

AN EXPLORATORY STUDY OF THE PRACTICES AND CHALLENGES OF PORTFOLIO DECISION MAKING GENRES

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Abstract

This article addresses the portfolio management practices and challenges of contemporary firms. Based on a review of the extant literature on project selection, termination and deletion decisions, we conducted an in-depth interview study with 19 key informants in 11 multinational firms. We identified three genres of portfolio management decision making: formalist-reactive, intuitive, and integrative. Each genre can be described by a unique set of portfolio management practices. For example, formalist-reactive firms rely on quantitative criteria while intuitive firms prefer qualitative criteria. In addition, each genre has to overcome a unique set of challenges. We discuss the three genres in detail and provide several implications for portfolio management decision making.

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INTRODUCTION

In today's competitive environment, continuous innovation is necessary to sustain long term business growth (Hauser et al., 2006). The proliferation of new products is often seen as a prerequisite of innovation; however, if not managed proficiently and in line with the firm's strategy, the negative impact of poor portfolio decisions on performance can be significant (Cooper et al., 2001b; Chao and Kavadias 2008). A search of the news archives of the popular business press (www.businessweek.com) provides various examples of firms losing money due to poor portfolio management decisions. For example, optical gear developer Nortel experienced substantial holes in its product portfolio in 2001, and subsequently lost considerable market share to its main competitor Cisco. Bayer, a global enterprise in health care, nutrition and high-tech materials, experienced such delays in their pipeline in 2002 that long-term growth was at risk. Also Bill Ford stated in 2006 that it was due to the failure of management to make the right portfolio decisions that Ford Motor got into trouble.

The portfolio management challenges that companies experience should not be underestimated as they can have severe consequences for a firm's long-term competitive position. Recent research shows that within many firms the new product development (NPD) focus has shifted from radical to incremental innovation, and that portfolios have become unbalanced and not in line with the aspired strategic direction (Barczak et al., 2009); Cooper et al., 2004a, 2004b, 2004c). In addition, NPD project portfolios have become overloaded, leading to situations such as fire fighting (Repenning, 2001), in which portfolio managers are constantly occupied resolving urgent problems, thereby losing the 'big picture'.

Today's successful companies across many industries recognize the importance of proficient portfolio management and emphasize it in their business vision. For instance, Novo Nordisk, a Danish pharmaceutical company, states that it is their "*broadest diabetes portfolio in the industry*" that makes them world leader in diabetes care (www.novonordisk.com). Hewlett Packard (HP), a global technology leader, claims that "*No other company offers as complete a technology product portfolio as HP*" (www.hp.com); and Nestlé pronounces as one of their key business principles that they

do not “*favor short-term profit at the expense of successful long-term business development*” (Nestlé annual report 2007).

There have been regular calls in the literature to attend to the importance of developing effective portfolio management processes for business success (Cooper et al., 1999, 2004a, 2004b, 2004c; Hauser et al., 2006). However, to date, the focus has primarily been on methods for individual NPD project selection (Englund and Graham, 1999; Cooper et al., 2001a; Blau et al., 2004), on strategies for product deletion (Avlonitis et al., 2000; Saunders and Jobber, 1994), and on investigations into the role of human limitations in termination decisions (Balachandra et al., 1996; Biyalogorsky et al., 2006). Despite these efforts to investigate NPD decision making at the individual project level, insights that prevent or resolve challenges in the daily practice of portfolio management do not abound (Eggers 2006). This is unfortunate as it is a far bigger challenge to maintain an overview of the entire portfolio and to make decisions from a strategic perspective than to make individual project selection, termination or deletion decisions (Cooper et al., 2000).

Following Cooper et al. (2001a), we do not view portfolio management as a singular process but as a span of interrelated decision making processes that aim to refine and implement the firm’s strategic goals by allocating the available resources. The decisions that have to be made in the portfolio management system occur at various levels in the firm involving different departments, and thus manifold decision makers pursuing various divergent goals. Taking this into account, it is undesirable to model portfolio management as a one-dimensional linear system (McCarthy et al., 2006). Therefore, we conceptualize portfolio management as a complex system of interrelated and recursive decision making processes. The objective of the portfolio management system is to translate the business strategy into a dynamic set of NPD projects and products, that:

- have not yet started and are subject to project selection decisions;
- are in development and subject to project continuation or termination decisions; and
- are launched into the market and subject to product continuation or deletion decisions.

This article starts with a literature review on portfolio decision making in which we discuss the existing streams of research in the NPD decision making domain, and note

that researchers have approached project selection, termination and deletion decisions from different perspectives.

PORTFOLIO DECISION MAKING

Portfolio decisions (i.e., selection, termination, and deletion decisions) deal with uncertain information and require a long-term vision. These decisions should not only be based on individual project characteristics but they should also be placed in the context of the whole portfolio and the achievement of strategic goals. Three wide-ranging goals for obtaining strong portfolios have been identified (Cooper et al., 2001a): *strategic alignment*, i.e., the alignment between the firm's business strategy and NPD efforts; *maximization of value*, i.e., the optimal ratio between resource input and return; and *balance*, i.e., a harmonious portfolio with respect to specific parameters (e.g. incremental versus radical innovation or risk versus reward characteristics). However, the literature to date primarily focuses on the individual selection, termination, or deletion decisions without treating them as interrelated parts of portfolio decision making. We will provide an overview of each of these portfolio decisions below.

