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Contextual Innovation Management Using a Stage-Gate Platform: The Case of Philips Shaving and Beauty

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To improve its innovation process, Philips Shaving and Beauty (S&B) designed a blueprint for its innovation process. Although it has proved to be quite effective, it has experienced a lack of efficiency, in terms of frequent cost and time overruns, in the fuzzy front end of this process. We suggest a contextual innovation management approach to set up a stage-gate-based innovation process platform and thus improve the efficiency in the fuzzy front end, which means that, for different contexts, stage-gate process variants will be designed from which unnecessary activities are removed and important activities are emphasized. The design is based on the identification of relevant contextual factors to develop variations of the common innovation process within Philips S&B. We distinguished different variants of the innovation processes within Philips S&B that can increase the efficiency in the fuzzy front end. Based on interviews within and outside Philips S&B, we identified problems and potential solutions with regard to efficiency in eight recently finished innovation processes. The results indicate that the most important contextual factors are the distinction between incremental and radical innovations, and between market and technology-based innovations. We used these factors to design three variants on the basic platform of the stage-gate process.

Introduction

The management of innovation processes has evolved over time. In the last five decades, the following generations of innovation management can be distinguished (Amidon Rogers, 1996; Cooper, 1994; Liyanage, Greenfield, and Don, 1999; Niosi, 1999; Ortt and Van der Duin, 2008; Rothwell, 1994): (1) a linear sequential innovation process primarily driven by technological changes (technology push), (2) a linear sequential innovation process driven by prespecified market needs (market pull), (3) an iterative project approach that allows both technology and market inputs throughout the innovation process, and (4) an innovation management approach involving a network of partners designing an integrated innovation system. These approaches and the associated innovation process specifications are designed to improve the success rate of innovation processes. Several studies indicate that the most complete (integral) processes are the most successful (e.g., Cooper and Kleinschmidt, 1987). These studies, which are reflected in various product development handbooks, propose a singular, complete innovation process (Crawford, 1991; Urban and Hauser, 1993).

One problem is that complete innovation processes are more effective than they are efficient. A complete innovation process that covers all the essential activities will definitely increase the effectiveness and success rate of the innovation process, but it will not automatically be efficient in every market situation or context. For instance, in some industries, it may be essential to have quick access to market information during innovation processes, while in other industries, it may be essential to have quick access to technology information. If that is the case, efficiency may be improved by designing innovation process variants for particular contexts, without seriously reducing the effectiveness of the innovation process. That is why, in this paper, we explore how an innovation process that is tailored to a specific context can improve efficiency.

Indeed, some of the most innovative companies have adopted various innovation management approaches that they consider appropriate for their specific organizational and market context (Ortt and Van der Duin, 2008). Empirical data underpin the concept of flexible innovation approaches (Elst, Van den Tol, and Smits, 2006; Griffin, 1997). Dutch electronics company Philips, for example, sells different types of products, based on different technologies, aimed at different markets with different customer needs. To do so, the company has adopted a decentralized structure and allows its business units to design their own innovation processes and make their own decisions about how to innovate. For example,

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body care products for consumer households are developed in a different process than electronic components for industrial clients (Elst et al., 2006). This flexible approach implies that a single prescribed innovation process is too rigid. Apparently, different contexts require different innovation processes, which reflects a *contextual* perspective on innovation management. The relevant context can be determined by the type of country, industry or organization, or by the type of innovation (e.g., incremental versus radical) (Ortt and Van der Duin, 2008).

In this paper, we explore contextually determined innovation processes, whereby the common innovation process functions as a platform from which the contextually different innovation processes vary. To make the potential contribution of contextual innovation management to improved efficiency as specific as possible, we focus on innovation processes within one business unit, Shaving and Beauty (S&B), one of the business units of Philips, rather than on different business units. Although, in this business unit, the efficiency of the innovation process was improved, innovation managers continued to experience problems with the product development process in the first part of the development process, the so-called fuzzy front end. In essence, there was a loss of efficiency because, for instance, certain innovation ideas were abandoned too late in the innovation process, indicating that the wrong innovation management approaches were used. As a result, innovation managers were forced to go back to the start of the innovation processes, which meant wasting a great deal of time and money. In addition, innovations reached the market later, which affected the company's market share and turnover. Indeed, Cooper and Kleinschmidt (1987) have found that the ability to manage the fuzzy front end is what distinguishes losers from winners when it comes to innovation. Wasting time at this stage is a serious issue because the fuzzy front end typically represents about 50% of the total innovation time (Smith and Reinertsen, 1998), which is why we focus on ways to manage the first stages of innovation processes more efficiently.

