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Improving Feedforward Controls To Improve NPD Portfolio Performance – An Empirical Study

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EDITORIAL NOTE

Mark Baker's fascinating study of the effects of managing project portfolios adds an important and specific contribution into the broad and extensive literature on project management, generally, and management of project portfolios, in particular. The article's focus is on how to manage complex and dynamic project portfolio's under significant turbulence. Such conditions characterize, for example, fashion (the topic of the case studies in the article), but also many other fields such as consumer products (e.g. smartphones), content industries (TV series, movies), or even software. The proposed idea to improve project portfolios is to introduce higher levels of explanation to the control of project portfolios using feed forward controls (predict the future for different scenarios and adjust your project based on feedback) which allows more dynamically assessments of the 'go/no-go' situations in project management. The article demonstrated by using action research method and comparative 'experiments' (before and after performance after project control intervention) that significant improvements can be made in managing project portfolios with the proposed approach. The article also shows that there are specific 'maturity' steps that most organizations can take under high turbulence to improve the management of their project portfolios by introducing stepwise changes in their project management techniques.

Improving Feedforward Controls to Improve NPD Portfolio Performance: An Empirical Study

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ABSTRACT

Managers making crucial project selections in large, fast-changing project portfolios face the challenge of balancing the tension between control (performance) and creativity (experimentation/innovation). To better manage this challenge and to improve performance, some practitioners and scholars have considered the application of more sophisticated feedforward controls in new product development portfolio project selections. However, empirical studies of changes in the sophistication of such controls and of their influence on performance are lacking. We use an engaged scholarship approach and an action research methodology in a large international organization with multiple business units to study the post-intervention changes in applied controls and changes in portfolio performance. Our findings identify the underlying generative mechanisms influencing the changes in the applied sophistication of feedforward controls, how these changes enable portfolio managers to better balance the tension between control and creativity in project selection, and the performance outcomes.

SYNOPSIS

Purpose

The purpose of this study is to empirically examine the effect that improving feedforward controls (anticipatory improvement actions) has on new product development (NPD) portfolio performance in large, fast-changing project portfolios. The study relies on a combination of two frameworks—a feedforward control framework and a portfolio performance framework. Developed from literature reviews and empirical study, managers can use these frameworks to improve NPD stage-gate project selection.

Problems of practice

In industry sectors that involve creative design and fashion aspects, large NPD project portfolios, and a fast-changing environment (e.g., fashion and branded sporting goods), managers face a significant challenge in balancing control and creativity. The setting of this case study is just such an environment—an organisation with nearly 4,000 projects in the portfolio, of which 80% change globally every 26 weeks.

The sector involves a high volume of project ideas, a fast clock-speed, a short shelf-life, a "fashion" market element, global third-party manufacturing and supply chains, and the important capability of forecasting NPD project margins. Thus, it represents a very challenging context for project selection decisions in the stage-gate process. Given this dynamic context, the utility of feedback control loops from market performance is limited; the information is often too late, becoming available only after the new portfolio NPD project selection decisions have already been made.

Balancing creativity and NPD margins to maximize sustainable portfolio values is crucial to business performance. The challenge is in knowing how best to manage the tension between delivering performance (control) and simultaneously delivering appropriate creativity and innovation in this dynamic context. For project selection decisions through the stage-gate development process (i.e., go-ahead/change/"kill"), using appropriate assessment criteria is crucial, especially to achieve the advantages of the practical application of management control systems (MCS) feedforward controls.

Results

The study shows that when NPD portfolio managers apply more sophisticated MCS feedforward controls in project selection, portfolio performance improves both in portfolio value and in strategic alignment. The study offers insights into the underlying improvement in controls that portfolio teams achieve after they are presented with the control and performance frameworks and explanations of their interventions. We present the progression of the developments in portfolio feedforward controls and activities over time in a "developmental process model."

Conclusions

For firms managing large, fast-changing NPD project portfolios, project selection is crucial to value creation and strategic alignment. To improve project selection and portfolio performance, managers' application of more sophisticated MCS feedforward controls is vital. More emphasis on a structured approach allows them to better predict the outcomes of project selection decisions and to strengthen the process of validating targets. The study finds that more sophisticated feedforward controls lead to more effective predictions of performance outcomes. This study is the first to surface the underlying change mechanisms in the NPD project selection process as applied feedforward controls become more sophisticated. The results of the study provide leaders with practical tools and a guide that can help them to improve NPD project selection and therefore to increase portfolio performance in large, fast-changing NPD project portfolios.

Practical relevance

The study establishes a relationship between an increase in the sophistication of applied MCS feedforward controls, the use of appropriate MCS feedforward performance measures, and improvements in NPD project portfolio performance. The increased sophistication of applied feedforward controls involves enhanced approaches to setting targets, to forecasting, to scenario planning, and to feedforward productivity metrics and new management heuristics (simple guiding rules). The study's conclusions for practice suggest that managers can improve NPD project portfolio performance by emphasizing better predictions of the outcomes of project selection decisions and emphasizing the process used for validating targets. The findings from the developmental process model provide specific suggestions for improving feedforward controls that can be applied to NPD project selection in large, fast-changing portfolios.

METHODS

Research question

How do NPD project portfolio managers apply feedforward controls to improve project selection and portfolio performance?

Method and Design

We adopted a case action research approach to observe the effect of the intervention (Eden and Huxham, 1996; Van de Ven, 2007) and to provide a richer understanding of underlying generative (repeatable) mechanisms. The design was a single case study involving a global branded footwear and apparel company, which we call *SportFashionCo*. The study involved multiple units of analysis (i.e., international brands business units (BUs)): six BUs in the intervention group and three BUs in a control group (see the Appendix on Method). The company employs about 700 people and has a combined annual revenue of $1.15 billion. The branded apparel and footwear industry has a relatively fast "clock speed" development cycle. The research was carried out by a senior manager within the organization as part of a Doctor of Business Administration (DBA) study.

The study required two phases: In Phase 1 we developed the portfolio controls and portfolio performance measurement frameworks; Phase 2 involved the intervention and measuring changes in portfolio performance. Note that in an action research study, the presentation of frameworks can constitute an "intervention." (Susman and Evered, 1978, p. 593). (See the Appendix on Method.)

Data Collection, Sample, and Analysis

Phase 1 required multiple methodologies: observation of NPD portfolio review meetings, semi-structured interviews with participants in project selection meetings, three focus groups of these participants, and review of the documents used in the meetings. Across eight BUs, the Phase 1 study involved: 56 participants in five portfolio review meetings of five BUs; 18 semi-structured interviews, including with two small groups, for a total of 26 interviewees; and three focus groups conducted with a total of 37 participants.

Phase 2 methodology used interviews, observations, documents, and performance measure data. Managers were asked to self-assess their perceived "starting" feedforward sophistication level against the control framework. To build the developmental process model (Van de Ven, 2007), we identified the developments in feedforward controls over the cycle that had been adopted and implemented by managers. At the end of the action research cycle, after two portfolio market launch cycles (the spring/summer season and the autumn/winter season), we conducted interviews with intervention participants and gathered data from each BU's finance department. Managers self-assessed their perceptions of changes in the sophistication of applied feedforward controls and their perceptions of changes in performance, guided by the two intervention frameworks.

Action research was selected as the methodology because of the value of carrying out interventions, observing how change happens, capturing the outcomes of the intervention, and observing the effectiveness of the changes. The methodology also enables testing of complex theoretical frameworks that help develop and elaborate theory, generating knowledge-for-action from practice.

