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From the Editor

Christophe N. Bredillet, PhD, DSc, MBA, Ingénieur EC Lille

Exploring Research in Project Management: Nine Schools of Project Management Research (Part 3)

This “Letter From the Editor” is the third part of a series in which I am presenting the results of research undertaken with my colleagues J. Rodney Turner and Frank T. Anbari. The purpose of the research was to review and map all research conducted in the field of project management and its main characteristics. I outline here these major schools of thought and review progress, trends, and potential research in two of them (Optimization School and Modeling School).

Project Management Schools of Thought

It is common to assume projects are fairly homogeneous. However, there is a growing belief that projects are different, their success can be judged in different ways, and they can require different competency profiles for their successful management (Crawford, Hobbs, & Turner, 2005, 2006; Shenhar & Dvir, 2004; Turner & Müller, 2006). It is also very common to assume project management itself is fairly homogeneous, and that there are fairly standard tools and techniques to be applied to all projects. However, there is a growing number of views of project management. Anbari (1985) identified five major schools of management thought and striving to develop the systems approach. Bredillet (2004) and Söderlund (2002) suggested that there are seven major schools of thought and discussed their characteristics. We can identify at least nine schools, and most research in project management can be said to fall into one of them (see Figure 1).

Morgan (1995) proposes eight metaphors of organizations and says they represent organizations in different circumstances. He suggests that if you want to understand your organization, then two to four of these metaphors may be relevant, and you should try to match your organization to them. If you want to change your organization, you should decide what new metaphor(s) you want to be relevant, and move your organization toward the new metaphor(s). His metaphors are the organization as a machine, organism, brain, culture, political system, psychic prison, agent of flux, and instrument of domination. Similarly, you could decide which school(s) of project management most closely matches the needs of your project and organization, and choose a project management approach most suited to these needs.

The Optimization School: The Project as a Machine

Modern project management has its roots in the field of operations research of the 1940s and 1950s (Morris, 1997). Optimization tools such as network scheduling techniques including the critical path methods (CPM) and program evaluation and review technique (PERT) reflect the genesis of modern project management in the management science/decision sciences field. Bar charts, developed in the early 1900s by Henry Gantt for production scheduling, and network scheduling techniques were adopted widely during the 1950s (Archibald & Villoria, 1967). Continuing progress in this area includes the development of resource allocation and leveling heuristics, project crashing, resource constrained scheduling, graphical evaluation and review technique (GERT), critical chain, theory of constraints, Monte Carlo simulation of project networks and cost estimates, and variations of these methods.

The main premises of this school are to define the objective(s) of the project; break the project into smaller components; ensure careful planning, scheduling, estimating, and execution of project tasks; and strive for cost and time efficiency throughout the project to achieve the optimal outcome. This school is very Taylorian in its approach.

An important contribution to this school is the textbook by Cleland and King (1983) (first published in 1968), in which the authors set out a theory of project management based on the view that the project is a system to be optimized. This textbook had a substantial influence on the development of project management, and has become the dominant view. The textbook by Kerzner (2006) (first published in 1979) can be considered the main textbook for this school. The school uses a systems approach to planning and controlling the project, to model and optimize its outcome. Conlon and Garland (1993) studied the relationship between resource allocation, sunk cost, and the degree of project completion. A Guide to the Project Management Body of Knowledge (PMBOK® Guide—Third Edition) (Project Management Institute, 2004) (originally published in 1996) is a global standard for project management and has done much to shape the subject worldwide. Several elements of the guide derive from this school, particularly the management of scope, time, and cost.

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1 ESC Lille, Lille School of Management, Lille, France
2 The George Washington University, Washington, D.C., USA

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A current, prominent area of research in the optimization school is the earned value management (EVM) method and its extensions (Anbari, 2003). Research can productively continue into the extensions of EVM such as forecasting project completion time, earned schedule method, integration of planning, and control of various project parameters, in particular scope, time, cost, quality, and risk within the context of the temporary nature of projects, as well as the relationship of project management to the operational life cycle of the completed project.

The Modeling School: The Project as a Mirror

Modern project management thought progressed from optimization of one or two objectives (such as time and cost) to modeling of the total project management system and the interactions among its components (Williams, 2002). The optimization school is based on a hard systems approach evolved into the modeling school, in which project management is broken into its main elements for study and understanding, and these elements are integrated to obtain a full view of the total system. This is akin to Descartes’ reductionism approach of dividing a complex problem into its parts, solving each part, and then climbing back to the solution of the entire problem.

Anbari (1985) discussed elements of the project management system and their interactions and postulated the quadruple objectives/constraints of project management: scope, time, cost, and quality. Yakura (2002) found that visual representation of time using Gantt charts would allow teams with different interests, assumptions, and interpretations to negotiate and manage time to transform uncertain outcomes to sought-after endings. Williams postulated that “it is generally held that the complexity of projects is also increasing” (2002, p. 4) and suggested the compounding causes of complexity in projects are the increasing complexity of products being developed and tightening of timescales. He provided a comprehensive approach to developing models to understand the behavior of complex projects.

The modeling school later encompassed soft-systems methodology and sense making with the aim of addressing organizational, behavioral, political, and other issues affecting projects and the complex environments within which they operate. Whereas the focus of hard systems is optimization, the focus of soft systems is clarification and making sense of our understanding of the project and its environment. Yeo (1993) linked project management to soft systems methodology, and Neal (1995) suggested using the soft systems approach for managing project change. Winter and Checkland (2003) examined the main differences between hard systems and soft systems thinking through a comparison of their different perspectives on the practice of project management. Crawford and Pollack (2004) identified dimensions of hardness and softness of projects based on differences in the philosophical basis of that dichotomy.

Alderman, Ivory, McLoughlin, and Vaughan (2005) drew upon sense-making literature to address the management of complex long-term service-led engineering projects and suggested such an approach may help untangle project management challenges in a new way. Atkinson, Crawford, and Ward (2006, p. 687) maintained that “common project management practice does not address many fundamental sources of uncertainty, particularly in ‘soft’ projects where flexibility and tolerance of vagueness are necessary,” and suggested that to manage sources of uncertainty, more sophisticated efforts are needed encompassing aspects of organizational culture and learning. Winter (2006) highlighted the importance of problem structuring during the front-end of projects and the potential role that soft systems methodology can play. Pollack (2007) indicated there is a growing acceptance of the soft paradigm and suggested that a paradigmatic expansion to include soft systems thinking...
From the Editor

could provide increased opportunities for researchers and practitioners.

It can be argued that hard systems include simulation, which provides a way of reflecting how a system evolves according to the influence and level of the initial conditions of its parameters. As such, hard systems are about sense making as well. Thus, the Modeling School is about acting and understanding, a mirror to reflect the project and shape our understanding of it. Research in this area can productively continue into integrating hard systems and soft systems methodologies for modeling the total project management system.

In the next “Letter From the Editor,” I will continue to outline these major schools of thought and review progress, trends, and potential research in each of them. Later, in future issues, I will discuss the impact of project management on related fields and their impact on project management.

Ordo ab chaos

Christophe N. Bredillet

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ABSTRACT

This paper reports the results of a project management practices study in the U.K. social housing sector. A five-factor model of project priorities is established, comprising traditional measures of project cost, time, and quality, in combination with a need to focus on stakeholders and to develop a customer and project team orientation. This model supports and integrates previously fragmented notions of project performance measurement. The relationship between these five project management criteria and the effectiveness and use of a performance management system (PMS) is then explored, with some limited evidence found that PMS effectiveness is an antecedent to practices that focus on the customer, the project team members, and other stakeholders.

KEYWORDS: project management practices and priorities; project performance; performance management systems

INTRODUCTION

In the performance measurement literature, frameworks have been developed that incorporate numerous dimensions of performance, including multiple-stakeholder agendas. This has led to models such as the balanced scorecard (Kaplan & Norton, 1992) and the performance prism (Neely, Adams, & Crowe, 2001). Project management research has similarly emphasized performance frameworks that apply to project environments (DeWit, 1988). The approach of these studies, however, is normally hypothetical—asking respondents in the abstract how they think the performance of projects should be measured, that is, what do you believe is important in project management? rather than exploring what influences your decisions on the project you are working on now? (Shenhar, Dvir, Levy, & Maltz, 2001).

Consequently, these performance frameworks are idealized in nature and do not necessarily reflect actual project management practice. Furthermore, these frameworks are often incomplete, because they do not include elements that address the psychosocial (Pinto & Pinto, 1991) needs of team members (Boehm & Ross, 1989) and the requirements of all stakeholders (Cleland, 1986; Karlsen, 2002; Tuman, 1993). While there is a palpable need to measure project performance and to derive a valid and meaningful set of measures, research in this domain has not kept pace with the wider performance measurement agenda. What is more, because current project management frameworks are incomplete and idealized, further research is needed to establish what is prioritized, and why. The remainder of this paper explores these issues.

In the next section the literature on project performance is reviewed, and two research questions are derived. The paper continues by outlining the context for this study and the research methods employed. Results are reported relating to the project management practices and priorities of one organization in the U.K. social housing sector, and the links between these practices and the organization’s performance management systems (PMSs). The paper concludes with a discussion of these findings and their implications for research and management practice.

Literature Review

Traditionally, project performance had been defined narrowly in terms of the “iron” or “golden” triangle (Atkinson, 1999; Gardiner & Stewart, 2000), which refers to meeting technical-related criteria, primarily cost, time, and quality. The deficiencies of such a narrow perspective of what constitutes performance have been highlighted in the PMS domain (Bourne, Mills, Wilcox, Neely, & Platts, 2000). In operational environments the limitations of
traditional PMS frameworks that are focused on a narrow range of mainly financial-based measures (such as return on investment) have been reported as a failure to focus on continuous improvement, resulting in sub-optimization of performance (Ghalayini & Noble, 1996).

In project environments a narrow focus on the iron/golden triangle may encourage project managers to emphasize short-term measures, particularly if reward and recognition systems are aligned to these measures. This can lead to optimization of project management performance in the short term and from a tactical perspective, but sub-optimization in the long term and from a strategic perspective. Recent studies have highlighted that this can be damaging to an organization because project managers focus exclusively on the task-oriented goals of individual projects at the expense of the psychosocial needs of project team members and the requirements of other projects being carried out concurrently (Bryde, 2005).

Despite the potential limitations of an over-reliance on the iron/golden triangle, it is still the most commonly used performance measurement model (White & Fortune, 2002). This seems in part to reflect the practical difficulties faced by organizations when trying to manage performance against a broader range of criteria than the cost/time/quality elements of the iron/golden triangle. Boehm and Ross (1989) gave examples of the difficulties and consequences of failure to manage and measure the psychosocial needs of various stakeholders in a project; similarly Maylor (2001), in a review of the current state of the project management discipline, described how processes for managing stakeholders’ needs remain poorly understood.

In addition, there is evidence that in some project environments a persistent problem is that, while project participants subscribe to the view that performance measurement needs to include elements beyond the iron/golden triangle, there is an unwillingness on the part of all parties to commit to the principle in practice, due in part to commercial pressures (Chan, Chan, & Ho, 2003; Ng, Rose, Mak, & Chen, 2002). This lack of application of a comprehensive framework of project management criteria, coupled with the focus on idealized rather than operationalized descriptions of project drivers, led to the first research question: What are the performance factors emphasized in live projects?

Another strand of operations management research has been to explore the links between operational practices and dimensions of performance. Beyond the project environment, for example, recent studies on total quality management (Hendricks & Singhal, 2001; Kaynak, 2003; Soltani, van der Meer, & Williams, 2005) just-in-time (Fullerton, McWatters, & Fawson, 2003), total productive maintenance (McKone, Schroeder, & Cua, 2001) and PMS (Haines, St-Onge, & Marcoux, 2003), total productive maintenance (McKone, Schroeder, & Cua, 2001) and PMS (Haines, St-Onge, & Marcoux, 2004; Pock, Westlund, & Fahrni, 2004) have provided such evidence of practice-performance links. However, the focus has been on organizational performance rather than project performance. In the specific context of project performance, robust empirical study of such practice-performance relationships is starting to emerge, but study is still in its infancy in terms of the range of factors investigated. Factors that have been investigated in a project context include total quality management (Shiell & Wu, 2002), human resource management (Belout & Gauvreau, 2004), organizational structures (Dai & Wells, 2004), and information management (Thompson, Smith, & Iacovou, 2007). One factor that has received little attention at the project performance level is PMSs. Thus, the second research question is: What is the relationship between project performance criteria and PMS? We make three observations about the existing project management literature:

1. It does not include work that considers all of the established perceived project management performance criteria.
2. It does not investigate the extent to which these criteria are operationalized.
3. It does not investigate the relationship between the project performance criteria and a PMS.

Consequently, this paper addresses these three issues outlined as follows.

Method

Research Context

The context for this study was the U.K. social housing sector. This sector was chosen because of the diversity of its activity and stakeholders. Its activity incorporates service provision to local government and tenants along with the tangible acquisition and build of new housing, and the maintenance of existing housing stock. We studied one organization in this sector with a diverse range of stakeholders including national and local government, the Housing Authority, public and tenants, suppliers and subcontractors, as well as a staff of 654.

There are external pressures on all organizations in this sector to improve their project management practices. In 1999, the Housing Corporation, which provides capital grants to the sector, stated that organizations would have to sign a Construction Clients Charter, requiring organizations to commit to a program of continuous improvement in relation to the provision of new housing stock. Failure to sign up to the charter would result in the withholding of funding for new-build projects. In addition, the Housing Corporation decided to reduce the number of organizations that would qualify for capital grants for new-build from approximately 350 to between 30 and 40 preferred suppliers, with one requirement of preferred suppliers being the production of a five-year action plan for improvement in the delivery of projects and evidence of
progress against the action plan. It is in this context that the focal organization has a policy of project management for development initiatives at all levels and every staff member had been trained in project management. The organization also has formal PMSs in place in many of its sub-parts.

Survey Instrument
To survey the project management practices in the focal organization, an existing instrument was adapted (Tukel & Rom, 2001), adding items to cover psychosocial team needs and consideration of multiple stakeholders. These variables comprised 26 items whose importance respondents were asked to evaluate in relation to a current project with which they had personal involvement. The use of this critical incident method was intended to yield more meaningful data than in past studies, where exploration was of a more generalized and hypothetical nature. More specifically, respondents were asked to indicate the emphasis placed on each of the 26 aspects of project management practice on a 7-point Likert scale (1 = strong emphasis to 7 = weak emphasis). These items were incorporated into a wider survey of performance management within the respondent’s part of the organization, in which six items were used to evaluate the perceived effectiveness of the PMS and three items to evaluate the extent to which the PMS was used on a regular basis (see Table 1). A 5-point Likert scale (1 = strongly disagree to 5 = strongly agree) was used to record opinions.

