



**جامعة جدة**  
University of Jeddah

**The Role  
of  
Project management  
in  
Developing a new Product**

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<b>Doctor</b>	
<b>Course</b>	

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## Introduction

The project management discipline has been accused of having lost its relevance for innovation initiatives because it overemphasizes planning and control over flexibility, leading to approaches that are poorly adapted to high-uncertainty endeavors. In response, the concepts of targeted flexibility and adaptive project management have been proposed. The individual aspects of the project, such as uncertainty, structural and dynamic complexity, novelty, technology, and pace, are systematically considered in this model to design project management approaches that are tailored to the project's demands. Project and contracting frameworks that emphasize on verifying assumptions through iterations and parallel experiments, as well as a "cold" management approach that allows some areas of the project procedural freedom while rigorously controlling and standardizing others, are among the recommended changes. In addition, the duration of project stages, the level of formalities and documentation, and the team's independence are all tailored to the specifics of each project.

However, there is still no widely accepted method for evaluating the needs of a specific innovation project early on and selecting a suitable project management methodology. This study evaluates current industrial practices, their challenges and accomplishments, and summarizes recommendations for managers and researchers in order to address this gap. The investigation focuses on product development, a setting that organizes all project activity and has high levels of innovation. Small and medium technology enterprises with manufactured products that are conducting highly inventive and incremental development initiatives within the same R&D organization are the subject of the investigation.

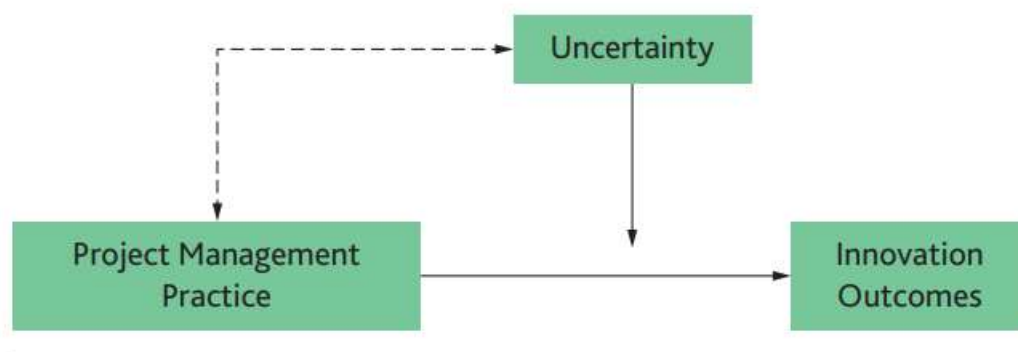
In these settings, projects fall into three categories: (1) fundamental technology or platform efforts that are not yet focused at a product launch, but spawn multiple future new product projects; (2) maintenance projects for already-launched products, such as extensions, modifications, improvements, and cost reductions; and (3) so-called new product projects.

The study provides various contributions, including deconstructing the relationship between the Stage-Gate (SG) framework, which dominates new product development techniques, and the Project Management Institute (PMI) project management framework, as one of the first articles of its sort. It accomplishes this by providing a comprehensive evaluation and integrative framework for the current, largely separate streams of literature on product innovation, organizational brilliance, and project management. It also deconstructs the dark box of project management in new product development and identifies company- and project-specific improvements to new product development and project management techniques.

- **Product Development in Context**

Project management practice in relation to adaptive project management is the subject of this article. It concerns how project management practices influence innovation outcomes such as the degree of innovation (radical versus gradual), the success of the innovation (e.g., market acceptability), and the efficiency of the innovation process (e.g., budget adherence, amount of rework). It is assumed that uncertainty modifies the relationship between project management practice and innovation outcomes, i.e., the same project management approach produces different results when applied to projects with high vs low uncertainty. It also presupposes that managers are aware that "one size does not fit all" and that they are already tailoring their project management approaches to the extent and kind of project uncertainty. Its goal is to find adaptive project management methods and assemble advice on how to approach different types of innovation projects. (Cooper, 2014) (Daly, 2012)

Figure 1 illustrates the main elements and relationships of this work.