PRACTICAL PROBLEM

In the development and management of large, fast-changing NPD project portfolios, the increasing costs of both excessive and under-performing projects lead to significant challenges for portfolio managers. Excessive development can dilute overall profit margins as design and development costs exceed the project margin market outcome; in addition, large numbers of low-performing projects can significantly damage third-party relationships and performance in the supply chain.

The global footwear and apparel industry is estimated to have an annual value of $300 billion. A significant part of the market is branded goods. In this creative and fashion sector, NPD specification variables are numerous, including market categories (e.g., clothing, footwear, and accessories); product categories (e.g., shirts, t-shirts, trousers, casual shoes, formal shoes, and sport shoes); and product characteristics (e.g., colors, materials, fabrics, style, silhouette, patterns, branding applications, and technical aspects). Each of these specification categories involves countless subsets. In our case study organization, *SportFashionCo*, approximately 90% of NPD was incremental and 10% was radical, with the radical innovations using new-to-market technology.

For NPD project portfolio management in this context, too little creativity leads to the possibility that important market opportunities are missed, with significant adverse consequences on overall financial performance. However, excessive creativity also can severely damage margins and productivity and adversely affect overall financial performance. In this specific context, with large, fast-changing NPD project portfolios and with significant creative design, a key challenge for NPD project portfolio managers is how to balance control and creativity, managing the tension and finding the "sweet spot" between delivering the appropriate creativity and delivering product margin, thus achieving the overall desired market and financial performance.

The case study organization employed highly experienced managers; many had worked in leading global businesses in the sector. However, their use of feedforward controls was sparse, and they had limited knowledge of the tools and how to use them in this dynamic context. Also lacking was a common "language" to help align stakeholder insights from the different disciplines on project selection decision-making. These stakeholders included designers, who want creativity in the products; technical managers, concerned with how to manufacture the designs; purchasing managers who try to identify the sources for third-party manufacturing at the target cost; category managers, focused on consumer trends, market performance, brand strategy, and product margins; sales managers, focused on what retail customers want; and financial managers concerned with the projects and portfolio's overall performance.

The performance outcome depends on the crucial activity of project selection in the stage-gate process. The problem in management is how to maximize portfolio value and performance by excluding wasteful projects while selecting projects that promote creativity and that experiment with new creative designs. How can NPD project portfolio managers better balance the tension between achieving desired performance (control) and investing in creativity and innovation? Little attention has been given to how managers can better balance this tension using feedforward controls in their NPD portfolio project selection.

LITERATURE REVIEW

The literature streams reviewed are management control theory, the different types of feedforward management controls, the use of such controls in NPD stage-gate project selection decisions and the related findings and conclusions from portfolio performance management research.

Management Control Theory and Portfolio Performance Management

Managers can use controls and performance measures to monitor and evaluate performance and to minimize the difference between planned and actual performance levels (Ishikawa and Smith, 1972). Management controls can curb profligacy and reduce excessive and wasteful new project development (Simons, 1994; Bisbe and Otley, 2004). Meanwhile, managers also recognize that rigid management controls can stifle new project development (Davila, 2000; Frow et al., 2005). Therefore, to improve project portfolio performance, management controls and performance measures need to cull wasteful projects but without stifling promising projects (Simons, 1994; Davila, 2000; Zagorchev and Gao, 2015; PMI Standard for Portfolio Management, 2017).

A control system that uses feedback and feedforward information, as in the case of NPD stage-gates, is the type of system depicted in both cybernetics, systems, and control theory (Wiener, 1950) and in general systems theory (von Bertalannffy, 1950). These feedback and feedforward loops are features of management control systems (MCS) theory. Here, feedback occurs after the performance outcome has been observed (Ishikawa and Smith, 1972). Feedforward control, which has origins in engineering, is a social science concept in MCS theory based on anticipatory control: predicting output levels before they occur, checking whether they will vary from the desired output level, and making proactive changes to the system. The idea is that management can take preventative action before a large difference between planned

and actual performance starts to occur (Ishikawa and Smith, 1972). The control is anticipatory, the performance output is predicted.

In NPD portfolio stage-gate project selection decisions, feedback loops use data on actual market performance outcomes of products and portfolios. These performance outcome data are fed back later into the stage-gate decision, after the sales event occurs. In contrast, feedforward loops predict the effects of the decision on the outcome variables at the point of project selection. The notable difference with feedforward management controls is the timing of the control function—before the project selection decision is made—and it is associated with the planning activity. To apply this concept in stage-gate NPD project selection, managers predict the performance outcome of the selection decision for both the individual project and for the overall portfolio. With the appropriate application of feedforward controls, managers should have more confidence in the project selection decisions, and that the predicted outcomes are aligned with strategy and value maximization (PMI Standard, 2017; Cooper et al. 2000).

Feedback management controls can be categorized as "actuals reporting/feedback measures" (Micheli and Manzoni, 2010). In contrast, feedforward management controls are found in the literature to have more categorizations:

- "Forecasting and target setting" (Bisbe and Otley, 2004; Poskela and Martinsuo, 2009);
- "Scenario planning" (Miller and Friesen, 1982; Makridakis, 1986); and
- "Review of targets and target metrics," or double-loop learning (Argyris, 1977).

The lowest level of sophistication in portfolio feedforward control is when there is *no measurement* by management, either feedback or feedforward. The capture of *actual* performance is therefore a more sophisticated feedforward control than no measurement at all. An organization would not be carrying out forecasting until it has first captured feedback or actual performance. Therefore, *forecasting* is a more sophisticated feedforward control than reporting only actual performance. *Scenario planning* is not carried out unless the organization is already carrying out forecasting activities. That an organization would be carrying out scenario planning before it does forecasting is highly unlikely. Finally, a more sophisticated application of feedforward controls would be *review of targets and target metrics*. This review could not be done unless the targets are set in the first place, and the literature suggests that an ultimate review of the validity of targets would not be done until completion of scenario planning. The more sophisticated the use of feedforward controls is, the more effective managers' predictions of individual product and overall portfolio outcome performance should be when managers make NPD product selection decisions in stage-gate NPD processes. Because this is the application of MC systems theory, we use the word *sophistication* in this study, rather than the word *maturity*.

The highest levels of feedforward control sophistication include the use of robust validity checks on plan targets, of double-loop learning, and of "questioning underlying organization objectives"; in this case, "underlying assumptions, norms, and objectives would be open to confrontation" (Argyris, 1977, pp. 116, 123). Here, portfolio managers ask, "is the target or goal still appropriate?" To answer this question, they identify the outcome variables of the project selection and portfolio decisions and predict their values in light of an assessment of the expected market opportunity. Therefore, they apply MCS feedforward controls: The forward-looking processes, with analytics that assess different options and with predictions of the performance outcomes and validation of the targets are aspects of feedforward control.

The sophistication levels for a feedforward control measurement framework can be established deductively, using the extant literature. Such a framework could be used for measuring changes in the applied feedforward controls in stage-gate NPD project selection decisions in an empirical study.

Portfolio Performance Management Research

Cooper et al. (2000) identified three key portfolio goals: maximizing portfolio value, strategic alignment, and having the right balance of projects. Strategic alignment means that both the project portfolio and the allocation of resources "mirror the strategic priorities of the business" (Cooper et al., 2002, p. 48). Management controls can help balance tensions between efficiency and flexibility in project selection (Jørgensen & Messner, 2009).