Project selection: A focus on quantitative modeling methods

The project selection literature in the NPD domain has primarily focused on the development and investigation of sophisticated quantitative modeling methods to facilitate NPD selection decisions. In doing so, this stream of research predominantly approaches NPD selection decisions from a rational perspective embedded in financial and operations research theories (Camillus, 1982). Methods commonly used to facilitate NPD project selection decisions can be classified as financial and mathematical optimization methods (Cooper et al., 2001a; Dickinson et al., 2001). The common denominator of these methods is the idea to ultimately present the decision as a rigorous comparison of numbers.

Although the majority of financial and mathematical optimization methods are theoretically well justified, they have also been subject to extensive criticism. A number of researchers have argued that NPD project data are often speculative until market launch; hence, the absence of accurate data can make the outcomes of these methods unreliable (Blau et al., 2004; Linton et al., 2002; Poh et al., 2001; Repenning, 2001). In

response to this criticism more sophisticated methods have been developed, which are commonly classified as probabilistic financial methods, such as real options (Cooper et al., 2001a). Real option methods follow the principles of buying options in the stock market and aim to compensate for the associated risks of innovation (Janney and Dess, 2004; McGrath, 1997). Although real option methods can help to obtain realistic risk and reward calculations, they are not user friendly.

Benchmark studies conducted by Cooper (Cooper et al., 2004a, 2004b, 2004c) showed that companies that relied solely on financial methods in project selection decision making performed worst. However, financial methods are still the most popular ones for facilitating project selection decisions in the portfolio management system (Blau et al., 2004; Cooper et al., 1999; Poh et al., 2001). An explanation may be that rationality and objectivity are generally seen as the bases upon which human beings should make good decisions. Focusing on methods that represent complex decisions as abstract judgments may be regarded as a safe way to deal with the uncertainties inherent in innovation and change (Nelson et al., 2001; Walls, 2004).

Although financial methods are the most-researched portfolio decision-making methods, recent research has shown that the only technique that differentiates between the “Best” companies in innovation performance and the “Rest” is using strategic buckets (Barczak et al. 2009). The strategic buckets method for evaluating a portfolio is a top-down approach that operates from the simple principle that implementing strategy equates to spending money on specific projects where the money that is spent mirrors the business’s strategy (Cooper et al. 1999; Chao and Kavadias 2008).

The challenge that still results however is the integration of individual project selection decisions within the overall strategic portfolio perspective.

Project termination: Human behavior in decision making

Termination decisions are a critical facet in the portfolio management system as these decisions are needed to free up resources and to create room for other, perhaps better NPD opportunities. However, the decision to terminate an ongoing project is not an easy one. In fact, project termination is cited as one of the most difficult decisions to make in business practice (Balachandra et al., 1996; Balachandra and Friar, 1997; Calantone et al.,

1999). To illustrate this, imagine a project manager who has devoted substantial time and effort to an NPD project that they believe is truly innovative and highly relevant for the future of the company. Let us assume that the success of the project is also decisive for the project manager's prospective bonus. However, after several months or even years, it turns out that the project has a low probability of success and should therefore be discontinued. It is understandable that someone in the role of project manager in this situation would perceive the termination of their project as a personal failure (Boulding et al., 1997; Schmidt and Calantone, 1998). "Individuals get emotionally involved in the project and are very reluctant to terminate it, even if there are many clear signals that the project is not going to be successful" (Balachandra and Friar, 1997 p. 92).

The source for this so-called escalation of commitment is usually seen in initial personal involvement with the project, and could therefore hypothetically be avoided if termination decisions were not made by those involved in the project. However, recent findings indicate that also biased belief updating, i.e., the distorted valuation of new information in relation to initial beliefs, plays a substantial role in the development of escalation of commitment situations (Biyalogorsky et al., 2006). This finding implies that even if those making portfolio management decisions have not been involved in the start-up of a project, they may still be influenced by subjective feelings that can lead to an overly positive evaluation of the project's future.

To summarize, project termination research mainly investigates how individuals deal with such termination decisions, thereby assuming that human beings are rationality bounded (Eisenhardt and Zbaracki, 1992; Simon and Newell, 1960). Some interesting findings on how managers deal with project termination decisions in the context of NPD have been elucidated. However, the literature has not yet connected termination challenges to how firms organize and execute their overall portfolio decision making processes.