**Figure 1:** Research overview.

- **Product innovation Management**

Empirical research has long dominated the product innovation literature examining the link between product and project characteristics and product success. The research is not based on theory and does not usually look into the inner part of the project management "black box", but makes management recommendations based on project factors that correlate with success. (Daly, 2012). It illustrates how new goods succeed as a result of meticulous preparation and faultless execution of a better product for a well-chosen business opportunity. As a result, it advises thorough preparation ahead of time, documenting plans, and moving forward to increase

communication and commitment, cross-functional teams, and decision gates that ensure senior management acceptance. (Daly, 2012)

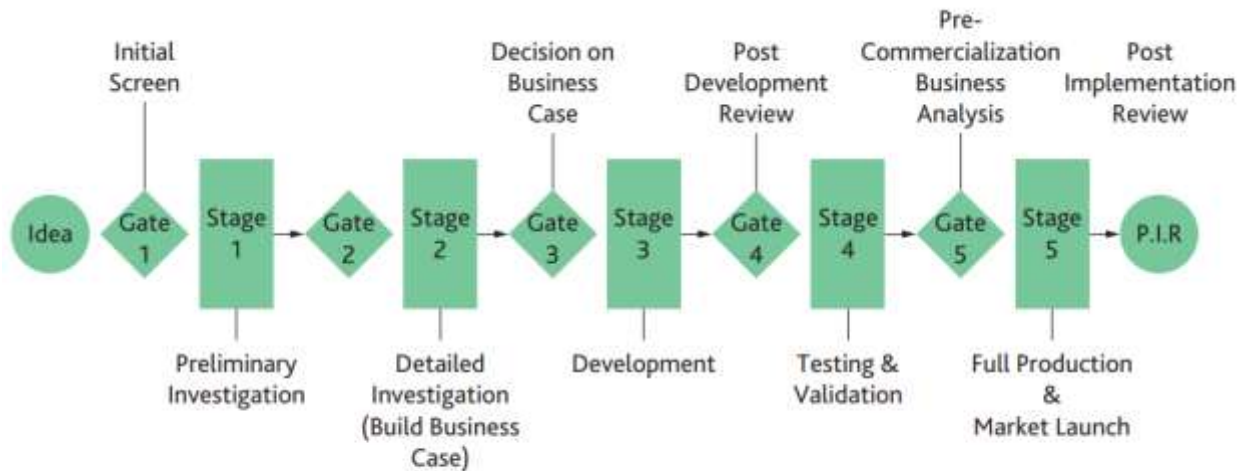


Figure 2: Stage-Gate (SG) system for new product development (NPD).

Each portal review necessitates a distinct set of outputs that detail the activities to be taken and the information to be provided. The fact that the process is self-documented enables for ongoing development. Although linear process management with gates has been related to greater product success, it has also been criticized for being more specification-driven than customer-driven, too heavy for minor projects, and too limiting for radical innovation. One set of issues is that too much rigidity could be introduced into organizational routines and cultures. Even against their better judgement, product development teams may follow tight project standards and freeze product specifications early in the development process to get approval. (Daly, 2012)

Instead of making adjustments to the project in reaction to new market and technology insights, the project team can adopt a project implementation attitude and focus on the project plan and whatever is required to go through the next portal after approval. The difficulty of proposing or terminating an alternative course of action is heightened by the fact that the project has passed official reviews, typically with high-level management involvement. As a result, proponents of closed product development frameworks point out that different sorts of projects require different approaches. (Daly, 2012)

## • **Project Management Approaches for High-Uncertainty Projects**

Project contexts have long been described in terms of the level of uncertainty they contribute to projects, according to product innovation and project management literature. There may be uncertainty about the product's marketing and technology components (for example, what the customer needs to address and the technical solutions that must be deployed), as well as how markets, technologies, and the general business environment will grow in the future.

Furthermore, the optimum resource distribution to projects and within programs is unknown. The majority of research focus on what is uncertain (markets, technology, environments, etc.) rather than why uncertainty emerges. Some authors view uncertainty as an objective absence of information that can be addressed by gathering more data, leaving only "residual" doubt.

