Jurnal Mutu Pangan, Vol. 2 (1): 57-65, 2015
ISSN *2355-5017*

Efektifitas Penerapan Model Pembuat Keputusan Dalam Proses Pengembangan Produk Pangan Baru

Effectiveness of Decision Making Implementation in New Food Product Development Process

Ulfiana Anika Sari[1], Feri Kusnandar[2], Dede R Adawiyah[2]

[1]Magister Program of Food Technology, School of Graduate Program,
Bogor Agricultural University
[2]Department of Food Science and Technology, Faculty of Agricultural Engineering and Technology,
Bogor Agricultural University

Abstract. *Portfolio management is essential to support food companies in the selection of new food product development (NFPD) projects. This is a tool to ensure that a food company performs enough of right NFPD projects to put the business objective and strategy into action. The objectives of this study were (1) to develop criteria for approval in each gate of NFPD process, (2) to measure the effectiveness of these criteria from the cost reduction advantage, and (3) to evaluate the performance of the developed NFPD process. This study developed criteria for approval as an integrated decision making process (starting from orientation, creation, preparation to implementation) to help the selection of projects. The improved NFPD process minimized the risk of project failure and gave more certain success of the new product launch in the market. Its implementation reduced the failure cost of projects. The company spent 40% of the allocated budget for the projects that completed all the stages and went through all the gates until the launch. For the projects that were either on hold or cancelled, the company spent 20.8% of the allocated budget. The underspent budget of 39.2% were then reallocated for new project initiatives. The developed NFFD model was considered effective by the company management.*

Keywords: *Food product development, dairy industry, portfolio management*

Abstrak. Manajemen portofolio telah menjadi bagian penting dalam mendukung perusahaan untuk menentukan proyek pengembangan produk pangan baru. Manajemen portofolio merupakan perangkat untuk memastikan bahwa perusahaan dapat menjalankan proyek pengembangan produk pangan baru yang tepat sesuai dengan tujuan dan strategi bisnis. Tujuan dari studi ini adalah untuk (1) mengembangkan kriteria persetujuan di setiap tahap proses pengembangan produk baru, (2) mengukur efektifitas dari kriteria persetujuan terhadap pengurangan biaya, dan (3) mengevaluasi kinerja dari proses pengembangan produk baru yang telah dikembangkan. Kriteria persetujuan pada setiap tahapan sebagai proses pengambilan keputusan yang terintegrasi (dimulai dari tahap orientasi, kreasi, pembuatan hingga implementasi) membantu dalam memilih proyek yang dapat diloloskan pada tahap selanjutnya. Hasil modifikasi ini dapat mengurangi resiko kegagalan. Perusahaan menghabiskan 40% dari dana yang dialokasikan untuk proyek-proyek yang berhasil melewati seluruh tahapan hingga diluncurkan ke pasar. Untuk proyek yang ditunda atau dibatalkan, perusahaan menghabiskan 20.8% dari dana yang dialokasikan. Dana yang belum digunakan sebanyak 39.2% kemudian dialokasikan untuk inisiasi proyek baru. Model yang dikembangkan ini dinilai efektif oleh pihak manajemen perusahaan.

Kata kunci: Pengembangan produk pangan baru, industri susu, manajemen portofolio

Practical Application: The result of this study is applicable for companies who highly consider the importance of innovation to sustain the success and grow the business, especially for those who offer broad products to the market and have number of innovation through NFPD projects. Criteria for approval help the company to make selection and prioritization of NFPD projects to ensure the alignment with business strategy and objective as well as to minimize the risk of failure of new product launch.

INTRODUCTION

Sustainable existence of a food business depends on its ability to innovate (Trott 2005). The most common example of innovation is introducing new food products into the market. These new food products enable the company to grow in the business and provide profitable returns and increment of sales. Besides, new food products help the company to gain new markets, costumers,

Coressponding author: fkusnandar@gmail.com

consumers, and market share (Ulrich and Eppinger 2011). Understanding that there are a lot of benefits for the business from being able to innovate, the successful launch of new products becomes very essential for the company (Parry *et al*. 2008).

Consequently food companies are looking into how to manage the development of new food products from idea to launch, both in short lead time and with minimum failures, especially when development process has reached to the later stage and closer to launch. In fact, the majority of new products never make it to market and those that do expose to failure rate between 25 to 45 percent. Every seven new product ideas, only about four enter development, one and a half are launched, and only one really succeeds as expected (Bhuiyan 2011).