Two studies (Kester et al., 2011; and Martinsuo & Poskela, 2011) have stated that researchers need to develop practical approaches for assessing and managing project portfolios. These studies note that the "how" of portfolio decision-making is complex and that insights that prevent or resolve challenges in the daily practice of overall portfolio decision-making are scarce. Both Kester et al. (2011) and Martinsuo and Poskela (2011) encourage new research on developing frameworks that cover both project and business level performance measures and the use of evaluation criteria. In our case study organization, *SportFashionCo*, and in its sector context, both frameworks and criteria are needed because little is known about the "how" of making such decisions.

Balancing the tension between control and innovation is now considered crucial for commercial organizations (Deloitte and Nyenrode Business University Research Program, 2016; Zagorchev & Gao, 2015). To improve controls, managers need to understand the "right interventions to identify and facilitate critical dilemmas" in the "moments that matter" when there is a "choice between several desirable, or undesirable options, with no clear 'best' alternative" (Deloitte and Nyenrode BU, 2016, pp. 12, 13). In project portfolio

management, sound controls "can omit some extremely risky projects and focus on creating value through projects with more controllable risks" (Zagorchev & Gao, 2015, p. 19).

The Project Management Institute's (PMI's) Standard for Portfolio Management (2017) notes the fundamental principle of navigating complexity to enable successful outcomes. With large, fast-changing portfolios, where creative design is a key aspect, little is known about how managers can navigate the need to maximize portfolio performance by excluding wasteful projects and, at the same time, experiment with more radical, riskier but potentially higher return projects. Empirical studies are lacking that focus on changing the sophistication of feedforward controls in NPD portfolio project selection in this context and on observing the influence on performance.

FINDINGS

The findings are presented in five parts: 1) development of the two frameworks; 2) the identification of the underlying control change mechanisms (used to build the developmental process model); 3) changes in the sophistication levels of applied portfolio controls to project selection; 4) managers' perceived changes in performance; and 5) portfolio value and productivity changes.

Phase 1: Framework Development

Portfolio (Feedforward) Control Framework

The Portfolio Control Framework (see Figure 1) was developed inductively in our empirical study in Phase 1, building on a deductive framework constructed from literature. The final Portfolio Control framework has eight levels. In increasing order of feedforward sophistication, these levels are: 1) No measurement; 2) Actuals reporting (feedback measures); 3) Category level forecasting and target setting; 4) Project level forecasting through the process and strategic fit checks; 5) Category level productivity metrics: reporting actuals and setting targets; 6) Scenario planning and forecast review: project level forecast; 7) Category level review of targets; and 8) Category level review of the forecast (feedforward) productivity metric target.

Each higher level of feedforward control sophistication appears to be built on the application and learning of the control from the lower levels in the framework. Effective sophistication at higher levels requires consolidation of the applications of the lower levels, shown as a "+" sign in the framework.

Figure 1. Framework Development: Portfolio (Feedforward) Control Framework

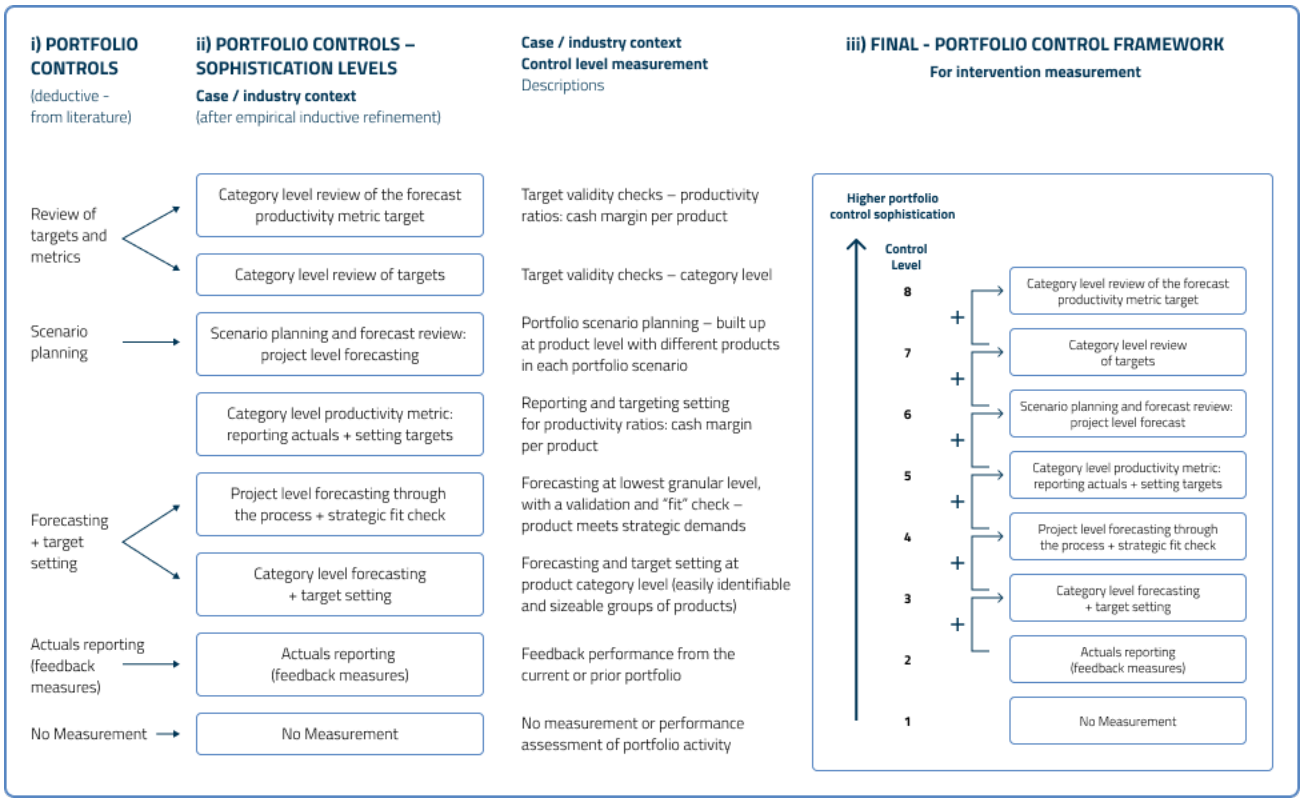
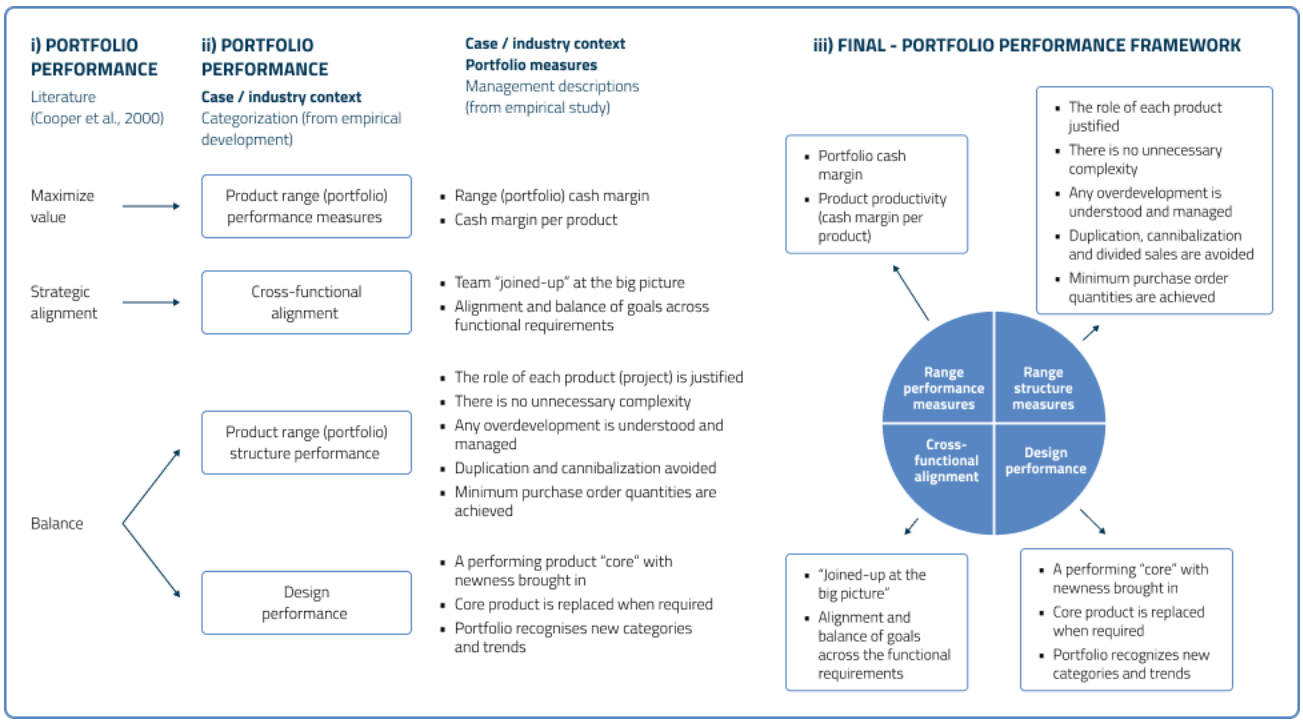