Product deletion

The product deletion literature has approached deletion decisions from a strategic perspective, investigating how firms should deal with new product failures (Avlonitis et al., 2000; Boulding et al., 1997). For example, Boulding et al (1997) concluded after

several experiments with senior managers that escalating commitment to failing new products can not be completely avoided due to the complexity of the innovation environment. They suggested several actions for firms to reduce decision biases in new product launch, such as precommitting to a predetermined decision rule or introducing a new (more objective) decision maker at the time of the go/ no-go decision. None of these methods however, completely avoided commitment to a losing course of action (Boulding et al., 1997). Avlonitis et al. (2000) developed a typology of product deletion scenarios based on a survey amongst manufacturing firms and distinguished between the type of firm, a number of deletion process variables, and organizational and environmental variables. Despite the interesting research efforts that have been undertaken, the nascent product deletion literature has not yet integrated product deletion decisions in the context of the overall product portfolio management system.

Research question

So far the streams of research focusing on different portfolio management decisions have remained rather separate. To date, the NPD literature has not yet investigated how the three types of portfolio management decisions are related. The main objective of our research project was therefore to identify how firms approach their portfolio management decision making; that is their project selection, termination, and deletion decisions across projects and over time, and what challenges they encounter in making these decisions efficiently and effectively. We were interested to discern whether it is possible to identify “genres” of portfolio decision making, and if so, what the practices, challenges and determinants of these genres are. To investigate this research question, we conducted an exploratory in-depth interview study among senior managers of multinational firms.

METHOD

Research strategy

As our research question was exploratory in nature, we chose a semi-structured interview approach of face-to-face discussions with key informants in their daily work environment. Historically, the semi-structured interview strategy arose from the desire to understand complex phenomena and relationships (e.g. Fontana and Frey, 1994). Another

motivation for our methodology choice was the sensitive nature of such topics as difficulties in NPD project termination or deletion. We wanted interviewees to openly express their viewpoints on their firm's organizational portfolio decision making practices. Building an interviewer-interviewee rapport was thus important for our study and was thought to be easier to build if the interview style was kept conversational and the interview was conducted on the respondents' own turf. An important guide in deciding on the number of interviews were the studies of Kvale (1996) who found that the common number of interviews in qualitative studies is 15 ± 10 , and of Griffin and Hauser (1993) who identified that 20 interviews obtain 91% of the theoretically available information, respectively. More interviews typically do not lead to much new information in exploratory studies. We therefore aimed at 20 interviews with selected key informants in a broad sample of about ten multinational firms.

Sampling strategy

Using the database of a Dutch consultancy firm and conducting additional desk research, we identified a sample of business units from multinational firms that operate in various industries, such as fast moving consumer goods (FMCG), consumer durables, services, and industrial products, and for practical reasons have their head-quarters in The Netherlands. Further inclusion criteria were:

- The firm operated globally;
- The firm was involved with portfolio management; and
- The business unit of the firm had extensive portfolios (> 100 projects).

We selected 11 business units from 11 firms that emphasized the importance of portfolio management in their corporate strategy. These firms were either in the process of implementing a portfolio management system or had an up-and-running system, which they aimed to improve. As a second step, we identified key informants within each business unit. Nineteen key informants were interviewed based on their involvement with the firm's portfolio management processes and their authority to make portfolio decisions. Each interviewee held a senior management position, such as chief financial officer (CFO), business unit manager, marketing manager, or senior product manager.

Participation in the study was on a voluntary basis and the transcripts of the interviews were sent back to the participants to check for accuracy.

Data collection and analysis

We developed an interview guide to assure comparable breadth and depth of the information across the interviews. A categorization structure was developed after data collection using thematic coding and pattern matching. Below, we will discuss each stage in more detail.

Stage one: preparing for data collection

In the interview guide the main themes were: 1) portfolio management practices (i.e., how did the firm organize for portfolio management decision making), 2) portfolio challenges (i.e., which challenges did the firm encounter in its portfolio management practices), and 3) strategic approach (i.e., how did the firm approach and deal with innovation). The detailed interview guide was developed following the four criteria of Merton and Kendall (1946) and Flick (2002): 1) Non directional: be flexible but restrain from being too directive; 2) Specificity: avoid staying too general; 3) Range: address all relevant aspects; and 4) Depth: acquire a similar level of depth across interviews. Using pre-established topics in the interview guide precluded having unproductive discussion and added to fulfilling the four criteria (Flick, 2002; Miles & Huberman, 1984). All interviews were digitally recorded and lasted about one and a half hour.

Stage two: Establishing the categorization structure

In the analysis of the data, we followed the procedure of thematic coding (Flick, 2002) in order to obtain a clear overview of our findings. An initial set of thematic categories was derived from the interview transcripts of three companies, based on the coding procedures developed by Strauss and Corbin (1990). With the help of open coding, responses were paraphrased as concepts and preliminary categories. In the next step, axial coding, categories were further defined and in the final step, selective coding, thematic core categories relevant to the research questions were elaborated. Based on this initial thematic category structure, the remaining cases were coded and we modified the initial structure when new or contradictory aspects emerged. This coding process led to a

categorization structure with three main topics and several sub-topics related to our research question:

1. Portfolio decision making practices
 - a. Criteria used in portfolio decision making processes
 - b. Methods used in portfolio decision making processes
 - c. Portfolio review activities
2. Portfolio decision making challenges
 - a. Self evaluation of the experienced challenges
 - b. Self evaluation of strategic discrepancy
3. Strategic approach on innovation
 - a. Alignment of portfolio decision practices with innovation strategy

Based on this classification structure each interview was coded, after which the material was compared across all cases (Flick, 2002). The results section will present the categorization analyses in detail, supported with quotations from the interviews.