Philips has adopted lean product development to increase the efficiency of its innovation process (Aarts, 2010). Lean product development considers the use of resources for any goal other than the creation of value for the end customer wasteful and therefore a target for elimination (Ward, 2007). This is derived from the way Toyota manages its manufacturing processes ("lean manufacturing"). Estimates indicate that about 50% of the costs of product innovation is spent on waste or nonvalue-adding activities and that a much larger portion of the time spent on product innovation is waste (Schulze and Störmer, 2012. The aim of lean product development is to minimize waste by (1) reducing development time and resources, (2) reducing the risk of schedule and cost overruns, (3) reducing the chance of failed products, and (4) increasing the success rate of innovation processes (Ward, 2007).

Although Philips S&B has significantly improved efficiency in their product innovation processes by implementing lean principles, efficiency in the fuzzy front end has remained a problem. With regard to this phase in the development process, a broad range of new innovation ideas is explored, of which only very few will contribute directly to a successful new product. This does not mean that these activities are intrinsically wasteful because exploration is needed to develop successful innovations.

We look at ways to improve the efficiency in the fuzzy front end by adapting it to the context of the innovation process. Because the fuzzy front end looks different in different contexts, a contextual approach is required to make sure the right choices are made at an early stage, which in turn will make innovation processes more efficient. Philips S&B has adopted a stage-gate innovation process, which we regard as a platform for innovation processes. To determine whether and how different variations of this platform can improve efficiency, we address three research questions:

1. What are the relevant contextual factors that determine variations to the common innovation process within Philips S&B?
2. Which variants of the innovation processes can be distinguished within Philips S&B?
3. How can the different types of innovation processes contribute to increased efficiency in the fuzzy front end of these processes within Philips S&B?

The theoretical framework and methodology are described in the next two sections, respectively, and the

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results are discussed the following section. We then present our conclusions, followed by a discussion of the results and suggestions for future research.

Theoretical Framework

In the management sciences, there is a long tradition that "one size does not fit all." The theoretical foundation for this has become known as the "contingency theory," an early discussion of which focused on innovation management (Burns and Stalker, 1961). The contingency theory states that, to be successful, an organization should adapt itself to a specific factor or contingency variable: "The essence of contingency theory paradigm is that organizational effectiveness results from fitting characteristics of the organizations, such as its structure, to contingencies that reflect the situation of the organization (Donaldson, 2001, p. 1). There are different versions of the contingency theory. In a strict version of the theory, only one contingency variable is chosen to represent the relevant types of context. In less strict versions of the theory, more variables can be used to represent the relevant context, and several approaches can be successful in a particular context. This version is called configurationalism (Donaldson, 2001). We view contextual innovation management as a form of configurationalism because multiple contingency variables, hereafter referred to as contextual variables, can be used to represent the relevant context (see Figure 3), and different types of innovation management approaches can be distinguished for different contexts (see Donaldson, 2001).

There is a sharp contrast between contextual innovation management and the universalistic innovation approach that assumes that there is one set of success factors that explains the success of an organization in all relevant contexts. Studies such as the famous SAPPHO study by Pavitt (1984), and studies by Miller and Blais (1993) and Van der Panne, Beers, and Kleinknecht (2004) have tried to identify universal success factors that explain why some companies are more innovative than others. On the basis of these universal success factors, one generic innovation process is proposed.

In contextual innovation management, the context is described in terms of contextual factors, which have an effect on the organization in general and on its innovation management in particular. These factors have been studied extensively (e.g., Tidd, 2001), and they have yielded different factors, such as the pace of technological change (Drejer, 2002), the nature of innovation, market and technology (Balachandra and Friar, 1997), the nature of market orientation of the product innovation process (Kok and Biemans, 2009), the level of uncertainty and complexity (Lynn and Akgun, 1998; Tidd and Bodley, 2002), socioeconomic conditions, and culture (Souitaris, 1999). The categorization of these factors used in this paper is derived from Ortt and Van der Duin (2008):

- *Type of innovation* (e.g., Drejer, 2002; Ortt and Smits, 2006; Tidd, 2001; Tidd and Bodley, 2002). These studies show that different innovation approaches are required for different types of innovations: "heavy-weight project managers and cross functional teams were more effective for the high-novelty projects, and customers and suppliers were twice as likely to be involved in the development and commercialization of the novel projects" (Tidd, 2001, p. 178).
- *Type of organization* (e.g., Nessim, Ayers, Ridnour, and Gordon, 1995). These studies indicate that different innovation approaches are required in different types of organizations. For example, organizations operating in the consumer market tend to adopt different innovation approaches compared to companies operating in the business market (Ortt and Smits, 2006).
- *Type of industry* (e.g., Miller and Blais, 1993). These studies claim that innovation processes are organized differently in different industries. For instance, because the pharmaceutical industry is highly regulated, innovation processes contain many obligatory clinical tests and trials, whereas innovation processes in the consumer software industry are much more trial-and-error based.
- *Type of country/culture* (e.g., Drejer, 2002; Olivera, Dostaler and Dewberry, 2004). These studies indicate that different innovation practices have developed in different cultures. Some of these differences have to do with the different orientation within a culture, for example, an individual versus a collective orientation. Other differences have to do with regulations and institutions, for example, different degrees of intellectual property protection.

