® of new product development

The stage-gate process bifurcates new product development activities into stages, separated through management decision gates (Booz-Allen and Hamilton, 1982). As Figure 4 above depicts the usual sequence of the NPD process starts with the product or service idea discovery stage. After passing the idea screening gate and entering the next stage, the product idea enters the scoping stage, and if cleared, it crosses the second gate to be established as a ‘business case’. After becoming a viable business case, the product idea passes the third gate for product ‘development’. A product development, being a prototype, goes through ‘testing and validation’. After passing the test and going through the required validation, if necessary, it crosses the final gate for ‘product launching’. The final stage is the ‘post launch review’ stage that records the overall success or failure of the company through the market feedback on the product (Jaruzelski, Kevin, and Rakesh, 2005; Shahid and Nabeshima, 2007). The NPD stage gate process, defined above, highlights its interconnectivity with the various organizational segments (i.e. though scattered operationally, geographical and hierarchically).

2.2. Strategic thinking and new product idea generation

Several theorists consider strategic thinking as an umbrella term (Bonn, 2001). Employing strategic thinking enables analysis, exploration, understanding and defining a complex situation and then developing planning actions to achieve the greatest possible positive impact towards a pre-defined goal. According to Bonn (2005), strategy theorists have consensus on the notion that strategic thinking is needed at multiple organizational levels.

Thomas and Carroll (1979) stressed the significance of human cognition and linked their definition of product design thinking to the mental approach or the intent of the product designer, supporting the notion that design occurs when a problem-solver tries to solve the problem or acts as there is some indecision in the aims, initial conditions or allowable transformation. To utilize corporate opportunities, offered by challenging external forces, it is essential for organizational leaders to comprehend and interpret the future goals by using a systematic and cognitive approach to enforce strategic thinking by relying less on mere experience and intuitive guesswork (Oelkers, Elsey, 2004) while perusing new product idea generation process. In addition, corporate planning is a mere segment of the comprehensive process of strategic thinking (Goldman and Casey 2010). It does not come as expected since most of us are static thinkers who tend to make decisions merely for a known or particular period, while strategic thinking (Kazmi, Naraanoja, 2015, Kazmi, Naaranoja, juha 2015, Kazmi 2012,) skills have to be learnt, cultivated, practiced, and then applied (Bonn, 2005).



Source: Kazmi, S. A. Z.; Naaranoja, M; Kytola, J (2015)

Figure 3. Strategic thinking process

Figure 3 displays a simplified cycle involving systematic thinking, creativity and vision which progresses to a relatively focused strategic thinking approach based on planning and implementation, problem solving and decision making approach (Goldman, 2007). Whether one takes the simplified approach or the focused one, the aim in selecting either of them is usually to utilize the core functionality of strategic thinking i.e. recognizing assumptions, to evaluate argument and finally to draw conclusions. Batty and Quinn (2010) define strategic thinking as a process that involves collection, combination and filtration of information to generate new, relevant, focused and feasible ideas and strategies. Corporate planning is defined as simply the tip of the iceberg or the part of the greater process of strategic thinking (Essery, 2002). According to Wheatley (2006), the requirement for information and thinking skills which were once considered the key skills for top leaders is now moving deeper into organizations, since currently it is the requirement of every employee to be able to interpret complex information and explore their own realities. In fact, the cognitive mechanisms connected to the (i.e. product idea related) design process are usually considered a precedent-based type of reasoning (Oxman and Oxman, 1992), where knowledge is continuously transformed to generate new knowledge. During the product idea generation process, designers refer to their background experiences and skills, in addition to connecting such exposures with different types of internal and external stimuli they might have access to. For instance, in the process of inspiration, designers tend to combine physical and/or mental visual samples to support inspirational purposes (Keller et al., 2009).