Figure 2. Framework Development: (Context Relevant) Portfolio Performance Framework



Portfolio Performance Framework

The Portfolio Performance Framework (see Figure 2) presents four key measure categorizations in equal share, with the empirically identified contextual descriptions providing supporting examples of "hard" and "soft" (perception) measures.

We identify three concepts crucial for portfolio performance measures (Cooper et al., 2000) in the case industry context: 1) "maximizing value" is maximizing the "portfolio cash margin"; 2) "balance" can be assessed using two categories, "range (portfolio) structure performance" and "design performance"; and 3) the case industry proxy for "strategic alignment" is "cross-functional alignment." Project productivity was measured using realized actual "cash margin per project"—that is, the actual market performance.

Phase 2: Developmental Process Model

Our developmental process model draws on the work of Van de Ven (2007). The identified underlying control change mechanisms and example data are presented in Table 1. We found two apparent strands of concurrent change: mechanisms that were more "operational" (1 and 2) and mechanisms involving longer term time horizons and more "strategic" implications (3, 4, and 5). These two strands are shown in the developmental process model in Figure 3.

The identified underlying control change mechanisms and the example data presented in Table 1 show sample quotes, as well as BU and participant/interviewee roles. Note that our evidence of managers' perception of changes in feedforward sophistication is indicated with a single underline, and evidence of their perceived changes in performance is identified with a double underline; perceived causality is bold-faced text in the quotations. These mechanisms are also presented graphically in Figure 3. In Figure 3, we show the underlying changes in control mechanisms that we observed in the intervention BUs, over time, after we presented and explained the two frameworks as an intervention.

Table 1. Underlying control change mechanisms and changes perceived by managers, observed during action research cycles

MECHANISM/CODING/EXAMPLE QUOTES/EVIDENCE
1) Improvement of Stage-Gate Operational Performance Measures
1.a Recognition that performance and controls are not good enough
"*People are **starting to understand** better the impact of poor decisions.*" Sport-One Business Analyst
"***It brought into focus** that a lot of what we were doing was a waste of time.*" Fashion-Three Supply Chain Manager
1.b Confidence to act, to change, to challenge
"*The framework gave me a reference point. You gave me the confidence to do it.... It makes me think about the right questions to ask, to drive return on investment on these products and drive volumes.*" Walk-One Product Manager
"*It changed my confidence to be able to challenge in the business, but more importantly, **it changed the confidence** of the business because we started understanding it and seeing the results coming out.*" Foot-One Managing Director
1.c Motivation to improve process controls and disciplines
"***The biggest win** has been the product managers now want to review with the supply chain team the forecast volumes at the start of the process and to do it together.*" Sport-One Supply Chain Manager
"*...it has been a motivation to action. And that's been the key thing for me.*" Sport-Two Product Category Director
"*These **frameworks started the whole process**. They put some discipline into the business.*" Foot-One Managing Director
1.d Provision and use of new performance information
"*I think data drive a lot of it and the integrity of the data and having the most updated version of the forecast. And **one version of the truth**.*" Sport-One Supply Chain Manager
"*..... **what's changed** is that now we're doing the math on it.*" Foot-One Managing Director
"*The main one is the quadrant margin mapping. I think what appeals to people about it is you don't have to be a genius to understand it. It's quite straightforward. You don't have to look at a load of numbers to understand it.*" Sport-One Business Analyst
2) Greater Confidence To "Kill" NPD Projects Earlier
2.a "Killing" easily identifiable products that are highly unlikely to add value
"*Category managers **are making product culls before this early review meeting** based on a review of the forecast and margin maps.*" Sport-One Business Analyst
"*The Product team quickly got rid of their 'tail draggers.'*" Sport-Two Business Analyst
2.b New heuristics
"*The focus is on doing fewer, bigger, better.*" Sport-One Brand President
"If every product [project] we do can't sweat, then we don't do it." Foot-One Managing Director
"Do less, do it better, and achieve more." Fashion-Three Managing Director
2.c Reducing / eliminating product duplication
"*With what we've got at the moment some [projects] are doing the same job, it's diluting what we're trying to do.*" Fashion-Two Product Director
"*The benefit of taking out the duplication **is that it** reduces cost and it's driving efficiency through the supply chain and the factories.*" Sport-One Supply Chain Manager

3) Improvement of Overall Portfolio Controls and Performance Measures

3.a Control Framework acts as a "roadmap"

"***The [Control] Framework has definitely helped give it more of a structure, a plan**, 'what's next,' 'how do we take this to the next level?'" **The great thing about the [Control] Framework is that it gives you something to aim for**. And if you're not sure what that is, this shows you what you need to do. And it'll drive the conversations that you need to have.*" Sport-One Supply Chain Manager

"*The Control Framework gives you **the roadmap of how to get there.***" Walk-One Category Manager

3.b Greater challenge of portfolio performance

"*It helps as 'Am I getting a balanced [project] range?' **The new approach forced people to question the viability of the project**.*" Walk-One Category Manager

"*It is making us **as a team to focus, revisit, focus, revisit.** We're asking: 'if it doesn't add value, why is it there?'*" Fashion-Two Product Director

"*In the main parts of the portfolio that drive the business, there is much more willingness from Category Management **to actually engage in conversation about taking stuff out**: 'Have we got too many products doing a similar type of thing?' 'Why are we doing this sort of product?' 'How much money am I going to make?'*" Sport-One Business Analyst

3.c Greater portfolio performance focus

"*Focusing on what's working and what isn't and why it isn't working. This is the most focused relevant global range [portfolio] we've ever launched.*" Walk-One Category Manager