Although there have been extensive researches on how to achieve success in new product development, number of companies continue to launch new food products in the market that finally fail and thus new product development considered as the riskiest activities for most industries. As the cost invested in new product development increases, the pressure to maximize the return on those investments also increases (Cooper 2001). Even worse, around 46 percent of resources allocated to new product development are spent on products that are cancelled or fail to contribute sufficient financial return (Bhuiyan 2011). Nonetheless, it is still clear that in order to achieve a successful performance of new food products, it is important to have a successful implementation of new food product development (NFPD) process. This can only be done when a food company has a systematic and documented procedure for NFPD.

NFPD procedure was already available and implemented in the company where this study was conducted. This procedure described step-by-step activities for the development of new food products. The activities were classified in four different stages, which are orientation, creation, preparation, and implementation. However, this only focused on the process itself from beginning to end without providing clear and organized way to track the progress. Practically, there was a big possibility that NFPD project run from idea to launch without decision making process in between the stages saying if the project was still on track or there might be some alarm in completion of activities in each stage. The progress of NFPD project is assessed in terms of time, budget, quality, risk, organization, information, and communication aspects.

Since company may have number of food products, number of NFPD projects may also run concurrently (Dooley *et al*. 2005). At the same time, number of resources in the company is limited or allocated already for the day to day business (Miguel and Segismundo 2006). Thus, ideally the NFPD procedure should also provide a clear guideline for selection and prioritization of NFPD projects, looking into alignment with business strategy and objective as well as the benefit to net sales and other potentials to sustain the business (Nagji and Tuff 2012). The selection and prioritization of new product development projects are translated as portfolio management (*Cooper* 2000).

Portfolio management is defined as a dynamic decision process in which a list of active new product development projects is continuously reviewed and updated (Cooper 2001). This process involves evaluation, selection, and prioritization of projects. Old projects may be deprioritized, postponed, or cancelled, while new projects may be initiated. These decisions on the projects are important to optimally allocate the available resources in the company to the active projects.

Cooper *et al*. (2002) also identified that this important topic is often absent in managing new product development, which potentially leads to several problems. The common problem is that there are only limited numbers of resources for too many new product development projects. While most of these are not aligned with the business strategy, the projects remain to be progressed until the launch. In the end, the quality of portfolio is highly affected by the selection of active projects. Thus, companies should only choose the right projects to have a high quality portfolio. Additionally, the portfolio should be properly analyzed and balanced to support and achieve business strategy and objectives (Nagji and Tuff 2012).

In the old NFPD process of the company, portfolio management was also not available. When there are several NFPD projects in the portfolio, criteria for approval to support the management's decision making process in evaluating if the projects still align with the business strategy and objective thus worth to carry on, need to be prioritized for valid reasons, postponed, or even stopped was also not set. This led to the consequence of higher attrition rate of new product launched in the market than the chance of achieving potential success that contributes to the growth of the business.

During 2012, when the old NFPD process was still being implemented in the company, there were five projects running. Four of these projects could go through all stages until the launch into the market. One project was dropped in the creation stage, thus could not enter the preparation stage. After having spent up to 85% of the budget allocated for this project, it was not clear why this project was cancelled since evaluation was not properly done and well documented. From four projects that could make their way to the launch, only two new food products remain marketed until today. Two others were stopped sold after 11 months and 14 months since the launch.

The main reason for this failure was that the additional net sales of these products did not contribute significant profit to the total business. Instead, the company spent numerous resources only to support advertisement and promotion (A&P), thus to avoid further loss, decision to discontinue selling the products was taken. This failure could have been mitigated if net sales estimator and business case were available during the NFPD process. As these two criteria were also mentioned as critical and required in the procedure, the team might have missed to

consider these in assessing if the project could pass all the stages up to the launch.

From this failure, the company realized if quite massive improvement of old NFPD process is needed. Step-by-step activities in each stage of NFPD process have to be clearly defined, although each project may not require all but only some of the steps. Additionally there should also be a gate in between the stages to assess if the project can go into the next stage or should be cancelled or hold. The assessment should be supported with criteria for approval, reflecting the activities that are critical for the project to go through the stages.