Modern theorists emphasize the significance of (Pisapia et al. 2005) three main cognitive processes, namely systems thinking (Senge, 1990), reframing (Morgan, 1986; Bolman and Deal, 1994), and reflection (Dewey 1933;

Argyris and Schön, 1978; Schön, 1983) as the success factors for organizational leaders in dealing with situational complexity. Information gathered through the process of system thinking and reframing is used as a significant tool by management leaders during the process of reflection to make sense of the situation (Pisapia et al., 2005).

These three processes support leaders in (a) understanding the situation through the process of reframing; (b) formulating theories of practice to guide actions through the process of reflecting and; (c) using systems thinking in a holistic manner (Parsons, 1960; Senge, 1990; Capra, 2002; Pisapia et al., 2005).

These three processes support leaders in visualizing events and understanding problems in terms of concepts to combat them effectively (Pisapia et al., 2005).

Systems thinking propagates the logic that the unified whole is superior to its individual parts. Modern theorists emphasize that in systems thinking the whole is primary while the parts are secondary (Capra, 2002; Pisapia et al., 2005). However, the traditional approach to systems thinking (analytic/linear/reductionist thinking) proposes that the parts are crucial and primary while the whole is secondary (Senge, 1990; Capra, 2002; Pisapia et al., 2005). This reverse of the mindset from parts to whole is of great significance for modern theorists and management experts to understand living organisms (Parsons, 1960; Senge, 1990; Capra, 2002; Pisapia et al., 2005). Capra (2002) further defines that in order to understand an object or a phenomena one initiates the cognitive process by visualizing it from a larger context rather than dividing it into parts. In addition, modern systems thinkers agree that it is not viable to isolate the organization from its environment (Pisapia et al., 2005) to understand its processes. 'Reframing' is defined as a cognitive tool or skill to collect and arrange the information or knowledge set to define the situational realities (Morgan, 1986; Bolman and Deal, 1994; Pisapia et al. 2005). 'Reflecting' is explained as a skill to process information or the knowledge set to apply it according to the situational requirements (Schön, 1983; Pisapia et al. 2005) through practice. As a whole, the cognitive processes require understanding by taking leads from the surroundings and day to day events for enhancement of the skill level to effectively apply strategic thinking.

Development of Hypotheses

The study endeavoured to examine NPD practices in an organization from the perspectives of strategic Product innovation, keeping in view the competitive nature of multinational businesses of today, combating against social, economic and cultural factors. Thus to evaluate the success of an organization's new product development efforts through innovation will present limitations in a scenario where various work teams as well as work systems are operating together while either being controlled from different hierarchal levels or being operated upon by individuals having entirely different skill sets. To support such limitations and to equip the theoretical framework of new product development with strategic manoeuvring capability, the researchers proposed the integration of the findings of various research studies done in the field strategic thinking (Pisapia, et. al., 2005; 2006; 2009; 2011). The framework of the subject case study is a combination of two established models (i.e. product innovation and strategic thinking) developed in relation to the new product idea generation capability of an organization by harnessing NPD teams on the basis of product innovation and strategic thinking. On the basis of above, following study variables were selected for empirical investigation;

Table 1. The study variables along with their theoretical base

<i>Theoretical origin</i>	<i>Variables</i>
Product innovation	<i>Early client involvement</i>
Strategic thinking	<i>Target Reach</i>
Product innovation	<i>Customer value</i>
Product innovation	<i>Management initiatives</i>
Strategic thinking	<i>Collaboration</i>
Strategic thinking	<i>Communication</i>
Product innovation	<i>Idea generation</i>
Strategic thinking	<i>Responsiveness</i>

In the light of the literature review and the selected study variables, we have proposed following hypotheses:

H-1: “Early client involvement” (Product innovation) is significantly linked to “Target Reach” (Strategic thinking).

H-2: “Customer value” (Product innovation), is significantly linked to “Target reach” (Strategic thinking).

H-3: “Early client involvement” (Product innovation) is significantly linked to “Customer value” (Product innovation).

H-4: The variable “Management initiatives” (Product innovation) is significantly linked to team “Collaboration” (Strategic thinking).