Of the 654 questionnaires distributed, 338 useable returns represent a response rate of 52%. Of these, 143 were currently involved in live projects and these are the primary basis of the analysis in relation to the first research question. Three hundred and fourteen respondents concurred that they had a PMS in their department of the organization, of which a maximum of 131 of the 143 were involved in live projects. These 131 were used for addressing the second research question. This data was also supplemented by interviewing staff involved in the management of projects in the organization.

Analysis Procedures
The first research question was concerned with the factors that were driving live projects in this organization. In other words, what were the performance issues that were given most and least emphasis in reality? Exploratory factor analysis was used to reduce the data from the 26 items to its constituent factors that represent the priorities of active project teams vis-à-vis such live projects. The data set exceeded the recommended sample-to-variable ratio of 5:1 to maximize the potential generalizability of the results (Hair, Anderson, Tatham, & Black, 1998).

The 26 independent variables were analyzed using principal components analysis as the extraction method and Varimax rotation with Kaiser normalization. The critical assumptions underlying factor analysis were tested and confirmed using the Bartlett test of sphericity, which was significant ($p < 0.01$), and the measure of sampling adequacy ($KMO = 0.837$). All factors with eigenvalues greater than 1.0 were extracted. A cut-off loading of 0.55 was used to screen out variables that were weak indicators of the constructs. All variables loaded satisfactorily onto the latent factors. The factor analysis was also examined to ensure acceptable levels of variable communality and multicollinearity. Each of the factors showed robust reliability, with Cronbach’s alpha values ranging from 0.71 to 0.93.

The second research question concerned the relationship between the project performance criteria and the effectiveness and use of a PMS. Correlation tests were run to determine the extent to which PMS effectiveness and use was an antecedent to project management practices. A composite score for each of PMS effectiveness and use was calculated by summing each respondent’s ratings of the six items (effectiveness) and three items (use), respectively (Table 1). The composite scores for the factors identified in the first part of the analysis were used as the project management performance variables.

Results
Project Management Priorities
Factor analysis identified five distinct and significant themes in the priorities of project team members (Table 2).

We labeled these themes (in order of dominance) as:
1. Managing for efficiency
2. Customer and project team orientation
3. Stakeholder orientation
4. Control
5. Flexibility.

<table>
<thead>
<tr>
<th>Item</th>
<th>PMS Effectiveness</th>
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<tbody>
<tr>
<td>Item 1</td>
<td>We set realistic goals for performance improvement.</td>
</tr>
<tr>
<td>Item 2</td>
<td>Generally, we are clear about how to measure our performance.</td>
</tr>
<tr>
<td>Item 3</td>
<td>Our PMS tells us if we are meeting our objectives.</td>
</tr>
<tr>
<td>Item 4</td>
<td>We have an effective PMS.</td>
</tr>
<tr>
<td>Item 5</td>
<td>We have performance measures that are linked to our overall strategy.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>PMS Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item 1</td>
<td>My organization regularly uses measures of customer satisfaction.</td>
</tr>
<tr>
<td>Item 2</td>
<td>We regularly use measures of internal process performance.</td>
</tr>
<tr>
<td>Item 3</td>
<td>My organization regularly uses measures of employee satisfaction.</td>
</tr>
</tbody>
</table>

Table 1: Perceived effectiveness and use of PMS—Items.
Project Management Priorities

The total variance explained by the five factors was over 70%, confirming the significance of these project drivers. Factor 1, “managing for efficiency,” is considered to be the most important performance issue when making decisions during the implementation of a project, accounting for 44% of the variance in these items. As regards the second factor, although prior research has highlighted the importance of considering the external customer, this analysis shows that in the perception of project teams, customer orientation is closely linked with the need to emphasize the psychosocial needs of the team itself. In other words, developing a customer orientation in project management requires the provision of development opportunities for project team members and an associated orientation toward organizational learning. The presence of factor 3 confirmed the validity of including stakeholder needs as a consideration in a project management framework. The remaining two factors endorse the traditional notion of the iron or golden triangle, being centered on issues associated with project duration, cost, and meeting technical specifications.

PMS and Project Management Practices
These five factors were then used to explore the relationship between
practices and a PMS. In terms of the effectiveness of the PMS, a weak, yet statistically significant, relationship at the 1% level was found with two factors: stakeholder orientation and customer and project team orientation. Weaker (statistically significant at 5%) relationships were found with flexibility and managing for efficiency factors and no statistically significant relationship was found with the factor of control (see Table 3). For PMS use, a weak relationship (significant at the 5% level) was found for the factors of customer and project team orientation and control. No relationship was found for the factors of stakeholder orientation, managing for efficiency, and flexibility.

These results generally endorse the findings of prior studies in the wider PMS domain that the key antecedents to performance are those associated with the character of the PMS, rather than just its use per se. The exception to this relates to the link between the use of a PMS and the factor of control.

Conclusions
This research contributes to the body of knowledge on project management in three ways. First, it reveals what is actually important to project teams in the midst of live projects. The critical incident method was used to focus respondents’ answers on current projects relating to their personal experiences. The authors believe that this is an enhancement over previous research, which has sought only project managers’ opinions on what should be important. A hierarchy of priorities for project teams is demonstrated, with efficiency being predominant.

Second, it provides a more complete profile of project performance factors, which have only been considered in isolation in previous work. The framework comprises factors associated with the traditional iron or golden triangle parameters of projects, namely time, cost, and quality. More significantly, it also encompasses the need for a stakeholder orientation in managing projects, and specifically it asserts the importance of developing a customer orientation in the project management process, by inculcating customer focus in the project team members and by providing them with development and learning opportunities.

Third, it provides some, albeit from research of an exploratory nature, evidence that highlights the role of a PMS in increasing the emphasis of project team members on project performance criteria associated with meeting the requirements of the customer, team members, and other stakeholders. The importance of customer-focused operational practices has been highlighted in the literature, with such practices being seen as a precursor to optimal performance (Egan, 1998; Tuman, 1993). Likewise, the importance of prioritizing the psychosocial needs of team members (Boehm & Ross, 1989; Bryde, 2005) and meeting the requirements of other stakeholders (Cleland, 1986; Karlsen, 2002; Tuman, 1993) has been highlighted.

In terms of current practice in the organization, the emphasis given to managing for efficiency suggests that for project teams the focus is very much on individual projects per se and not necessarily on dimensions of performance outside the project, such as developing the long-term relationships with customers and other stakeholders. Although managing for efficiency is a valid and understandable short-term priority, it does not necessarily ensure the future well-being of the organization. Therefore, the central implication for managers is that they should be wary of allowing traditional project management criteria to dominate the process, even though these may be the most tangible and the easiest to measure.

This was underscored by the comments of the interviewees. In other words, there was a strong feeling that a project management strategy in the organization had led to a culture of fragmentation of the corporate effort, which had mitigated a collective emphasis on a drive to overall organizational accomplishment. Senior managers in the organization expressed concern that projects had become ends in themselves and that team members, concerned mainly with project efficiency, routinely lost sight of the overarching contribution of their projects to the organization as a whole.


<table>
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<th>Relationships</th>
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<th>Sig.</th>
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<tr>
<td>PMS Effectiveness and</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>– Factor 3 Stakeholder orientation</td>
<td>120</td>
<td>.372**</td>
<td>&gt;.001</td>
</tr>
<tr>
<td>– Factor 2 Customer and project team orientation</td>
<td>112</td>
<td>.324**</td>
<td>&gt;.001</td>
</tr>
<tr>
<td>– Factor 5 Flexibility</td>
<td>124</td>
<td>.219*</td>
<td>.014</td>
</tr>
<tr>
<td>– Factor 1 Managing for efficiency</td>
<td>114</td>
<td>.228*</td>
<td>.015</td>
</tr>
<tr>
<td>– Factor 4 Control</td>
<td>116</td>
<td>.197**</td>
<td>.034</td>
</tr>
<tr>
<td>PMS Use and</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Factor 2 Customer and project team orientation</td>
<td>114</td>
<td>.217*</td>
<td>.020</td>
</tr>
<tr>
<td>– Factor 4 Control</td>
<td>123</td>
<td>.200*</td>
<td>.026</td>
</tr>
<tr>
<td>– Factor 3 Stakeholder orientation</td>
<td>127</td>
<td>.142</td>
<td>.111</td>
</tr>
<tr>
<td>– Factor 1 Managing for efficiency</td>
<td>118</td>
<td>.143</td>
<td>.121</td>
</tr>
<tr>
<td>– Factor 5 Flexibility</td>
<td>128</td>
<td>.131</td>
<td>.141</td>
</tr>
</tbody>
</table>

** significant at the 1% level.
* significant at the 5% level.

Table 3: PMS use/effectiveness and project management factors—Correlations.
Project Management Priorities

Follow-up interviews with staff revealed that, in terms of developing the organization’s project management strategy, while there was a recognition that the organization needed to move toward a more customer- and team-focused approach and away from an overemphasis of efficiency (which focused primarily on the iron triangle), an obstacle to this transition was the degree of change required to operational project management practices. These changes included the following:

- Getting all project participants, such as contractors, to accept that the organization was serious about change
- Introducing a longer-time horizon for viewing the relationship with project participants from outside the organization, moving from one-year contracts to five-year partnerships
- Having more transparent and agreed-upon profit margins for project participants, such as 5% for contractors
- Aligning projects more closely with organization strategy, for example, by developing a link to their 30-year asset management plans
- Bringing project participants on board with experience of and commitment to new practices, such as architects
- Better training of project participants in new ways of working.

The survey results also highlight to the organization’s management that in terms of developing this desired customer and team focus, putting effort into embedding PMSs that set realistic goals for improvement, provide clear measures, respond to user’s needs, and provide information on achievement against objectives, is effective, is linked to overall strategy, and may well facilitate such a focus. Furthermore, in terms of establishing a truly balanced PMS that incorporates an internal focus as well as an external customer and stakeholder focus, then it is necessary to ensure that any PMS established is regularly used.

References


David J. Bryde is a reader in operations management and the head of the Doctoral Programme at Liverpool Business School, Faculty of Business and Law, Liverpool John Moores University. His research interests include performance management in project environments and the use of project management approaches across different business sectors, especially construction, social housing and regeneration and clinical research. Prior to joining the Liverpool Business School, he worked as a project manager for ICI and as a technical consultant for Metier Management Systems, suppliers of Artemis project management software.

Gillian H. Wright is chair of strategic marketing and director of research at the Research Institute for Business and Management at Manchester Metropolitan University, UK. Her research is concerned with service quality, market orientation, and effective strategic marketing. Her professional background is as a market analyst in electronics and market research in pharmaceuticals.
INTRODUCTION

Despite the increasing use of project management within organizations, one study showed that new U.S. consumer product projects failed 95% of the time (Clancy & Stone, 2005), and industrial product launches fail about 40% of the time (Stevens & Burley, 2003). With such a poor rate of project success and the increasing rate of organizational change and environmental uncertainty, a closer look at the determinants of project performance is necessary.

Several studies have addressed the determinants of general project performance (see, for instance, Belassi & Tukel, 1996; Crawford & Cooke-Davies, 1999; Sherman, Berkowitz, & Souder, 2005). However, the performance of a specific type of project has not gained the same level of attention and investigation. This paper focuses on a particular type of project that is crucial to the long-term survival of the organization. It focuses on new product development (NPD) projects that can be critical for a firm’s competitive advantage and even survival (Gresham, Hafer, & Markowski, 2006; Lim, Sharkey, & Heinrichs, 2006). In particular, this paper investigates the effects of organizational culture—a strategic level variable that has been greatly overlooked in the literature on NPD projects—on NPD project performance.

New product development projects have all the characteristics of other types of projects. They are temporary endeavors undertaken to create a unique product or service. Every project has a definite beginning and a definite end (temporary means), and the products or services developed are different in some distinguishing way from all other products or services (unique means) (Project Management Institute, 2000). In the last two decades, issues surrounding the management of these types of projects (NPD projects) have gained increasing attention. Greater domestic and global competition, continuous development of new technologies, constantly changing customer needs, shorter product life cycles, and rising costs place organizations under constant pressure to meet time, budget, and performance requirements as they develop new products (Drennan, 1990).

Compounding the problem is the fact that the failure rate for new products is alarmingly high (Clancy & Stone, 2005).

In investigating the determinants of NPD project performance, current NPD literature primarily focuses on project-level variables and their effects on performance and overlooks variables that are more strategic in nature. This paper contributes to the literature by closing this gap and investigating the effects of organizational culture—a strategic-level variable—on NPD performance. Organizational culture affects how organizations do things. It influences a firm’s strategy as well as its processes and, consequently, the outcome of NPD projects. In measuring organizational culture, this study relies on the work of Hofstede (1997, 2001), Gupta (1984), Souder (1987), and Kluckhohn and Strodtbeck (1961). Factor analysis is used to group cultural
Although Hart took a broad view of project-level variables (Hart, 1995). Organizational strategy, organizational structure, and top management involvement and orientation. They include department interactions, firm proficiencies, management support, and marketplace orientation, and refer to product development initiatives. They also include the development, marketing, and launch of new offerings. Finally, marketplace characteristics encompass elements that describe the target market; they include market potential, competitive activity, and the intensity of competitive activity in response to new product introductions (see Henard & Szymanski, 2001, for more detail). Process characteristics complement the project-level variables described in Hart's (1995) study.

Henard and Szymanski's (2001) study also makes clear that capturing the effect of process characteristics—that is, the set of elements that have the least impact on product performance—receives the greatest attention in the literature. In their classification, we believe that product characteristics are an outcome of the development process rather than an antecedent. Factors such as product advantage, technological sophistication, ability to meet customer needs, and innovativeness that Henrad and Szymanski list as determinants of the performance of NPD projects are in fact an end result of the development process and should not be considered as factors affecting NPD performance.

There have been a few studies that have highlighted the role of strategic-level variables in general and culture in particular on NPD performance, but these have focused on the differences in national culture as defined by Hofstede (1980, 1997), with results indicating that national cultural differences have no influence on NPD results (Lynn, 2002; Souder & Jensen, 1999). For example, one study by Souder and Jensen (1999) uses the national cultural dimensions suggested by Hofstede (1997) to compare NPD in the U.S. with NPD in Scandinavian countries. Because a strong immediate relationship between national culture and the performance of NPD projects is lacking, these authors consider national culture as a *ceteris paribus* exogenous matter and concentrate on the effects of other project and organizational variables. In light of this, the authors believe researchers need to turn their attention toward organizational culture rather than national culture, as it should have a more immediate impact on NPD. Organizational culture is expected to be more relevant to project performance and have more direct effects on NPD project performance than national culture. National culture only matters insofar as it may influence organizational culture.