Criteria for approval is not an algorithm for making go or no go decisions but, rather, a systematic process that can be used at multiple stages of NFPD to show faulty assumptions, gaps in knowledge, and potential sources of risk, and to ensure that every room for improvement has been explored. Criteria for approval can also be used to identify and help solve problems that are alarming a project, contain risks, and show problems that cannot be fixed and thus should lead to termination of project (Day 2009).

Considering the above rationale, this study was aimed to develop criteria for approval in each gate, measure the effectiveness of these criteria from the cost reduction advantage, and evaluate the performance of the new NFPD process.

METHODOLOGY

Time and Place of Study

This study was done from October 2012 to December 2013 in a dairy processing industry in Indonesia.

Materials

This study was completed using several materials including corporate NFPD procedure, corporate Research and Development and packaging development guideline for NFPD, corporate marketing guideline, questionnaire, minutes of NPD meetings in 2012, and project documents.

Methods

This study was conducted in three steps, aligned with the objectives to develop decision making model in NFPD process, measure effectiveness of decision making model, and evaluate the decision stage gate model performance. The detail methods of each step are explained below.

Developing Decision Making Model in NFPD process

This step was aimed to modify the old NFPD process in order to map the comprehensive activities required per stage in the development of new food products and how critical these activities are as the criteria in making decision if a project shall be continued or stopped. Modifications of this NFPD process were done by (1) identifying activities in each stage and determining the actors involved in each activity with gap analysis; and (2) identifying criteria for approval in each gate, which also defined as in between stages to decide if the NFPD project can be continued to the next stage.

In details, these modifications were achieved through two phases. The first phase was by developing stage gate model. This model is characterized by a process that consists of series of stages that are always followed by gate in between the stages. The stages are where the activities occur, while the gates provide the review of stages with specific criteria for the project to move to the next stage or to take 'go/stop/hold' decision for the project. Identification of activities per stage and actors involved were carried out in this phase.

The second phase was by developing criteria for approval in between stages, which help in decision making of NFPD project. These criteria is defined as series of list of questions refer to the activities that take place in each stage to assess if the project can pass through the current gate and enter the next stage. Respective actors, including board of directors who are responsible in making decision and others who are impacted by the decision were gathered in a workshop to realize this phase. The discussions were raised on their ideal expectations on what to achieve in each stage, also as the project progresses the potential success and failure risk of the new product should only be getting clear for them before making the decision.

From this workshop, the decision stage gate model including the activities per stage and actors involved as well as the list of criteria for approval were discussed and finalized. The outcome was documented and included in the company procedure for NFPD process. This procedure is also required in partial fulfilment of quality management system, ISO 9001.

Measuring Effectiveness of Decision Making Model

This was progressed through gathering information and data on the costs needed for NFPD process in a year time frame, a full year 2012 for the old process and 2013 for the improved one. As the cost varied per project, the value was converted into percentage per stage against the total. The cost exercises were gathered from the principal toolbox, a corporate tool where all information regarding NFPD projects from idea to launch, including progress, time, budget, quality, risk, planning and actual, as well as the project documents are gathered and maintained by the portfolio manager, the owner or the guide of NFPD process implementation in the company. Principal toolbox is also audited regularly.

The costs represented the implementation of old NFPD process without decision making process in between the stages during 2012 and the new one with decision stage gate model during 2013. The costs were compared against the success rate of new product in the market with implementation of new model and the failure rate with the old one. NFPD projects were also grouped into two categories, specialized nutrition for infant, follow on, and toddler (IFT) and dairy based beverages (DBB). This categorization was to align with the business

strategy. In this study, the costs exercise was done for DBB only since to do reasonable comparison, during these two years, coincidentally there was new product that was successfully launched in the market, but there was also one that failed in only few months after the launch.

Decision Stage Gate Model Performance

The evaluation of decision gate model performance was realized by creating a short questionnaire covering different measures which ranged in score from 1 to 4, meaning as below expectation (1), partially meet expectation (2), meet expectation (3), and excellent (4). The measures were all about the implementation of decision stage gate model, if this model perceived as effective (Q1), perceived as efficient (Q2), realistic and easy to follow (Q3), able to guarantee the successful launch of NFPD project (Q4), able to reduce the risk of loses in cost if the project is stopped or postponed (Q5), available resources in the company utilized optimally for NPD projects (Q6), the criteria for approval sufficient for making decision through stages (Q7). This evaluation was assessed by the actors, including six members of board of director, three marketing managers, and three research and development managers who were also involved during the development of criteria for approval mentioned earlier. This satisfaction survey was conducted in one of the monthly portfolio meetings where selection and assessment of NFPD projects take place.