Unavoidable uncertainty about which no information is available is reasonably easy to manage with standard risk management: regions of uncertainty are documented, evaluated for likelihood of occurrence and severity of consequences, and risk mitigation methods are implemented. The essential premise of these strategies is that decision makers should have a basic understanding of how project parts and the project environment are related. (Eisenmann, 2012)

Other scholars, on the other hand, argue that uncertainty is cognitive. When a decision maker is unable to completely comprehend the relationships between project components, this situation arises. Milliken distinguishes between uncertainty (the inability to forecast the variable's future state), impact uncertainty (the inability to judge the influence of the variable variable), and response uncertainty (the inability to judge the effect of the variable variable) (lack of information about response actions and their effects). Because of these uncertainties, the decision maker is unable to use typical risk management techniques. They endure because the situation is too fresh and complex for a decision maker to explain the essential variables and their functional links (for example, markets with wholly new usage patterns or emerging technology).

Ambiguity, unanticipated uncertainty, unfamiliar or unknown, or "deep uncertainty" characterize this circumstance. (Blank, 2012)

It's the result of a lack of information, as well as the persistence of so-called "rugged" project landscapes, in which adjacent points of project performance are closely linked, and project interdependencies cause minor changes in a single project element to result in significant changes in overall project performance. A common analogy for this phenomenon is geographic research: project managers know that the goal of best project performance is that one peak in the area is clearly visible from all sides, similar to a volcanic summit view, such as Mount Fuji, from the surrounding valley, on projects that lack information, which is not uncommon. Project management tries to attain optimal performance while also anticipating and mitigating hazards that may arise along the route. (Brady, 2014)

Managers working on unclear projects, on the other hand, work in a thick fog, unable to discern the peak or the peak of performance. They could see a portion of the road ahead of them and identify whether it was sloping up or down. Continuing down a road with an upward slope in a non-rugged area will eventually bring the project to or near peak performance. In a rough region, however, the project may conclude at a small local peak that is distant from the highest peak. Sommer et al. developed a new product based on project management advice and literature on new product development. For unskilled settings, I discovered two techniques to supplement traditional risk management: learning by trial and error and choice. Trial and error learning is focused on allowing customers to try out an early version of a product. The trial can take the shape of product concept testing or the selling of a pre-released functional product. Tests can also be related to key parts of a business model. This increasingly rigorous culture of experience is characterized as a "lean startup approach" in entrepreneurial practice (and increasingly in well-established firms), and is tied to the Project Management Institute's notion of testing Minimum Viable Products (MVP). Before investing in scaling the firm, the MVP tries to achieve market validation. MVPs are frequently software models, e-commerce offerings, or landing sites for future firms in this context. Customers demonstrate their willingness to adopt the product by purchasing it despite its limited features or by attempting to purchase a future product and making an early commitment. (Grönlund, 2010)

Experimentation takes the form of often producing products through a series of short feedback cycles in the framework of Extreme Programming (XP): the first release of the product is designed to address very basic consumer needs and as a means of gathering feedback. Each subsequent version adds complexity to meet evolving customer needs, but always with the goal of providing the fewest features that can be expected to answer an express need. Plans, timelines, and occasionally contractual agreements relate to the work required until the next release, rather than everything that needs to be done to complete the project, because releases occur in short periods of time (two months). Experience-based techniques evaluate a wide range of things, from full company concepts to specific functional features of software, but they all leverage parametric objects to permit high-quality input from real-world customers. (Daly, 2012)

Selection is a method of researching multiple-candidate solutions until the best one can be found. Success in selection is dependent on discovering solutions with enough diversity that at least one of the variations is excellent enough to solve the problem and apply evolutionary pressure, similar to Darwinian selection. The latter takes the shape of obvious decision points and resource withdrawal to force the selection of the best available solutions and the end of all other tests. Pharmaceutical corporations, for example, frequently support research on multiple target molecules to address the same medical problem as a backup in the event that the lead molecule fails. The same approach underpins Toyota's group-based design practice: multiple functional groups involved in the development process seek multiple answers in tandem and pass them on to other functional groups. (Daly, 2012)

The groups then proceed to establish which of their answers are also in the potential group of the other groups. The final design evolves when each group narrows down its own set of possibilities while simultaneously ensuring that the solution remains within the scope of other groups' probable solutions. The most important consideration is the situation in which you should employ trial and error and choosing. For all but one situation, in which the unanticipated unpredictability of a project is related to its multiple correlations, rather than its absolute size, and in which there are trustworthy experiences of real market performance, Sommer and Loch find that trial-and-error learning is preferable to picking. (Daly, 2012)