H-5: The variable “Management initiatives” (Product innovation) is significantly linked to organizational “Communication” (Strategic thinking)

H-6: “Idea generation” (Product innovation) is significantly linked to team’s “Responsiveness” (Strategic thinking).

3. Methodology

3.1. Sample and Data Collection

The scope of this study takes into account specialized groups of total 30 professionals (i.e. representing new product development related work operations and roles) from three international locations of a European multinational company : Finland, the UK and Norway on the basis of their professional expertise and operational relevance. A specialized feature of the selected work locations is that each one of the unit is engaged in different types of product manufacturing i.e., Finland – Power engines, The United Kingdom – Green energy solutions, Norway- Marine products and service solutions. The selected quantitative approach is the survey methodology which is performed through an email based questionnaire having 50 fixed ended items. Evaluation of the subject company’s new product development culture is carried out by combining quantitative and qualitative research methodologies. The qualitative approach, on the other hand, is involved with putting together an organizational case study through in person and email based interview questionnaire. Feedback obtained from those 30 respondents were analyzed by using statistical analyses.

3.2. Results and analysis

The chosen theoretical framework use prior studies that are as below:

To study the concept of ‘strategic thinking’, the researchers have focused on the theoretical framework introduced by Pisapia, et. al., (2011) that involves three cognitive factors, i.e. system thinking (Pisapia, et al., 2009; Senge, 1990), reflecting (Pisapia, et. al., 2009; Argyris and Schön, 1978) and reframing (Pisapia, et al., 2009; Bolman and Deal, 1994).

Overall, 50 items using 5 Likert-type scale are used to measure product innovativeness and strategic thinking to support new product idea generation potential. 100 % of feedback was achieved to support the survey findings. Furthermore, the Cronbach’s Alpha values for each question item exceeds 0,70, that indicates the reliability of the study scale used formulated and implemented in the survey.

The results on the six study hypothesis are as follows;

i - Relationship between 2 variables - Early client involvement (Product innovation) and target reach (Strategic thinking)

The correlation calculation to assess the relationship between the above referred variables yielded the r value of 0.47, thus technically proving a positive but weak correlation between the two study variables i.e. early client involvement (Product innovation) and target reach (Strategic thinking), since the nearer the value is to zero, the weaker the relationship. In addition, the value of R², the coefficient of determination, is 0.22.

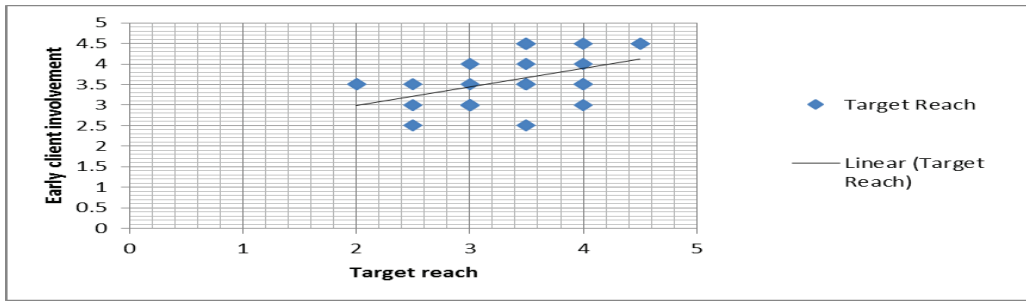


Figure 4. Scatter plot to display regression trend of the variables of study’s H1

According to Figure 4, the regression details reveal the following data facts with reference to the study hypothesis (H1):

- i. Sample size: 30
- ii. Mean x (\bar{x}): 3.4
- iii. Mean y (\bar{y}): 3.6
- iv. Intercept (a): 2.09
- v. Slope (b): 0.46
- vi. Regression line equation: $\hat{y}=2.09+0.45x$

The P-Value calculated on the basis of R value is 0.009 and is significant at 5%. Therefore, the study hypothesis; H1- “Early client involvement” (Product innovation) is significantly linked to “target reach” (Strategic thinking) is accepted.

ii - Relationship between 2 variables - Customer value (Product innovation) and target reach (Strategic thinking)

The correlation calculation to assess the relationship between the above referred variables yielded the r value of 0.49, therefore, technically proving a positive but weak correlation between the two study variables i.e. customer value (Product innovation) and target reach (Strategic thinking), since the nearer the value is to zero, the weaker the relationship. Furthermore, the value of R², the coefficient of determination, is 0.24.