RESULT AND DISCUSSIONS

Decision Making Model in NFPD process

As mentioned in the introduction, portfolio management, as well as decision making in between stages was not available in the old NFPD process. Figure 1 visualizes how the project moves through stages without assessment to decide on 'GO' or 'NO GO'. There were four stages in the old process, which were orientation, creation, preparation, and implementation. A short docu-ment called new project request in which idea was proposed in brief explanation was created to initiate a project. Orientation stage was about identifying product and/or process including project planning. Recipe and packaging development was started already in this stage. Idea, product and/or process description including project planning were summarized in the project assignment document.

Creation stage was about production trial, shelf life test, and consumer test. Product registration to authority and halal body was done in the preparation stage. Lastly, implementation stage was where the commercial production and launch took place. In this stage, also monthly evaluation regarding the new product performance in the market was conducted up to 6 months from the launch. Not only were the unavailability of decision making in between the stages, the progress of projects in each stage not very well documented. Only new project request and project assignment were required. The lack of documentation led to agile control of project.

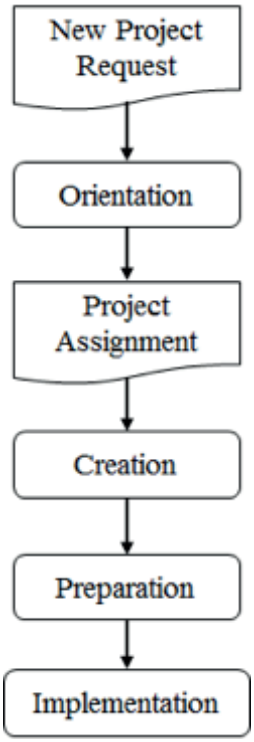


Figure 1. Activity stages of old new food product development process

Decisionstage models were developed to improve the old NFPD process. These models represent the NFPD process as a series of decisions that needs to be taken per stage to progress the project as seen in Figure 2. As mentioned earlier in the introduction, the activities in the old NFPD process were grouped into four stages, which are orientation, creation, preparation, and implementation. However, in the improved process, concept stage in which the old process is lacking of is added to cover insight generation as an initial step of NFPD.

Orientation stage is about identifying the product and/or process. Orientation stage of the new process is also focused on defining objective, deliverable, scope, and requirement (ODSR), creating project planning, and risk assessment. These steps are important to build a firm foundation to run the NFPD project from idea to launch. Unlike in the old process where recipe and packaging development was done in the orientation stage, in the new process, this activity is done in the creation stage.

The general overview regarding the activities occur and the functions involved in each stage for both old and new NFPD process are shown in Table 1. In this table, the stages are shown for both old and improved process. Activities are classified according to what is expected to be realized in each stage. The functions involved means the person or team who are responsible in completion of an activity or a task.

Besides, using the old process as reference, for the same stages, some activities are included in the improved one, such as investment assessment, route to

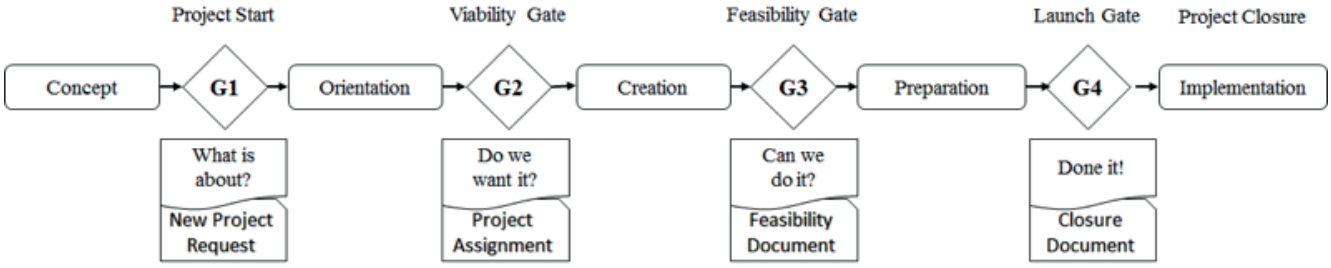


Figure 2. Decision stage gate in the new NFPD process

market strategy, and creative communication development in the creation stage. More importantly, unlike in the old process, in each stage of the improved process, financial figures are required, from the net sales estimator in the concept stage, initial business case in the orientation stage, updated and final ones in the creation and preparation stages, also lastly the innovation tracker after the launch of new product. These figures are meant to provide signal how the NFPD will contribute to the total business.