RESULTS

Using a grounded theory approach (Strauss & Corbin, 1990) to analyze the data across the multiple cases, three genres of portfolio management decision making coalesced from our sample. These three genres can be described in terms of a unique set of portfolio management practices:

- Formalist – reactive firms use rigid planning processes. They primarily rely on quantitative criteria and financial methods in their decision making processes. Their approach toward innovation and their portfolio management practices are predominantly determined by responses to competitor actions and a focus on incremental innovation.
- Intuitive firms use incremental learning processes, emphasizing qualitative criteria and methods. They primarily rely on managerial experience in decision making. Portfolio decisions are predominantly guided by the insights of the senior managers and less by a strategic approach. Their attitude toward innovation depends on the risk profiles of the decision makers.

- Integrative firms use a combination of quantitative and qualitative criteria and multiple methods that combine rigid planning with the flexibility of learning. Their actions in portfolio decision making are driven by a strategic vision and by a desire to obtain market leadership.

Table 1 presents how the firms in our sample were divided across the three genres of portfolio decision making as well as the industry in which the firms competed.

INSERT TABLE 1

Portfolio management decision making practices

This section describes how each of the three portfolio decision making genres can be characterized in terms of their portfolio decision making practices. They differ in the criteria and methods used and in the frequency with which they conducted portfolio review activities.

Criteria used in portfolio decision making

Table 2 presents an overview of the criteria used by the firms classified according to the different genres of portfolio decision making.

INSERT TABLE 2

Formalist – Reactive firms relied heavily on quantitative criteria in their portfolio decision making practices. Although a variety of qualitative criteria were also used, these were considered subordinate to the quantitative ones. The main purpose for using qualitative criteria was to support the portfolio decisions that were already made based on the quantitative data. In addition, top management regularly initiated “must do projects” that skipped the official portfolio management procedures most often due to an urgent need to follow a competitor. If competitors introduced new products that were considered a potential threat, then these firms often reacted counter competitive by rapidly initiating new projects or pushing existing projects through the pipeline.

Intuitive firms rarely used quantitative criteria in their portfolio decision making practices. Although some attention was paid to feasibility issues such as the business case, quantitative criteria were considered inferior or not important compared to qualitative aspects such as brand fit and value for the customer. “Must-do projects”

initiated by top management were not appreciated by these firms and interviewees could not report any rationale for doing them. In fact, these decisions were considered intrusive and unwelcome in light of an already heavy workload: *“It used to be the case that management saw it could not be done, but that they still decided that it should be done. Well, that goes in expense of your portfolio and your people”* (Company IN1).

Integrative firms employed a wide range of both quantitative and qualitative criteria in their portfolio decision making practices. Unlike the formalist–reactive firms, qualitative criteria were considered just as important as quantitative criteria. Often, they decided on the dominance of quantitative versus qualitative criteria based on the innovativeness of the project. These firms argued that innovative projects were more difficult to assess by means of quantitative criteria compared to incremental projects. In general, the use of criteria served the purpose of facilitating discussion and to construct a proficient argumentation behind the portfolio decision. “Must-do projects” were often the result of strategic decisions made by senior management. However, these firms did not feel the urge to follow competitors’ actions, but rather emphasized the importance to stick to their long-term strategic aspirations. *“We do not have a ‘me too’ strategy. That means that you have to go your own way, without getting distracted too much by what the competition does. We know best what our customers want.”* (Company IG2)

Methods used for portfolio decision making

The portfolio methods identified in this section refer to how firms used the criteria in their overall portfolio decision making process.

Formalist – Reactive firms relied on an output driven methodology, whereby some people developed a set of numbers to feed into a quantitative modeling method. Management then picked the top n projects to fit within the budget constraints. The inputs to those outcomes were not questioned. However, there was also a second set of projects that was simply ‘dictated’ by management. Those dictated projects were usually driven by the need to react to competitive offerings.

Intuitive firms did not use official modeling inputs or formal mechanisms in their portfolio decision making practices. Their decision making was intuition based and negotiated without quantitative data directing the discussion.

Integrative firms used quantitative modeling methods to negotiate their projects but also brought in qualitative input and strategic considerations. They tried to understand both the hard side and the soft side of potential outcomes, as explained in the following quote:

“With projects that are hard to predict you should actually give priority to the use of other types of methods and only use financial methods for those projects that are easy to predict. But it is so nice, isn’t it...someone says one million, the other says two...oh, that is better!” (Company IG1)

Portfolio review activities in the portfolio management process

The portfolio review activities refer to what the firms did to evaluate previous decisions in relation to the portfolio. Portfolio reviews are not only an important means to enhance learning but also an important mechanism to identify projects that should possibly be terminated or deleted. We distinguish portfolio review activities before market launch (during the development process) from portfolio review activities after market launch.