The categories of contingency factors are not independent; they can be related. For instance, in the highly volatile gaming industry, there are many small organizations. This means that the type of industry, innovation, and organization are related.

Methodology

We examined eight innovation processes within the S&B business unit of Philips, a Dutch multinational electronics corporation, comparing the prescribed innovation approach in the business unit and the approach that was

Table 1. Research Design

Part	Goal	Research method and data sources	Type of result	Refers to RQ
I	See difference between general/ actual innovation process.	Study internal documents	Determine the general innovation process in the business unit.	2
		Interviews with project leaders and members (internal experts)	Describe the innovation process in practice.	2
II	Assess contextual factors and potential innovation process adaptations relevant for Philips S&B.	Literature search Interview with external and internal experts	Selection of most important contextual factors (for Philips S&B).	1
		Interview with external and internal experts	Eight completed innovation processes from Philips S&B are grouped using the selected contextual factors.	2
		Work done by the authors	Different innovation processes are designed for each group of processes.	2
III	Assess eight innovation processes to identify problems and possible improvements.	Interview with external and internal experts	Innovation process adaptations are checked against actual innovations. Effect of these adaptations (if they would have been adopted for the innovations) are discussed.	3

RQ, research question; S&B, Shaving and Beauty.

actually used by studying internal documents and interviewing employees and external experts. Rather than conducting a typical descriptive historical case study, we assessed in retrospect which contextual factors were important in these innovation processes and what type of innovation process could have been adopted to improve the efficiency in the fuzzy front end. The research was conducted in 2009, over a six-month period.

We collected and analyzed internal documents to describe the common basis of the innovation process within Philips S&B. The findings from the documents were supplemented by interviews with innovation process leaders and members to check whether the findings were correct and determine to what extent innovation processes within Philips S&B differed from what was put on paper.

Next, we conducted a literature search to compile a list of contextual factors that may have an impact on the type of innovation process. Several product and innovation managers from Philips S&B (internal experts) as well as several external experts were interviewed to indicate the most important contextual factors for innovation processes in Philips S&B in general. The external experts were added to validate the findings from the internal experts and to prevent company bias. The experts were asked to indicate which contextual factors they considered important in the specific situation of eight recently completed innovation processes. In addition, they were asked to group these projects by looking at the possible context similarities. Finally, they were asked to indicate how the prescribed innovation process could have been adopted. Based on the search and interview results, we were able to design different innovation processes for innovations that were grouped based on their contexts. The internal and external experts were asked to make their personal selection in a semistructured interview in which they could select three innovation processes and different contextual factors. Although they could add contextual factors, all the interviewees agreed on the list we presented to them.

Third, the adapted (contextual) innovation processes were discussed with the various experts to determine to what extent these process variants could help improve efficiency in the fuzzy front end of product innovation processes. The research methods and design are summarized in Table 1.

Results

The Innovation Process at Philips S&B

Within Philips S&B, innovation is managed in a very structured way. The entire innovation process, from idea to implementation, is divided into three main subprocesses (see Figure 1). The first subprocess is the innovation planning process (IPP), that is, the fuzzy front end. In this subprocess, consumer insights are translated into concepts and product propositions (e.g., a shaver that can be used in the shower). In the second subprocess, technology and function creation, the actual technologies for the concepts and proposed propositions are developed, while in the third subprocess, integrated product devel-

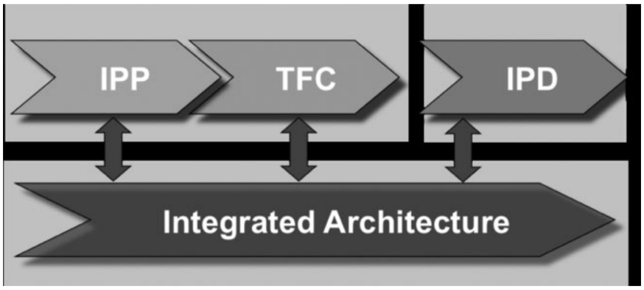

Figure 1. The Common Basis of the Innovation Process and the Three Subprocesses at Philips Shaving & Beauty

opment, the product is constructed, tested, mass-produced, and shipped for the first time. These three subprocesses are supported technically by the integrated architecture (IA). Because our proposed contextual innovation management can be viewed as a platform, this platform can in turn be seen as the nontechnical counterpart of the IA.

The IPP is described in a work breakdown structure with "major activities and deliverables" (see Figure 2). It describes which departments should carry out which activities and what their deliverables are. This structure is used for every IPP, regardless of the type of innovation or relevant context.