- **Limited Use of Project Management**

Although product development fits the definition of project organizations (PMI, 2013), the practice of project management in R&D organizations is very limited. Development projects cost a team of engineers, scientists, and marketing personnel to create a new product/technology for the benefit of the business. They do this by forming temporary groups, providing them with resources, and holding them accountable for meeting project goals by the conclusion of the project. Regulatory grounds for project management's limited use We first looked at the idea that project management use is limited due to company size or a lack of project management knowledge: we found no pattern with regard to firm size. In fact, they have very little formal project management training, and many respondents were unaware of project management certificates, as well as typical project management language and concepts. (Grönlund, 2010)

There is also very little project documentation, with the exception of the checklists and reports used in the portal and engineering change management reviews. However, a lack of project management knowledge is insufficient as an explanation. Several R&D managers participated in our survey because they were familiar with PMI standards, either through personal training/certification or because their firm has a project office that works with R&D managers. One of the companies in our sample even requires Project Management Professional (PMP)® certification from its development project managers (also known as Program Managers) and the personnel of each project with a Program Analyst tasked with putting the project management procedure into practice. Even in these companies, however, there have been various reasons given for not completely applying the project management knowledge corpus to R&D. (Daly, 2012)

Those reasons included the following: Project Logic In R&D, the dynamics of budget, schedule, and quality play out in a distinct way. Budgets, even if large in dollar values, are often small in comparison to the sales revenues that the new product generates over a lifetime, even in fast-paced markets. They may amount to as little as 1% of product revenues. Even the most R&D-extensive industries rarely top out at more than 15% of R&D expenditures as percentage of sales.

In such an environment, it matters much more that the project is completed and delivers on its promise than what it costs to get there, as the following quote from a respondent illustrates: “Honestly, budget is not that big of a deal for us. The timing is more of an issue, and I say budget is not a big deal, but if we said, hey, we can still make the timing but we need to bring on fifty contractors, that’s a big deal, we’re not going to do that. But, if it’s, oh, yeah, we got 10 people on this and if we had one more contractor we’ll still be on schedule, no problem, hire a contractor and keep going.” Moreover, a very large percentage of R&D costs are typically caused by permanent staff. A budget overrun may therefore only have minor cash flow implications, though it may cause staffing problems for other projects in the development pipeline. Quality of deliverables matters immensely a project that isn’t completed at all or does not deliver what it was designed to provide has immediate impacts on revenues, positioning in the competitive landscape, and brand image. (Cooper, 2014)

Design errors can cause very high costs for rework, as is the case in more traditional domains of project managements, such as construction. However, there is typically no way to offset these added costs by adjusting the scope: The product simply has to deliver what it was planned to do or it is useless to the marketplace. However, differences exist as to how this “full scope” is achieved. Some products are sold in small numbers, are manually assembled, and can still be modified and upgraded after they are at the customer site. In these cases, teams may ship an early version and improve upon it later. Other products are produced in the millions, with mass-manufacturing equipment, and would have to be recalled and scrapped if they were to have a problem. In addition, expensive production investments (e.g., for specialized tooling) would become obsolete. Timing matters in fast-paced high-tech, but not everything is equally fast. The companies in our sample reported on product development times between one and three years. Platform innovation in manufacturing and measurement equipment can have a product life cycle of 10 or more years, while the market cycle for one of the consumer electronics products was fewer than two years. (Blank, 2012)