Related to the functions involved, in the old NFPD process, mainly marketing and the brand team were the champion of the project and thus responsible in completion of each task. In the new process, a project manager, who is not necessarily comes from marketing or with brand experience background, is appointed to lead the project. The project manager is not the contents winner but he/she must ensure if the team members who are the subject matter expert of each activity deliver the task. By doing this way, NFPD project becomes more fully in control.

Still as seen in Figure 2, a gate was developed in between two stages. The gate is where the assessment to take decision if the project can move into the next stage. Furthermore document in each gate, after the completion of activities in each stage are required in the improved process. These documents are new project request to start the project after the concept stage, project assignment in the viability gate after orientation stage, feasibility document in the feasibility gate after creation stage, launch document in the launch gate after preparation stage, and project closure after implementation stage. These proper documentations are required to be in control in tracking the progress of NFPD project and enable making considerate decision to move to the next stage. The improved process is to ensure that implementation of NFPD projects is executed in a controlled and timely manner, also to guarantee food safety, quality, safety, health, and environment (SHE), legal requirement, business risk and other potential risks are properly mitigated. These were not properly captured in the old process.

After developing decision stage models, refer to the activities occurred per stage, criteria for approval in each gate was then developed. These criteria are used to assess if the project can continue to the next stage or should be cancelled. The assessment takes place in each gate. Major question was developed to represent what is expected from the previous stage. The detail criteria are to measure if the result of the previous stage can make the project enter the next stage. For instance in the concept stage, the activities are about insight generation and innovation path review, the criteria for approval to the orientation stage are about the alignment of idea with business and innovation strategy, relation between insight and consumer relevance also market potential, as well as probability of success of the new product. The information about the result of the previous stage and what will be achieved in the next stage should be gathered in the gate document. The assessment is based on the gate document. The complete overview on the criteria for approval is listed in Table 2.

However, it is important to note that the list of criteria for approval is not ranked in such a way that determines if one element in the criteria is more critical compare to the others at the same gate in making decision for the project. Each NFPD project is unique, thus not all criteria in each gate may be applicable to support the assessment. It can also be that some criteria are critical for one project but less relevant for different projects. Therefore the assessment shall be done by the portfolio team that consists of people from across functions, including R&D, marketing, and manufacturing. They should also work with senior managers, management team, or board of directors who are familiar with the screen and have the expertise and the instincts to push objectively for accurate answers, particularly at each decision gate during development. At the same time, however, these managers should be sympathetic and willing to provide the team with the resources to fill information gaps (Day, 2009).

There were only four gates of which criteria for approval were developed. For the final gate of project closure, criteria for approval is no longer needed, only post launch evaluation is required to measure the newly launched product performance in the market among its competitors or its acceptance towards customers or consumers. Product performance criteria may include sales volume, sales value, market share, volume share, or even cannibalization of product with the same brand in the portfolio. In other words, this evaluation is the conformity controls if the newly launched products are meeting the goals of project quality related to consumer, channel, competitor, financial and product quality. Eventually, in case of any failure, a root cause analysis and action shall be made.

Table 1. Comparison of old and improved new food product development (NFPD) process in dairy processing company

