The Practice of Project Management in Product Development

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ABSTRACT

This research investigates (1) how existing project management frameworks complement product development practice; (2) how product development projects are managed with standard vs. project-adapted management practices; and, (3) what challenges arise in the context of project adaption. Distinct streams of literature on product innovation, organizational ambidexterity, and project management are reviewed.

The research is based on small and medium technology companies that manage incremental and highly innovative product development projects within the same R&D organization. It identifies company-specific and project-specific adaptations of standard new product development and project management practices.

THE PROBLEM

Project management has been accused of having lost its relevance for innovation initiatives because it over-emphasizes planning and control over flexibility, leading to approaches that are poorly adapted to high-uncertainty endeavors. This research investigates and explains how PM practices are adapted to cope with the uncertainty of product development scenarios.

Organizational theory has long been interested in ambidexterity, which enables companies to sharpen and exploit an existing knowledge base, as well as to explore innovative opportunities that build on different competencies.

Exploitation initiatives are looking for solutions inside the existing technologies and for the existing market and therefore are more likely to have a predictable return on investment. They increase the fit and alignment of the organization with evolutionary changes, lowers costs and increases the flexibility to accommodate new customer requirements.

KEY WORDS
Innovation
R&D
Ambidexterity
Product Development
Dynamic Environments
Uncertainty

“This research investigates and explains how PM practices can be adapted to cope with the uncertainty of product development scenarios.”

“Ambidexterity is a prerequisite for competitive success, unless the business environment never changes or is so extremely volatile that knowledge becomes very quickly obsolete and no exploitation is possible.”

1 Organizational ambidexterity refers to the ability of an organization to both explore and exploit—to compete in mature technologies and markets where efficiency, control, and incremental improvement are prized and to also compete in new technologies and markets where flexibility, autonomy, and experimentation are needed.
In contrast, exploration initiatives are seeking solutions beyond the company’s existing technologies or markets. They are less certain, and slower to produce results, but give new competencies to the organization through which it can confront revolutionary changes in the business environment.

Ambidexterity is a prerequisite for competitive success, unless the business environment never changes or is so extremely volatile that knowledge becomes very quickly obsolete and no exploitation is possible. Most project management practices are optimized for exploitation, making it difficult to achieve ambidexterity.

## THE METHOD

The study is focused on small and medium technology companies with manufactured products that manage incremental and highly innovative product development projects within the same R&D organization.

The research presents three consecutive studies that cumulatively lead to the results. In total 17 individuals, representing 12 different companies were interviewed. The results were presented and discussed with a four-person project advisory panel, which consisted of academic and industry experts in project management and new product development.

## FINDINGS AND PRACTICAL IMPLICATIONS

### What companies should do: Uncertainty approach

Recommended project management approaches for different levels of uncertainty are presented in the following table:

<table>
<thead>
<tr>
<th>Nature of the project</th>
<th>Technology or Market Uncertainty</th>
<th>Recommended project management approach</th>
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</thead>
<tbody>
<tr>
<td><strong>Innovative New Product</strong></td>
<td>High</td>
<td>Trial-and-Error: initial planning steps are non-linear, non-orderly, and non-predictable and simultaneously focused at discovery and feedback learning.</td>
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<td>new functionality with potential to change current technology paradigm; market adoption by visionaries.</td>
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<tr>
<td><strong>Significant Improvement Product</strong></td>
<td>Medium to Medium-High</td>
<td>Planning steps are focused at testing/validating assumptions through experimentation and feedback, but approaches differ with regard to their initial structure:</td>
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<tr>
<td>Significantly improved functionality through adding and removing of features that makes the product attractive to mainstream adopters and adjacent markets.</td>
<td></td>
<td>• Recursive: loosely coupled, unstructured steps are decided on as feedback. Information becomes available, making the actual project activities and outcome relatively unpredictable.</td>
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<tr>
<td><strong>Incremental New Product</strong></td>
<td>Low to Low-Medium</td>
<td>• Evolving: project steps and feedback loops are planned upfront, but length and outcome of each feedback cycle are unknown.</td>
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<tr>
<td>Moderate changes in existing functionality, targeted at existing markets.</td>
<td></td>
<td>• Selection: project steps are designed to generate and test alternative solutions in parallel and select the best alternative after testing. Learning occurs ex-post.</td>
</tr>
<tr>
<td><strong>Linear</strong></td>
<td></td>
<td>Linear: Process consists of a fixed sequence of several defined gates and stages.</td>
</tr>
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</table>
**What companies do: Findings about Stage-Gate Practices and Challenges**

The most common approach to organizing new product development projects is a linear process model with decision points that separate sequential project phases, such as the Stage-Gate© (SG) System\(^2\). It is focused on project selection for moderately explorative projects and explicitly excludes project control. SG therefore needs to be used in conjunction with micro-level project management practices. The research found that companies apply SG broadly and tailor it to manage research projects and development projects. Only few companies have the different frameworks for explorative and exploitative projects and even fewer combine SG with rigorous project management approaches. Approaches for managing uncertainty, in particular trial-and-error learning and selectionsim, are rarely implemented.

**Findings about PM Practices and Challenges**

Product development organizations have all of the definitional criteria for project organizations. However, PM practice in new product development is relatively rudimentary. The reasons seem to lie in the differences between new product development projects and traditional projects, such as construction.

- Budgets are often small in comparison to the sales revenues the new product generates over a lifetime.
- Quality of deliverables matters immensely. Design errors can cause very high costs for rework. However, there is typically no way to offset these added costs, the product simply has to deliver exactly what it was planned to do or it is most likely useless to the market place.
- Timing matters in fast-paced high-tech. The companies in the sample reported on product development times between one and three years.
- Project managers in R&D very rarely have formal project management training.

Several explanations were given regarding why much of the project is managed informally and with little documentation. One reason is that time-driven projects often need to reduce documentation to save time. Another reason given is the limited usefulness of documentation for some types of R&D projects. A final reason, stated by the respondents, is a lack of PM training and/or mindset.

**CONCLUDING REMARKS**

The respondents in this research describe product development as a messy process that is characterized by surprises, reoccurring problems, and improvisations. The literature confirms this and suggests that the success rate of commercialized new products is roughly 50%, and only about 50% of all new products are launched on time.

The study found several explanations for the observed problems: most R&D organizations in the sample fail to clearly delineate the two frameworks of PM and SG. Consequently, neither concept is used to its full potential. PM is typically reduced to simple upfront scheduling and budgeting, tracking, and engineering change management without providing many insights into how to adjust the project to changing needs. SG is often reduced to checking of gate documents without sufficient analysis, if the project should continue to be funded.

Given the size of the study, managerial recommendations are given with caution. Incremental development activities, such as improvements of existing products, likely do not need a SG process or full-blown PM.

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Projects without any immediate market focus, such as technology investigations, do not benefit from SG. PM may be relevant if schedules and tasks in different functional areas need to align but, in most cases, a simple allocation of resources and a task list should suffice.

New product initiatives and custom-products both require a SG approach and PM. Project outcomes should not only be monitored based on tasks completion, but on learning.

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