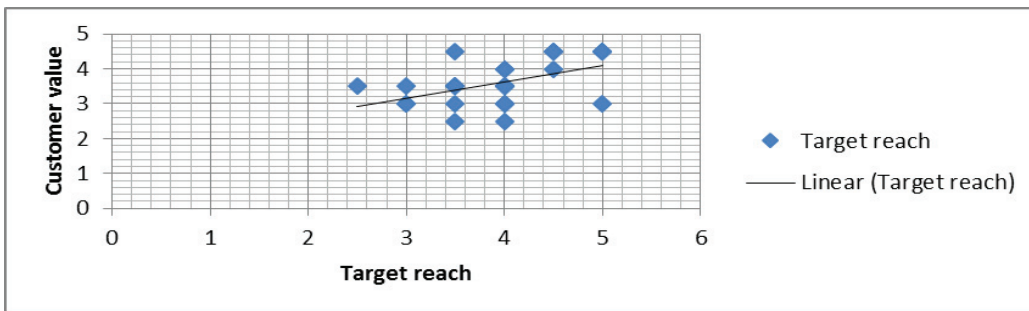


Figure 5. Scatter plot to display regression trend of the variables of study’s H2

According to Figure 5, the regression details reveal the following data facts with reference to the study hypothesis (H2):

- i. Sample size: 30
- ii. Mean x (\bar{x}): 3.9
- iii. Mean y (\bar{y}): 3.6
- iv. Intercept (a): 1.7
- v. Slope (b): 0.49
- vi. Regression line equation: $\hat{y}=1.7+0.48x$

The P-Value calculated on the basis of R value is 0.005 and is significant at 5%. Therefore, the study hypothesis; H-2: “Customer value” (Product innovation) is significantly linked to “target reach” (Strategic thinking) is accepted.

iii - Relationship between 2 variables – early client involvement (Product innovation) and customer value (Product innovation)

The correlation calculation to assess the relationship between the above variables yielded the r value of 0.64. Thus, technically proving a positive but weak correlation between the two study variables i.e. early client involvement (Product innovation) and customer value (Product innovation), since the nearer the value is to zero, the weaker the relationship. Furthermore, the value of R², the coefficient of determination, is 0.43.

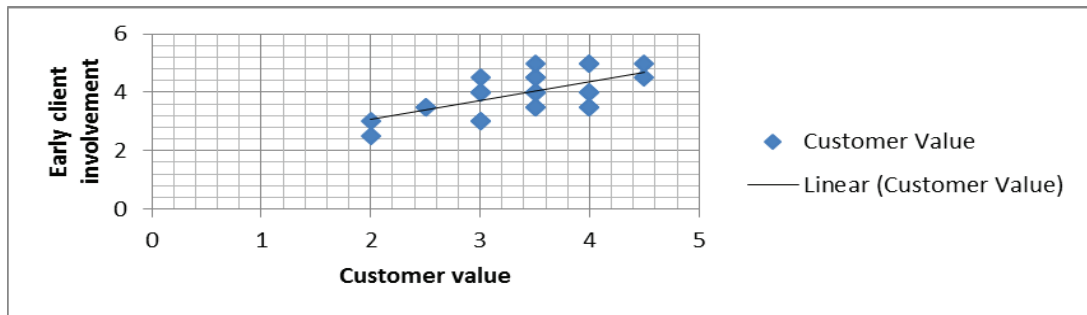


Figure 6. Scatter plot to display regression trend of the variables of study's H3

