A Study on Small and Medium Enterprises Awareness and Practices of Pre-Development Implementation

*Noor Hidayah Abu[1], Baba Md Deros[2], Dzuraidah Abd Wahab[2], Mohd Nizam Ab Rahman[2], Mohd Fitri Mansor[3]
[1]Universiti Utara Malaysia
[2]Universiti Kebangsaan Malaysia
[3]Universiti Malaysia Perlis
*dayah@uum.edu.my

Abstract: Pre-development process is an important driver for organizations to improve their performance and sustain competitiveness. Large-scale organizations have received full attention from many researchers with respect to efficient pre-development implementation and practices. However, small and medium enterprises (SMEs) did not received adequate attention from the research community for their pre-development practices. This study was performed with the main objective to identify different practicing between Malaysian food and beverage manufacturing SME and large organization in implementation of pre-development process. To do this a survey questionnaire was developed and pilot tested to ensure its validity and reliability. Later, the survey questionnaire was sent to 687 Malaysian food and beverage manufacturing SMEs to identify their practicing on pre-development process implementation. Descriptive analysis was carried out to determine respondent profile and rank of five critical success factors (CSFs) based on its contribution. Tests to investigate any differences between SMEs and large organization in pre-development implementation practices were conducted using MANOVA and ANOVA analysis. The results of the study indicated that there is significant difference between SMEs and large organization in practicing pre-development process implementation. Both of the companies agreed that idea generation phase, commitment top management and project team members are important factor during pre-development process implementation. However they have different perspectives on the level of importance for factors: concept development phase, project evaluation phase, clear product strategy, external organization involvement and training during the implementation process. The results presented a clarified view of pre-development implementation practice based on the Malaysian food and beverage manufacturing SME perspective.

Keywords: *Pre-development implementation practice, Malaysian food and beverage manufacturing SMEs, product innovation*

1. Introduction

Organization needs to continuously introduce new products in order to improve performance and competitiveness. The business process for developing new products and then introducing them into marketplace is defined as the new product development (NPD) process. Success or failure of the NPD process depends very much on the performance in the earliest phase of the NPD process known as the pre-development process. Effective performing and managing pre-development activities are important to achieve successful in developing innovative products. However not many organization successful in developing and introducing new food and beverages product into market place especially SMEs. Approximately 70% to 90% of new food and beverage products produced by SMEs fail within the first year in the market. This is due to the increasing of global competition, increasing technological capabilities, decreasing of product lifecycle, and rapidly changing consumer demands. Besides that SMEs in manufacturing are faced with numerous constraints in order to achieve high performance in the pre-development process due to several factors such as: limitation of finance, workforce, skill, knowledge and raw materials. There is a lot of literature available that deals with the pre-development activities in large-scale industries (Kim & Wilemon 2002; Herstatt & Verworn 2004; Verworn et al. 2008). However, there is a lack of empirical research to identify the pre-development implementation practice for product development in SMEs. pre-development practices and approach in large organizations cannot be applied directly in the SME context due to different characteristics (McAdam et al. 2007). SMEs have limitations in terms of knowledge, resources, experience, and skills to become more innovative compared than large organization (Freel 2000). Thus to the authors knowledge it's important to develop a framework for pre-development process implementation which suits SMEs. However for the first step it is need to conducted an empirical study in Malaysian SMEs to identify awareness and practices of SMEs in the pre-development implementation process.

The objective of this paper is to present the findings of an investigation different practice between Malaysian food and beverage manufacturing SME and large organization in pre-development implementation practice. Finally, the results obtained from this research shall have significant value to a large number of SMEs, as well as aiding in future research to develop a framework for pre-development process implementation which suits SMEs. The variables developed in this study will adopted from Russell and Tippett (2008), Herstatt & Verworn (2004); Verworn et al., (2008) which are focusing their studies in large organization. In view of that two hypotheses will be develop in this study. The hypothesis proposed in this study is to examine significant difference between SMEs and larger organizations in practice of pre-development process implementation. Implementation of pre-development process consists of two main practices which are 1. Implementation of pre-development phases; and 2. Critical factors that support in successful implementation pre-development phases.

2. Literature Review

Pre-development Process: The pre-development process refers to the earliest stage of the NPD process. The process plays an important role in determining which final product will be executed in the manufacturing process. Backman et al. (2007) believed that successful management of pre-development stages make it possible for an organization to reduce manufacturing cost, increase customization, and improve quality of new product. Pre-development process consists of three phases: idea generation, development of product concepts and project evaluation.