The IPP is divided into four activities: (1) IPP analysis, (2) IPP insight development, (3) IPP proposition development, and (4) IPP validation and programming. Figure 2 indicates that different types of inputs are required to complete these activities, which can be ordered in a linear, sequential fashion. Although the result may look complete, many interviewees indicated that it is not efficient. Although the IPP consists of activities aimed at exploring a broad range of possible ideas for new products, not all these activities contribute directly to the development of a successful product.

Thus far, Philips S&B has not learned how to create leaner IPPs. During the interviews, several problems were mentioned, such as alignment problems between the departments and actors involved in the IPP, which we felt are connected to the idea that innovation may proceed differently in different situations. In Philips S&B, the IPP activities should be completed in prescribed amounts of time. One problem with the IPP is that the prescribed time line is based on an ideal process that cannot always be adhered to in practice. Although every IPP roughly contains all the prescribed processes and results, the overall approach and actual time line can be completely different. In many cases, at the end of an IPP, all of the expected outcomes and deliverables are produced. However, in practice, the completion of the IPP phase can take eight months up to two years. In some cases, changes in the environment of Philips S&B (e.g., changes in the market, economy, or consumer demands) will delay the progress of an IPP, requiring a return to the drawing board in the course of an IPP. In some cases, this leads to unfinished IPPs or IPPs that are changed and renamed halfway through. This implies that the same set of IPP activities may in practice be completed in a completely different process where a single prescribed time line does not apply.

A second problem of this IPP process description is that, in practice, different activities were emphasized or

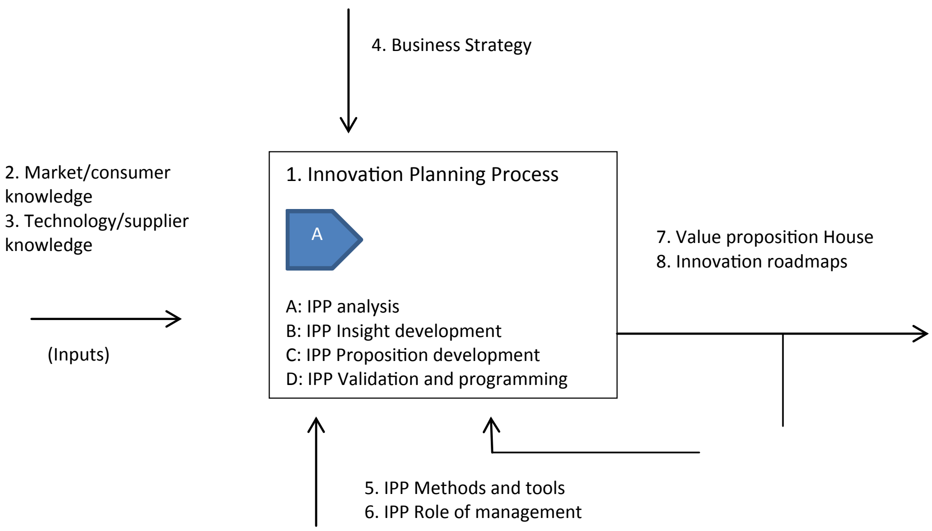

Figure 2. The Innovation Planning Process (IPP) of Philips Shaving and Beauty.
IPD, integrated product development; TFC, technology and function creation

completed. Philips S&B, while monitoring the progress in the IPP phase of its innovation processes, in many cases found that the completion of this phase was highly inefficient. On closer inspection, it turned out that IPP processes are completed (sometimes deliberately) in a different order, for example, by omitting some of the activities the innovation manager in question considers unnecessary. The product and innovation managers are not satisfied with the IPP and adapt the prescribed approach as they see fit, which suggests that a contextual approach may be a better solution. So, a kind of contextual approach is chosen by informally deviating from the official IPP process. It is likely that the "political struggle" about whether or not managers can deviate from the IPP does not contribute to an efficient innovation process.

Eight Recent Innovations at Philips S&B

To examine more specifically how contextual innovation management could contribute to lean product development within Philips S&B, eight innovations were selected that provide a good representation of the kind of innovations that are developed within Philips S&B.

1. Coolskin: The first additive (Nivea) shaver, which can also be used in a wet environment.
2. Child Clipper: A clipper customized to the needs of children, with a friendly design and lower noise level.
3. Arcitec (SR1): The first high-end dry shaver with a completely new slim body design.
4. Arcitec 2 (SR3): The successor of Arcitec, which focuses on a close shave, especially in the neck. The new cap with special teeth should provide a better shaving result.
5. Retraction: A new shaving system that first pulls the hairs from the skin and then cuts them.
6. Sonicare: An electric toothbrush that vibrates with sonic speed for a better result.
7. Merlin: An update of the Coolskin shaver with a completely new slim body.
8. Wake-up Light: An alarm clock that simulates sunrise by slowly increasing light and sound.