According to Figure 6, the regression details reveal the following data facts with reference to the study hypothesis (H3);

- i. Sample size: 30
- ii. Mean x (\bar{x}): 3.35
- iii. Mean y (\bar{y}): 3.93
- iv. Intercept (a): 1.8
- v. Slope (b): 0.63
- vi. Regression line equation: $\hat{y}=1.79+0.63x$

The P-Value calculated on the basis of R value is 0.00013 and is significant at 5%. Therefore, the study hypothesis; H-3: “Early client involvement” (Product innovation) is significantly linked to “customer value” (Product innovation) is accepted.

xi- Relationship between 2 variables – management initiatives (Product innovation) and collaboration (Strategic thinking)

The correlation calculation to assess the relationship between the above variables yielded the r value of 0.42, thus, technically proving a positive but weak correlation between the two study variables i.e. Management initiatives – (Product innovation) and “collaboration – (Strategic thinking) since the nearer the value is to zero, the weaker the relationship. In addition, the value of R², the coefficient of determination, is 0.18.

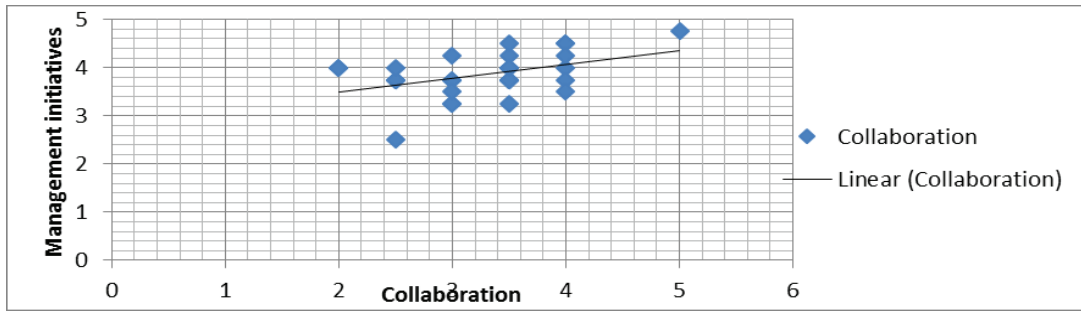


Figure 7. Scatter plot to display regression trend of the variables of study’s H4

According to Figure 7, the regression details reveal the following data facts with reference to the study variables of hypothesis (H4):

- i. Sample size: 30
- ii. Mean x (\bar{x}): 3.28
- iii. Mean y (\bar{y}): 3.86
- iv. Intercept (a): 2.92
- v. Slope (b): 0.29
- vi. Regression line equation: $\hat{y}=2.91+0.29x$

The P-Value calculated on the basis of R value is 0.02 and is significant at 5%. Therefore, the study hypothesis;

H-4: The variable “Management initiatives” (Product innovation) is significantly linked to “collaboration” (Strategic thinking)” is accepted.

xvi- Relationship between 2 variables – Management initiatives (Product innovation) and communication (Strategic thinking)

The correlation calculation to assess the relationship between the above variables yielded the r value of 0.33, thus, technically proving a positive but weak correlation between the two study variables i.e. management initiatives (Product innovation) and communication (Strategic thinking) since the nearer the value is to zero, the weaker the relationship. In addition, the value of R2, the coefficient of determination, is 0.11