Idea generation phase: Idea generation phase plays a major role in shaping the outcome of the whole NPD process. During this stage, project team members explore the new products and business opportunities before systematically searching for new potential ideas that do not yet exist. The value and quality of the ideas will determine the quality of the end product. Acquiring more and accurate information is crucial for team members to minimize the cost for subsequent NPD activities (R.G Cooper 1993; Koen et al. 2001; Kim & Wilemon 2002).

Development new product concept phase: The second stage is the development of the new product concept. In this stage project team members will develop the new product concept based on the idea generation results. Team members will translate the initial new product concept through product definition activities. Sharp and early product definition activities will lead to easy and fast decision making processes by top management. In addition team members will achieve early and clear understanding of development cost, duration of time and risk before new project begin (Koen et al. 2001; Krishnan & Ulrich 2001).

Project evaluation phase: The final stage is project evaluation. The objective of this stage is to decide whether the proposed idea is to be accepted and enter into the systematic project development or terminate it in order to save the cost of failure. Several analysis and evaluation procedures will be conducted during this stage, such as business analysis, feasibility study, and risk analysis. The analysis may help top management to determent organizational direction and capabilities (Tidd & Bodley 2002).

Critical Success Factors: Russell & Tippett (2008); Herstatt & Verworn (2004); Verworn et al., 2008 had determined critical success factors to achieve effective and early commencement of pre-development process implementation in large organization. The CSFs proposed are: commitment from top management, clear product strategy, good project team work, external organizational involvement and training.

Commitment from top management: The commitment from top management is critical for the initial of the NPD project. Top management commitment influences the level of resources devoted to the pre-development project (Sun & Wing 2005). Tb his is because firms resources such as financial, labor, technical assistance and energy experts are controlled by top-management. In the initial stage of pre-development process top management responsible to determine and develop product strategy as a guideline to entire project team members (Zhu et al. 2012).

Clear product strategy: Product strategy is very critical in facilitates decision making process. Development product strategy should be start before pre-development process implementation begins (Russell and Tippett 2008). Product strategy more emphasizes on the activities of new product development and exploration of new opportunities in the market (Sun & Wing 2005). Among the information included in the product strategy are: organization's financial goals, responsibility of each team members, characteristics new products to be developed, added value to be gained by organizations as well as consumers and target market (Russell & Tippett, 2008),.

Project team work: Consistent involvement of project team work is critical during implementation of pre-development process. Good project team members normally composed of multi-disciplinary teams such as from research and development (R&D), marketing and manufacturing (Burke et al. 2006). Newman et al. (2012) believed that external and internal communication across or within project team work is very crucial to determine and generate new potential ideas. In addition involvement early project team members in pre-development process implementation will help the group members identify problem and obstacle occurred in early.

External organization involvement: External organization encompasses several important people in NPD process such as: customer, supplier, strategic partners, governments, and virtual community. Through gathering information from external organization project team member capable to gain clear understanding of current and potential customer needs, possible market size and growth rates, regulation trend, and marketing strategy ideas. Thus earliest study by Cooper & Kleinschmidt (1987) stated that customer involvement as a buyer and user can significantly improve product concept once project team understand of current customer needs and then future needs. On the other hand, strong relationship with supplier may reduce development costs, promote higher quality with fewer defects, reducing time to market, as well as supplier able to fulfill sudden requests quickly and effectively.

Training: Implementation of pre-development process required high creativity, innovation and imagination from employees. In view of that training and development is important to improve employees' knowledge, skills and behaviors (Duerr & Duerr 2011). In addition a lot of exploration, experimentation, and evaluation need to do by project team members to identifying and develop potential ideas during implementation of pre-development process (Barczak et al. 2009). Training and development may be provided by organization in the form of formal and informal. Taken together, these arguments suggest that: H1a. There is significant difference between SMEs and large organization in practice of pre-development process implementation.