Philips S&B generally uses a stage-gate innovation process consisting of three main parts, which can each be subdivided into several separate activities. Evaluation of progress in between these stages allows managers to reconsider the portfolio of innovation processes and continue, redirect, or terminate some of these processes.

Earlier, we distinguished four categories of contextual factors. Table 2 presents the most relevant factors for all of the four categories. The factors are based on the literature.

The relevant contextual factors were selected by product and innovation managers working with IPP within Philips S&B. After we explained these factors to them, the experts were asked to indicate which factors they perceived as being most relevant to innovations within Philips S&B. They indicated that "degree of newness" and "driving force," which are described in greater detail below, were the most relevant.

1. Degree of newness: incremental versus radical
   On the basis of the newness of an innovation, broadly speaking two types can be distinguished: incremental innovations and radical innovations. A radical innovation is a new product, service, or technology that can provide a completely new functionality or that can provide the same functionality based on a new technology. In the long term, these types of innovations completely change price performance ratios and thereby substitute existing products in a product category. Incremental innovations are modified (or improved) new products, services, or technologies that do not make existing products obsolete.
2. Driving force: technology vs. marketing
   In innovation practices, different driving forces of innovation can be distinguished. A market orientation facilitates innovations that offer greater benefits to mainstream customers and are often based on customer research, while a technology orientation facili-

Table 2. Contextual Factors within Each Category

Categories of Contextual Factors	Type of Innovation	Type of Organization	Type of Industry	Type of Culture
	Degree of newness Entity to whom newness refers Driving force Placement within ranges	Open/closed organization	Technology intensity Market scope or geographical reach Industry regulation	Culture of participating companies Culture of targeted consumers

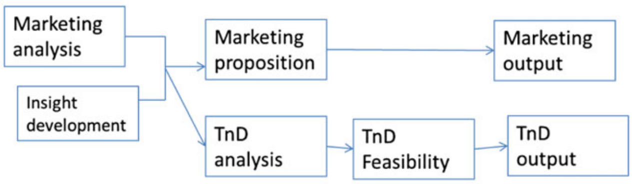

Figure 3. First Option Innovation Process.
TnD, technology and development

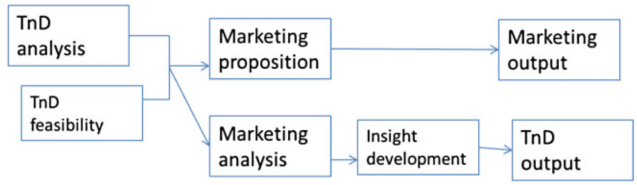

Figure 5. Third Option Innovation Process.
TnD, technology and development

tates innovations that apply new technological principles or new combinations of principles.

We designed three different innovation processes to test the application of contextual innovation management within Philips S&B. They vary in the sequence of subprocesses and the cooperation between departments at specific points in the innovation process.

1. The first option focuses on marketing at the start of the innovation process, which means that marketing will create a clear view on marketing and business objectives, competition, and consumer insights before communicating its findings to the technology and development department (see Figure 3).
2. The second option starts with marketing and technology development taking place in parallel (see Figure 4).
3. The third option focuses on technology development at the start of the process. The aim is to analyze the technological possibilities and feasibility before the exact consumer insights are described (see Figure 5).

Determining how to apply different innovation processes in different contexts was done in a number of steps. To begin with, we categorized the innovation processes for eight innovations using the two contextual factors that the experts considered most important (degree of newness and the driving force behind the innovation). Second, we asked the experts to indicate which innovation process option they would have selected for each individual process, and third, we assessed whether

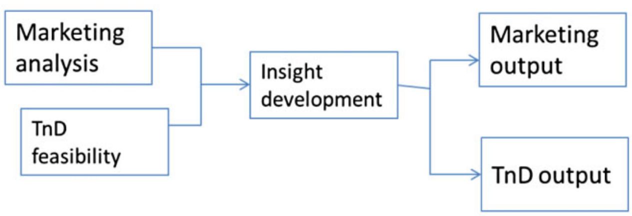

Figure 4. Second Option Innovation Process.
TnD, technology and development

the two contextual factors and the preference for a specific innovation process coincide.

Step 1: Positioning of the innovations using the contingency factors. Figure 6 shows the framework and the eight innovations, and indicates how the internal experts positioned the eight innovations within the framework in which the two relevant contextual factors served as axes.

The internal and external experts agreed on the positioning of the innovations within the framework. Only three innovations were positioned slightly differently by the two groups of experts.