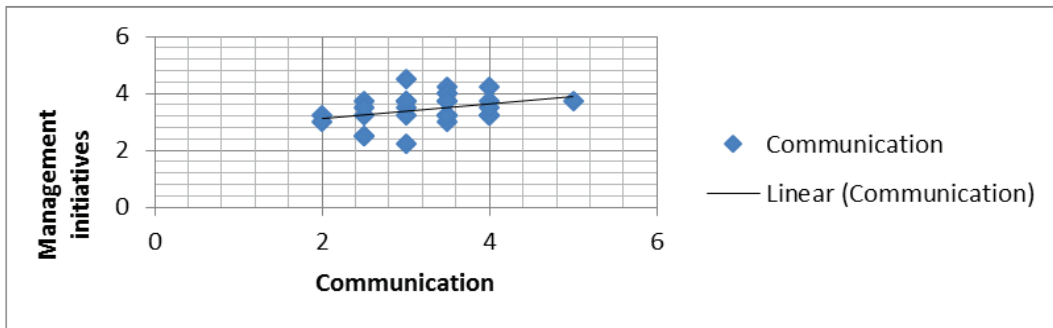


Figure 8. Scatter plot to display regression trend of the variables of study’s H5

According to Figure 8, the regression details reveal the following data facts with reference to the study variables of hypothesis (H5):

- i. Sample size: 30
- ii. Mean x (\bar{x}): 3.28
- iii. Mean y (\bar{y}): 3.45
- iv. Intercept (a): 2.63
- v. Slope (b): 0.25

vi. Regression line equation: $\hat{y}=2.64+0.25x$

The P-Value calculated on the basis of R value is 0.08 proving that the result is significant at 5%. Therefore, the study hypothesis;

H-5: The variable “Management initiatives” (Product innovation) is significantly linked to organizational “communication” (Strategic thinking) is accepted.

xvii - Relationship between 2 variables – Idea generation (Product innovation) and responsiveness (Strategic thinking)

The correlation calculation to assess the relationship between the above variables yielded the r value of 0.51, thus, technically proving a positive but weak correlation between the two study variables i.e. Idea generation (Product innovation) and responsiveness (Strategic thinking) since the nearer the value is to zero, the weaker the relationship. In addition, the value of R2, the coefficient of determination, is 0.26.

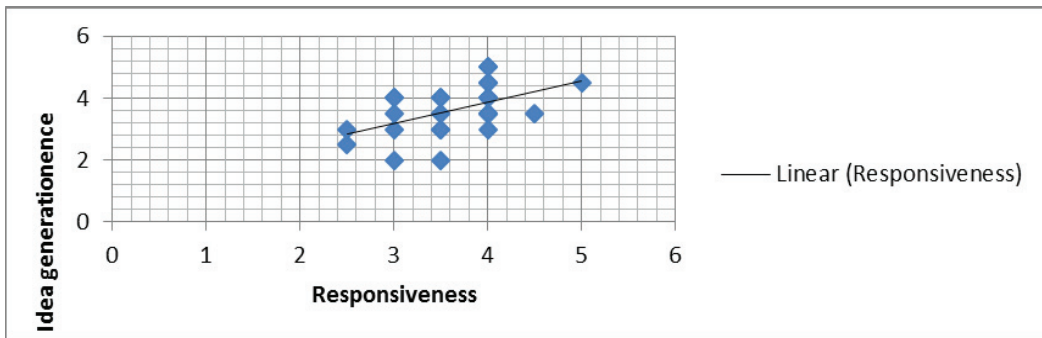


Figure 9 Scatter plot to display regression trend of the variables of study’s H6

According to Figure 9, the regression details reveal the following data facts with reference to the study variables of hypothesis (H6):

- i. Sample size: 30
- ii. Mean x (\bar{x}): 3.67
- iii. Mean y (\bar{y}): 3.63
- iv. Intercept (a): 1.1
- v. Slope (b): 0.69
- vi. Regression line equation: $\hat{y}=1.1+0.69x$

The P-Value calculated on the basis of R value is 0.003 and is significant at 5%. Therefore, the study hypothesis;

H-6: “Idea generation” (Product innovation) is significantly linked to “responsiveness” (Strategic thinking) is accepted.

Hence the regression analysis results support H1, H2, H3, H4, H5 and H6 hypotheses.