### Literature Review

A number of researchers have investigated the factors that affect NPD performance, and those factors have been grouped in a variety of ways. In her analysis of NPD performance, Hart (1995) classified the determinants of NPD performance as either strategic or operational, and grouped them into strategic-level and project-level variables. Strategic-level variables represent factors related to the innovating organization's general approach to NPD, and include organizational culture, organizational strategy, organizational structure, and top management involvement and orientation. Project-level variables, representing factors related to the specific NPD project under consideration, include NPD processes and how they are performed, NPD structure, cooperation between the R&D and marketing departments, and the involvement of suppliers in the development of new products. The factors typically examined in the literature are project-level variables (Hart, 1995). Although Hart took a broad view of factors affecting NPD, the effect of organizational culture on NPD performance largely remains overlooked, possibly due to the difficulty of quantifying and measuring organizational culture.

Henard and Szymanski (2001) classified the determinants of NPD performance in another way. They performed a meta-analysis on 60 studies that reported one or more antecedents of NPD performance. By reviewing the predictor variables, they identified 24 antecedents affecting new product performance and classified them into four main groups: product characteristics, firm strategy characteristics, firm process characteristics, and marketplace characteristics.

Product characteristics are elements related to the product or service being introduced, such as price, innovative-ness, and managers' perceptions of how well the offering meets customer needs.

Firm strategy characteristics represent planned actions that may give a firm a competitive advantage in the marketplace separate from any factors related to the NPD process. These strategic elements include dedicating resources to the NPD initiative, timing market entry, and capitalizing on marketing and technological synergies.

Firm process characteristics refer specifically to elements associated with the NPD process and its execution. They include department interactions, firm proficiencies, management support, and marketplace orientation, and refer to product development initiatives. They also include the development, marketing, and launch of new offerings.

Finally, marketplace characteristics encompass elements that describe the target market; they include market potential, competitive activity, and the intensity of competitive activity in response to new product introductions (see Henard & Szymanski, 2001, for more detail). Process characteristics complement the project-level variables described in Hart's (1995) study.
New Product Development Projects

In the authors’ opinion, enough attention has been given to project-level variables and a shift toward strategic-level variables is necessary. Despite the fact that authors such as Lynn (2002) and Souder and Jensen (1999) have studied the effect of culture (a strategic-level variable) on NPD performance, they focused on less relevant national culture and should have directed their attention toward organizational culture instead. In this study, the authors focus attention on organizational culture (rather than national culture) and investigate its direct effects on NPD performance.

Organizational Culture and Its Dimensions

Interest in organizational culture has resurfaced recently, and several definitions of organizational culture have been introduced in the literature (Hofstede, 1997, 2001). Schein (1990) defined organizational culture as a pattern of basic assumptions that are invented, discovered, or developed by a given group as it learns to cope with problems of external adaptation and internal integration and that have worked well enough to be considered valid and, therefore, taught to new members as the correct way to perceive, think, and feel in reference to those problems. Hofstede (1997) defined it as the set of shared assumptions that is often unstated. Drennan (1990) defined organizational culture as how things are done in an organization. Ouchi (1981) and Pascale and Athos (1982) viewed culture as the philosophy that guides an organization’s policies toward employees and/or customers. In general, it is clear that culture both prescribes and proscribes individual behavior in organizations.

Despite the resurgence and interest in organizational culture, it remains overlooked in the study of NPD partly because the concept of organizational culture largely resists a common definition or shared theoretical paradigm (Alvesson, 2002; Martin, 1992, 2002; Martin & Frost, 1999). Researchers use a range of theoretical approaches and assumptions and often interpret similar cultural phenomena in different ways. Within the organizational culture literature, there appears to be fundamental disagreement over theoretical perspectives (Alvesson, 2002; Martin, 2002), a situation that further complicates the study, and, in particular, the measure of organizational culture.

The lack of paradigm consensus aside, the study of organizational culture can contribute a great deal to the understanding of how organizations operate. Researchers have described how shared values help individuals rationalize the irrational or deal with uncertainty (Louis, 1990; Selznick, 1996). Peters and Waterman’s (1982) In Search of Excellence: Lessons from America’s Best-Run Companies provides descriptions of strong, unified cultures produced and reproduced through specific processes such as surface-level physical artifacts, symbols, ceremonies, stories, slogans, behaviors, and dress. The shared meanings, behaviors, and assumptions are intended to produce successful organizational outcomes in terms of productivity and profitability. The key message was that an appropriate organizational culture provided positive performance, with the implication being that organizations need to actively manage organizational culture in order to maximize performance. Since Peters and Waterman’s work, a number of researchers have identified elements of culture that are believed to be critical to the success of an organization. For example, Pfeffer and Viega (1999) discussed cultures that revolve around a variety of high-involvement human resource practices that they felt provided a competitive advantage to a firm. Practices such as sharing information, careful hiring, and employing self-managed work teams were identified as behaviors that reflected successful organizational cultures. Other authors, with varying degrees of success, have attempted to link elements of organizational culture with such things as attempts to implement total quality management (Detert, Schroeder, & Mauriel, 2000) and how to leverage organizational culture for innovation and change (Loew & Dominiquini, 2006; Schraeder, Tears, & Jordan, 2005).

Clearly, innovation and NPD are critical to the success of an organization (Gresham et al., 2006; Lim et al., 2006), but if an organization’s culture does not support innovation it is unlikely to occur, much to the detriment of the organization. For example, some organizations encourage and reward risk-taking behavior even if it is not successful. Other organizations, by rewarding only success and punishing those who take risks and fail, discourage risk-taking and innovative behavior. Corporate leaders are becoming more aware of these issues and are increasingly interested in actively managing corporate culture, although there is some debate about how possible it is to actively manage culture given the taken for granted nature of at least some of its elements. Nonetheless, organizational culture is a strategic-level variable that has an influence on overall organizational performance. Can these strategic-level behaviors be a key to successful NPD processes or, in other words, does the organizational culture support NPD projects or are there systemic (culture) reasons that hinder their success? In cases where NPD consistently fails, analysis of the elements of organizational culture may be a key method for assessing the causes of such failures, rather than focusing on other more direct influences on NPD such as project structure. As discussed next, it may be that project structure may have little or no effect on NPD, forcing researchers and practitioners to look elsewhere for explanations of NPD success or failure. Of note, it has been argued that more traditionally envisioned sources of organizational success (e.g., process technology) are less important than ensuring that an
appropriate culture exists within an organization (Pfeffer, 1994), making this sort of research of great interest.

Although researchers have offered various definitions of organizational culture, few suggest ways of measuring it. Measuring organizational culture is not easy, especially when it is approached as a variable consisting of shared values and beliefs that are taken for granted and not obvious even to an organization’s members. Among the researchers who have suggested dimensions for organizational culture are Hofstede (1997, 2001), Gupta (1984), Souder (1987), and Kluckhohn and Strodtbeck (1961). For this study, the authors developed a questionnaire based on these authors’ suggested dimensions.

**Research Design and Scale Development**

The population of this study includes all organizations that develop new products. A sample of organizations was selected and studied using direct mail collection procedures. The authors mailed a questionnaire to upper-level managers responsible for, or involved with, developing new products in 500 organizations located in the U.S. All 375 organizations listed in the Mergent Online database were surveyed. The authors chose to use the Mergent Online database because it provides Internet-based access to company databases and such access simplifies the process of searching for and selecting the sample frame. The study also included 125 organizations randomly selected from *Fortune* magazine’s Fortune 500 list.

R&D managers selected in the sample frame were asked to report on the culture of their organizations and on their common practices in developing and implementing NPDs. The original questionnaire was based on the literature review and was tested using an iterative process that included expert validation and pretesting using a small number of business executives not included in the sample frame. The questionnaire was modified after receiving feedback from both test groups. The revised questionnaire and a cover letter were then sent to the sampled organizations. Several steps were taken to ensure an adequate response rate. These included personalizing mailing labels and cover letters, explaining in the cover letter the importance of the research to both academia and practitioners, providing prepaid business reply envelopes, and offering respondents a summary of the results. Multiple mailings were also used to ensure sufficient responses.

Of the 500 questionnaires mailed, 101 were returned. Six of the questionnaires were missing critical information on the dimensions of organizational culture and the performance of NPD projects and were excluded from analysis. The number of usable questionnaires totaled 95, yielding a response rate of 19%. This compares favorably with survey response rates reported in the literature (e.g., Ettlie & Pavlou [2006], with a 9.2% response rate; Judson, Schoenbachler, Gordon, Ridnour, & Weilbaker [2006], with a 9.3% response rate; and Quesada, Syamil, & Doll [2006], with a 10.4% response rate).

The authors asked participants 24 questions based on the literature search and the pretesting (see Table 1 for the questions used and the means and standard deviations of the responses). A seven-point Likert-type scale was used, with 1 equaled strongly disagree and 7 equaled strongly agree. Mean scores ranged from 2.67 (employees perceiving the organization as merely interested in the work they do) to 5.53 (the organization’s major emphasis is on meeting customers’ needs). It may be noted here that Likert-type scales are frequently used in cultural studies (Fan & Wang, 2006; Hofstede, 1997; Shivers-Blackwell, 2006).

**Dimensions of Organizational Culture**

The responses to the survey questions about organizational culture were used to check for the possibility of applying factor analysis to group the questions into cultural dimensions. This is necessary given that measuring corporate culture is still in its infancy and there is no consensus on stable and definitive measures. The Kaiser-Meyer-Olkin (KMO) and Bartlett’s tests, in particular, were used to check the possibility of grouping these measures. As indicated in Table 2, the KMO measure of sampling indicates the potential usefulness of factor analysis in grouping the measures. The table shows that the proportion of common variance in the variables (i.e., that portion that might be explained by underlying factors) is 0.669. The proportion is greater than 0.5, indicating the suitability of factor analysis in performing a grouping of culture questions. The significant value of Bartlett’s test (less than or equal to 0.05) points to a significant relationship among the variables (a value higher than 0.1 might indicate that the data are not suitable for factor analysis).

To develop measures of organizational culture, exploratory factor analysis (EFA) with Varimax rotation was used to extract factors and obtain a clean factor structure. A Scree-plot diagram was used to determine the correct number of factors. The cutoff point for interpreting the factor loading was set at the generally accepted value of 0.5. The exploratory nature of the study favors the use of EFA and reliability analysis to confirm the new constructs of organizational culture (Brislin, 1980; Buss & Royce, 1982; Hui & Triandis, 1983; Souder & Jensen, 1999). During the EFA, several variables—Par; Collect 1 and 2; Tight 1, 2, and 3; Risk 4; and Long 2—were excluded due to their low loading on factors. The EFA of the remaining variables results in a solution of three factors that explain 93.3% of the variance. Table 3 reports the loading of the factors.

As Table 3 shows, the measures of organizational culture presented in Table 1 can be divided into three groups. Group 1, labeled “positive work...
<table>
<thead>
<tr>
<th>Organizational Culture Questions</th>
<th>Variable Names</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Hofstede, 1997)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Employees willing to exert maximal effort to get the job done.</td>
<td>R1</td>
<td>5.47</td>
<td>1.03</td>
</tr>
<tr>
<td>• Employees feeling that every day brings new challenges.</td>
<td>R2</td>
<td>4.98</td>
<td>1.22</td>
</tr>
<tr>
<td>• Employees feeling comfortable in unfamiliar situations.</td>
<td>R3</td>
<td>4.52</td>
<td>1.28</td>
</tr>
<tr>
<td>• Correct procedures are more important than correct results.</td>
<td>Job1</td>
<td>3.39</td>
<td>1.62</td>
</tr>
<tr>
<td>• Employees experiencing strong pressure to complete the job.</td>
<td>Job2</td>
<td>3.46</td>
<td>1.54</td>
</tr>
<tr>
<td>• Employees perceiving the organization as merely interested in the work they do.</td>
<td>Job3</td>
<td>2.67</td>
<td>1.15</td>
</tr>
<tr>
<td>• Important decisions are made by individuals.</td>
<td>Job4</td>
<td>4.51</td>
<td>1.62</td>
</tr>
<tr>
<td>• Organization’s norms cover employees’ behavior at home.</td>
<td>Par</td>
<td>4.82</td>
<td>1.12</td>
</tr>
<tr>
<td>• Employees often openly discuss job matters as well as personal items with their bosses.</td>
<td>Open1</td>
<td>4.82</td>
<td>1.27</td>
</tr>
<tr>
<td>• New employees will need only a few days to feel at home.</td>
<td>Open2</td>
<td>4.35</td>
<td>1.46</td>
</tr>
<tr>
<td>• Almost anyone would fit into the organization.</td>
<td>Open3</td>
<td>2.96</td>
<td>1.45</td>
</tr>
<tr>
<td>• No one thinks of cost.</td>
<td>Tight1</td>
<td>3.99</td>
<td>1.33</td>
</tr>
<tr>
<td>• Meeting times are only kept approximately.</td>
<td>Tight2</td>
<td>5.05</td>
<td>1.27</td>
</tr>
<tr>
<td>• Jokes about the company are frequent.</td>
<td>Tight3</td>
<td>3.03</td>
<td>1.40</td>
</tr>
<tr>
<td>• The organization’s major emphasis is on meeting customers’ needs.</td>
<td>Norm</td>
<td>5.53</td>
<td>1.17</td>
</tr>
<tr>
<td>• Employees are afraid to express disagreements with their bosses.</td>
<td>Power</td>
<td>4.81</td>
<td>1.59</td>
</tr>
<tr>
<td>Collectivism versus individualism (Hofstede, 2001)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Whether or not employee would prefer to work with people who cooperate with one another rather</td>
<td>Collect1</td>
<td>5.07</td>
<td>1.02</td>
</tr>
<tr>
<td>than working alone and having considerable freedom.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Whether or not the organization encourages individual achievements and promotes individual</td>
<td>Collect2</td>
<td>3.58</td>
<td>1.38</td>
</tr>
<tr>
<td>competition.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk-taking (Gupta, 1984)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Management provides enough incentives for employees to work on new ideas.</td>
<td>Risk1</td>
<td>4.84</td>
<td>1.33</td>
</tr>
<tr>
<td>• Management has a strong desire for high-risk, high-return projects.</td>
<td>Risk2</td>
<td>4.39</td>
<td>1.59</td>
</tr>
<tr>
<td>• Management encourages employees to keep trying even if they fail in the process of creating</td>
<td>Risk3</td>
<td>4.94</td>
<td>1.41</td>
</tr>
<tr>
<td>something.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Employees feel that company rules should not be broken even if breaking them is in the best</td>
<td>Risk4</td>
<td>4.45</td>
<td>1.83</td>
</tr>
<tr>
<td>interest of the company.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long-term orientation (Kluckhohn &amp; Strodtbeck, 1961; Souder, 1987)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• All decisions made by top management are aimed at achieving company’s long-term objectives.</td>
<td>Long1</td>
<td>4.74</td>
<td>1.53</td>
</tr>
<tr>
<td>• Top management spends considerable time (at least 40% of its time) in determining what should</td>
<td>Long2</td>
<td>4.82</td>
<td>1.44</td>
</tr>
<tr>
<td>be done (or achieved) rather than how to get the job done.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[a\] Hofstede introduced the concept of collectivism versus individualism. However, the way the dimension is measured in this study is modified to suit the concept of NPD projects.