"*Avoid overdevelopment, focus design resource and effort where it is critical to the plan.*" Fashion-Three Managing Director

"*There are two significant reasons for the massive improvement in margin. Because **we're creating far less products, we're putting bigger quantities behind the products being placed with our vendors** [factories]. The **economy of scale means that we are much better positioned and driving a lower cost** from the vendor.*" Foot-One Managing Director

4) Improved Target Setting

Setting targets; portfolio size, productivity metric

"*Having a more realistic number, a number with more credibility and belief. **People believe it** and it's sensible.*" Sport-One Supply Chain Manager

"*We're starting to build up from the dissected view of margin. We're starting to have that bigger picture of the absolute cash margin target from that range [portfolio] and asking how's that going to come through.*" Fashion-Three Managing Director

5) Changing the Stage-Gate Review Meeting Format and Content: Implementation of More Collaborative and Structured Forecasting

Forecasting: more structured, more collaborative, and more "bottom-up" forecasting reviews

"*The key internal stakeholders feed on to the forecast right from the very start of the process.*" Sport-One Supply Chain Manager

"*We now do post reviews of the forecasts to see how everyone has tracked against the forecast, it's to get an understanding of how much reliability we can put in the forecasts.*" Sport-Two Business Analyst

"*We now have a more collaborative approach to agree on what the final forecast is that we're going to 'lock-down.'*" Walk-One Supply Chain Manager

6) Enhanced Feedforward Metrics Application

6.a Product portfolio "mapping"

"***The quadrants margin mapping has helped** our category teams focus on the right areas. It doesn't solve all our problems, but **it focuses attention in the right areas**. Predominantly we are using the quadrant mapping at the planning stage.*" Sport-One Business Analyst

"***Using the Productivity Matrix spreadsheet makes you think about** 'where we need to grow areas, where we need to retract.'*" Walk-One Category Manager

6.b Product strategic sense checks

"*The points when you forecast and what you forecast on are critical. We do it once at the very start and we do it once before development. **So that's another check** we make just to say, "Are we sure?" And then we forecast again when the product has been developed and it's a check of 'Is this what we thought it was going to be?'*" Sport-One Supply Chain Manager

"*It gives more visibility across the business about what we're trying to achieve. You can then test the micro trends against the category visions. You can ask: 'Is this product delivering against the category vision?' If not, then we ask: 'Why is it here?'*" Walk-One Category Manager

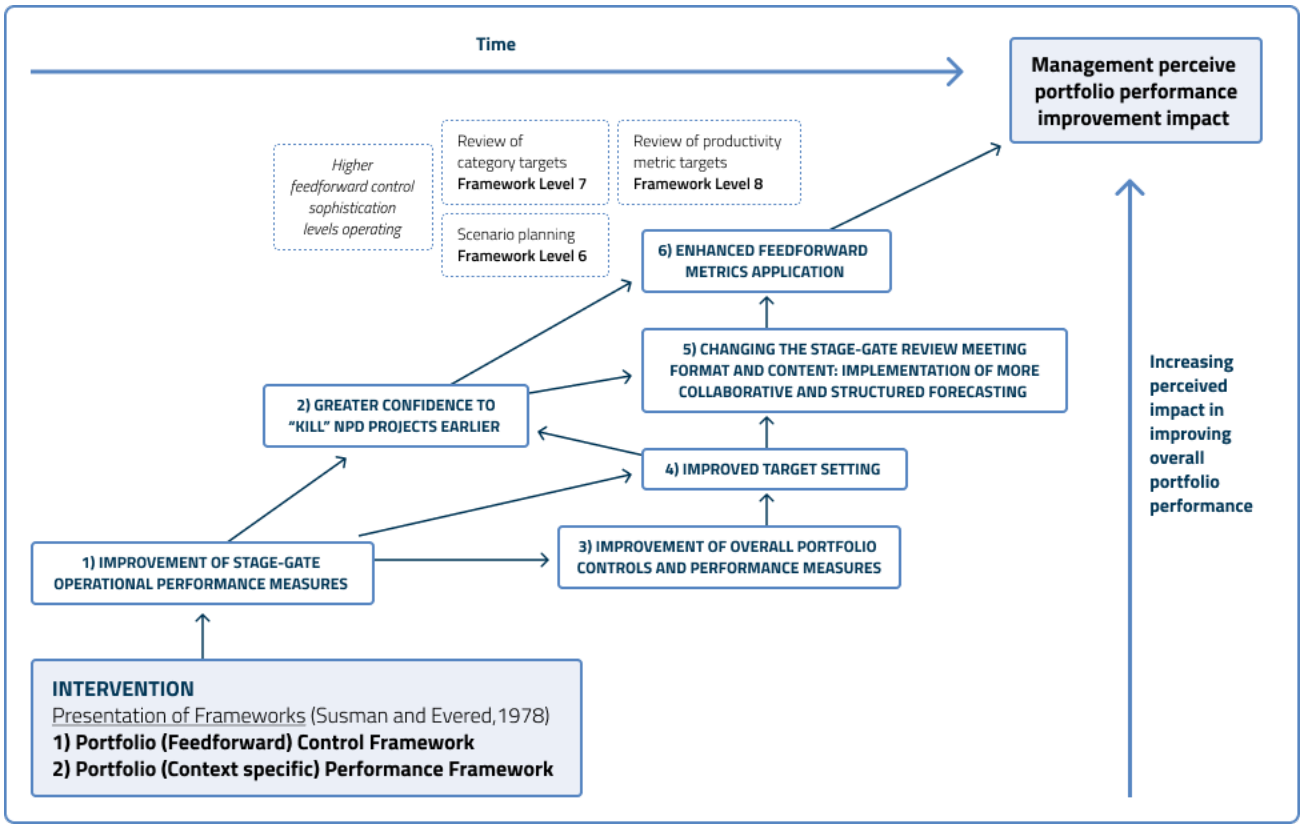
6.c Promoting productivity "enhancers" and reducing "diminishers"

"*Scenario planning* ***focuses the mind on what has to work harder*** *to drive the cash I want.* ***It focuses*** *where you want to add products, where to add newness and where not, and the effect on margin.*" Sport-One Head of Category

"*We now have a Category Management head who takes a helicopter view and sets parameters, limitations on range [portfolio] size, the percentage of newness that the designers can bring in.* ***We've been a lot harder on*** *margin thresholds, based on forecasts, and with the quadrants where if it's down in the bottom left, you don't even talk about it unless it's for strategic reasons.*" Sport-One COO

"*I put it very simply to the Sales team: 'These are the margin-rich products, and you need to sell more of them.'*" Fashion-Three Supply Chain Manager

Figure 3. Developmental Process Model



Note: Adapted from Van de Ven (2007)

Improvement of Stage-Gate Operational Performance Measures

Immediately post-intervention, managers acknowledged performance issues, recognizing low productivity and lack of value from the effort expended. After they recognized the issue, they found that use of the control framework gave them confidence to act and make control changes. Managers became motivated to improve the process controls and disciplines. These first changes appeared to mark a catalytic effect at this initial stage of intervention, with the result that participants wanted to change controls and change behavior. The motivation triggered the development of new performance information (e.g., quadrant mapping of the forecast cash margin (in dollars) against the forecast cash margin (as a percentage), for all projects).