Formalist – Reactive firms had an official mechanism in place to continuously monitor their NPD projects on a one by one basis (but not in light of the overall portfolio) during the development stages. The progress of the individual projects was discussed in formal meetings that took place with a frequency ranging from once every quarter to once a month. However, these firms did not have official mechanisms in place to review their products after market launch and they rarely deleted products from the market. Unsuccessful products were ignored, upgraded over time or supported by additional promotions.

Intuitive firms informally reviewed their NPD projects on a one by one basis. The NPD projects were individually monitored through a system of informal communication and more formal meetings were planned only if necessary, that means if problems occurred. These firms did not undertake official post launch review activities but were rather reluctant to consider deletion decisions because they were so personally involved, as the following quote illustrates: *“No, I would never delete a product. I believe in my*

products and if they do not perform as expected then they just need more time.”
(Company IN1)

Integrative firms approached the monitoring of their NPD projects in a structured and formal manner in which the information on each project was continuously updated. This usually happened on a one by one basis although infrequent attempts were made to evaluate the entire portfolio of NPD projects in light of strategic aspirations by means of visual representations, such as innovation funnels or bubble diagrams. Post launch review activities were usually conducted on a once a year basis. Hence, it is unclear if these firms would recognize deletion candidates in time to maintain a healthy and balanced commercial portfolio that reflects their strategy: *“Recently we analyzed our entire portfolio, looking at what percentage of our products substantially contributed to our turnover. And the ‘20-80 rule’ was almost applicable...that means that a majority of our products did not add anything to our profit or even made losses.”* (Company IG1)

Genres of portfolio decision making and their challenges

This section describes the challenges that the three genres of portfolio decision making encountered.

Formalist – Reactive firms experienced the making of project selection decisions relatively straightforward as these decisions were primarily based on a comparison of numbers driven by a quantitative modeling methodology. However, most firms also indicated that because they selected individual projects strictly by the best numbers, independent of the projects’ alignment with strategy, they experienced a strategic discrepancy between their NPD portfolio and their strategic aspirations. These firms had no formal process in place to ensure strategic alignment in the idea generation and evaluation process and therefore, the projects selected for development were not necessarily well aligned with strategy, or in the words of an interviewee from FR2: *“It is an enormous battle to see your vision and strategy translated in your products and portfolio.”* Another drawback of this strictly number based approach was a tendency to select projects with higher predictability (i.e., more predictable positive outcomes). This meant that these firms regularly lost out on (major) innovation opportunities as these

kinds of innovations are inherently riskier in nature and tend to have lower risk adjusted numerical outcomes when only quantitative criteria are considered.

Intuitive firms experienced difficulties in selecting the “best” overall set of projects for their portfolio. In the absence of concrete methods or procedures for portfolio decision making, success for these firms means that individual decision makers need a strategic overview across all projects in order to make good decisions, which is a challenge with large and diverse portfolios. Other portfolio outcome problems that these firms frequently encountered relate to portfolio overload (i.e., too many projects in the pipeline and a shortage in resources) because no one really knew when to say ‘no’. In general, they experienced reluctance towards making termination and deletion decisions both for projects in the pipeline and products in the market place; *“Our brand has about 170 products... that is a huge assortment. We did not think about our portfolio as a total picture, it just grew this way...there is no clear strategy.”* (Company IN3).

Integrative firms explicitly considered strategy in their selection decisions. However, because they tried to understand both the ‘hard side’ and the ‘soft side’ of potential new product outcomes, the decision process also became more complex and more time consuming. These firms often had (ambitious) strategic goals that they wanted to achieve and they enthusiastically embraced each new innovation opportunity. Consequently they were still likely to overstretch their resources because they wanted to do it all: *“Once we have scored a project with the management team on several criteria, we give it a priority. And I must say that we are not very good at that. We say “yes, we have to do this”, and half an hour later we give the same high priority to another project...”* (Company IG1).

Aligning the portfolio management genres with strategic approaches on innovation

In this section we present our findings on the potential relationships between the genres of portfolio decision making and the firm’s strategic approach to innovation (see Table 3). Miles & Snow (1978) identified three strategic approaches to innovation:

- *Prospectors*: these firms perceive innovation as one of their strategic pillars and continuously push for the initiation and launch of new products. They aim to be leaders rather than followers in their industries and focus on the development of breakthrough innovations as well as incremental innovations.

- *Analyzers*: these firms actively focus on the development of incremental innovations while dedicating limited efforts to radical innovation. These firms aim to be on top of developments in their markets but are usually not the market leaders.
- *Defenders*: these firms have historically not been innovators and focus more on cost efficiency and acquisition. However, as they are increasingly facing changing (global) market environments and increasing global competition, they do acknowledge the necessity of innovation for long-term survival.

INSERT TABLE 3

Formalist – Reactive firms dealt with innovation primarily from a reactive perspective and tended to align more with characteristics of defenders or perhaps analyzers. These findings coincide with their tendency to rely on quantitative modeling methodology, which in this sample resulted primarily in (more predictable) incremental innovations on the one hand, and on their tendency to react counter competitive.