The study results confirms positive linkage between the theoretical concepts of strategic thinking and product innovation that can be viewed in Figure 10:

Connecting study constructs- Strategic thinking and product

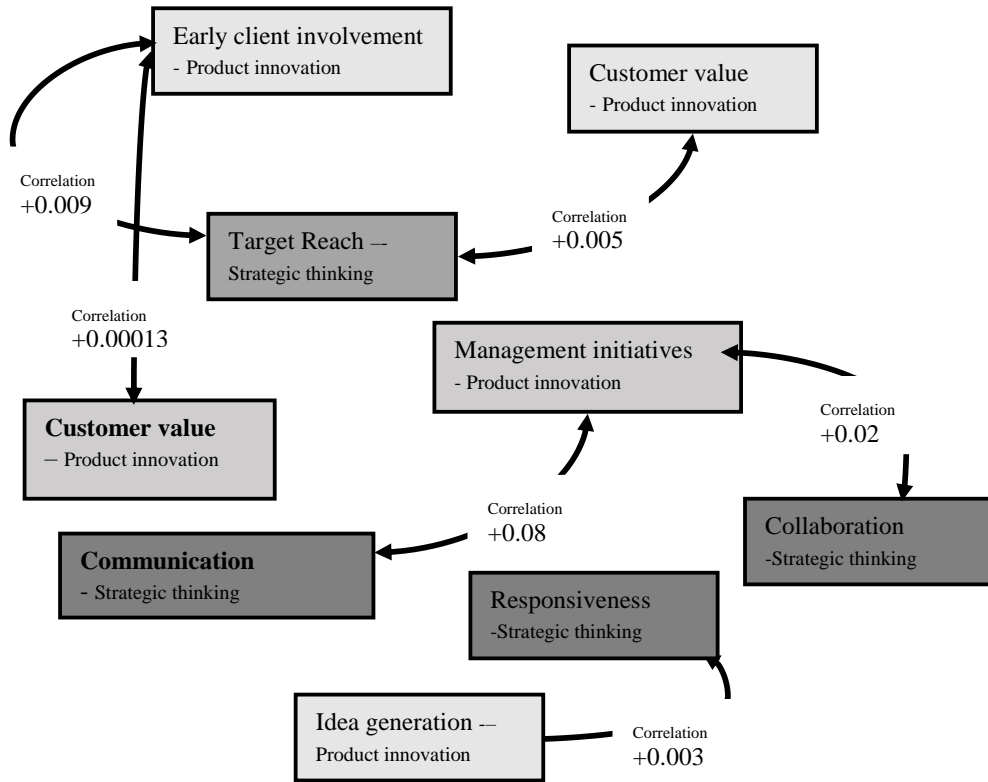


Figure 10. Formulated theoretical framework based on study results

According to the study results displayed in figure 10 above, the key variables reflecting positive linkage are 'early client involvement' (product innovation) to 'target reach' (strategic thinking), 'customer value' (product innovation) to 'target reach' (strategic thinking), 'early client involvement' (product innovation) to 'customer value' (Product innovation), 'management initiatives' (product innovation) to 'collaboration' (strategic thinking), 'management initiatives' (product innovation) to 'communication' (strategic thinking), and finally the variable of 'idea generation' (product innovation) to the variable of 'responsiveness' (strategic thinking).

4. Conclusion

The study results confirm the proposed theoretical linking between strategic thinking and product innovation to support industrial work teams' effectiveness. Strategic thinking is a key analytical process to support and strengthen corporate potential and has a special attention by users of industrial strategists and academics (Pisapia et al. 2011). The current research investigate the level of connection the two concepts i.e., strategic thinking and product innovation share, to strengthen the new product development initiatives by the industrial work teams. The study tested six hypothesis that have shown strong positive linkage among the selected variables. The study variables that have shown positive linkage among them were, early client involvement (product innovation) to target reach (strategic thinking);

customer value (product innovation) to target reach (strategic thinking); early client involvement (product innovation) to customer value (Product innovation); management initiatives (product innovation) to collaboration (strategic thinking); management initiatives (product innovation) to communication (strategic thinking); and idea generation (product innovation) to responsiveness (strategic thinking).

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