Greater Confidence to "Kill" NPD Projects Earlier

With the availability of new performance information, managers were able to identify more easily the projects that were likely to achieve the lowest performance in the portfolio—those highly likely not to add enough value—and that were therefore cut earlier in the process. Senior managers reinforced these changes by creating and introducing new heuristics (simple guiding

rules) to communicate in a simple way the changes in feedforward sophistication. The senior managers perceived that the heuristics they introduced were "principles" that provided operational utility in project selection. The combination of the increased motivation to improve process controls and the new heuristics led managers to target the elimination of project "duplication," where projects were "doing the same job." In the case organization context, with very large, fast-moving NPD project portfolios, BUs have to apply more sophisticated controls to avoid duplication of NPD projects. Duplication occurs where more than one NPD project is trying to achieve the same strategic target and consumer purpose.

Improvement of Overall Portfolio Controls and Performance Measures

Managers described the portfolio control framework as providing a "roadmap of how to get there," as "a flashlight in the dark," and one interviewee said that it is important for their teams to know what "good looks like." Such comments serve as evidence that managers perceived both the operational utility and the strategic utility of the control framework. The combination of all the changes provided impetus for managers to apply greater challenge to their assessment of predicted project and portfolio performance. At this stage, managers began raising many questions with each other about their portfolio and project selections. Such questions and challenges included the following: "If it doesn't add value, why is it there?" "Am I getting a balanced range [portfolio]?" "We're now questioning everything we do." "We're trying to justify everything we're doing, at all levels."

The portfolio teams recognized that they had not previously openly challenged each other enough on these concerns. The combination of the control framework's acting as a roadmap, the greater challenging of portfolio performance, and the availability of new performance information led to the next change: greater focus on portfolio performance. This change was reinforced by the new heuristics (e.g., "*focus on doing fewer, bigger, better*") and consistent communication from the BU leaders participating in the intervention cycle. The word "focus" was prevalent.

Improved Target Setting

The tracking of measures and the greater portfolio performance focus led to improved target setting. Target setting categories (i.e., feedforward metrics) that we observed included: 1) overall portfolio size (the number of projects being developed), 2) the number of projects at the category level, and 3) the productivity metric (volume per project, cash margin per project).

Changing the Stage-Gate Review Meeting Format and Content: Implementation of More Collaborative and Structured Forecasting

The aggregation of all these control changes affected the management approach and content of project selection in portfolio review meetings. We identified three categories of forecasting changes. First, forecasting became more "structured," where previously "there wasn't a lot of science applied." Second, forecasting became more "collaborative," with a "joint approach." Third, the structured forecasting included more "bottom-up" forecasting, assessing both the individual projects and for different levels of project aggregation (e.g., at the project category level).

Enhanced Feedforward Metrics Application

The project selection decision-making in the review meeting was enhanced with the development of more sophisticated portfolio forecast performance analyses. Management participants called these schedules and charts "margin mapping," "portfolio mapping," a "scatter-graph," and a "productivity matrix." These analyses are typically 2 x 2 matrices on which all the NPD projects are plotted, with a project's forecasted cash profit ($) on one axis and its forecasted profit margin (%) on the other axis. These analyses provided support to managers in making the project selection decision.

Another control element included in the control framework was a "strategic fit check." Managers introduced more validation checks in the portfolio review meetings, using questions, such as "Is this what we thought it was going to be?" and "Is this project delivering against the category vision?" These checks are used to "build confidence in the forecast" and to have a "clear link to the strategic plan." The final observed developments use the greater controls in forecasting and portfolio mapping analyses, along with the new heuristics, to promote projects that enhance overall portfolio value and project productivity and to eliminate ("kill") projects forecasted to diminish the value-add.

The developmental process model (Figure 3) was reviewed with six of the intervention participants for validation purposes. Their responses stated "that [it] tells the journey we've been on," that they could "totally associate that that's what we went through," and that "it absolutely shows the bulk of what we went through."

Changes in Feedforward Control Sophistication Applied to Project Selection

Participating managers in the six intervention BUs assessed the level of feedforward sophistication that they applied in their portfolio management project selection, weighing their assessment against the descriptions of the eight levels of the portfolio control framework. Meanwhile, the researcher assessed changes in the three control group BUs.

The participating managers in the intervention BUs saw between two and five levels of change in feedforward sophistication (see Table 2). Three BUs moved up by two levels: Sport-Two, Walk-One and Fashion-Three. Two BUs moved up by three levels: Foot-One and Fashion-Two. There were no observed changes in feedforward sophistication in the three control group BUs.

Table 2. Changes in the level of feedforward control sophistication: comparison of pre-intervention levels to post-intervention levels (self-assessment by participants)

(Portfolio Control Framework - eight levels)

	INTERVENTION BUs						CONTROL BUs		
	Sport-One	Sport-Two	Walk-One	Foot-One	Fashion-Two	Fashion-Three	Control One	Control Two	Control Three
Pre-intervention level	3	5	3	2	2	2	3	3	2
Post-intervention cycle level	8	7	5	5	5	4	3	3	2
Change in Level	**+5**	**+2**	**+2**	**+3**	**+3**	**+2**	**0**	**0**	**0**

e.g. for Foot-One the sophistication level moved from Level 2 to Level 5 (out of the 8 Levels), a change of +3

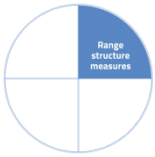
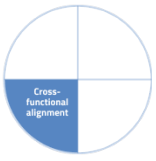
All the intervention BU managers perceived that at the end of the intervention cycle, the sophistication of the feedforward controls they applied to NPD project selection increased.

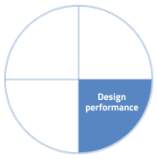
Managers' Perceived Changes in Performance

The two "soft" measures that intervention participants observed as having achieved the most significant improvement by the end of the intervention cycle were "range structure performance" (balance) and "cross-functional alignment" (strategic alignment) (see Table 3).

Intervention participants noted how crucial the change in range structure performance (portfolio balance) had been to "delivering overall improvement in performance." Improvements affected productivity by reducing "duplication" and "cannibalization," taking out the "bad" projects, and more fully justifying the role of each project in the portfolio. With cross-functional (strategic) alignment, intervention participants noted more cross-functional involvement and "more alignment of purpose"; the introduction of cross-functional forecasting allowed "everyone [to] work from the same sheet."

Table 3. Manager-perceived changes in portfolio performance (post-intervention)

Portfolio Performance Framework Measure	Number Noting Significant Improvement	Example Quotes/Evidence
 **Range structure performance** (balance)	12 of 13 interviewees	"We're now looking at the [portfolio] as a whole, rather than in silos." Sport-One Supply Chain Manager "…where we've had much more focus on productivity of the [portfolio]." Sport-Two Product Category Director "We've stopped cannibalization, we've sorted out our architecture, we've got a segmentation model." Walk-One Category Manager "The [portfolio] is simpler, we stopped spreading ourselves too thinly." Foot-One Category Manager
 **Cross-functional alignment** (strategic alignment)	6 of 13 interviewees	"Now we're all contributing to the forecast and what the [portfolio] is going to deliver. The alignment has come from a common view of forecast volumes." Sport-One Supply Chain Manager "A uniform, single picture of the truth for everyone. So everyone is working from the same sheet." Sport-Two Business Analyst "There is more integration and understanding of what the markets need." Walk-One Supply Chain Manager "So we are working as one team rather than functions." Fashion-Three MD

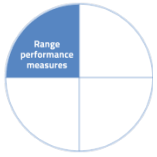
 **Design performance**	4 of 13 interviewees	Only 4 of the 13 informants observed significant improvement in "design performance." A possible reason for this result is that the performance impact is more likely to be observed over a longer period of time than was involved in the intervention cycles.