Some of the companies need to align their product releases with the calendar of customers, whereas others have more freedom to pick a market entry date. One of the respondents, therefore, differentiated between scope-driven projects, where the schedule may be extended to make sure the scope is met, and time-driven projects, where the scope is determined by what can confidently be guaranteed within a particular time line. The competing constraints of projects scope, quality, schedule, budget, resources, and risk thus play out in such a distinct way that the direction for optimization is evident without much detailed analysis and much of the data that project management provides. For example, in time-driven projects, the market window needs to be hit at all costs, even if this means increasing budgets or accepting higher technical risks. This underlying logic of a project the “why,” “what,” and “how” that governs all decisions is sometimes referred to as project strategy. It is known to the project team and guides decisions, though implicitly, in such a focused way that project management tools are rarely referred to. Our data, however, hint at one possible exception: R&D organizations with mainly time-driven

projects seem to use project management tools for scheduling more frequently and with more rigor than organizations with mainly scope-driven projects. This would make sense because demanding timelines need to be kept under control. Also, in comparison to companies with assembled business-to-business products (measurement equipment, dental chairs, lasers), we found slightly more rigor with regard to project management and SG in companies with mass manufactured products that cannot be modified at the customer site. However, most of the data come from scope-driven projects and assembled products, so we cannot draw strong conclusions. Documentation: Value Versus Effort A common assumption in project management and in product development is that there is inherent value in documenting project changes because this improves coordination, facilitates learning, and makes future budget or schedule forecasts more precise. (Blank, 2012)

This leads us to the assumption that respondents would value and strive for project documentation, even if a project's internal "logic" makes it simple to make trade-off decisions with very limited data. In reality, however, much of the project is managed informally and with little documentation, other than, in some cases, engineering change management. One reason is that time-driven projects often need to be reduced in scope to be on time for the product release date: Reduced documentation is one area to find time savings. The decision of what to skip and what to do is characterized as a negotiation with project stakeholders. Another reason given is the limited usefulness of documentation for some types of R&D projects namely, those that do not go into production (e.g., projects that are focused on technology validation or demonstrating a product concept) and those that require a lot of innovation. For example, the project management office lead of the very large and sophisticated company who was interviewed as a contrasting case in study 3 explained, "The effort to maintain that as people try, and try, and try, and try five different things to find what's going to work, there's no value for that overhead." The same thinking leads to the recommendation in the SG literature to require very little documentation for innovation projects. (Kurkkio, 2011)

- **Frequent Use of Stage-Gate**

According to our studies, SG is the most common strategy for structuring R&D projects. Eight of the twelve companies in our sample use an SG model-based process. 4 The SG Framework outlines the findings and the format in which they must be provided for each portal (for example, the structure and content of a feasibility study or a marketing requirements document). Because the activities within each phase are not clearly defined, teams working on one aspect of the project (for example, agile project management in software engineering) may adopt one technique while working on another. Various methods are utilized in parallel in numerous companies, although not by the same group. The nature of project adaptation is described in the following sections. (Kurkkio, 2011)

- **Project Adaptation by Type of Project**

Project adaptation in an SG framework can take two forms: either altering a single standard process by bypassing gates and deliverables, or selecting alternative SG frameworks for different types of projects. The latter is a rare occurrence. Most organizations utilize a single new product SG, with the company's review standards, checklists, and supporting papers tailored to the project's needs, usually by removing gate criteria that aren't relevant to the project. As a result, the gates can be close together, but the project must still go through all of the formal checkpoints. This method is typically employed for supplementary maintenance initiatives, which are considered similarly to new product development projects but require less documentation. One of the managers stated that changes to the company's regular process can be significant, estimating that up to 90% of the SG procedure does not apply to a small project with prototypes already in place. This method is in contrast to contemporary SG literature, which suggests a variety of SGs for new products, maintenance, and technology projects. The desire to develop a system around the new product SG process and to ensure that technology and maintenance projects have a market focus is the key rationale for building a single framework rather than one independent from SG. As a result, even if the projects are solely focused on technology creation and do not consider client acceptance, business model, or manufacturability, most responders never refer to them as "research" or "technology." Instead, they're classified as product development because they're working on technologies that will be used in future goods and, as a result, must have a strong market emphasis. (Grönlund, 2010)

As a result, one respondent warned against projects being left out of SG's comprehensive assessment of a new SG product too easily: "[T]he biggest detractor is Stage-Gate (review) or those who say, 'Well, it's too huge.'" It's a different story. We don't need to spend so much time on it since it doesn't belong to Stage-Gate or because it's too young. This strategy, he says, can result in technological initiatives that take on a life of their own and aren't tightly related to market needs. The goal to keep all projects focused on the market and maintain discipline for new product development explains why so few organizations in our sample followed existing SG advice and chose alternative SG models. Furthermore, there is a distinct temporal gap between academic research findings on SG and their implementation: while the new product SG was introduced in 1990, the companies in our study are new to SG management. Even the most experienced firm has only a ten-year track record. Because it is the first product to be adopted, companies may just remain focused on the new SG product. They may also be unaware of the most recent project adaption guidelines. (Cooper, 2014)