3. Methodology

The population for this study consists of SME organizations that are involved in the food and beverage industry. There were a total of 687 SME organizations involving in producing food and beverages in Malaysia. For each organization, managing directors, operation managers, production managers, R&D managers, or marketing managers who were directly involved in the NPD process, especially in pre-development processes, were ask to give feedback in this study. This study has used questionnaire survey methods in order to collect, analyze, and generalize the data. The main strength to survey method is that researchers are able to rapidly collect data from a large sample among different groups (Zikmund et al. 2010). The survey questionnaire developed in this research consisted of two main sections. The first section comprises questions about the company background, and the second section consists of questions about pre-development phases and critical success factors for implementation of pre-development process. The respondents were asked to rate on a five-point Likert scale on each statement. For the degree of importance, the rate scale ranged from 1 = not important at all, to 5 = very important. While for the extent of practice was given as 1 = very low, to 5 = very high. In order to establish the reliability and factor

analysis, a pilot study was conducted involving 100 SMEs. A total of 100 firms were chosen, but only 55 of them were committed and returned the completed survey questionnaire. The result of the pilot study was used to improve the final questionnaire. Completing the pilot study enabled the full survey to be launched, involving 687 respondents which are classified as Malaysian food and beverage SME manufacturers. The target participants for the survey were chosen from the Federation of Malaysian Manufacturing Directory (FMM), and the SME Corporation Malaysia directory. The summaries of the reliability and validity analysis are given in Table 1. All the results of reliability analysis proved high internal consistency with coefficient alpha ≥ 0.70 and therefore reliable. Besides that all the results of factor analysis demonstrated KMO value greater than 0.5 which is indicated all constructs are appropriate and acceptable.

Table 1: Reliability and validity results

Description	No of items	Reliability analysis		Factor analysis	
		Alpha value	Items deletion	KMO	Factor loading for each item
Pre-development phases					
1. Idea generation	6	.706	-	.757	.607, .701, .588, .606, .630, .683 .727, .687, .773, .787, 557
2. Concept development	5	.751	-	.770	.683, .763, .770, .748, .769, .757, .680,
3. Project evaluation	8	.878	-	.769	.706
Critical success factors					
1. Commitment top management	7	.826	-	.823	.732, .670, .624, .603, .763, .799, .702 .799, .856, .866, .781
2. Project team members	4	.844	-	.800	.705, .785, .773, .745, .721
3. Clear product strategy	5	.801	-	.815	.893, .876, .912, .894, .722
4. External organization involvement	5	.912	-	.845	.887, .903, .830
5. Training	3	.845	-	.707	

4. Results

A large-scale survey was conducted randomly among directors, owners, and managers of food and beverage manufacturing SMEs. Of the 687 questionnaires mailed, a total of 171 were returned giving a response rate of 25%, but seven were non-usable. According to Yusof and Aspinwall (2000) a response of 20-25% is normal for mailed questionnaire and the 25% obtained in this study was deemed reasonable. The responses were entered into the SPSS database and analyzed using both descriptive statistics and *t-test* statistics to generate and validate the results observed.

SME Profile: The aspects to be investigated were the general background of the respondents and company size based on Laforet & Tann (2006) study. The results are presented in Table 2. For the company size, the classification was done based on the SME Corporation directory. Small-sized enterprises employs between 5-50 full-time employees, and medium-sized enterprises employs between 51-150 full-time employees (SME Corp 2011). Based on this classification, 74% of the respondents in this study consisted of small-sized enterprises, followed by 26% medium-sized enterprises.

Table 2: Breakdown of organizations surveyed by employees

No. of Employees	Percentage (%)	N (164)
Small-sized enterprises	74%	121
Medium-sized enterprises	26%	43

Table 3: List of CSF ranked by respondent

No.	Critical Success Factors	Percentage (%)
1.	Clear product strategy	81
2.	Top management commitment	66
3.	Team work commitment	29
4.	Training	12
5.	External organizations involvement	10

The Practice of SMEs through pre-development process: In the first test respondents were introduced to five factors which are considered critical in successful implementation of the pre-development process (see Table 3). Respondents were asked to rank the factors they considered to be the most critical to the least critical. Table 3 illustrates the five listed most critical factors. The top three were 'clear product strategy', 'top management commitment', and 'team work commitment'. Approximately 81% of the respondents agreed that 'clear product strategy' was a very critical factor to achieve effective pre-development implementation. Product strategy is most important for organizations compared to business strategy because it is more specific to the market and product. Product strategy is responsible for informing all the workers within the organization regarding what types of projects they should consider. It acts as an organizational guideline for adequate decision making on a new concept for product development to meet customer needs, time-to-market targets, reach pricing targets, meet the sales potential target, and estimate the sales potential and costs (Bart 2002). The second most critical factor is 'top management commitment'. Top management is important to effectively develop and communicate the vision, mission, and guiding principles to the rest of the organization. Furthermore, the top management is accountable in allocating adequate resources such as: human, finance, and technology; and facilitating coordination and cooperation among project team members to

motivate project team members in presenting full commitment during pre-development activities. In other words, the top management plays major roles to facilitate continuous development of the project among project team members, customers, suppliers, and government agencies and institutions.