The intervention participants observed, post-intervention, that they perceived greater cross-functional focus on delivering overall portfolio performance.

Portfolio Value and Productivity Changes

Table 4 presents the values for the portfolio measures at the start and end of Phase 2 for both the intervention cases and the control group (no intervention). These measures include the portfolio size (number of projects), the portfolio cash margin, and the cash margin per project (productivity ratio), as presented in the portfolio performance framework (in Figure 2).

Table 4. Changes in "hard" measures of portfolio performance



		INTERVENTION CASES							CONTROL GROUP			
		Sport-One	Sport-Two	Walk-One	Foot-One	Fashion-Two	Fashion-Three	TOTALS	Control One	Control Two	Control Three	TOTALS
Portfolio size (No. of projects)	Pre-Intervention	846	267	916	275	393	187	**2,884**	380	231	345	**956**
	Post-Intervention	658	238	800	207	138	169	**2,210**	430	231	408	**1,069**
	Change incr/(decr) %	**(22.2)%**	**(10.9)%**	**(12.7)%**	**(24.7)%**	**(64.9)%**	**(9.6)%**	**(23.4)%**	**13.2%**	**0.0%**	**18.3%**	**11.8%**
Portfolio Cash Margin $'000s	Pre-Intervention	37,509	7,769	12,398	1,737	234	3,757	**63,404**	22,221	1,885	3,963	**28,069**
	Post-Intervention	43,554	8,693	13,899	2,006	307	4,176	**72,636**	25,394	1,805	3,047	**30,246**
	Change incr/(decr) %	**16.1%**	**11.9%**	**12.1%**	**15.5%**	**31.6%**	**11.2%**	**14.6%**	**14.3%**	**(4.2)%**	**(23.1)%**	**7.8%**
Cash Margin per Project $	Pre-Intervention	44,337	29,098	13,535	6,316	595	20,091	**21,985**	58,477	8,159	11,487	**29,361**
	Post-Intervention	66,192	36,527	17,374	9,689	2,228	24,710	**32,867**	59,055	7,814	7,469	**28,294**
	Change incr/(decr) %	**49.3%**	**25.5%**	**28.4%**	**53.4%**	**274.7%**	**23.0%**	**49.5%**	**1.0%**	**(4.2)%**	**(35.0)%**	**(3.6)%**

The aggregate results for the intervention cases show a 14.6% increase in portfolio cash margins, an increase of $9.2 million in the aggregate portfolio cash margin, and a 49.5% increase in NPD project productivity (i.e., an increase in cash margin per project of $10,900). All the intervention cases increased their portfolio cash margins and project productivity. The aggregate results for the control group show a 7.8% increase in portfolio cash margins and a reduction of 3.6% in project productivity.

All the intervention BUs registered marked improvements in the management control of project selection, accompanied by marked improvements in perceived and actual performance. In the intervention BUs, the improvement in the portfolio performance "hard" measures was significant. In the control group, which had no interventions and no observed changes in process controls, marked improvements in performance were lacking.

The marked improvement in metrics performance in the intervention BUs (shown in Table 4) provides additional evidence of why managers perceived significant performance improvement when applying more sophisticated feedforward controls in the stage-gate selection process.

Reflection on the Evaluation of the Outcomes

In the case study organization, NPD portfolio managers perceived that the feedforward control framework has practical utility in helping to improve the performance of stage-gate project selection. All the intervention BUs moved to a higher control framework level of applied feedforward controls in project selection, and the change in levels was self-assessed by portfolio managers. In the intervention BUs, we found significant observed improvement in perceived (soft) and hard measures: a more balanced portfolio, greater strategic alignment, and increases in portfolio value and productivity (i.e.,

realized margin per product). Post-intervention, these BUs achieved higher portfolio values with a smaller number of NPD projects, as shown in Table 4; the results provide evidence that the portfolio managers were better able to balance control and creativity.

The managers have created a way of quantifying their decision-making, and the changes to the process have helped them to make better decisions, in a "language" that they can share, thus improving alignment. They have developed the analytics associated with NPD project selection decision-making.

The combined use of the two frameworks has practical utility as an intervention in the sector context to motivate NPD portfolio managers to improve the sophistication of applied feedforward controls. The process model captured the generative (repeatable) control changes that managers made, post-intervention. Managers confirmed that the process model described the journey that the portfolio team went through. The study thus contributes insights into how NPD project portfolio managers can apply more sophisticated feedforward controls to improve project selection and portfolio performance.

LESSONS FOR PRACTICE

In the context of large NPD project portfolios involving short project lifecycles, the combination of a feedforward control framework and a context-relevant performance framework can be used as an intervention to motivate NPD project portfolio managers to develop controls to improve performance. The combined use of the frameworks enables NPD project portfolio managers to better balance the tension between achieving desired performance (control) and investing sufficient resources and effort in creativity and experimentation with new, creative designs.

The different types of feedforward control applications described are already known. However, these controls are not in common use in the case organization's industry, with its challenging, dynamic context. Simply knowing about these tools is insufficient. Instead, closing the gap between prediction and performance requires knowing how to combine them in practice. The development of a more sophisticated quantification "language" and approach creates a greater and more dynamic capability for project selection decision-making.

The findings suggest that, in this context, NPD portfolio managers can maximize portfolio value, achieve strategic alignment, and have a balanced portfolio of projects by undertaking the following actions:

Use feedforward performance information (e.g., forecast project category level value metrics) and set target productivity metrics (e.g., target/realized cash profit per project).

Regularly communicate feedforward control principles with new heuristics (e.g., "doing fewer, bigger, better").

Conduct project portfolio reviews that result in greater challenges to the status quo and that focus on feedback and feedforward portfolio performance, including setting and continually checking the validity of portfolio targets (e.g., number of projects, project value, and productivity).

Ensure that a more structured, collaborative, and "bottom-up" forecasting approach is applied.

Ensure that, throughout the project selection process, continual project strategic validation checks occur, resulting in the promotion of forecast value "enhancers" and the reduction of forecast value "diminishers" in the portfolio.

Some NPD portfolio managers working in this challenging context seek to better balance control and creativity, and to improve the application of feedforward controls in project selection. For these NPD portfolio managers, the process model can be used to describe the expected journey in changing such controls and therefore can act as a guide for intervention, helping to accelerate the process and control improvements.

These findings provide insight into how managers can maximize portfolio value and strategic alignment by excluding wasteful projects and can, at the same time, promote creativity.

CONTRIBUTIONS TO THEORY

The findings contribute to the understanding of portfolio performance management in the challenging, dynamic context of high-volume NPD project portfolios, involving a fashion design element, a fast clock-speed, and short shelf life. One of the fundamental principles of portfolio management, noted in the PMI Standard, is to navigate complexity to enable successful outcomes. This study contributes new context-specific knowledge about the importance of using feedforward controls and feedforward performance analytics, including a feedforward productivity metric, to help portfolio managers make NPD project selection decisions in this challenging and complex context.

The findings contribute to scholars' calls (e.g., Kester et al., 2011) for more insights into how to resolve challenges in the daily practice of overall portfolio decision making, and for developing frameworks that cover both project and business-level performance and that include the use of evaluation criteria. The study provides insight into how portfolio managers can improve controls to better balance the tension between control and creativity (Deloitte and Nyenrode Business University Research Program, 2016; Zagorchev and Gao, 2015).