Table 1: Measures of organizational culture.
environment,” includes six items that point to a people-oriented culture. Group 2, labeled “management leadership,” includes six items related to an organizational culture with a leadership style characterized by strong management involvement. The four items in Group 3 describe a results-oriented culture. We call this factor, appropriately, “results-oriented.”

Cronbach’s alpha was used to confirm the results of the EFA and verify the internal consistency of the three newly developed dimensions. Cronbach’s alpha assesses the homogeneity of the scale items. Typically, a Cronbach’s alpha of 0.7 is considered adequate; however, for scales with a small number of items, a much smaller alpha is considered permissible (Hull & Nie, 1981; Nunnally, 1978). Table 3 shows that the internal consistency of the three groups is acceptable. Cronbach’s alpha values for Groups 1

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Organizational Culture Dimensions</th>
<th>Loading</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group 1: Positive Work Environment—Cronbach’s Alpha 0.706</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R1</td>
<td>Employees willing to exert maximal effort to get the job done.</td>
<td>.647</td>
</tr>
<tr>
<td>R3</td>
<td>Employees feeling comfortable in unfamiliar situations.</td>
<td>.568</td>
</tr>
<tr>
<td>Job3</td>
<td>Employees perceiving the organization as merely interested in the work they do.</td>
<td>.682</td>
</tr>
<tr>
<td>Open1</td>
<td>Employees often openly discuss job matters as well as personal items with their bosses.</td>
<td>.579</td>
</tr>
<tr>
<td>Norm</td>
<td>Organization’s main emphasis is on meeting customers’ needs.</td>
<td>.609</td>
</tr>
<tr>
<td>Power</td>
<td>Employees are unafraid to express disagreements with their bosses.</td>
<td>.677</td>
</tr>
</tbody>
</table>

| **Group 2: Management Leadership—Cronbach’s Alpha 0.758** |
| R2       | Management setting clear goals and delegating ways of achieving them to employees. | .595 |
| Job4     | Employees feel that important decisions are made by individuals rather than committees. | .504 |
| Risk1    | Management providing enough incentives for employees to work on new ideas. | .508 |
| Risk2    | Management has a strong desire for high-risk, high-return projects. | .648 |
| Risk3    | Management encourages employees to keep trying even if they fail in the process of creating something. | .688 |
| Long1    | All top management’s decisions are aimed towards long-term objectives. | .704 |

| **Group 3: Results-Oriented—Cronbach’s Alpha 0.533** |
| Job1     | Correct procedures being more important than correct results. | .520 |
| Job2     | Employees experiencing strong pressure to complete the job. | .687 |
| Open2    | New employees will need only a few days to feel at home. | .550 |
| Open3    | Almost anyone would fit into the organization. | .739 |

Table 2: KMO and Bartlett’s test.

Table 3: Result of exploratory factor analysis.
New Product Development Projects

and 2 are greater than 0.7; though Group 3 shows a lower Cronbach's alpha, the relatively low number of items in this group makes the Cronbach's alpha value an acceptable indication of its internal consistency. It should be noted that these factors loaded differently than in previous studies. This may be due to the relative newness of culture measures.

Relating Culture to NPD Success
Evaluating the success of NPD projects has always been challenging (Griffin & Page, 1996; Montoya-Weiss & Calantone, 1994). Firms and academics have used more than 75 distinct performance measures, with little consensus on which were most useful for reflecting NPD performance. Product development projects are undertaken for different reasons, and the appropriateness of a particular performance measure will depend on a project’s strategy and objectives (Griffin & Page, 1996; Kuczmarski, 1992). Moreover, in many cases, success on one dimension means sacrificing some level of success on another dimension (Griffin & Page, 1993). Accordingly, a multidimensional measure is usually needed to properly measure NPD performance.

Despite the difficulties associated with choosing among the different performance measures, previous research has indicated that project success consists of three independent dimensions: consumer-based, financial, and technical success (Griffin & Page, 1993). In this study, customer satisfaction was used as a proxy for consumer-based success, commercial outcome as a proxy for financial success, and technical outcome as a proxy for technical success. It was necessary to choose between aggregating these three variables and using them separately. Because, as stated, organizations might sacrifice performance on one dimension to achieve success on another, the authors believe that using the dimensions separately and independently will help us achieve a clearer understanding of project performance. Aggregating different performance measures into one might obscure the effects of certain elements of NPD project performance. All three measures used are subjective and based on other field studies in which they were developed, tested, and validated (Song, Souder, & Dyer, 1997; Souder, 1987; Souder, Buisson, & Garrett, 1997; Souder & Song, 1997).

The authors asked top management to rate the commercial and technical success of their products on a scale of 0 to 100%, and to what extent customers accepted the developed products. Table 4 reports descriptive statistics for each NPD project performance measure and for the three culture measures, and provides the Pearson correlation coefficients. Two of the independent variables, positive work environment and management leadership, are both positively and significantly correlated with each other and with the dependent variables, lending preliminary support to the hypothesized link between culture and NPD performance. The results-oriented measure of

<table>
<thead>
<tr>
<th>Positive Work Environment</th>
<th>Management Leadership</th>
<th>Results-Oriented</th>
<th>Commercial Success</th>
<th>Technical Success</th>
<th>Customer Satisfaction</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Work Environment</td>
<td>1.00</td>
<td>0.38</td>
<td>0.02</td>
<td>0.41</td>
<td>0.33</td>
<td>0.26</td>
<td>24.83</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>0.00</td>
<td>0.83</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.01</td>
<td></td>
</tr>
<tr>
<td>Management Leadership</td>
<td>1.00</td>
<td>0.03</td>
<td>0.33</td>
<td>0.29</td>
<td>0.22</td>
<td>28.73</td>
<td>5.62</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>0.80</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Results-Oriented</td>
<td>1.00</td>
<td>0.15</td>
<td>0.03</td>
<td>0.03</td>
<td>13.44</td>
<td>3.71</td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>0.14</td>
<td>0.78</td>
<td>0.76</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial Success</td>
<td>1.00</td>
<td>0.51</td>
<td>0.57</td>
<td>60.17</td>
<td>21.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technical Success</td>
<td>1.00</td>
<td>0.59</td>
<td>78.72</td>
<td>1204</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>0.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customer Satisfaction</td>
<td>1.00</td>
<td>72.84</td>
<td>17.31</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(N = 95)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4: Pearson correlation coefficients.
culture, it can be noted, although displaying the appropriate signs, exhibits no significant relationship with the other variables.

Table 5 presents a profile of the sampled organizations in terms of the three cultural dimensions and performance measures. For each cultural dimension and success measure, organizations were classified into three categories: low, medium, and high. To complete the categorization, the interval scale was transformed into a categorical scale by dividing the total score of every dimension and success measure by three (three categories: low, medium, high).

The percentage of organizations falling into each category is recorded in Table 5. As the table shows, 2.1% of the sample have a low degree of positive work environment, 34.7% have a medium degree, and 63.2% have a high degree. The 95 sampled organizations have either a medium or high degree of positive management leadership, and most of the organizations have a high degree of results orientation. Almost half the sample have a medium degree of commercial success. In terms of the other variables, 86.3% of the sample have a high degree of technical success, and 75.8% have a high degree of customer satisfaction. The sampled organizations report having had better outcomes in technical performance and customer satisfaction than in commercial success.

The multivariate regression analysis was used to test the effect of organizational culture on the performance measures of NPD projects. The Beta coefficients and significance levels are presented in Table 6. As this table shows, the more positive the work environment, the more commercially successful a company’s new products are. Organizations with strong top management leadership tend to be more commercially successful than their counterparts at developing new products. In other words, the results indicate that for organizations to be commercially successful in NPD projects, they must foster a culture that encourages employees to exert maximal effort, and that makes them comfortable in dealing with unfamiliar situations and in expressing their opinions, even when in disagreement with supervisors or managers. For organizations to be commercially successful, top management must set clear goals, encourage employees to participate in decision making, delegate to employees ways of achieving those goals, and encourage employees to work on new ideas. This is consistent with the notion that organizations that encourage participative employee practices tend to be more successful and is consistent

<table>
<thead>
<tr>
<th>Dependent Variables</th>
<th>Commercial Success</th>
<th>Technical Success</th>
<th>Customer Satisfaction</th>
<th>Commercial Success</th>
<th>Technical Success</th>
<th>Customer Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Work Environment (PWE)</td>
<td>1.580 ***</td>
<td>0.946 **</td>
<td>0.754 *</td>
<td>5.702 **</td>
<td>1.743 **</td>
<td>1.827 *</td>
</tr>
<tr>
<td>Management Leadership (ML)</td>
<td>0.788 **</td>
<td>0.585 *</td>
<td>0.450</td>
<td>3.367 **</td>
<td>0.498 *</td>
<td>1.020</td>
</tr>
<tr>
<td>Results-Oriented (RO)</td>
<td>0.819</td>
<td>0.086</td>
<td>0.107</td>
<td>0.431</td>
<td>0.008</td>
<td>0.097</td>
</tr>
<tr>
<td>PWE * ML</td>
<td>-0.091</td>
<td>-0.055</td>
<td>-0.613</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PWE * RO</td>
<td>-0.120</td>
<td>-0.062</td>
<td>-0.053</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ML * RO</td>
<td>-0.260</td>
<td>-0.036</td>
<td>-0.007</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>r-squared</td>
<td>0.223</td>
<td>0.140</td>
<td>0.084</td>
<td>0.249</td>
<td>0.155</td>
<td>0.102</td>
</tr>
<tr>
<td>Adj-r-squared</td>
<td>0.197</td>
<td>0.112</td>
<td>0.054</td>
<td>0.197</td>
<td>0.098</td>
<td>0.041</td>
</tr>
</tbody>
</table>

* sig. 10%; ** sig. 5%; *** sig. 1%.

Table 6: Multivariate regression results.
New Product Development Projects

with the position of Pfeffer and Viega (1999). Moreover, top management needs to have a long-term orientation when planning.

Table 6 also shows that organizations with a positive work environment and strong top management leadership tend to be more technically successful than their counterparts. Organizations with a positive work environment also tend to be more successful in achieving customer satisfaction. These findings are consistent with the notion that culture can affect performance. The relationship between leadership styles and overall organizational performance has been studied in a number of contexts (e.g., Bass, Jung, Avolio, & Berson, 2003), and our study relates this style directly to the performance of individual projects. Along the same lines, it is not surprising that a positive work environment translates into perceived better outcomes of NPD projects. It stands to reason that organizations will have better performance outcomes when employees perceive a positive working environment. It is well established that job satisfaction can have a positive impact on worker commitment and organizational citizenship behavior (e.g., Randall, Cropanzano, Bormann, & Birjulin, 1999). This study shows that a work environment that leads to such satisfaction also affects the performance of NPD projects.

As shown in Table 6, the interaction effects of the three culture measures were also tested. This was based on the proposition that certain elements of organizational culture may be insufficient to improve organizational performance on their own, but may only influence performance in conjunction with other elements and may have a significantly greater effect when combined with other elements. As seen in the results, the interaction effects do not seem to have significant influence on any of the performance measures used. This indicates that performance enhancement does not appear to have an interactive effect with regard to elements of organizational culture.

In summary, the results of the multivariate regression analysis generally support the notion that organizational culture can affect the performance of NPD projects. The results indicate that for organizations to be successful in developing new products, they must have a positive work environment and strong leadership.

Discussion and Implications

This study complements current research and draws attention to an area in NPD that is largely overlooked. Current research on the performance of NPD projects primarily focuses on the role of project-level variables such as NPD project structure, the early involvement of the marketing and manufacturing departments in the development process and the buyer-supplier relationship. Pinto and Pinto (1990), for example, studied the project team's communication style (which could be significantly influenced by organizational culture) and its impact on NPD projects. A skilled and loyal supplier base can be a key competitive advantage, and firms today are aggressively reducing their total number of suppliers, thereby increasing their reliance on the suppliers that remain (Lyons, Krachenberg, & Henke, 1990) and getting suppliers involved earlier in the NPD process (Quesada et al., 2006).

Ettlie and Pavliou (2006) and Quesada et al. (2006) pointed out that involving suppliers early on gives manufacturers a number of advantages, including more innovative products, faster product development, and lower development costs. By involving its suppliers at early stages of NPD, Chrysler, for instance, reduced the time necessary to develop a new vehicle from 234 weeks to 160 weeks, and dropped the cost of development by 20% to 40% (Dyer, 1996). Although such studies highlight the importance of the buyer-supplier relationship, they leave vital questions unanswered. Why do some organizations have stronger relationships with their suppliers, or have suppliers more involved in the development of their products? Why do other organizations, applying a competitive approach, have suppliers bid against one another? We believe the answers lie in organizational culture and its influence on attitudes and behaviors. For instance, we expect organizations that believe in competition in getting the most out of people (and, in business terms, the best offer) to rely more on making their suppliers compete against each other for the lowest bid, while on the other hand, we expect organizations that foster collaboration (as opposed to competition) to have deeper and more involved buyer-supplier relationships. Further research to explain buyer-supplier relationships and other project-level variables needs to be conducted if we are to better understand NPD projects and how (and why) they succeed or fail. Culture determines why organizations do things the way they do. While focusing on project-level variables tells us “what” happened and how performance was affected, focusing on organizational culture explains “why” things are happening the way they are and may tell us what can be changed to improve performance. Although studying buyer-supplier relationships explains what happens when companies get their suppliers more involved in NPD and how such involvement influences the outcome of NPD, studying organizational culture tells us what kind of organizations usually have a better and more involved buyer-supplier relationship. Studying organizational culture can tell us what we need to change or enhance if we wish to have a more involved buyer-supplier relationship.

Other research focuses on the project structure and how it affects performance. Larson and Gobeli (1988) differentiated between five types of project structures: functional, functional matrix, balanced matrix, project matrix, and project team structures.
Barczak (1995), Peters and Waterman (1982), and Kidder (1981) argued that project teams are the most suitable structure for developing new services and products. Larson and Gobeli (1988) and Crawford (1979), on the other hand, suggested that there is no best way to organize projects. Nevertheless, evidence suggests that project team, project matrix, and balanced matrix have roughly equal success rates and are more associated with successful NPD than the functional and functional-matrix structures. Given the mixed nature of results, organizational culture could be the determining factor of success, rather than project structure. Moreover, organizational culture could be the determining factor in selecting project structure.

Authors such as Song and Parry (1992), Calantone and Cooper (1981), and Souder (1988) focused on the marketing department’s role in NPD. These authors show that R&D/marketing integration is important because technology alone cannot guarantee new product success, and that technological advances should be market-driven. They suggested that new product success rates will be highest when R&D/marketing relationships reflect mutual respect, trust, and commitment, as well as perceptions of competence and interdependence. These studies clearly illustrate the importance of the R&D/marketing relationship. They do not explain, however, why some organizations tend to have a better R&D/marketing relationship than others. Once again, culture could have a determining effect. Further research into the relationship between culture and these variables could be of great interest.