In our research, three firms use distinct SG methods for different sorts of projects. Case 3, the second-largest in our study, has annual revenues of US\$600 million and has been employing the

cutting-edge SG framework for nearly a decade. It employs two distinct linear project processes: one for market-driven development projects that respond to market opportunities, and another for technology development projects that are based on a technologists' idea and/or a technology gap. Market-driven projects are thoroughly researched and planned ahead of time, and they are only approved when a thorough feasibility analysis has been presented. Technology projects that show future promise for the market are approved with less formality and up-front planning. Their budgets are typically small (under US\$100,000). (Daly, 2012)

This method is used in technology initiatives to ensure that the source of new technology's radical innovation potential is supported. Basic developments may never be funded if the SG method is utilized for a new product for these projects since they do not match the approval criteria (Kurkkio, 2011). Alternatively, it could be funded ultimately (albeit with delays) based on planning efforts that provide little value and produce bad data, such as market estimations notwithstanding a fundamental lack of market understanding. As a result, a separate respondent from a different organization was afraid that the SG procedure would be used to manage too many research projects: "I believe there must be a limit to where it will truly assist in increasing efficiency." It's not as simple as saying the project will cost that much. You must be aware of the level of uncertainty in the market, as well as the level of uncertainty in the technical components of the project. (Kurkkio, 2011)

A program manager explained why radical product innovations, such as a new platform, should also not follow a new product SG and be managed without too detailed project plans (the company develops printers): "If we know exactly what we need to do in the front, we're not investigating anything. We're not innovating. [In R&D,] we're trying to increase speed, we're trying to increase the performance of the printer, reliability. the drying time needs to be less so the paper comes out quicker (Daly, 2012). We're in R&D! We have to research these things! We'll need to make a printer model once we've completed all of our study. We discover a fault that is causing a difficulty or that the spinning is not happening as we explore with the pattern. To figure out why the spinning isn't happening, go back to the drawing board. Was the physics incorrect? Perhaps the engine was malfunctioning. We'll replace the motor with one of a different style. "We take care of everything." "You have an idea, and your professor has given you permission to do it," he says, comparing it to producing a research paper for a class assignment. This is the portion of the project where you get approval and need stakeholders' commitment. Make a straightforward plan for what you're going to do. You know what you're going to do and where you're heading, but you're missing a few parts. As you alter books, you learn new things, take notes as you go, and come across new articles, it becomes clear that this isn't precisely what I want to accomplish. I'm going to switch things up a little bit here, but the purpose remains the same." (Daly, 2012)

- **Criteria for Project Adaptation**

Adaptive project management is accomplished by altering existing standard processes to match the project's individual demands, picking a customized process from various standard approaches, and employing learning-based tactics within projects, as explained in the preceding section. However, no organization in the research makes these judgments using a framework, checklist, or project profile (Kurkkio, 2011). The decision between numerous common ways was based solely on the project's origin (technology vs. product roadmap) and the nature of the project's end (an engineering construction project for internal clients vs. projects for external clients). There were answers to questions on whether gate outputs should be skipped and gates merged without a systematic analysis of project characteristics like uncertainty, risk, complexity, or speed. In addition, no single decision-maker or decision-making unit was in charge of authorizing adaptation practices. (Eisenmann, 2012)

Instead, the project manager, the project management office (if any), and the portal review committee negotiate. In fact, this rarely raises debate, but several respondents expressed concern about the lack of defined norms and responsibility. After all, SG Tech may allocate expenditures as high as \$100,000 in some of the companies in our study based on scant data and with a small executive group, without total openness about when it would apply. Furthermore, just 10% of the normative procedure is left intact, which apparently provides for fundamental tasks and reviews. Because these stripped initiatives don't require interdisciplinary collaboration, they frequently involve gate evaluations conducted by gatekeepers representing a particular function rather than a multidisciplinary approach. Individual decision makers and their personal methods, rather than established good practices, are at the center of project decisions, and this practice reduces SG's rigor for new product initiatives it wants to assist by modelling a "everything is optional" approach. (Grönlund, 2010)