Stage	Old NFPD process		Improved NFPD process	
	Activities	Functions involved	Activities	Functions involved
Concept	Create New Project Request	Marketing, Brand Team	· Insight generation · Review innovation path · Create New Project Request and net sales estimation	Marketing, Brand Team, Market Research, Project Manager
Orientation	· Identify product and/or process · Project planning · Recipe and packaging development · Create Project Assignment	Marketing, Brand Team, Research and development	· Define Objective, Deliverable, Scope, Requirement (ODSR) · Identify product and/or process · Project planning · Risk assessment · Create Project Assignment and initial business case	Marketing, Brand Team, Market Research, Project Manager
Creation	· Production trial and shelf life test · Consumer test · Registration to SAP system (i.e. bill of materials and Costing)	Research and development, Marketing, Brand Team, Market Research, Costing Team	· Recipe and packaging development · Production trial and shelf life test · Consumer test · Trademark / license / patent registration · Capex / investment assessment · Channel / account route to market strategy · Creative communication development · Logistic assessment · Create Feasibility Document and updated business case	Research and development, Marketing, Brand Team, Market Research, Trade Marketing and Sales, Logistic and Supply Chain, Project Manager
Preparation	· Finalize product specification and packaging · Product and halal registration to Indonesian FDA (BPOM) and MUI · Socialization of production manual and new product specification · Handover of new product and process to line organization · Create launch plan	Research and development, Regulatory Affairs, Production Team, Marketing, Brand Team	· Product and halal registration to Indonesian FDA (BPOM) and Halal · Order raw and packaging materials · Technology installation and commissioning · Registration to SAP system (i.e. Bill of Materials and Costing) · Demand planning · Commercial production planning · Create Launch Document and finalized business case	Regulatory Affairs, Supply Planning Team, Production, Engineering, Costing, Demand Planning Team, Marketing, Brand Team, Project Manager
Implementation	· Commercial production · Product launch evaluation every month until 6 months after launching	Production Marketing, Brand Team	· Commercial production · Product launch · Handover from project team to line organization · Project evaluation (measure performance against agreed parameters · Post launch conformity control · Create Closure Document	Research and development, Production, Project Manager

Effectiveness of Improved Decision Making Model

The effectiveness of new NFPD process implementation with decision stage gate models and criteria for approval in between stages was measured against the cost a project has spent from the initial stage until its ending stage. The ending stage means the stage where the project was ended for any reason including launching of product, if it ended in the implementation stage, or if it was simply stopped or hold in any stage before the launch because it did not meet the criteria for approval. The overview of DBB category project with new NFPD process during 2013 can be seen in Table 3.

There were seven projects during 2013. However, only three that made to the launch and is still being marketed until today. For the other three projects, these were cancelled with the reasons also listed in the table. One project was on hold, means cannot be launched on the same year, until the investment can be realized.

The overview of DBB category NFPD projects in cost allocation is listed in Table 4. With the implementation of new NFPD process, the company spent 40% of the allocated budget for the projects that completed all the stages and went through all the gates until the launch. For the projects that were either on hold or cancelled,

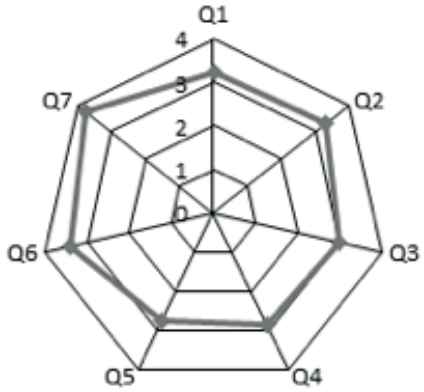
Table 2. Criteria for approval for each gate in improved NFPD process

Gate	Major question	Criteria for approval
G1. Project Start	1. What is it about?	a. Alignment with business and innovation strategy and target b. Insight, consumer relevance, and market potential c. Probability of success from technical feasibility, core competences, market attractiveness, competitive advantage
G2. Viability Gate	2. Do we want it?	a. Relevant customer needs vs insight and technical solution b. Suitability with brand strategy and company capabilities c. Available skill and resources d. Risks towards business and launch e. Product description in general
G3. Feasibility Gate	3. Can we do it?	a. Product and packaging descriptions b. Brand positioning c. Fitness with consumer's expectation (appearance, function and benefit, taste, etc.) based on the concept d. Production capability and investment e. Potential issue and complexity f. Understanding and acceptance of risk including measures g. Business case including profit and loss (PandL), revenue h. Launch plan
G4. Launch Gate	4. Will we do it?	a. Factory trials and shelf life studies b. Consumer demand c. Viability of business case and PandL, any deviation d. Cost price and profit margin e. Deliverables and requirements are met f. Budget availability for launch g. Any other risks and if these acceptable

the company spent 20.8% of the allocated budget. The underspent budget of 39.2% were then reallocated either for new initiatives in infant, follow on, and toddler (IFT) category, additional advertisement and promotion (AandP) budget, or overflown to budget of NFPD in 2014.