This study complements existing work by focusing on a strategic-level variable and by showing how a more holistic or global variable can affect NPD performance. Though this study centers on the direct effects of organizational culture on NPD project performance, it also lays the groundwork for further research on the effects of organizational culture moderated through project-level variables. Such studies could help determine why some organizations tend to have stronger relationships with their suppliers and greater marketing and manufacturing department involvement in the development of new products and, in turn, superior NPD performance. Is there a consistent culture that lays the groundwork for this increased collaboration? It may also tell us whether culture is the determining factor of NPD success rather than project-level variables or if we can discern what project-level variables do have an effect once we have controlled for differences in organizational culture. Does culture and NPD project structure need to match in order for NPD to be successful? Culture might also explain why firms with similar strategies may have different results.

This study’s focus on the direct relationship between culture and NPD performance is helpful to both academics and practitioners. It highlights the various effects of organizational culture on NPD performance and the importance of active management of organizational culture. It shows that for projects to be successful, managers must ensure a participative and trusting work culture is in place. Managers must foster a culture that encourages employees to exert maximum effort and to discuss both job-related and personal matters with their supervisors, and that encourages them to express disagreements with their supervisors and to continue working on new ideas even when initial attempts fail. In this sort of culture, important decisions are made by committees and not by a few select people; employees know that everyone’s ideas are valuable and that the organization is interested in them as human beings and not merely in terms of the jobs they perform. This kind of culture attracts employees and managers who feel comfortable in unfamiliar situations, are long-term oriented, and who are customer-focused. Also, this study lends general support to the hypothesis that culture affects overall organizational performance.

Previous research has been focusing on project-level variables in trying to explain why projects succeed or fail. We believe that more attention should be directed toward strategic-level variables such as organizational culture and organizational strategy. Studies that investigate how organizational culture affects project-level variables should be very informative and would give us ample information on why organizations tend to choose one course of action over the other. We believe studies should start focusing on studying the effects of organizational culture on buyer-supplier relationships, project structure, R&D budget, and R&D/marketing relationships and how that in the end affects project performance. By studying the effects of organizational culture on project-level variables, we will get to know why organizations act the way they do. Why do some organizations tend to have stronger relationships with their suppliers than others? Why do some organizations (and what type of organizations) tend to allocate a bigger percentage of their budgets toward R&D than others? Is it strategy or culture? Why do some organizations tend to have better R&D/marketing relationships and accordingly are more successful? By investigating these issues, we will have a better understanding of why projects succeed or fail than if we just focus on the effects of project-level variables. By digging further in organizational culture, we can draw a culture map to successful organizations that tend to have stronger and long-term relationships with their suppliers, invest heavily in R&D and have stronger and better R&D/marketing relationships, and, in turn, perform better. This paper is the first step on this road of investigating the effects of strategic-level variables.
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Conclusion
Many studies focus on the effects of organizational culture on the performance of organizations. The role of organizational culture on NPD project performance, on the other hand, is a long-overlooked area of research. The literature on NPD performance primarily focuses on the effects of project-level variables such as project structure, NPD processes and how they are performed, the interaction between marketing and R&D, and so forth. This research complements previous studies by investigating the effect of organizational culture on the performance of NPD projects. It offers a more comprehensive definition of organizational culture by using factor analysis to group related cultural measures from the literature. This analysis identifies three dimensions: the organization’s work environment, management leadership, and the organization’s results orientation. Backed by data collected from 95 U.S. firms, this study contributes to the literature by demonstrating the effects of organizational culture on the performance of NPD projects and by profiling successful, innovative organizations.

Organizations that wish to be successful in developing new products must have a positive work environment with strong management leadership. In particular, organizations must foster a culture that encourages employees to exert maximal effort, and that makes them feel comfortable in dealing with unfamiliar situations and expressing their opinions. Management must set clear goals, delegate to employees, and encourage employees to participate in decision making and work on new ideas. Finally, top management needs to consider the long term when planning.

As with any research, this study has limitations. It would be helpful to survey more than one person in the organization about culture and NPD success, rather than rely on sampling R&D managers only. Additionally, asking customers about their perceptions of NPD project outcomes may be less biased than surveying senior managers, especially when it comes to measures of customer satisfaction. Also, the use of surveying to ascertain the elements and qualities of culture is still somewhat in its infancy. Some progress has been made, but clearly more work on developing stable and generalizable measures must be done.

This study’s limitations notwithstanding, it does provide evidence of the direct effect of organizational culture on the performance of NPD projects. Organizational culture is also expected to have indirect effects on performance through its influence on project-level variables and other organizational practices, which could affect NPD project outcomes in an even more profound way. This work provides the groundwork for future studies of this nature. Clearly, more research measuring organizational culture and its relationship to organizational performance, and in particular its relationship to new product development projects, is necessary.

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Walid Belassi, PhD, is an associate professor of management science at the School of Business, Athabasca University, Alberta, Canada. His research interests include new product development, project management, and advanced manufacturing technology. He obtained his DBA in business administration with a concentration in operations management and business statistics from Cleveland State University, Cleveland, OH. His research has been published in the International Journal of Project Management, Journal of Applied Community Colleges, Journal of Development Areas, and Omega.

Alex Z. Kondra, PhD, is an associate professor and chair of the Centre for Organizational Analysis and Marketing, School of Business, Athabasca University in Athabasca, Alberta, Canada. He obtained his PhD in business administration with a major in industrial relations from the University of Alberta. His current research interests focus on institutional theory, organizational ethics, and organizational culture. He has published in numerous journals, such as Organization Studies, Journal of Labor Research, Journal of Individual Employment Rights, and Journal of Collective Negotiations in the Public Sector.

Oya Icmeli Tukel, PhD, is an associate professor in the Department of Operations Management and Business Statistics at Cleveland State University. She received her PhD in decision information sciences from the University of Florida concentrating in the area of project scheduling and resource management. She has been involved in training programs and consulting in project management, innovation management and supply chain management in the United States, Europe, and Asia. She is actively publishing in the areas of project management and supply chain management for both academic and practitioner journals.
Flexibility at Different Stages in the Life Cycle of Projects: An Empirical Illustration of the “Freedom to Maneuver”

Nils O. E. Olsson, The Norwegian University of Science and Technology, Norway
Ole M. Magnussen, The Norwegian University of Science and Technology, Norway

ABSTRACT

Many textbooks on project management present illustrations concerning the relative size of project attributes during different project phases. The derived models all have attributes in common, such as uncertainty, significance of decisions, and degree of freedom to maneuver, that are typically high in the beginning of the project and low in the end. At the same time, variables such as the accumulated cost and available information begin at low levels and end up at a high level at the end of the project. Based on empirical data from projects, this paper illustrates and quantifies one of these attributes, the freedom to maneuver, in different project phases.

KEYWORDS: project attributes; project flexibility; scope reductions

INTRODUCTION

The paper is an attempt to provide empirical results on some project management issues related to project flexibility. Project flexibility is discussed and models for illustration of project flexibility are presented. The paper presents quantifications of one aspect in the presented project flexibility models.

Flexibility and Project Management

Flexibility is one approach to prepare projects for the effects of uncertainty. Terms like adaptability and robustness are often used when discussing issues related to what this paper calls flexibility. Flexibility may also be described as a way of making irreversible decisions more reversible or postponing irreversible decisions until more information is available.

The uncertainty of a project decision can be described by the gap between the information needed to make a decision that is entirely consistent with the actual outcome and the information available at the moment of decision making (Galbraith, 2001). Mikkelsen and Riis (2003) identified a fundamental dilemma in project planning—the importance of decisions is at the highest at the same time as the available information is at its lowest. A common way of reducing this dilemma is to increase the available knowledge about the project. One key idea in project flexibility is to postpone irreversible decisions in the front-end phase of projects, in addition to (or instead of) gathering more information.

Flexible projects are generally not described as desirable in project management literature. A wide range of studies (including Hall, 1980; Miller & Lessard, 2000; Morris & Hough, 1991) indicated that a clear project definition is a critical success factor for projects. On the other hand, a number of scholars, including Kreiner (1995), argued that flexibility is necessary to face the changes and uncertainty in the business environment. There is a desire of project owners and users to have “room to maneuver” to be able to adjust projects as they gain knowledge about their needs and changes in the project context (Christensen & Kreiner, 1991; Eikeland, 2001; Kreiner, 1995; Midler, 1995). As pointed out by Garel and Midler (2001), the approach to flexibility held by the different stakeholders is closely related to the incentives open to the stakeholders. Flexible projects have a value for those who can align a project to their priorities, but flexibility represents a cost for those who have to adapt (Mahmoud-Jouini, Midler, & Garel, 2004).
The approach to flexibility can be depending on the unit of analysis. Adaptability is frequently seen as a key success factor for organizations (Bahrami & Evans, 2005). Projects, on the other hand, are established to be targeted, focused instruments for execution of defined tasks. However, as the Western world is getting “projectified” (Lundin & Söderholm, 1995), management by projects (Gareis, 1989) means that the traditional distinction between an organization and its projects becomes less apparent. A strategic perspective on project management means to emphasize the link between projects and strategic objectives of an organization, as highlighted by Srivannaboon and Milosevic (2006) and Shenhar and Stefanovic (2006). A growing emphasis on strategic aspects of projects is likely to generate a growing interest in project flexibility. The substantial and well-documented drawbacks of project flexibility on project efficiency—primarily cost and time—are a major argument against flexibility. Kreiner (1995) pointed out that the traditional focus on stability in project management becomes challenged under uncertainty, which creates what he calls “drifting environments.” Winch (2004) and Jaafari, Doloi, and Gunaratnam (2004) pointed out a major limitation in the predominant theory in project management during the last decades is that it assumes that the scope of a project can be completely known in advance.

Project flexibility can be seen as both a blessing and a curse to project management. On one hand, projects need stability and control to be executed efficiently, typically measured by time, cost, and meeting specifications. From this point of view, flexibility should be minimized. On the other hand, important decisions in projects must be taken based on limited information in an unpredictable world, creating a need for flexibility.

Flexibility is used in a rather wide meaning in this paper, based on the definition of Husby, Kilde, Klakegg, Torp, Berntslen, and Samset (1999): flexibility is “the capability to adjust the project to prospective consequences of uncertain circumstances within the context of the project.”

**Visualizing Project Flexibility**

Lundin and Söderholm (1998) described how a project moves from relative openness in the beginning of the project to relative closeness in the execution phase. In the execution phase, the predetermined action is supposed to be carried out according to the plans, in a “planned isolation.” The concept of project flexibility in the execution phase disturbs this planned isolation. Midler (1995) described a management strategy for modern concurrent engineering projects. First, prevent early commitment while at the same time trying to gather as much information as possible on the project. In the second phase, the project is locked as precisely as possible. Finally, at the end of the project, speed is given maximum priority in order to solve the remaining technical obstacles. In a similar way, Mahmoud-Jouini et al. (2004) characterized project management by the speed of three project phases: preparation, freezing, and implementation.

Many textbooks on project management present illustrations concerning the relative size of project attributes during different project phases. The attributes include uncertainty, significance of decisions, freedom to maneuver, accumulated cost, and available information. Figure 1 is an attempt to summarize some of the main elements from the different models. The figure is based on Christensen & Kreiner (1991, p. 40), Mikkelsen & Riis (2003, p. 47), Midler (1995, p. 369), and Samset (2001, p. 32). Even though the shapes of the curves vary between different authors, the models show that uncertainty, significance of decisions, and degree of freedom to maneuver are typically high in the beginning of the project and low in the end. At the same time, variables such as the accumulated cost and available information begin at low levels and end at a high level at project closing. Although the type of shapes shown in Figure 1 appears to be logical, the models appear to primarily serve as summaries and illustrations. They seem to a lesser extent to be based directly on

![Figure 1: Summary of the main attributes of the project life-cycle models.](image)
empirical evidence. There are obvious challenges in quantifying and measuring the different variables. Miller and Lessard (2000, p. 34) showed that for one particular project, regulatory, political, and financial risks were at the highest during the middle of the project.

The “high to low” curve may have different direct meaning, but the underlying message is similar. Christensen and Kreiner (1991, p. 40) used Galbraith’s (1977) definition of uncertainty as the difference between the needed and the available information. As the available information increases, the uncertainty decreases throughout the project. Samset (2001) used a similar definition of uncertainty. Eikeland (2001), on the other hand, equalizes “room for maneuvering” with the internal uncertainty of the project, related to internal decisions that will be, but are not yet, taken. A decision is within the room for maneuvering if it does not violate the consequences of previous decisions. Midler (1995) related the decreasing degree of freedom to maneuver with a rising degree of irreversibility in project decisions. Mahmoud-Jouini et al. (2004, p. 361) described the descending curve as “possibilities of action in the project.” Mikkelsen and Riis (2003, p. 47) let the “high to low” curve represent importance of decisions.

The “low to high” curve usually represents either accumulated cost (Eikeland, 2001) or the relative amount of information or knowledge available related to the project (Mahmoud-Jouini et al., 2004; Midler, 1995; Mikkelsen & Riis, 2003; Samset, 2001).

Project flexibility is part of a fundamental dilemma in project management. On one hand, projects need stability and control to be executed efficiently, typically measured by time, cost, and meeting specifications. From this point of view, flexibility should be minimized. On the other hand, important decisions in projects must be taken based on limited information in an unpredictable world, creating a need for flexibility.

Method and Material
The data utilized in this paper is based on 48 quality-at-entry assessments of major governmental Norwegian projects carried out between 2000 and 2004. These assessments are made by consultants prior to the parliament’s appropriation of the projects. Information from the quality assurance reports has been entered into a database. The information is relatively detailed, but limited to the situation at the time of approval of the project investments in parliament. These assessments were carried out as a part of the quality-at-entry regime of Norwegian governmental investments. The quality-at-entry regime is described in more detail in Magnussen and Samset (2005). As a part of the Norwegian quality-at-entry regime, a forum was established consisting of the involved consultants and ministries. A key issue in this forum was to ensure a uniform structure and terminology of the quality-at-entry reports. As a consequence, the research data used in this study have a uniform and quality assured structure. The data have been codified and entered into a research database, facilitating proper storage and retrieval of data (see Table 1).

Reduction Lists
It is a part of the consultant’s assignment in the quality-at-entry regime to assess the possibility for potential scope reductions. These are scope reductions that can be carried out if other parts of the project turn out to be more costly than planned. These possible reductions are summarized as reduction lists. It is assumed that the elements in the reduction list can be extracted from the planned project activities without threatening the fundamental functionality of the delivery. As a part of the quality assurance assessments, it is required that possible scope reductions be identified and described, the cost reduction arising from the change of scope defined, and a list prioritizing the possible reductions made. Prerequisites and expected consequences of the proposed reduction are also to be described. Although it was not a formal requirement, many of the consultants chose to add due dates for the scope reductions, to indicate when decisions have to be made to realize any cost saving from the reductions.