Intuitive firms in this sample seemed to align with characteristics of prospectors and analyzers; however, we also found that the way these firms dealt with innovation depended on the individual preference of the decision makers in dealing with risk. The intuitive firms made portfolio decisions primarily driven by qualitative input and intuition, which meant that personal views on innovation and risk could exert a greater influence on the decision output. We found a predominant alignment with the higher risk profiles in innovation behavior, which is not surprising as decision makers with strong preference for avoiding risks would probably prefer to work in an environment where he or she can apply rigid methods (such as quantitative modeling) to predict more precisely how the new (incremental) product would possibly perform in the market place.

Integrative firms tended to align with prospector or analyzer characteristics, because they were more strategically driven. The three prospector firms aimed to be first to market and understood that not all their new product initiatives were necessarily going to be successful. These firms decided on their new product portfolio by evaluating both the ‘hard’ and ‘soft’ sides of innovation in their portfolio decision making to ensure that their risk taking was in line with the strategic direction of the firm. Other integrative companies in our sample however, negotiated their portfolio decisions based on quantitative input while bringing in qualitative criteria and strategic considerations in

order to follow competitors and simultaneously maintain their long term strategy. These analyzer firms realized that if they used solely quantitative considerations they would have a hard time executing their long term strategic objectives.

Synthesis of the results

This section synthesizes the results on the practices and problems of the different genres in portfolio decision making.

Formalist-reactive firms made portfolio decisions based on a quantitative output driven methodology and competitor reactions, and selected potential innovation opportunities that were mostly incremental in nature. These firms struggled to align their portfolio decision making with their (long term) strategy and tended to lose out on more radical innovation opportunities. Due to their number-driven approach they tended to align with low risk innovation profiles.

Intuitive firms relied strongly on qualitative criteria and the experience and expertise of the decision makers. The absence of a strategic overview across the portfolio made it difficult to select “the best” overall set of project for their portfolios and to terminate or delete ongoing projects and products that had been launched into the market. The risk profiles of these firms depended on the individual risk profiles of the decision makers.

Integrative firms emphasized strategic considerations and evaluated both the ‘hard sides’ and the ‘soft sides’ of innovation in making portfolio decisions. These firms had clear strategic ambitions and tended to take higher risks. They also tended to be overenthusiastic in selecting the right number of NPD projects for their portfolio, which could easily lead to an over-commitment of resources.

DISCUSSION AND IMPLICATIONS

The present study identified three genres of portfolio management decision making that describe the portfolio practices of sample firms across a wide range of industries. We will first relate these genres to the existing literature. Subsequently, we discuss some limitations of our research and conclude with implications of the three genres for managerial practice.

The three genres and their relationship with the extant literature

Strategic decision making approaches have been used in other product development decision studies to explain decision making processes (Mulebeke and Zheng, 2006) and it has been proposed that portfolio management plays an important role in the implementation of strategy (McNally et al., 2007). An analysis of the strategic decision making literature shows the prevalence of two dominant streams: synoptic formalism and incrementalism (Elbanna, 2006). Synoptic formalism emphasizes procedural rationality in decision making and argues for a comprehensive generation of alternatives and the evaluation of all relevant information to arrive at an optimal decision (Camillus, 1982; Dean and Sharfman, 1996; Wiltbank et al., 2006). The NPD literature however, also emphasizes the role of learning in new product development decisions (Akgun et al., 2007), which finds its roots in the concept of incrementalism. The incrementalism perspective treats strategic decision making as an adaptive, incremental and complex learning process, thereby emphasizing bounded rationality (Brews and Hunt, 1999; Eisenhardt and Zbaracki, 1992; Newell and Simon, 1972). In this light, our formalist - reactive genre corresponds well with the arguments underlying the synoptic formalism model. The intuitive genre follows the principles of the incrementalism perspective.

Recently, scholars have recognized the value of a more integrated approach. For example, Biyalogorsky et al. (2006) plea for objective stopping rules and rigid planning in NPD decision making but they also propose that firms should recognize and accept that decision makers hold biased beliefs (Biyalogorsky et al., 2006; Hammond et al., 2006). Cooper et al. (2001a) reveal that best practice firms often use multiple methods in their decision making processes that encompass both quantitative and qualitative measures. These findings do not clearly coincide with either synoptic formalism or incrementalism. Instead, these authors promote an integrated approach that on the one hand induces awareness of how people make decisions in practice, and on the other hand prescribes rigid rules to control for limitations of human decision making. This integrated approach coincides with our integrative portfolio decision making genre. Such an integrated model that encompasses both aspects from synoptic formalism as well as incrementalism is not new in the strategy literature as scholars in the 1980's already discussed some possible benefits of such an approach (Camillus, 1982; Quinn, 1980).

These authors refer to such an integrated model as logical incrementalism (Elbanna, 2006; Papadakis et al., 1998; Quinn, 1980), which shares several similarities with our integrative genre. Unfortunately, the ideas underlining logical incrementalism never passed the concept stage and the arguments supporting such an approach have not been investigated empirically.