Step 2: The innovation process options for the eight innovations. We asked the internal and external experts to indicate which innovation process option they considered most appropriate for each of the eight innovations. The innovation processes were described and presented to the interviewees. Here, the separate innovation processes are assigned the numbers 1, 2, and 3. Table 3 shows the results for each interviewee, and Table 4

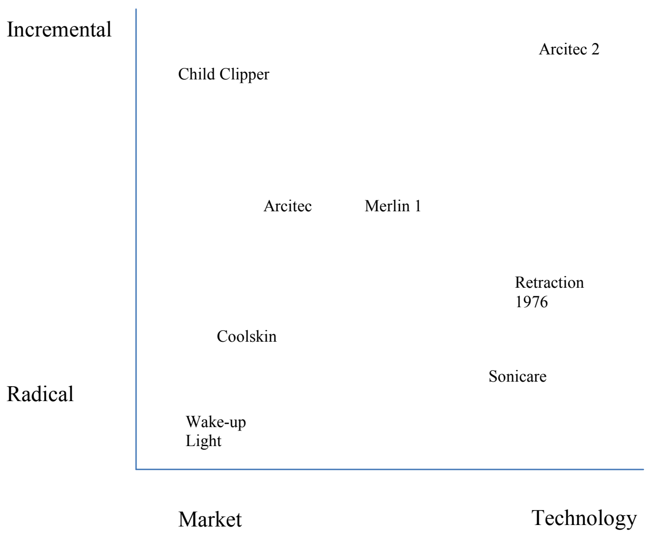

Figure 6. Innovations Plotted Using the Two Contextual Factors

Table 3. Expert Preferences Indicating the Type of Innovation Process that They Would Prefer Regarding the Eight Innovations

Experts	Coolskin	Child Clipper	Arcitec	Arcitec 2	Retraction	Sonicare	Merlin	Wake-up Light
1. Ext. cons.	2	2	3	3	3	1	3	1
2. Ext. cons.	2	3	1	3	3	2	1	1
3. Ext. cons.	1	1	3	3	3	3	1	1
4. Ext. cons.	1	1	3	2	2	2	1	2
5. Ext. cons.	3	2	2	2	3	3	1	1
6. Inn.man. Ph.	1	1	1	2	2	2	1	1
7. Inn.man. Ph.	1	1	3	1	2	3	1	2
8. Inn.man. Ph.	1	2	1	3	3	3	1	1
9. Ext. cons.	1	1	2	3	3	3	1	3
10. Ext. cons.	1	1	3	2	3	3	3	1
11. Ext. cons.	1	1	2	2	1	3	2	1
12. Inn.man. Ph.	3	2	3	2	3	3	2	1

Ext. cons., external consultant; Inn.man. Ph., innovation manager Philips.

summarizes the number of times the various options were preferred by experts, per innovation.

We carried out a chi-squared analysis to see whether the number of preferences differs significantly from the average scores of four experts that could be expected if the choice were random. If 12 experts choose one process randomly out of three variants, it would lead to an average of four preferences for each process type. For the Coolskin case, the number of times the process variants are chosen are eight, two, and two, respectively, and the corresponding chi-squared score is 6. The significance level is .05, which means that the fact that eight experts prefer process 1, and two experts prefer processes 2 and 3, respectively, differs significantly ($p = .05$) from the average number of four experts preferring each type of process. For other chi-squared values and their significance, see Table 5.

The table shows that, in five out of the eight cases, the outcomes differ significantly from the expected values, which means that the experts did not select an option at random. The five innovations that were not selected randomly are Coolskin, Retraction, Sonicare, Merlin, and Wake-up Light. Although the chi-squared values of Child Clipper, Arcitec, and Arcitec 2 were not significant, they still provided valuable information about the preferences of the experts. First, Arcitec shows the highest variation, which is not surprising because of the differences in opinion of the experts on the positioning of this innovation. The insignificance of both the choices for the Child Clipper and the Arcitec 2 can be clarified by the innova-

Table 4. Number of Times Innovation Processes 1, 2, or 3 Were Preferred by the Experts in the Eight Innovations

Innovation → ↓ Type of process	Coolskin	Child Clipper	Arcitec	Arcitec 2	Retraction	Sonicare	Merlin	Wake-up Light
Process 1	8	7	3	1	1	1	8	9
Process 2	2	4	3	6	3	3	2	2
Process 3	2	1	6	5	8	8	2	1

Table 5. Chi-squared Scores Indicating Whether the Number of Experts Preferring Specific Innovation Processes Is Significant

	Test Statistics							
	Coolskin	Child Clipper	Arcitec	Arcitec 2	Retraction	Sonicare	Merlin	Wake-up Light
Chi-squared	6.000[a]	4.500[a]	1.500[a]	3.500[a]	6.500[a]	6.500[a]	6.000[a]	9.500[a]
df	2	2	2	2	2	2	2	2
Asymp. Sig.	.050	.105	.472	.174	.039	.039	.050	.009

[a] Three cells (100.0%) have expected frequencies less than 5. The minimum expected cell frequency is 4.0.
df, degrees of freedom.