Information on reduction lists was possible to obtain from 42 of the studied projects. As shown in Table 2,
Flexibility at Different Stages in the Life Cycle of Projects

<table>
<thead>
<tr>
<th>Number</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>33</td>
<td>70%</td>
</tr>
<tr>
<td>18</td>
<td>38%</td>
</tr>
<tr>
<td>24</td>
<td>51%</td>
</tr>
</tbody>
</table>

Table 2: Occurrence of reduction lists (N = 47).

| Type of Reduction               | Total observations | Amount | Percentage
<table>
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<tr>
<th></th>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Percent</td>
<td>Mill. NOK</td>
</tr>
<tr>
<td>Preparations for alternative use</td>
<td>9</td>
<td>5%</td>
<td>70</td>
</tr>
<tr>
<td>Quality, functionality</td>
<td>71</td>
<td>42%</td>
<td>804</td>
</tr>
<tr>
<td>Visual impression</td>
<td>22</td>
<td>13%</td>
<td>239</td>
</tr>
<tr>
<td>Volume</td>
<td>48</td>
<td>28%</td>
<td>864</td>
</tr>
<tr>
<td>Dependencies between projects</td>
<td>4</td>
<td>2%</td>
<td>41</td>
</tr>
<tr>
<td>Other</td>
<td>15</td>
<td>9%</td>
<td>221</td>
</tr>
<tr>
<td>Total</td>
<td>169</td>
<td>100%</td>
<td>2,239</td>
</tr>
</tbody>
</table>

Table 3: Reductions by type, frequency, and size.

reduction lists were used in 30 of these projects. For 24 of the projects, the reduction lists also included due dates to define when the window of opportunity closed for each item on the reduction list. The total value of all identified possible reductions was 7% if only the projects with reduction lists are used as basis for percentage calculation, and 5% if all projects are included—that is, also the projects without reductions lists.

Table 3 shows a categorization of the reductions, their frequency, and total amount. Preparations for alternative use refer to the final product of the projects. It was observed that reductions in quality or functionality lowered the quality, but the volume remained the same as planned. A common type of reduction for roads was related to planned actions on existing roads in connection to the new construction. We have registered these cases as reductions in quality. Adjustments of ambitions related to the aesthetic quality of the project deliveries were common. Examples of this category include planting fewer trees, establishing smaller lawns, and reducing the aesthetic quality of concrete walls. Due to its frequency in transportation infrastructure projects in particular, reduction of aesthetic qualities is presented as a separate category. Reductions in volume are related to number of items delivered, fewer kilometers of road, etc. The dependencies between different projects were typically that “if another project includes this particular delivery in their scope, we can take it out of our scope.” Finally, any type of reduction that did not match the identified categories is listed as “other.” As can be seen in Table 3, quality and volume issues were most frequent and represented the largest monetary value.

Several concerns regarding the scope reductions can be raised. One issue is related to cost sharing between stakeholders in the projects (for example, between the governmental Public Roads Administration and the local counties). Some type of scope reductions may only represent a relocation of the cost.

A similar discussion related to weighing investments versus maintenance cost is also present for many projects. In some cases, it is commented that future maintenance cost becomes neglected by the use of a fairly high discount rate in cost/benefit calculations.

In many cases, reductions are claimed only to be possible by reducing the volume of the projects (for example, in terms of highway meters or defense equipment units). Commonly noted is that by reducing the volume, the unit cost will increase in projects because of fixed costs. There is also a tendency for frustration because the projects have been through several rounds of reductions to focus the scope prior to the external quality-at-entry analysis, where a new round of reductions is asked for.

The need for fast decisions regarding possible reductions is very common. According to one consultant, reductions in system architecture and quality standards have to be made early in projects. Reductions in volume are possible to be made at later stages depending on the contract structure. Also noted is that the potential savings from the reductions are so small that it is not justified to set up a system to manage reductions.

The purpose of the reduction lists is to have possibilities to reduce the scope in response to cost overruns. A major challenge is that the due dates for the reductions typically occur before one can expect that the project manager has updated cost estimates that may indicate potential overruns.
Calculating the Remaining Flexibility of Projects

Based on the reduction lists and due dates, it was possible to illustrate how the due dates of the items on the reduction list expire on a time scale. Quality assurance reports were typically delivered a few months prior to the final decision in parliament to go ahead with the projects. We modeled the time span of the projects from the date of the delivered quality assurance report to the planned delivery date of the final project result. To perform the calculations, we divided the time span of each project into quarters of years. For each quarter, the value of the still-open items on the reduction list was calculated as a percentage of the total project budget. Remaining flexibility of the project decreases each time a due date for an item on the reduction list passes. This value can be seen as an indication of the remaining room to maneuver. It was possible to perform such calculations for 19 of the projects. The shortest of these projects had a duration of one year, the longest 10 years. The average duration was 4.1 years. Only one project had a duration over seven years. The average remaining flexibility shows a pronounced drop during the first year of the projects, from almost 6 to less than 2%. After six years, none of the projects had any remaining items on their reduction lists. Only three projects had such a long duration.

To achieve a uniform presentation of the projects, regardless of their duration, the time scale was then converted to percentages of time span, as shown in Table 4. Thus, all projects begin at 0% on the time scale. At this point, the initial remaining flexibility is represented by a full reduction list (on average 5.9%). The projects were completed at the 100% mark on the time scale. At 50%, all projects were halfway between the delivery of the quality assurance report and their planned date of completion. At this stage, the average project had open items on the reduction list equivalent to 0.8% (and 3.4% at the most) of the total budget. The projects were completed at the 100% mark on the time scale. At 50%, all projects were halfway between the delivery of the quality assurance report and their planned date of completion. At this stage, the average project had open items on the reduction list equivalent to 0.8% (and 3.4% at the most) of the total budget. Table 4 shows remaining flexibility presented as average, maximum, minimum, and standard deviation on the uniform time scale.

Reserves

It is also a part of the consultants’ assignment to recommend a budget for the project. Projects are typically assigned a budget that consists of the expected cost including expected extras. In addition, reserves are allocated to the investments in order to avoid the need for additional funding. The intention with the allocated reserves is to mitigate project risks that could not be fully predicted.

As Figure 2 illustrates, the external consultant recommends a total budget that is expected to cover the consequences of the identified uncertainties. The allocated budget should represent the cost that has 85% probability of being met (referred to as “P85”), minus the identified potential for reductions. The reserves are, however, not expected to be used, and specific rules for the management of reserves have been established. The budget allocated to the projects, or the executing government agency, is usually the most probable final cost (P50). The reserves were not managed by the project manager, and usually not even by the executing government agency. Use of the reserves must be approved by the responsible ministry. It should be noted that reserves are not intended for expanding project scope, but solely to cover unexpected expenses.

The size of the reserves recommended by the external consultants could be established for 45 of the projects. On average, the external consultants recommended a 9% reserve (interpreted as a mark-up above the expected cost). Viewed as a share of the total allocated budget the recommended reserve is 8% on average. In 30 of the projects the external consultants directly recommended a budget managed by the subordinate agency, and in 20 projects a project manager cost target was recommended.

A closer look at the recommendation on how the reserves should be managed reveals that the subordinate agency on average is pointed out as responsible for 94% of the total allocated budget. The recommended expected cost is on average 92% of the total budget, which means that the subordinate

<table>
<thead>
<tr>
<th>Percent of Project on Time Scale</th>
<th>Size of Remaining Items on Reduction Lists</th>
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<tbody>
<tr>
<td></td>
<td>Average</td>
</tr>
<tr>
<td>0%</td>
<td>5.9%</td>
</tr>
<tr>
<td>10%</td>
<td>5.2%</td>
</tr>
<tr>
<td>20%</td>
<td>2.9%</td>
</tr>
<tr>
<td>30%</td>
<td>1.7%</td>
</tr>
<tr>
<td>40%</td>
<td>1.5%</td>
</tr>
<tr>
<td>50%</td>
<td>0.8%</td>
</tr>
<tr>
<td>60%</td>
<td>0.4%</td>
</tr>
<tr>
<td>70%</td>
<td>0.3%</td>
</tr>
<tr>
<td>80%</td>
<td>0.2%</td>
</tr>
<tr>
<td>90%</td>
<td>0.1%</td>
</tr>
<tr>
<td>100%</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

Table 4: The size of the reduction lists at different phases of the projects (N = 19).
Flexibility at Different Stages in the Life Cycle of Projects

This paper contributes empirical data on some of the issues related to project flexibility. By using the results presented in Table 4, part of the curve for the freedom to maneuver in Figure 1 can be redrawn based on the empirical data presented. The relative size of the remaining open reductions can be seen as an empirical illustration of the “room for maneuvering.” Figure 3 shows a curve generated from the reduction lists where the calculated room for maneuvering is shown with respect to the life span of the projects. The gray area in the figure represents the average plus one standard deviation of the relative remaining amount of the reduction lists.

In Figure 3, the curve related to reduction lists is placed in an overall time project time axis. To do this, it was noted that the first publicly available cost estimate for these projects on average was dated 3.4 years before the final approval. This means that the initial work in the early phase of these projects started even earlier. The average duration of the studied projects was 4.1 years. The decision to finance the projects is therefore located in the middle of the project time scale in Figure 3.

agency is granted somewhat more than the expected cost. In the 20 projects where a project manager cost target was recommended, the analysis showed that the project manager managed less than the expected cost (85% on average). This is supported by the observation that in many cases a specific project manager cost target was not explicitly recommended. Instead, it was frequently mentioned that a reasonable level would be in the P45–P50 area. This was expected to launch a cost focus that ultimately would result in more cost-efficient projects.

Discussion
We see the use of reduction lists in the projects studied here as an introduction of a structured approach to flexibility. We saw, however, that the sole purpose of the reduction list is to keep the project within budget. This might be described as a “negative” or internal freedom to maneuver. This means that there is no intention to use the freedom to maneuver to increase effectiveness, or the benefit side, of the projects. In contrast, a “positive” or external freedom to maneuver would include options for increased user satisfaction with the projects.
knowing that the relative location on the time scale is an approximation.

The size and shape of the gray area indicated in Figure 3 have similar features as the model presented in Figure 1, which means that these quantitative results support the illustrative models used in many textbooks.

Another way of quantifying the remaining flexibility at the time for final approval of projects is to see the reduction lists and allocated reserves in combination. On average, the reduction lists amounted to 6% of the total project budget. At the same time, an average of 8% of the project budgets was allocated as reserves to cover unexpected expenses. Adding these two types of flexibility gives an approximate total remaining flexibility of 14% of total budget at the time of parliamentary approval. This number can be used as an approximation. Figure 2 shows that when calculating the recommended budget, 13 out of 42 projects subtracted the reduction list value before the recommended budget was set. These numbers indicate that a remaining flexibility ranging between 9% and 14% of the total budget appears manageable at the time of final project approval, measured by the relative size of reduction lists and allocated reserves.

Conclusion
Models for illustration of project flexibility in a time perspective were presented. An attempt was also made to quantify one dimension in project flexibility models based on empirical data. Remaining flexibility has been quantified during the life cycle of projects, and the result is a curve similar to the illustrative models used in many textbooks on project management. Around the time for final approval, the project management consultants saw it manageable to have an average of 6% of the total project budget still open, with a standard deviation of 5%, maximum 18%, and minimum 0.2%. These numbers are based on the 19 projects that used reduction lists with due dates.

Another representation of the remaining flexibility at the time of final approval is the fact that 8% of the project budgets was allocated as reserves to cover unexpected expenses. An approximation of the average manageable total remaining flexibility at the time of parliamentary approval is therefore estimated to be in the range between 6% and 14% of total budgets.

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Flexibility at Different Stages in the Life Cycle of Projects

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Nils O. E. Olsson received a PhD from the Norwegian University of Science and Technology (NTNU) and an MSc from Chalmers in Sweden. He is presently research director of the Concept Research Program at NTNU and a senior research scientist at SINTEF Technology and Society, both in Trondheim, Norway. He also teaches at NTNU. He has extensive experience as a consultant, research scientist, and manager.

His consulting experience includes Ernst & Young Management Consulting and DNV (Det Norske Veritas). His current research is focused on project owner perspectives on large projects.

Ole M. Magnussen holds an MS in project management from the Department of Industrial Economics and Technology Management, Norwegian University of Science and Technology (NTNU), Trondheim, where he graduated in 2003. He works as a researcher and is currently responsible for the trailing research conducted by the Concept Research Program based at the Department of Civil and Transport Engineering, NTNU. At the same time, he is enrolled as a PhD student at NTNU and is working toward a PhD in project management.
A Negotiation Approach to Project Sales and Implementation

Jaakko Kujala, Helsinki University of Technology, Finland
Jarkko Murtoaro, EQT Partners, Finland
Karlos Artto, Helsinki University of Technology, Finland

ABSTRACT

We conceive the project sales and implementation process as a continuous joint decision-making process between the customer and supplier. We draw a parallel between the stage model of negotiations and phases of the project sales and implementation process, and apply the framework of negotiation analysis to the context of project management. A sample of negotiation strategies for both counterparts is presented to illustrate how the negotiation analytic framework can be used to describe and analyze different strategies the supplier and customer can employ in different phases of the project sales and implementation process. We find that a qualitative application of the approach facilitates the description of generic negotiation maneuvers in projects, supports the analysis of project negotiations, and provides several practical suggestions to improve negotiation outcomes.

KEYWORDS: project sales and implementation process; decision making; negotiation analysis

INTRODUCTION

Project business is concerned with complex transactions involving products and services that are integrated into "total solutions" to deliver certain business benefits within the constraints of time, cost, and quality (Grönroos, 1994; Turner, 1999). Project sales and implementation processes entail complex negotiations between buyer and seller, as the details of the project are agreed upon during extensive buyer-seller interaction, often over a substantial period of time (Skaates, Tikkanen, & Lindblom, 2002). It is widely admitted that buyers and sellers face significant difficulties in negotiating major projects (Cova, Ghauri, & Salle, 2002), but very little research has been done on the project negotiation process (Ghauri & Usunier, 1996).

The motivation for the focus on negotiations in projects in this paper can be derived from the extant project management literature that emphasizes the importance of managing the interaction between the project supplier and the customer. For example, Pinto and Rouhiainen (2001) and Turner and Keegan (2001) derived their suggestions for customer-based and project-based organizations from previous work that specifically concentrates on customer-focused managerial mechanisms in single projects. Studies on risks and their management in projects report the lack of communication and cooperation between the supplier and the customer, and insufficient alignment of the supplier's and the customer's project activities as significant sources of risk (Chapman & Ward, 2004; Miller & Lessard, 2001). Morris and Hough (1987) and Shenhar, Levy, and Dvir (1997) suggested that satisfying both the customer's and supplier's expectations in a project is an important determinant of project success. In sum, the relevant ties between the supplier and the customer are, in the existing project management literature, often characterized by communication, information exchange, risks, or success-related issues. We aim to address these challenges by analyzing projects as continuous joint decision-making between the customer and supplier.