The study presented in this article noticed however, that the conceptual work in previous literature is applicable in the real world; we extend the literature by taking the conceptual developments from the strategy literature to investigate NPD portfolio decision making. By doing so, we did not only look, but also found, applications of something that was previously only conceptual in nature into the real world of large firms. Figure 1 presents an integration of the findings from our interview study with the theoretical background from the extant strategic decision making literature.

INSERT FIGURE 1

Limitations and directions for further research

This study has several limitations that should be addressed in future research. Limitations pertain to the distribution of interviews in our sample. In several of our cases we used a single senior manager as the informant for practicability reasons, which means that our findings may be subject to single-informant bias. Since a senior marketing manager's knowledge about portfolio management may be of a different nature compared to that of a commercial director, further research should systematically include managers from different representative positions within the business unit of the firm. This would enhance triangulation and help to clarify whether the results in this study are sensitive to key informants' specific expertise. Furthermore, the results may have been different had the sample size per company been bigger. However, due to the exploratory nature of our research, we chose a larger sample of companies with a relatively low number of interviewees per company.

This study offered a preliminary framework for investigating portfolio management in the broader context of strategic decision making. However, more systematic research is needed to identify key aspects in the decision making processes that altogether constitute the portfolio management system. We believe that the integration of such research fields

as strategy management and innovation management can positively contribute to the portfolio management literature and enhance our understanding of the interplays between different disciplines in the portfolio management system. We also propose more field studies to investigate the interaction between organizational and individual decision making processes in the portfolio management system.

Genres of portfolio decision making and implications for managerial practice

This section provides suggestions for firms in each of the three genres on what kind of portfolio challenges they may encounter and how they can possibly organize their portfolio management decision making to overcome the portfolio challenges.

Formalist – Reactive: Firms that have a formalist- reactive approach embedded in their organizational processes focus primarily on incremental new product development, and the initiation of responses to competitors' actions. With respect to portfolio decision making, their rigid, number driven approach entails some particular pitfalls, especially if the firm wants to become more innovative. Formalist – reactive firms should be aware that financial estimations are based on individuals' interpretations of information, which cannot be completely separated from issues such as personal motivation (Carmerer, 2000). Portfolio decision making based on a comparison of numbers may seem straight forward in the case of incremental innovation; yet, it can lead to problems such as strategic discrepancy and missed innovation opportunities. Formalist – reactive firms that want to be innovative may take the following challenges into consideration:

- Formalist – reactive firms should be aware of strategic discrepancy between their NPD portfolios and innovation strategy. Decision makers can possibly overcome this challenge by operating on the principles of the strategic buckets method. The strategic bucket method is a top-down approach to assure that their spending on specific projects mirrors the business strategy, whereby each strategic bucket represents a collection of NPD programs that are aligned with a particular innovation strategy.
- Another challenge for these firms is not to lose out on innovation opportunities due to the reliance on a solely quantitative output driven methodology and responses to competitive offerings. This challenge suggests that decision makers in formalist-reactive firms need to find a way to make riskier projects more acceptable and likely to get approved.

Intuitive firms are more likely to be aware of the uncertainties inherent in innovation and subsequently avoid decisions made solely on possibly misleading financial forecasts. These firms want to explore and develop new areas, while relying on the expertise and experience of the decision makers within the firm. This may be a sound approach for the evaluation of highly innovative NPD projects in which the firm has expertise. However, the lack of overall strategic guidance in the decision making process makes project selection a challenging task, especially for market domains new to the firm. Furthermore, a lack of focus and structure combined with high personal involvement can make these firms vulnerable to fire fighting (Repenning, 2001). Intuitive firms wanting to be innovative players on the market may pay attention to the following challenges:

- These firms should be aware that project selection based on negotiating qualitative criteria and intuitive insights may induce a lack of structure and focus, which can lead to portfolio overload. The absence of strategic overview usually goes hand in hand with a poor division of resources leading to orphaned projects and delays in the pipeline, which take up much of people's valuable time resulting in a high workload.
- Intuitive firms can overcome the pitfalls of deficient structure and focus by defining clearly measurable strategies and e.g., employing personnel resource planning systems to assure an efficient use of resources. In line with the arguments of Bialogorsky et al. (2006), intuitive firms should not only introduce more structure into their decision making processes but also be aware of the strengths and weaknesses of people's decision making capabilities and implement tools and training to bolster those capabilities.

Integrative firms recognize that projects of different degrees of innovativeness require different evaluation approaches. This notion coincides with earlier findings in the literature depicting different ways of management for more radical innovations in contrast with more incremental innovations (O'Connor and McDermott, 2004). Integrative firms seem to be adequately organized for dealing with both incremental as well as radical innovations. However, in their attempts to understand both the hard side and soft side of new product innovation these firms may encounter some challenges:

- Integrative firms can experience difficulties in prioritizing which projects to develop or terminate. Their ambitious goals and enthusiasm for new innovation opportunities

may lead to overburden of resources and, in the worst case, to situations of fire fighting (Repenning, 2001).