Results of Hypothesis Testing: The variable was tested using MANOVA and ANOVA analysis with SPSS program. The results are summarized in Table 4 and Table 5. As Table 4 shows, through MANOVA analysis it had been found that there has a significant difference between SMEs and large organization in practicing the pre-development process implementation ($p \leq 0.05$), in support of Ha1.

Table 4 MANOVA analysis of significant difference between SMEs and large organization in practicing pre-development process implementation

Description	N	Value of Pillai's Trace	F	Sig.
Organization size	SMEs =(154) Large organization =(23)	0.416	3.529	0.000

Further analysis has been done using ANOVA analysis to make in depth analysis to see which factors brought the most obvious significant differences between SME and large organization. A post-Hoc Test had been done using the the Tukey HSD multiple comparisons method. The result shows in Table 4, there has a clear significant difference between SMEs and large organization in practicing concept development phase, project evaluation phase, clear product strategy, external organization involvement and training. The *p* value for the each variable is ≥ 0.05.

Table 5 ANOVA analysis with Post-Hoc Test

Description	F	Sig.
Pre-development phases		
Idea generation phase	1.18	0.311
Concept development phase	3.73	0.026
Project evaluation phase	6.28	0.002
Critical success factors		
Clear product strategy	9.67	0.000
Commitment of top management	0.58	0.563
Project team members	1.39	0.252
External organization involvement	3.39	0.036
Training	3.24	0.042

Discussion: The MANOVA analysis reveals that there is significant difference between SMEs and large organization in practicing the implementation of pre-development process. In addition ANOVA analysis successfully specified the practices which have been considered difference between SMEs and large organization. The practices are concept development phase, project evaluation phase, clear product strategy, external involvement and training organization. Meanwhile ANOVA results also exposed that both organizations was agreed that the practice of idea generation phase, commitment of top management and project team members is an important component in the implementation of the pre-development process. The results were support previous findings by McAdam et al. (2007) which has been believed that the implementation practice of large organization in implementation of pre-development process can't be simplified followed by SMEs. SMEs have different characteristic compared than large organization in term of organizational structure, procedures, human resources and culture (Hotho & Champion 2011). Besides that SMEs also faced with several deficiencies such as: limitation of financial, employee skills and experience and technology (Saleh 2006; Olawale & Garwe 2010).

5. Conclusion

The purpose of this paper was to explore the practicing of Malaysian food and beverage manufacturing SMEs toward pre-development implementation practice. Previous researcher were focusing they studies in larger organization. In view of that comparison studies has been done in this studies in order to identify different practice between SMEs and larger organization in pre-development implementation. This study had discovered significant differences between SMEs' and large organization in practicing concept development phase, project evaluation phase, clear product strategy, external organization involvement and training. The significant values for all factors were below 0.05. Both organizations have different perspectives on the level of importance for the factors and it based on the organization's characteristic. In addition, the survey results showed that 'clear product strategy', 'top management commitment' and 'team work commitment' were ranked as the top three most critical factors for successful implementation of the pre-development process by SMEs. The results may serve as a guideline for SMEs to adopt good implementation practices of the pre-development process within the organization. Additionally, the finding may serve future studies in developing a more comprehensive framework for the successful implementation of the pre-development process that matches with the SMEs' perspective. Development of pre-development process implementation framework is important for Malaysian food and beverage manufacturing SMEs. Studies have revealed that most of the new product produced by Malaysian food and beverage manufacturing SMEs failed within one year in market. Therefore, the development of pre-development process framework that meet SME's characteristic is important to assist SMEs in producing new products with great potential.

References

Backman, M., Borjesson, S., & Setterberg, S. (2007). Working with cocepts in the fuzzy front end; Exploring the context for innovatin for different typesof concept at volvo cars. *R&D Management, 37*(1), 17-28.