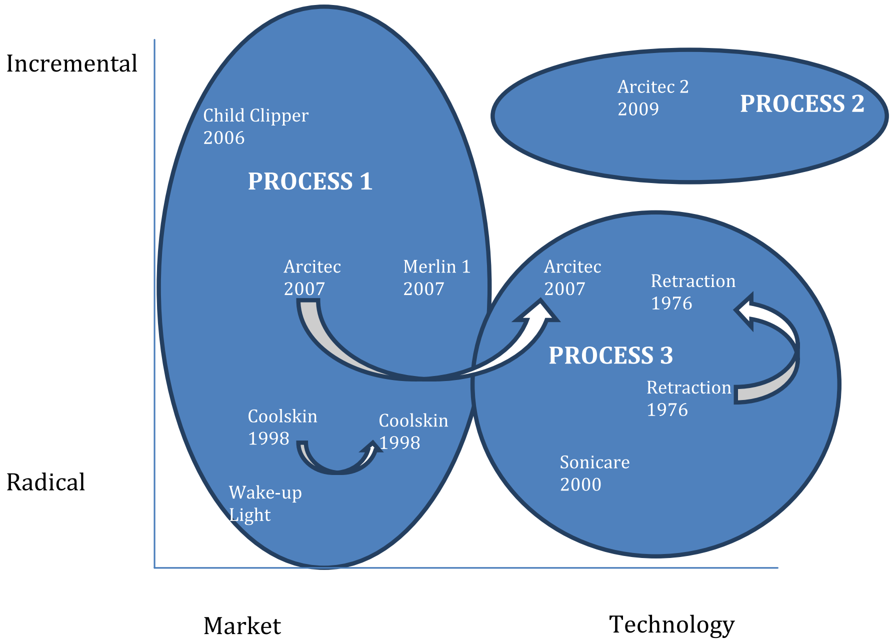

Figure 7. The Experts' Opinions on the Appropriate Innovation Process for Each of the Eight Innovations

tion process variations that were chosen. Both internal and external experts perceive these innovations as being incremental in nature. Child Clipper is perceived as a market-driven incremental innovation, while Arcitec 2 is perceived as a technology-driven incremental innovation. Because the three process variants both contain a strong variant for incremental innovations and for both driving forces, the choice in favor of one of these options was considered difficult. In both cases, we see an almost equal division between innovation process option 2 and the process that best matches with the dominant driving force. The dominant choices for the innovation process options per case are presented in Figure 7.

Step 3: Do contextual factors and innovation process variants coincide? Figure 7 shows that all innovations are surrounded by the area of the dominant process option corresponding with the case. The insights from the statistical analyses on the choices of the external experts clearly correspond with the areas covered by the different innovation process options.

Figure 7 shows that the experts are very consistent in categorizing the eight innovations and in assigning different types of innovation processes to product innovations. Indeed, market-based innovations should be developed using a market-based innovation process, while technology-based innovations should be developed using a typical technology-push type of process if the innovation is (supposed to be) radical, and with a combined process in case the innovation is incremental in nature.[1] Figure 7 illustrates that, in retrospect, the innovations located in process 2 and process 3 areas would have been developed differently (and better) by adopting a different innovation process than is suggested by the current prescribed innovation process in Philips S&B. This means that process 1 would initially cover the entire framework, but the contextual innovation management approach shows that process 1 is not the best approach for every product innovation developed by Philips S&B.

Conclusions

This paper started out with a dilemma: on the one hand, more complete and extensive innovation processes tend to be more effective (successful), while on the other hand, a complete innovation process can sometimes be very inefficient because of its rigidity. This problem is particularly relevant in the fuzzy front end of innovation processes, where the exploratory activities aimed at finding a viable idea for innovation necessarily can lead to inefficiency. We described these problems from the perspective of a high-tech company, the business unit S&B of the electronics company Philips.

As a possible solution, we tried to combine the notion of efficiency, as prescribed by the idea of lean product

[1] We would like to note that it is not always possible to decide in advance whether an innovation will be radical or incremental in nature. However, innovators can decide in advance whether they have a radical or incremental ambition with their innovation process.

development, and the notion of contextual innovation management. This could mean that, wherever possible, activities can be omitted or ordered differently to increase efficiency.

The common basis for the innovation process was a stage-gate type of innovation process. Philips S&B uses an elaborate stage-gate process as a blueprint for all innovation processes within the business unit. During interviews with internal and external experts, two contextual factors were identified as being most important: (1) incremental versus radical innovations, and (2) market-oriented versus technology-based innovations. Three innovation process variants were designed in collaboration with product and innovation managers. We reanalyzed eight innovations within the business unit to assess the problems in the innovation process and discuss the probable improvement had different innovation processes been adopted to complete the same innovation process.