- **Timing of Project Adaptation**

In our research, we discovered a lot of situations of unforeseen project adjustments in response to project needs: The gates were vacated pending the outcome of an ongoing trial; Despite the fact that the marketing requirements document is authorized when the project is funded, product needs are usually generated throughout the project (Brady, 2014). Because the initial notion may not operate as expected, competing technical alternatives are investigated in parallel. Although some of these "reactive" alterations are the result of poor initial planning, they cannot all be

avoided due to a lack of resources for more extensive advance planning. Several of the study's unplanned interviews point to the presence of the unknown as the primary problem. We discovered plenty of evidence of intentional and prior adaptation in addition to these unintended adaptive actions (at least at first). These changes, however, adhere to the linear philosophy focused on planning for the new, well-established SG product, as mentioned above, and do not expressly integrate learning-based tactics. (Brady, 2014)

- **Effectiveness of the SG Process**

The SG provides a generally accepted way for managing new product development, as well as its dominance over project management literature's "crowding out" practices, such as project monitoring and control approaches. Furthermore, SG is still mostly linked with new product SG, which is supposed to be a linear process that decreases risk incrementally while raising resource commitments by its very nature. As a result, we wanted to know if using the Secretariat as a de facto "gold standard" was justifiable. Participants in our study saw a variety of outcomes. (Brady, 2014)

SG's goal is to help management make portfolio decisions (including project cancellations) and to provide development initiatives a market focus, rigor, and cross-functionality. Participants in the study agreed that the process improves project implementation quality by aligning the many tasks and activities behind the project and checking for factors that could create future problems on a frequent basis. They are less confident of its capacity to enhance portfolio decisions: in practice, portal reviews are used to initiate projects, report project progress, and make minor tweaks, not to terminate them. The fact that high management had accepted the project in earlier stages, according to one participant in Study 2, could make it difficult to cancel it in the future because it signified that "management erred." "Because there was an assumption that if you filed it, it would be approved, and you need to do that," another Study 3 respondent explained. (Brady, 2014)

Several respondents mentioned occasions where they decided to work beyond the phase's scope without informing all project stakeholders or even making it obvious at the review gate. This product manager's statement sums it up nicely: "Honestly, if I'm sitting in a room with the CEO and engineering directors, and we're like, sure, we need to do that, but we need to put this out into the field immediately," says the project manager. We'll take the call and head to the gate, where we'll enter the field and check in later." Although one manager regarded this as a significant bet that may put his career on the line, these exceptions normally occur because timing is critical and decision makers have a strong understanding of which way the gate review is going. In addition, we discovered reoccurring issues regarding a lack of discipline, such as

management's marginalization of the agreed-upon procedure and project offices coping with "under the radar" initiatives, in our research. (Eisenmann, 2012)

The problem of "toothless gates" is addressed in the Secretariat literature with several recommendations: gate review meetings should be held at the appropriate management level so that decisions are linked to resource commitment, termination criteria should be transparent, and discussions about project readiness (e.g., Did the team do everything that was required for the portal?) should be held. It should be kept distinct from talks regarding the project's commercial value. Furthermore, the data must be sufficiently complete and trustworthy, as important decisions cannot be made without solid evidence. Many of the companies in our survey had trouble implementing these suggestions. (Eisenmann, 2012)

They frequently lack complete data since the small project management that occurs does not maintain track of what is important for future business value decisions. If the budget is surpassed or not met, for example, it says little about the market's demand for future projects. Another issue is that the gate output has been crossed out because it is something that must be done but adds little value: "We inserted part A into part B,' you can check your checklist on occasion. It's useless, but you have it ""At the very least, they did the steps." There appears to be implicit consent on some cases that the portal documents may not tell the complete story. One participant mentioned a project (a relatively low-tech consumer product) that came from a significant market opportunity but required a rushed timeline to fulfil the pre-Christmas shipment deadline. The project followed the company's usual process and included all required deliverables, but the reviews' concept was different from that of other projects. Manufacturing validation, for example, took place at a time when any change may have caused the company to phase out costly tools. In addition, the samples reported in one review were lab samples rather than typical industrial samples. All project stakeholders were under the notion that the project was identical to others, therefore these discrepancies were not immediately obvious. (Cooper, 2014)