The objective of this research paper is to create a conceptual framework that can be used to describe and improve joint decision making between the project supplier and the customer during the project process. Our primary theoretical background is the negotiation analytic approach (Raiffa, Richardson, & Metcalfe, 2002; Sebenius, 1992), which provides a theoretically well-founded methodology for analyzing project negotiations. While some authors have approached the subject in a highly analytical fashion (e.g., Kersten, 2001), our approach is more in qualitative applications as advocated in Raiffa et al. (2002). The point of departure of this paper is the project marketing literature. The theoretical body of knowledge in the negotiation analytic approach is used to construct a negotiation analytic framework for the project sales and implementation process. Project marketing and project management literature is used throughout the study to provide the analysis with a context of the whole life of a project. The view on applying
Negotiation Approach to Project Sales

Different project negotiation strategies in different phases throughout the life cycle of the project emphasizes the interpretation of the whole project as a continuous negotiation flow. A sample of negotiation strategies are presented to illustrate how the negotiation analytic framework can be used to describe and analyze different strategies the supplier and customer can use in the different phases of the project sales and implementation process. These strategies are not derived from specific empirical cases, but they are based on the authors’ industrial work experience, involvement in multiple research projects, and executive education schemes run by the authors in various international, project-based firms. As such, they only provide a starting point for empirical studies to analyze which type of strategies are successful in different types of situations.

Project Sales and Implementation as Negotiation

In this paper, we adopt the project marketing approach to complement the project management discipline. This choice is warranted by the recognition that the project marketing approach focuses specifically on the interaction between the project supplier and the customer. In the project marketing approach, a project is defined as a complex business transaction covering a package of products, services, and work, specifically designed to create capital assets that produce benefits for a buyer over an extended period of time (Cova et al., 2002). The discontinuity, complexity, and uniqueness of a project as a business transaction require joint decision making to reach a contract. However, project negotiations extend far beyond the tactical considerations associated with competitive bidding, and are not limited to the project sales phase (Cova, Mazet, & Salle, 1994). Essentially, the customer and the supplier face the problem of identifying or creating and distributing potential payoffs offered by joint behavior during different phases of the project sales and implementation process.

Negotiation is a process of joint decision making (Young, 1991a). The whole project sales and implementation process can be framed as a continuous sequence of negotiation between a customer and a supplier. As proposed by Lax and Sebenius (2006), negotiation analyses should not be limited to only the tactics used in actual contract negotiations at the table, but to have more focus on the design of the negotiations and actions to change the negotiation situation away from the table. In different phases of the project, there are local negotiations that focus on getting tentative agreements, such as contract negotiations or negotiations related to change orders during the project delivery phase. This paper integrates such local decisions to a bigger and continuous decision scheme, where a decision made in the earlier phase of the project influences the structure and flow of the negotiations in later phases. We interpret the process starting from project idea to the final acceptance of the project as a whole integrated negotiation process.

Each project can be conceived as two parallel projects: from the customer’s perspective as a procurement and investment project, and from the supplier’s perspective as a sales and implementation project. Project management literature introduces different life cycles and their phases for project sales and implementation, both from the supplier’s and the customer’s viewpoints (Arenius, Arto, Lahti, & Meklin, 2002; Arto, 1999; Kujala & Arto, 2000; Turner & Keegan, 2001). We select here the project phase definition from the project marketing literature as introduced by Cova and Holstius (1993), and use it to illustrate the project sales and implementation process in Figure 1. The figure shows how, at different phases, each party faces the decision problem of selecting a certain course of action from among multiple alternatives and committing to it.

Both the customer and the supplier make important decisions on tentative settlements, such as an investment decision, tender documents, or the submission of tender. Although some of these decisions seem to be taken unilaterally, they are in fact a result of purposeful communication—that is, negotiations—between project parties. An important element to recognize is that such decisions made in the negotiation process are interlinked.

In time, the parties’ “degrees of freedom” decrease, which highlights the specific importance of decisions made in the early phases of a project (Arto, Lehtonen, & Saranen, 2001; Morris & Pinto, 2004). By following certain courses of action, the parties also narrow down their ability to influence the final result at later stages. For example, in the preparation phase, a supplier needs to select preferred projects to which the supplier commits through its bidding decisions. At the same time, a customer in the call for tender has committed to the technical and commercial requirements included in the tender documents.

Negotiation Analytic Approach

The fundamental objective of negotiations is to jointly select and commit to courses of action that are superior to unilateral action for each and every party (Raiffa et al., 2002). A jointly selected, common course of action is called an agreement (Zartman, 2002), which determines a payoff for each party (Sebenius, 1992). Parties are motivated to negotiate with payoffs what they cannot achieve alone. Negotiation is therefore aimed at either creating something that the parties could not do on their own, or to resolve a problem or dispute between the parties (Lewicki, Saunders, & Minton, 1999).

Negotiations take place in all domains of life, but the structure and pattern of negotiations are fundamentally the same (Lewicki et al., 1999). There are four characteristics common to all negotiation situations (Kremenyuk,
There are two or more parties. The parties can cooperate to arrive at a joint decision. The payoffs to any party depend either on the consequences of the joint decision or alternatives external to the negotiations. The parties can reciprocally and directly exchange information.

At the heart of the subject of negotiation is essentially the insight that separate and independent behavior, even if perfectly intelligent and calculating, often leaves interacting parties with outcomes inferior to what could have been achieved through joint behavior. Negotiations are often perceived as zero-sum games, which demand competitive behavior. However, most negotiations also present opportunities for creating solutions from which all parties gain. The negotiations in which the creation of joint value is an obvious opportunity are often referred to as integrative, collaborative, win-win, or creating negotiations (Fisher, Ury, & Patton, 1991; Lewicki et al., 1999; Raiffa et al., 2002).

The negotiations in which opportunities for joint gains are not identified are referred to as distributive, competitive, win-lose, or claiming negotiations (Ibid.). Distributive negotiations are generally concerned with the division of a single resource; that is, there is only one issue under negotiation, and behaviorally speaking, they tend to be less collaborative than integrative negotiations (Raiffa et al., 2002). Effective information exchange promotes the development of good integrative solutions.

Theoretical roots of negotiation analysis approach are in the theory of games, decision analysis, and behavioral decision theory. However, negotiation analysis departs from some of their analytic rigor and formal argumentation in order to pursue a broader scope of application and increased practical value (Sebenius, 1992).

In game theoretical analyses, the parties make their decisions independently of each other, but these separate choices interact to determine a payoff for each side (Raiffa et al., 2002). Game theory proceeds by applying standard utility axioms to abstract the interests of the parties into utility functions to search for “equilibria” in which each party has no incentive to change its course of action.

Decision analysis is the systematic decomposition and clarification of independent decision problems (see, e.g., Clemen, 1996). It proceeds by structuring and sequencing the party’s choices and chance events, then separately and subjectively assessing probabilities and values, as well as risk and time preferences. An expected utility criterion is again used to aggregate these elements in ranking possible courses of action to determine optimal choice.

Behavioral decision analysis is concerned with describing how and why people think the way they do (Bazerman & Neale, 1992). The field has identified a number of deviations from the rationality ideal. Such deviations are called behavioral errors, biases, heuristics, and anomalies (see, e.g., Kahneman, Slovic, & Tversky, 1982).
Negotiation Approach to Project Sales

Behavioral decision analysis gives descriptions of how the other parties might actually behave, and also informs the parties of decision-making fallacies to which they are susceptible.

Although negotiation analysis draws heavily from the three fields of theory previously discussed, the approach has the following four distinct features (Sebenius, 1992):

- **First**, an asymmetrically prescriptive-descriptive orientation means that negotiation analysis typically seeks to develop prescriptive advice to one party, given a description of how others will behave (Sebenius, 1992). The development of asymmetrical advice to one party is in line with decision analysis, whereas game theory obliges to consider the behavior of other parties, and behavioral decision theory gives descriptions of how the other side might behave.

- **Second**, a radically subjective perspective means that the analysis relies heavily on subjective sources of information in the assessment of probabilities and other parties’ expected behavior. Additionally, subjective perceptions of interests and more operational objectives are considered legitimate and are included in the analysis.

- **Third**, sensitivity to “value left on the table” refers to an acknowledgment that the negotiating parties do not automatically reach efficient solutions, which is often assumed in game theory (Sebenius, 1992). One of the main purposes of negotiation analysis is to help the parties identify and realize potential gains through a systematic study of the negotiation situation (Raiffa, 1982).

- **Fourth**, a focus away from equilibrium analysis and toward perceptions of the zone of possible agreement essentially means that the situation is incompletely determined and parties may themselves construct the situation (Schelling, 1960; Sebenius, 1992). For example, the parties can take action to introduce new alternatives, to influence the other parties’ preferences, or to change their own conditions for an agreement, thus changing the zone of possible agreement.

### Negotiation Analytic Framework for Project Sales and Implementation Process

This section employs the theoretical body of knowledge in the negotiation analytic approach to construct a negotiation analytic framework for project sales and implementation process. In this framework, the basic elements are: structure of the negotiations, flow of the negotiations, and outcomes. The meaning and application of these elements in the context of project sales and implementation process is analyzed in the following.

**Structure of the Negotiations**

The structure of negotiations is, in a sense, the snapshot of a negotiation situation outside of the time dimension. It is continuously redefined during the negotiation process. The requisite concepts that define the structure of negotiations are parties, interests, issues, options, and *best alternative to negotiated agreement* (BATNA; Raiffa et al., 2002; Sebenius, 1992).

One of the distinctive features in the project sales and implementation is complexity, which primarily refers to the number of actors involved throughout the acquisition and delivery process (Cova & Ghauri, 1996; Skaates & Tikkanen, 2003). Even if we focus just on the customer and the potential suppliers, both of them often have multiple representatives. Because a project is often a solitary event for a project customer, the customer may use representatives who have adequate knowledge of the substance. They may participate in the actual face-to-face negotiations or have a more technical role in preparing tender documents and evaluating proposals.

The second analytic step after identifying the negotiating parties is to probe deeply for interests and separate them from the issues under negotiation on which positions are taken (Sebenius, 1992). In-project business interests may relate to short-term project goals, customer-supplier relationships, or other business goals, such as getting a good reference case. Additionally, there may be different interests among customer and supplier representatives that have to be taken into account. Issues are decision variables with two or more resolution levels: that is, options. In general, the main issues under negotiation in the project context are delivery time, price, and scope. However, each of these items has to be broken down to a more detailed level for actual negotiations.

Parties negotiate in order to better satisfy the complete range of their interests through some jointly determined action (Sebenius, 1992). In practically all situations, negotiators have outside alternatives that they can turn to should they fail to reach an agreement in current negotiations. There is a game theoretical component underlying every negotiation: a party always has the option of taking unilateral action to pursue payoffs outside of the negotiations (Raiffa, 1982). A project customer may have better investment options and may decide not to invest on the project under negotiations. Similarly, any project supplier can decide not to participate in the tender, and seek business opportunities elsewhere.

Alternatives to a negotiated agreement also play a tactical role. Research shows that negotiators with more attractive BATNAs capture a greater share of the negotiation zone (Chen, Mannix, & Okumura, 2003) and can expect a better payoff from the negotiations. Thus, it is essential for a project customer to give the impression that there are alternative suppliers and not to commit to any single supplier too early in the sales process. This can be accomplished, for example, by a tender process, in which two or more suppliers are selected based on an evaluation of all the proposals to the
Flow of the Negotiations

The flow of the negotiations refers to the behavior of negotiation parties and the interaction among structural elements in time. The behavior of negotiation parties can be classified into claiming value, creating value, or efforts to change the game itself (Sebenius, 1992). A phase model of the negotiations enables us to analyze negotiations as a process, and to link it with the phases of the project sales and implementation process.

In a purely distributive negotiation, the relationship between the payoffs for each of the parties is strictly negative (Raiffa et al., 2002). This is the case, for example, in final price negotiations, after all other issues are settled in the project contract negotiations. In this type of negotiation, claiming behavior—that is, increasing payoffs for a single party—is the only alternative for both parties. Project suppliers may avoid this situation, in which they often have a rather weak position, by keeping options related to technical issues open until price has been settled.

In integrative bargains, searching for joint gains is possible; that is, the payoffs to one or both sides can be improved without weakening the payoffs to any party (Raiffa et al., 2002). The main source of integrative potential comes from differences in preferences related to the negotiated issues. For example, a project supplier may demonstrate creative behavior by offering to implement a new technical solution, which provides a higher payoff to the customer, without additional costs. The payoff for the supplier comes, for instance, from an opportunity to develop and test a product that can be sold to other customers.

Negotiation is not simply creating and claiming the elements of negotiation within a fixed configuration; these elements may evolve or be intentionally changed during the negotiations. The parties typically seek to learn about their own and the other side’s situation and what is jointly possible, for the purpose of advantageously influencing their own or the others’ actual or perceived situation and favorably changing the parties, issues, or options under negotiation (Young, 1991a). The project marketing literature recognizes this type of supplier behavior as the constructive approach to project sales and marketing (Cova & Hoskins, 1997).

The flow of the negotiations proceeds through several distinct phases (Douglas, 1962; Morley & Stephenson, 1997). Lewicki, Saunders, and Minton (1999) came to the conclusion that the various models of negotiation fit nicely into a general structure of three phases, or stages: initiation, problem solving, and resolution. In a treatise of the theory and practice of diplomacy, Berridge (2002) adopted a similar, three-stage model: prenegotiations, around-the-table negotiations, and packaging agreements. The origin of a three-stage model can be traced to Simon (1960), who described three stages of decision making: intelligence, design, and choice. In the intelligence phase, the need to make a decision is recognized, intelligence is gathered, stakeholders are identified, and the general decision problem definition is formulated. In the design phase, objectives are set, options are generated, and options are evaluated against the outcomes they produce. In the choice phase, a choice is made, the choice is implemented, and the implementation process is controlled. The purpose of the phase model is to describe the general patterns with which the elements of the negotiation are constructed, and the way that the contracts are formed and renegotiated. In Table 1, the phase model of negotiation is compared with the phases of the project sales and implementation processes of Cova and Holsti (1993).

Outcomes

Addressing options for each of the issues is the basis for the creation of a contract. This determines a payoff for each party as measured by the degree to which the contract satisfies the interests of the parties. A contract or tentative settlement in this discussion refers to any written or verbal agreement during the negotiation process that fixes options of the issues under negotiation. The objective in negotiations is to reach a contract, which can be analyzed in terms of feasibility, potential, surplus, domination, efficiency, and impact (Raiffa et al., 2002; Underdal, 2002; Young, 1991a). However, any tentative settlement or project contract is inherently incomplete (Turner & Keegan, 2001). It is subject to adaptations and interpretations and further negotiations in the later phases of the project life cycle.