- Integrative firms should retain a strategic overview of the whole portfolio, and conduct portfolio review activities on a regular basis to detect and subsequently terminate or delete lesser promising NPD projects or products, respectively. Strategic overview may be obtained by implementing a portfolio database management system with clearly defined (quantitative and qualitative) criteria for each single project and function (Cooper et al., 2001a). Such a system can also be used as a supportive tool for conducting regular portfolio review activities.

Summary

Those firms employing an integrative approach toward portfolio decision making are most likely to have an easier time being successful in the long run, because they manage to integrate their strategic considerations into their portfolio decision making, while still considering quantitative criteria. Formalist-reactive firms will probably experience more difficulties in achieving their long term strategic objectives due their short term and incremental focus in portfolio decision making, letting “unquestioned” numbers lead the way. Intuitive firms can strongly benefit from their experience and expertise in their current markets and have the flexibility to jump start break-through innovations. However, if the long term strategy moves away from the markets in which they have their expertise or if their experienced key decision makers leave the company, these firms will struggle being successful in the long run.

Table 1: Sample description

Genre	Company	Criteria	Methods	Industry
Formalist - reactive	FR1	Primarily quantitative criteria	Quantitative output drives the portfolio decisions, with the exception of decisions being dictated by competitive offerings	FMCG
	FR2			Services
	FR3			Industrial
Intuitive	IN1	Primarily qualitative criteria	Negotiation based on qualitative criteria and intuition	Durables
	IN2			FMCG
	IN3			FMCG
Integrative	IG1	Quantitative and qualitative criteria were equally important or the choice depended on the innovativeness of the project	Quantitative input drives negotiation bringing in qualitative criteria and strategic considerations	FMCG
	IG2			FMCG
	IG3			Durables
	IG4			Services
	IG5			Durables

Table 2. Overview of the criteria used for portfolio decision making

Criteria for portfolio decision making	Answers	Formalist - Reactive			Intuitive			Integrative				
		FR1	FR2	FR3	IN1	IN2	IN3	IG1	IG2	IG3	IG4	IG5
Type of quantitative criteria used	Turnover	++	++					+++		+++		+++
	Sales volume	++	++	++				+++	+++	+++		+++
	Market share	++						+++	+++	+++		+++
	Profitability	++	++	++				+++	+++	+++	+++	+++
	Feasibility (business case)	++			+		+	+++	+++	+++	+++	+++
Type of qualitative criteria used	Strategic fit	+	+	+	++		++	+++	+++	+++	+++	+++
	Fit with company/ brand image	+			++	++	++	+++	+++		+++	
	Value for the customer	+	+	+	++	++	++	+++	+++	+++	+++	+++
	Technical feasibility		+	+	++					+++		

Table 3. Alignment of the genres with strategic innovation approaches

Innovation focus	Strategic approach	Formal- Reactive			Intuitive			Integrative				
		FR1	FR2	FR3	IN1	IN2	IN3	IG1	IG2	IG3	IG4	IG5
Innovation behavior	Prospector				×		×	×	×	×		
	Analyzer	×				×					×	×
	Defender		×	×								

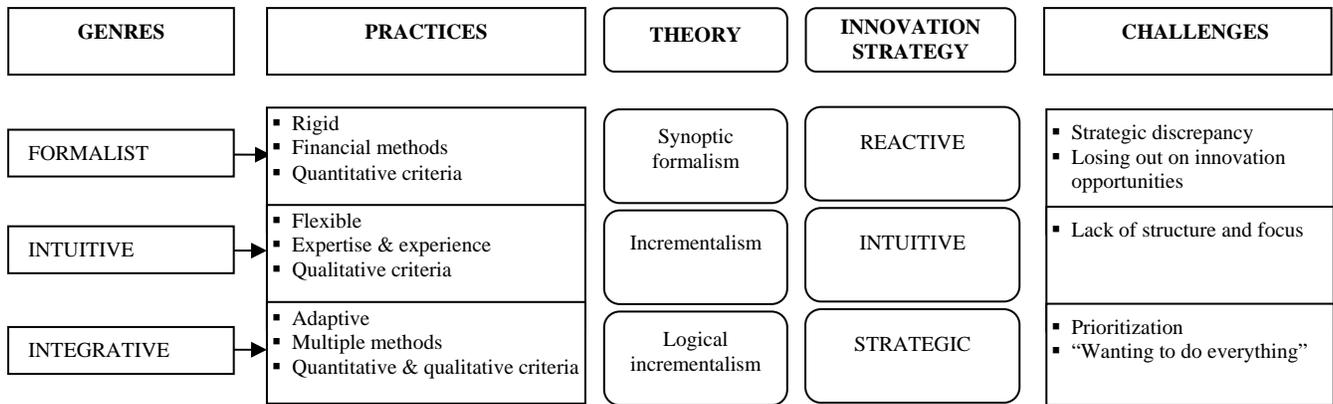


Figure 1. Integrating our key findings with the existing literature

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