Barczak, G., Griffin, A., & Kahn, K. B. (2009). Perspective: trends and drivers of success in NPD practices: results of the 2003 PDMA best practices study. *Journal of Product Innovation Management, 26*, 3-23.

Bart, C. (2002). Product innovation charters: mission statement for new products. *R&D Management, 32*, 23-34.

Burke, C. S., Stagl, K. C., Klein, C., Goodwin, G. F., Salas, E., & Halpin, S. M. (2006). What type of leadership behaviours are functional in teams? a meta-analysis. *The Leadership Quartely 17*(3), 288-307.

Cooper, R. G. (1993). *Winning at New Products: Accerelating the Process From Idea to Launch* (2nd ed.): USA:Addison Wesley.

Cooper, R. G., & Kleinschmidt, E. J. (1987). Success factors in product innovation *Industrial Marketing Management, 16*, 215-223.

Duerr, E. C., & Duerr, M. S. (2011). Japanese and western management approaches: is convergence occurring? *International Business & Economics, 2*(4).

Freel, M. (2000). Barriers to product innovation in small manufacturing firms. *International Small Business Journal, 18*(2), 60-79.

Herstatt, C., & Verworn, B. (2004). The fuzzy front end of innovation. In EITIM (Ed.), *Bringing Technology and Innovation into the Boardroom* (pp. 347-373). Houndmills and New York: Palgrave MacMillan.

Hotho, S., & Champion, K. (2011). Small businesses in the new creative industries: innovation as a people management challenge. *Management Decision, 49*(1), 29-54.

Kim, J., & Wilemon, D. (2002). Focusing the fuzzy front-end in new product development. *R&D Management, 32*(4), 269-278.

Koen, P., Ajamian, G., Burkart, R., Clamean, A., Davidson, J., D'Amore, R., Elkins, C., Herald, K., Incorvia, M., Johnson, A., Karol, R., Seibert, R., Slavejkov, A., & Wagner, K. (2001). Providing clarity and a common language to the fuzzy front end. *Research Technology Management, 44*(2), 46-55.

Krishnan, V., & Ulrich, K. T. (2001). Product development decision: a review of the literature. *Managment Science, 47*(1), 1-21.

Laforet, S., & Tann, J. (2006). Innovative characteristics of small manufacturing firms. *Journal of Small Business and Enterprise Development, 13*(3), 363-380.

McAdam, R., Keogh, W., Reid, R. S., & Mitchell, N. (2007). Implementing innovation management in manufacturing SMEs: a longitudinal study. *Journal of Small Business and Enterpreneur Development, 14*(3), 385-403.

Olawale, F., & Garwe, D. (2010). Obstacles to the growth of new SMEs in south africa: a principal component analysis approach *African Journal of Business Management 4*(5), 729-738.

Russell, R. K., & Tippett, D. D. (2008). Critical success factors for the fuzzy front end of innovation in the medical device industry. *Engineering Management Journal, 20*(3), 36-43.

Saleh, A. S. (2006). An evaluation of SME development in Malaysia. *International Review of Business Research Papers, 2*(1), 1-14.

SME Corp. (2011). Difinition of SMEs (Publication no. www.smecorp.gov.my). Retrieved 1 August 2011, from SMECORP Malaysia: www.smecorp.gov.my

Sun, H., & Wing, W. C. (2005). Critical success factors for new product development in Hong Kong toy industry *Technovation, 25*(Issue 3), 293-303.

Tidd, J., & Bodley, K. (2002). The influence of project novelty on the new product development process. *R&D Management, 32*(2), 127-138.

Verworn, B., Herstatt, C., & Nagahira, A. (2008). The fuzzy front end of Japanese new product development projects impact on success and differences between incremental and radical projects. *R&D Management, 31*(1), 1-19.

Yusof, S. M., & Aspinwall, E. (2000). Critical success factors in small and medium enterprises: survey results. *Total Quality Management, 11*(4/5&6), 448-462.

Zhu, Y., Wittmann, X., & Peng, M. K. (2012). Institution-based barriers to innovation in SMEs in china. *Asia Pacific Journal Management, 29*(4), 1131-1142.

Zikmund, W. G., Babin, B. J., Carr, J. C., & Griffin, M. (2010). *Business Research Methods*. Canada: South-Western, Cengage Learning