Despite recent changes to the SG framework that clearly emphasize the prospect of quick and agile learning cycles, the prevailing approach in adopting SG remains one of thorough planning and execution. Our research found that project implementation of 'planning' may outrun project success in one scenario (Blank, 2012). During an interview, a respondent acknowledged being a part of a commercially successful company that, despite some challenges, eventually succeeded in exploiting a "bigger than typical" market opportunity with very high profit margins by 20-30 times. Internally, however, the project was considered as a failure because it did not follow the normal strategy and had unexpected adjustments and shocks. Some people on the project's careers had suffered as a result, according to the answer, and the organization had just faced a comparable significant opportunity that, once again, required a more adaptable management strategy. (Daly, 2012)

## Conclusion

Furthermore, despite the fact that the concept of project strategy is still growing, project management does not yet have frameworks or procedures in place to assist teams in articulating and understanding the strategic implications of a project. Without this link to strategy, project management can help decision-makers understand the consequences of tactical decisions (e.g., prioritizing time over cost), but it leaves out more fundamental questions, such as "Should this project be pursued further, even though the market opportunity is less than expected or development costs are rising?" and has weak support. To improve the situation, project management research has to reconsider the metrics that project management typically tracks: Time or budget spent does not mean much if there isn't reliable information about how much effort it will take to get to results. (Daly, 2012) And task completion levels and earned value approaches are equally problematic: Is new software 99% complete when it is fully coded but not yet integrated with a device? Or 70%, because last time it took three days for debugging? Or 0%, because we are integrating new software with a new device and anything can happen? How much value does the software bring from a customer's standpoint, given how difficult it is to predict what customers truly value? A more realistic indicator may be how much development work is focused on a well-organized problem with known risks, versus how much ambiguity and subjectivity there is with the unknown. Current project management practices in R&D organizations, on the other hand, do not produce such ideas. (Brady, 2014)

As a result, project management struggles to fit into product development, as the SG framework addresses key project decisions and coordination demands, while tactical decisions are handled utilizing just needed project management tools. However, with frequent complaints of unfamiliar later phases, schedule and budget overruns, this is not an ideal condition (Cooper, 2014). The majority of the R&D organizations in our sample failed to clearly define project management frameworks and the SG, and hence did not exploit either term to its full potential, according to our research. With so much size and shape, the SG is often burdensome, or so adjustable, that "anything goes" and Gateway reviews lose their teeth. Project management is typically reduced to simple scheduling, budgeting, tracking, and engineering change management, with no insight into how the project might be updated to meet changing requirements. At the same time, the focus of attention is on advance preparation and plan implementation. Hermetic and rolling-wave planning, as well as learning-based methods like selection and trial-and-error learning, are rarely used in the SG framework up front and only appear in response to downstream difficulties. (Grönlund, 2010)

Future research should look into how both the SG and project management might move people's mindsets toward more flexibility, with the (still limited) good practices described in the literature and by some of the respondents in this study potentially playing a role. In addition, studies should look into how to improve success in a methodical way. However, this should be done with caution. Specific procedures, while identical at a general level, varied from firm to company and, in many cases, from project to project, according to this study. Furthermore, the "official" practices that are recorded do not always accurately reflect the reality on the ground. (Kurkkio, 2011)

Instead of asking whether SG or project management procedures are commonly employed in the organization, future research on project management and project success should take this into consideration and record actual practices that apply to the specific projects under investigation. This can help explain inconclusive data on new product development success determinants and provide fresh insights into project management drivers and project success that are still limited. Adaptive project management is now constrained by the "plan and execute" approach that dominates project management and the literature on product innovation. Furthermore, despite the fact that both literary tracks cover comparable issues, there is little overlap and cross-referencing between them (Eisenmann, 2012). Product Development Research has produced a number of project management methodologies and tools that are tailored to the problems of innovation projects. The Design Structure Matrix, for example, was first published in 1981 and is regularly cited in product development publications, but it has had little momentum in project management. (Blank, 2012)

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