Decision Stage Gate Model Performance

From the short questionnaire distributed to the board of directors, marketing managers, and research and development managers to measure the satisfaction from the implementation of the new NFPD process, 12 responses were received. The results show that questions 1, 2, 6, and 7 scored higher than 3, in the range of meet expectation towards excellent, meaning that the new NFPD process perceived as effective and efficient with available resources in the company utilized optimally for NFPD projects and criteria for approval are sufficient for making decisions through stages. Question 3 scored just at 3, meet expectation, saying that the new NFPD process is realistic and easy to follow. However, for questions 4 and 5, which scored less than 3, only partially meet expectation towards meet expectation, showing that there are still minor doubts if the new NFPD process is able to guarantee the successful launch of project and reduce the risk of loses in cost if the project is stopped or postponed. These doubts mainly caused by the implementation maturity of the new NFPD process, which has been only a year since it was deve-loped. Nevertheless, the overall feedback was in meet expectation toward excellence with the average score of 3.19 for all questions as seen in Figure 3, which means that the new NFPD process can be implemented to help the company in ensuring successful launch of new product in the market.



Q1: Is the new NFPD process perceived as effective?
Q2: Is the new NFPD process perceived as efficient?
Q3: Is the new NFPD process realistic and easy to follow?
Q4: Is the new NFPD process able to guarantee the successful launch of project?
Q5: Is the new NFPD process able to reduce the risk of loses in cost if the project is stopped or postponed?
Q6: With the new process, are available resources in the compny utylized optimally for NFPD projects?
Q7: Are the criteria for approval sufficient for making decisions through stages?

Figure 3. Average result of satisfaction survey with seven different questions (Q1-Q7) with 12 respondents to assess the implementation of new NFPD process. Scaling score: (1) below expectation; (2) partially meet expectation; (3) meet expectation; (4) excellent.

However, also from the feedback of the questionnaire, to further improve the procedure, business intelligent to gain insight on where the competitors stand in NFPD is advised as one of the key criteria during the concept stage.

Table 3. Overview of DBB category NFPD projects with the stages approval. Project status: (v) pass the stage current stage and gate, can enter the next stage, (x) cancelled, cannot enter the next stage or on hold, more information required to pass the current stage and gate.

Project	Stages Approval					Latest decision and the reason
	Concept	Orientation	Creation	Preparation	Imple-men-tation	
Flavour extension and concept refreshment	v	v		v	v	Project went through all the stages and gates up to the launch into the market
Squeeze pack for sweetens condensed milk	v	v	v	v	v	Project went through all the stages and gates up to the launch into the market
Ready to drink for infant, follow on, and toddler	v	x	-	-	-	Project was cancelled. The concept was not clear and never been validated via market research, also unaligned with the business strategy *)
Tin can with easy opening or reclosable lid	v	v	v	x	-	Project was only on hold, not yet cancelled. Production capability issue, investment was postponed to 2014. Project will be continued once the investment is agreed
Launch of drinking yoghurt	v	v	v	v	v	Project went through all the stages and gates up to the launch into the market
Launch of Extended Shelf Life (ESL) milk	v	x	-	-	-	Project was cancelled. Probability of success was low, competitive advantage was doubtful **)
Launch of ready to drink milk for kids and school segments	v	v	x	-	-	Project was cancelled. Incremental of net sales as presented in the business case is very small, risk of cannibalization of the current product in the portfolio is high ***)

*) project did not meet the criteria for approval G1.1.a (alignment with business and innovation strategy and target) and G1.1.b (insight, consumer relevance, and market potential)
**) the project did not meet the criteria for approval G2.2.b (suitability with brand strategy and company capabilities) and G2.2.d (risks towards business and launch)
***) the project did not meet the criteria for approval G3.3.g (business case including profit and loss (PandL), revenue target)

Table 4. Overview of DBB category NFPD projects in cost allocation

Project	Percentage of cost allocation per project (A)	Percentage of cost allocation per stage					Spending up to last approval (G) = (B+C+D+E+F)	Underspent budget (H) = (A-G)
		Concept (B)	Orientation (C)	Creation (D)	Preparation (E)	Implementation (F)		
1	20.00	1.60	3.80	7.00	5.40	2.20	20.00	0.00
2	15.00	1.35	2.70	4.35	4.95	1.65	15.00	0.00
3	10.00	1.40	2.30	3.70	1.80	0.80	1.40	8.60
4	20.00	2.20	3.40	7.80	4.80	1.80	13.40	6.60
5	5.00	0.60	1.20	1.20	1.40	0.60	5.00	0.00
6	15.00	1.35	2.70	5.55	3.60	1.80	1.35	13.65
7	15.00	1.65	3.00	6.00	2.40	1.95	4.65	10.35
Total	100.00	10.15	19.10	35.60	24.35	10.80	60.80	39.20