Our analysis shows that contextual innovation management is applicable in practice and has added value. Internal and external experts were able to determine the context of a proposed innovation and select the appropriate innovation process design. Furthermore, they were relatively consistent when it came to positioning the innovations and selecting the best alternative innovation process, which indicates that the context of a proposed innovation can be defined with a considerable degree of objectivity, regardless of the knowledge one has about innovations at Philips S&B and the IPP. In the same interviews, the external experts were asked to link each case to the innovation process option they would prefer for developing the case in question. In most cases, the experts had a significant preference for one specific process option. The preferences varied significantly for the different innovations. In particular, "driving force" was an important determining factor, according to the external experts. This study proves that experts can make decisions regarding the design of innovation processes based on contextual factors. It has become clear that the "driving force" has a dominant influence on the design of the IPP at Philips S&B.

In addition to the possibility of applying contextual innovation management in practice, the internal experts of Philips S&B conclude that contextual innovation management contributes to the goals of lean product development. It provides them with sufficient theoretical and practical background to make better informed choices at the start of an innovation process about the order of the different innovation activities. There was a consensus that this will increase the efficiency of the innovation processes because the information about newness (incremental versus radical) and orientation (market versus technology) helps innovation managers to make better decisions in advance about which innovation activities are the most relevant at the start of the innovation process. More specifically, it shows that contextual innovation management is not so much about omitting innovation activities, but more about putting those activities in a better order. As such, it contributes to reducing development time and resources and reducing the risk of schedule and cost overruns, the first two goals of lean product development as defined by Donaldson (2001).

Our approach distinguishes different innovation process variants on the basis of the common platform of a stage-gate innovation process. Such a process platform can serve as a valuable tool in developing a contextual innovation management approach because the platform allows freedom to vary while limiting the degree of freedom, allowing effectiveness and efficiency in innovation management to be balanced in a better way. Rigidity can be seen as a disadvantage of platforms in general. However, in the current situation, in a company that prescribes one particular innovation process, the rigidity is reduced considerably. The benefit of using a common platform is that variation on the innovation process can be discussed and assessed explicitly. A challenge of the platform approach in innovation is to develop a limited set of process variants to fit the different contexts. We have chosen three variants; other variants might be developed in completely different company and industry settings.

Discussion and Future Research

We used the case study method to answer our research questions. Case studies are often used when theory has not yet fully been developed and more "exploratory" research is required. Case studies offer a very suitable way to study (organizational) processes and mechanisms in depth. In principle, the conclusions of case studies can also be applied to other cases through theoretical generalization, provided that they have the same characteristics and operate under similar circumstances. With regard to this study, we expect the conclusions also to be applicable (to a greater or lesser extent) to other companies operating in a high-tech industry or which have a focus on consumer products and use so-called third-generation innovation models (Rothwell, 1994) (where innovation processes either start with a new technology or with some kind of market need or insight). Furthermore, to apply contextual innovation management, business units (or other types of organizational departments) need to be able to make their own decisions on how to innovate, which means that this approach is less suitable for companies with a centralized organizational structure. In addition, applying contextual innovation management is particularly suitable for companies that have enough experience in innovation management to master different types of innovation processes.

We think that the concept of contingency in general and contextual innovation management in particular deserves more attention in the current "open innovation" era. First of all, a contextual approach in innovation means that the huge popularity of open innovation should be looked at with much suspicion. Presenting "open innovation" as the best way to innovate is a form of universalism, which we consider less than helpful. Indeed, Chesbrough himself in his opening pages states that open innovation is not the best solution in every industry (Chesbrough, 2003, p. xxviii). Given the diversity of approaches in innovation management, it is interesting to see how different organizations will innovate together. Luckily, the open innovation concept is sufficiently vague to allow different organizations the opportunity to come up with their own interpretation of this concept, making them interesting subjects for further research.

On the whole, contextual innovation management, as a form of configurationalism, leans much more toward contingency than toward universalism. The quest for universally applicable or valid innovation success factors has proved futile. Success factors are either only valid at certain times or in specific situations.

Given the open systems nature (Bhaskar, 1975) of organizations and their context, these kinds of universally valid relationships are almost nonexistent, and, at best, there are "tendencies," that is to say there are certain mechanisms in the area of innovation management that roughly describe and explain what is going on. Indeed, open innovation can be considered such a tendency. Although many companies are trying to apply the principles of open innovation, there is no scientific law that states that every company is (or should be) engaged in open innovation. More in-depth research into the concept of tendencies in management science in general, and innovation management in particular, could help enhance the contingency perspective and counter the overly simplistic approach that is often advocated by management consultants.

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