Researchers have long sought a clear understanding of how control mechanisms are used in managing NPD portfolios. In this study, we have unpacked this "black box" and provided descriptions not only of the controls, but also of how they are used

and how this use develops over time in a fast-moving business setting.

None of the control mechanisms used in this study are new. However, what the study demonstrates is how the use of the tools has been combined to create more sophisticated controls that, in this case, have resulted in better performance. We believe that this sequential development of the tools has improved the management team's capability to predict, leading to better portfolio NPD selection decisions. From this case study, we believe that improvements in management control systems can and should be delivered this way. We would even go so far as to posit that, although individual tools may be useful in specific situations, a more systemic development of tools and management capability is a better approach, leading to better performance outcomes.

In this study, we have established a relationship between increasing the sophistication of applied feedforward controls and the resulting improvements in NPD portfolio performance. The study has developed a framework involving eight different levels of feedforward control sophistication that NPD portfolio managers can apply in stage-gate project selection. This portfolio (feedforward) control framework is a contribution to theoretical knowledge.

The highest level of MCS feedforward sophistication that we observed in the post-intervention NPD portfolio stage-gate project selection involved an amalgamation of feedforward loop planning (i.e., anticipatory improvement actions) (Ishikawa and Smith, 1972) and rigorous double-loop learning (challenging of targets and objectives and target validation) (Argyris, 1977). This approach uses anticipatory control characterized by the discipline to predict both the outputs and the validity of the targets. Validating the targets, especially target market performance, is more challenging than simply predicting the outputs. The combination of both these predictions, as double-loop learning, was the most sophisticated anticipatory control we observed.

This amalgamated approach identifies and defines a new MCS theory concept, which we call feedforward anticipatory control. The greater the sophisticated application is of this control (through the eight levels of the control framework), the more effective is the observed management prediction of performance outcomes; thus, managers develop a greater confidence in their selection decisions.

This detailed longitudinal study, using an engaged scholarship approach, has surfaced the underlying generative (repeatable) mechanisms influencing the development of applied management controls and applied performance measures. Again, the feedforward tools are not new. Instead, their use in combination, around a commonly understood structure, builds the capability to understand the data and help make better decisions. The application of more sophisticated feedforward control enables managers to better balance the tension between control (performance) and creativity in NPD project selection.

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APPENDIX ON METHOD

Action Research: Interventions Based on Presentation of Frameworks

Presentations of frameworks can constitute an "intervention" in an action research study:

> Interventions are acts of communication between two or more self-reflecting subjects, requiring mutual understanding of the meaning of the acts and common consent as to their presumed consequences. Such interventions have an element of surprise or unexpectedness to them so that they are unlike other actions routinely undertaken within the organisation.... The element of surprise evoked by an intervention results when the change agent offers members of the target organisation a new way to conceptualize an old problem and offers it in a language or framework that differs from that by which members of the organisation define their present situation. (Susman and Evered, 1978, p. 593).

At the end of Phase 1 of the study, when I sense-checked and validated the two final developed frameworks with 15 knowledgeable informants across 7 of the business units (BUs), many of the informants easily and willingly (and unprompted) identified the level of portfolio feedforward control being applied in their BU. Some informants made an almost immediate decision to adopt the ideas and became motivated to achieve higher sophistication levels of feedforward control. Thus, the intervention phase, Phase 2, seemed to start at the point of validating the frameworks with the informants. The presentation and explanation of the control framework and the performance framework were used as the intervention.

Case Organization: Contextual Information

SportFashionCo's BUs are shown in the following table, including the six intervention BUs and the three control BUs:

Business Unit (disguised)	Portfolio Key Categories	Age of Brand (years)	Portfolio Sales $m	Number of countries brand is sold in	Development Cycle Time (weeks)
Intervention BUs					
1. Sport-One	apparel, equipment	>40	515	>100	45
2. Sport-Two	footwear	>40	105	>100	37
3. Walk-One	apparel, equipment	>40	98	28	56
4. Foot-One	footwear	>40	20	2	26
5. Fashion-Two	apparel, footwear	>20	3	30	36
6. Fashion-Three	footwear	>20	20	8	26
Control Group BUs					
1. Control One	footwear	>40	335	>100	42
2. Control Two	equipment	>40	17	>100	54
3. Control Three	footwear	>20	41	3	26

Across the six intervention BUs, there were 31 participants who had an average of almost 12 years' experience each; their combined total was 365.5 years of sector experience. Although planning was an important activity, the participants showed negligible awareness before the interventions of the practical aspects of feedforward controls.

We selected the three control group BUs based on their being part of the case organization and therefore having similar management processes, including NPD project selection. In addition, they were similar in portfolio size and product categories, by comparison, to the intervention BUs, and as the researcher, I was granted similar access to them, which facilitated longitudinal monitoring.

Intervention Cycles

Across the six intervention BUs, there were 37 separate interventions in the action research cycles. The initial intervention was the same in all the intervention BUs: the presentation and explanation of the two

frameworks. The shortest intervention cycle was 4 weeks, and the longest was 42 weeks; the average cycle was 22 weeks. Across the six BUs, 31 participants worked and made decisions on NPD portfolio project selection. The additional interventions by the researcher supported managers in developing feedforward controls and performance measures, anchored by the two intervention frameworks. Across the six BUs, the end-of-cycle interviews included 13 participants. Among the three BUs in the control group, where no intervention occurred, I assessed any perceived changes both in the feedforward controls they applied and in their performance.

The action research cycle data can be used to construct a "developmental process model," which provides a visual map of the progression of activities or events that the focal unit undergoes as it changes over time (Van de Ven, 2007, p. 199). Events are defined as "abstract concepts of coded sets of incidents," where incidents are "operational empirical observations" (Van de Ven, 2007, p. 217). When developing or testing theories of how organizations change over time, process studies are "fundamental" to obtain comprehension (Van de Ven, 2007, p. 195). A story that narrates the sequence of events can help explain how these events lead to a particular outcome. An additional and "exceptional" advantage of action research is the triangulation opportunities (Eden & Huxham, 1996) between observation of interventions and their effect, between participant accounts and how those accounts change during the longitudinal study.

Action Research: Quality Checks

I used the Eden and Huxham (1996) standards for assessing the quality of good action research as a guide and checklist. Practical benefits tests (Platts, 1993) were assessed by directly asking the interview participants at the end of the action research cycle whether they considered the (feedforward) control framework to have feasibility (could be used), usability (easy to use), and utility (has value when used).

Data Collection

Data collection at the intervention and during the action research cycle used the Pettigrew et al. (1989) framework to capture context, process, and content. "Context" captured data, such as the number of markets, size of the business, and brand maturity. "Process" captured what managers were actually doing, whether feedback or feedforward controls were being applied, and if so, how they were being used and when. "Content" captured managers' impressions of changing portfolio controls and the perceived changes in portfolio management and performance.

At the end of the action research cycle, I used the data obtained from each BU's finance department, extracted from the common SAP accounting software platform, to calculate the portfolio cash margin changes and the portfolio productivity metric changes. For data collected spring/summer or autumn/winter in Year 1, the comparative data were collected for the same season in Year 2, a year later. Therefore, these final portfolio measures were captured after two portfolio market launch cycles (seasons), post-intervention.

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