Innovation matrix can already tell how the company doing with NPD projects towards the perspective of consumers and technological complexity. However, products from this company are not the only options consumers always look

into. There are other brands available in the market, which may offer value to consumers differently. Competitors might also be working on other innovations already when the company is busy with developing and launching new products to compete with the competitors' products that are already launched or available in the market earlier. By having business intelligent, the company will be able to take steps ahead, thus not always behind the competition. Especially in today's competitive market place, industries need to work hard to be innovative and creative to offer products that meet the needs of consumers. In fact, some new products are being successful in the market through education by industries to consumers.

CONCLUSION

The improved NFPD process provides a systematic approach, in which the old one is lacking of to manage the projects. The improved process not only covers the stages with detail activities and processes required from idea to launch but also by giving indications on the potential success or failure risk in the market. The criteria for approval has been confidently developed to help in making decision if the projects can go to the next stage, shall be stopped or postponed. The improved NFPD process has been able to reduce the failure cost since the projects that did not meet criteria for approval to enter the next stage were stopped as early as possible, thus could guarantee the successful launch of new food products in the market. Besides, the improved process was also appreciated positively by management, as summarized in the satisfaction survey. By implementing the improved NFPD process, risk of failure can be minimized and successful launch in the market is more certain. In short, the criteria for approval in each gate which has been developed is proven to be effective in reducing the failure cost of NFPD projects and therefore appreciated positively as more than meeting the expectation by management.

REFERENCES

Bhuiyan N. 2011. A Framework For Successful New Product Development. J. Industrial Eng. & Man. Vol 4(4): 746-770. ISSN 2013-0953. http://dx.doi.org/ 10.3926/ jiem.334

Cooper RG, Edgett SJ, Kleinschmidt EJ. 2000. New Problems, New Solutions: Making Portfolio Management more Effective. Research Tech. Man. Vol 43(2): 18-33.

Cooper RG, Edgett SJ, Kleinschmidt EJ. 2001. Portfolio Management for New Product Development: Results of an Industry Practices Study. R&D Management (Industrial Research Institute, Inc.) Vol 31(4): 9-12.

Cooper RG, Edgett SJ, Kleinschmidt EJ. 2002. Portfolio Management: Fundamental for New Product Success. Stage-Gate International and Product Development Institute Inc.

Cooper RG. 2001. Winning at New Products: Accelerating the Process from Idea to Launch. Reading, Mass: Perseus Publishing, 3rd edition.

Day GS. 2007. Managing Risk and Reward in an Innova-tion Portfolio. Harvard Business Review. Vol 12: 110-120. Harvard Business School Publishing Corporation. Reprint R0712J.

Dooley L, Lupton G, O'Sullivan D. 2005. Multiple Project Management: a Modern Competitive Necessity. J. Manufacturing Tech. Man. Vol. 16(5): 466-482.

Miguel PAC, Segismundo A. 2006. An analysis of portfolio

management in new product development: a case study in a truck company. http://pmd.hostcentral.com.br/revistas/vol_04/nr_2/v4n2a4204.pdf

Nagji B, Tuff G. 2012. Managing Your Innovation Port-folio. Harvard Business Review. Vol 5: 1-9. Harvard Business School Publishing Corporation. Reprint R1205C.

Parry G, Graves A, James-Moore M. 2008. Lean New Product Introduction: a UK Aerospace Perspective. University of Bath, School of Management Working Paper, No. 2008/03.

Trott P. 2005. Innovation Management and New Product Development. Pearson Education Limited. Essex, England. ISBN 0 273 68643 7.

Ulrich KT, Eppinger, SD. 2011. Product Design and Development. McGraw-Hill. ISBN 978-0073404776

JMP-11-14-003 - Naskah diterima untuk ditelaah pada 19 Nopember 2014. Revisi makalah disetujui untuk dipublikasi pada 3 Februari 2015. Versi Online: http://journal.ipb.ac.id/index.php/jmp