The set of feasible contracts is called the zone of possible agreement (ZOPA). A contract is said to be feasible if it is individually rational for each party; that is, if it assigns to each party a payoff that is at least as good as that party’s BATNA. If the contract is not individually rational, a project customer probably would select an alternative supplier or decide not to implement the project. The same applies for a project supplier; however, in competitive situations, a party might be forced to sign a contract that is not initially rational, but one that gives opportunities for improvement during the project delivery phase (Cova & Hoskins, 1997).

For any contract, the surplus to a party is the difference between the payoffs associated with that contract and the party’s BATNA (Raiffa et al., 2002). The concept of potential refers to the maximum surplus a party can receive, associated with a contract, when the other parties’ surpluses are zero; that is, where the payoffs are driven to the BATNA levels. For example, by keeping options open as late as possible and fostering competition, a project customer may be able to realize most of its potential and increase its payoffs.

A contract is dominated if there is another contract that leaves none of the parties worse off and is preferred by
Negotiation Approach to Project Sales

The efficient boundary consists of the complete set of nondominated contracts. A contract is efficient if all potential gains are realized. In principle, if all information related to issues, options, and payoffs is available, rational negotiation parties should always conclude with an efficient contract. Thus, one of the objectives for project negotiations should be to maintain opportunities for improving a contract during the later phases of the sales and implementation process when more information is available.

Fairness is concerned with the problem of selecting an equitable contract that all parties are willing to commit to. Fairness is a concept usually not included in economical analysis; yet, it is present in most real-world settings (Young, 1991b). It is reasonable to assume that negotiators seek to achieve efficient contracts, but it is also realistic to assume that the parties are concerned with a fair distribution of net benefits (Underdal, 2002).

Finally, an important distinction related to outcomes is between expected payoffs—that is, the contract—and actual payoffs—that is, the impact (Underdal, 2002). The signing of a contract—or, in other words, the joint selection and commitment to a complete course of action—specifies the rights and obligations of each party, with associated payoffs. The payoffs at the time of the signing of the contract are expected payoffs, and are likely to be different from the actual payoffs resulting from implementing the jointly selected course of action. As the impact is often difficult to capture in the project contract, it must include (negotiation) practices that can be used to improve it during the project delivery process.

Summary of Negotiation Analytic Framework

The concepts of this approach form a logically consistent, complete framework, oriented around the perceptions of the zone of possible agreement (ZOPA; Sebenius, 2002). The main items in the framework are the structure of the negotiations, the flow of the negotiations, and the outcome, which were described in the previous chapters. The general representation in Figure 2 visually summarizes the framework of project negotiation analysis, with respect to the simplest negotiation between two parties, project customer and supplier.

Negotiations involve a set of two or more parties, which are bound independently by the issues under negotiation. Each of the issues has two or more options. The fixing of an option for each of the issues combines into a

<table>
<thead>
<tr>
<th>Phase of Negotiation (Berridge, 2002; Simon, 1960)</th>
<th>Negotiation Content</th>
<th>Project Phase and Its Content (Cova &amp; Holsti, 1993)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intelligence or Prenegotiations</td>
<td>The need to negotiate is recognized; parties are identified; intelligence on the interests and BATNAs of both own and the other parties are gathered; and the general issues under negotiation are defined.</td>
<td>Search phase: scanning the environment to identify project opportunities and relevant industry developments.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Preparation phase: undertaking a feasibility study; exerting influence on the buyer and other relevant parties in order to get information and obtain tender specifications favorable to the supplier; evaluating the competitive situation.</td>
</tr>
<tr>
<td>Design or Around-the-Table Negotiations</td>
<td>The parties define their own interests; determine a set of options, for each issue; and evaluate the different combinations of options [contracts] with respect to their interests.</td>
<td>Bidding phase: preparing the bidding documents after receiving the invitation to bid, making decision concerning price and the use of resources.</td>
</tr>
<tr>
<td>Choice or Packaging the Agreement</td>
<td>The parties jointly select and commit to a common negotiation contract; and finally implement and control the implementation of the contract.</td>
<td>Negotiation phase: starts when the seller makes the preliminary offer for the project; ends at the signing of a contract.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Implementation phase: delivering and supervising the project; identifying and resolving of any problems that may arise; training buyer’s personnel; possibly creating after-sales systems.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Transition phase: evaluating the project as a whole; building up knowledge for future offerings; possibly supplying additional services to the buyer.</td>
</tr>
</tbody>
</table>

Table 1: Conceptual comparison of the phase model of negotiation with the phases of the project sales and implementation process.
contract, which is evaluated with respect to the parties’ interests to produce a measure of payoff for each of the parties. The set of payoffs associated with all possible combinations of agreements represents the available contract set. BATNAs represent the constraints, which, together with the contract set, define the ZOPA. The intersection of the parties’ BATNAs represents the payoffs of failing to reach agreement. The efficient frontier represents the set of contracts that cannot be improved from the standpoint of one party without harming another. Within this configuration, the process of negotiation consists of creating and claiming behavior, and efforts to change the game (Sebenius, 1992).

**Project Negotiation Strategies**

This section constructs a view on applying different project negotiation strategies in different phases throughout the life cycle of the project. This way, the negotiation analysis framework is further developed toward a tool that can be used to create and analyze negotiation strategies. The concept of “negotiation strategy” in this context refers to generic means to influence ultimate payoffs from negotiation situations. A negotiation strategy is therefore used to denote any deliberate action, or a complete course of action, that a negotiating party may choose to rely on in order to attain as favorable an outcome as possible, and could as well be dubbed a negotiation maneuver.

In the different phases of the project, both the customer and the supplier should understand the structure of the negotiation, plan which strategies they want to use within that structure—or develop strategies to change the structure—and define objectives for each tentative settlement. Figure 3 presents an illustration of a tool of thought for mapping negotiation process. The main objective for use of this tool is to guide negotiators to prepare for negotiations by taking into account all available information and to create a shared understanding of the role of each member in a negotiation team and which type of negotiation strategies should be used.

In each phase of the project, both project customer and supplier should
prepare for negotiations by first analyzing the structure of the negotiations. The analysis of the structure of the negotiation includes identification of negotiation parties and their interests, issues, options, and BATNA. This analysis has to be done in each round of negotiations, because structure of the negotiation is influenced by negotiation strategies and outcomes from negotiation in the previous phase. Understanding the structure of the negotiation enables negotiators to understand their negotiation power and to create credible objectives for each phase of the project. We distinguish between two major types of strategies that are used parallel in each phase: (1) strategies to change the structure of negotiations and (2) strategies to claim or create value. Negotiation objectives and outcomes can be evaluated using the following criteria: feasibility, potential, surplus, domination, efficiency, and impact.

**Supplier’s Negotiation Strategies**

A project supplier has two basic approaches in reacting to project opportunities, which are termed the deterministic and the constructivist approach (Cova & Hoskins, 1997). The constructive approach refers to activities aimed at becoming involved in shaping the competitive arena and the rules of the game (Cova, Mazet, & Salle, 1994). For example, a supplier can seek to influence both technical issues in the tender documents and the customer’s interests, the criteria with which the customer evaluates possible proposals in such a way that the supplier appears more favorable in relation to competing suppliers. Applying the concepts of the negotiation analytic framework, this translates to worsening the customer’s BATNA.

In general, supplier strategies often focus on how to get into position, where there is less or no competition (project contract has been signed), and the supplier can get all necessary information from a supplier to create a technical solution to solve those problems. Although suppliers may use this position for claiming behavior, we should also take into account that negotiating parties might not choose to disclose their full confidential information until after they have come to an agreement (Raiffa, 1982). Only after a tentative agreement might negotiators be willing to confide information and search for joint gains—that is, better agreements. Table 2 shows four sample negotiation strategies for the supplier.

**Customer’s Negotiation Strategies**

Market creation strategy for a customer aims to create and maintain a competitive situation, in which the customer has several alternatives to choose from. In addition, the customer may decide to go to the market to satisfy stated business needs and leave it for the suppliers to propose technical solutions. This may turn into more integrative potential in the later phases of the project sales and implementation process. Negotiations between the customer and supplier can be transformed into auctions by including other contractors in the game (Raiffa et al., 2002). Cova et al. (2002) introduced different types of tendering practices, which the customer may use to maintain a competitive situation. The main issues to decide are the selection of the supplier to include in the tender process, and the decision of whether proposals are evaluated based on price or the overall quality of the proposal. If the only issue under negotiation is price, only claiming strategies are available. Evaluation

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**Figure 3:** A tool for documenting both the results of the negotiation analysis and appropriate negotiation strategies in different phases of the project sales and implementation process.

<table>
<thead>
<tr>
<th>Search</th>
<th>Preparation</th>
<th>Bidding</th>
<th>Contract negotiations</th>
<th>Implementation</th>
<th>Transition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structure of the negotiations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flow of the negotiations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Desired outcome from this phase</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
based on overall quality provides more opportunities for strategies to create value in the later project phases. Table 3 shows four sample negotiation strategies for the customer. The strategies are: market creation, competitive sealed bid, bargaining rounds, and variation orders.

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Description</th>
<th>Negotiation Analytic Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project framing</td>
<td>Supplier becomes actively involved in the shaping of the customer's interests or perceived alternatives so that the supplier appears more favorable in relation to competitors.</td>
<td>Customer's BATNA shifts to a lower level, increasing the potential of the supplier leading to higher expected payoffs.</td>
</tr>
<tr>
<td>Captive pricing</td>
<td>Supplier seeks to win a contract by submitting an extremely low bid and to make profits in later stages through contract claims.</td>
<td>Supplier accepts an individually irrational contract initially, but enters the feasible region eventually and ends up with positive surplus by claiming with guile during the course of the project.</td>
</tr>
<tr>
<td>Post-settlement modifications</td>
<td>Supplier makes recommendations on project plan or implementation after submitting a bid against tight specifications.</td>
<td>Supplier changes the zone of possible agreement by introducing new options for negotiated issues, new issues altogether, or by influencing the interests of the customer, and thereby gains additional payoffs.</td>
</tr>
<tr>
<td>Acceptance test</td>
<td>Supplier receives approval from customer for completing a certain subsection of the contract.</td>
<td>Supplier secures a new BATNA, and may anticipate further changes in the contract whereby additional gains are realized.</td>
</tr>
</tbody>
</table>

Table 2: Supplier’s sample negotiation strategies.

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Description</th>
<th>Negotiation Analytic Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market creation</td>
<td>Customer arouses interest in the project by publicly announcing a project opportunity.</td>
<td>By ensuring the participation of multiple suppliers, the customer develops an attractive BATNA with reference to negotiations with any single supplier and maximizes integrative potential.</td>
</tr>
<tr>
<td>Competitive sealed bid</td>
<td>Customer arranges a call for tenders where two or more suppliers are invited to submit tenders for the project.</td>
<td>Customer transforms face-to-face negotiations into auctions and claims a greater share of distributive potential by shifting the region of expected convergence closer to supplier’s BATNA; supplier must balance payoffs implied by bid with probability of winning.</td>
</tr>
<tr>
<td>Bargaining rounds</td>
<td>Customer, after receiving a quote from one supplier, goes on to another to ask for a slight improvement in terms until convergence on best and final offers is reached.</td>
<td>Customer claims a greater share of the potential payoffs by shifting the region of expected convergence closer to supplier’s BATNA, again by sequentially exploiting the competitive tension between the suppliers.</td>
</tr>
<tr>
<td>Variation orders</td>
<td>Customer makes change requests on project contract.</td>
<td>Customer claims additional gains unilaterally by exploiting the bilateral contract setting, in which the supplier needs to complete variation orders on a cost-reimburse basis.</td>
</tr>
</tbody>
</table>

Table 3: Customer’s sample negotiation strategies.

Discussion and Conclusions
This study builds on our previous research on project negotiations. It conceptualizes the project sales and implementation process as a negotiation problem. A project is interpreted as a process of joint decision making in which negotiation parties need to select and commit to a course of action that is superior to unilateral alternatives. Such a course of action results in payoffs that none of the parties could achieve alone.

For managers who are responsible for project negotiations, the results of this study enable an understanding
of the essential elements of systematic and beneficial negotiation strategies in project sales and implementation. This is important, as research has shown through simulated experiments that, contrary to people's common beliefs, people on average are not very good at negotiating optimal outcomes (Raiffa et al., 2002). The approaches used to manage (project) negotiations are relatively unsystematic, and most negotiators have had little formal training on the subject (Lewicki et al., 1999). Negotiators rely predominantly on implicit knowledge, individual capabilities, and situational factors in crafting agreements (Ertel, 1999).

Although experience and sound intuition are at least as important to successful negotiation as any amount of analysis, some analysis is necessary to “correct” people's intuition and to force them to reexamine their assumptions (Young, 1991). Analytical reasoning, backed up by empirical evidence, can deepen understanding of real-world negotiating situations (Raiffa et al., 2002). The negotiation analysis approach creates awareness of the structure and flow of negotiations, and may ultimately help to change negotiation games to become more favorable to negotiators. The conscious direction of attention toward the structure and flow of negotiations is the route to intuitive application of the concepts and, ultimately, more favorable negotiation outcomes.

Negotiation analysis provides a theoretically well-founded methodology for preparing and managing project negotiations. A main advantage of the negotiation analysis approach is its conceptual clarity, which can be used to stimulate fundamental thinking regarding negotiation situations (Raiffa et al., 2002). The negotiation analytic approach relies heavily on the model of rational decision-making behavior, in which negotiating parties always calculate; that is, define their objectives, enumerate their alternatives, evaluate the alternatives against the objectives, and choose the best alternative. The negotiation analytic approach can be complemented with other theories, such as transaction cost economics (Williamson, 1996), which explain the rationale for different paths of contracting or the causes of deviations from rational behavior and how they should be taken into account in the negotiation process and contract.

In real-world negotiations, a careful examination of the issues under negotiation, the various options for resolution, and the parties' underlying interests can lead the parties to win-win behavior and to converge on win-win type outcomes, which ideally leave no money on the table; that is, which are efficient.

In principle, the negotiation analysis approach could be used to quantify a negotiation process to find the optimum outcome. As such, it can be used as a training tool. However, for practical applications, we suggest that a qualitative application of negotiation analysis would be most fruitful in project negotiations. Such a qualitative application is mostly concerned with consciously directing attention to the critical aspects of a negotiation situation with the help of a complete and consistent framework. The best negotiation results are achieved when both parties trust each other and share information about their preferences. Practical suggestions for managing negotiations from the negotiation analysis perspective include the following:

- An understanding of the alternatives for negotiations is essential not only for the simplistic reaching of an agreement, but for actively managing the attractiveness of the alternatives.
- Analysis is necessary to “correct” people's intuitions, and the benefit of systematic preparation may be significant in attaining desired negotiation outcomes. Moreover, although experience and intuition are highly important, it is difficult to codify and transfer them between negotiators.

The main integrative potential in negotiations comes from differences in the way that each party values the issues under negotiation. It is important to identify and analyze these differences to create win-win contracts. Reciprocal open and truthful sharing of information and creativity helps the parties to identify integrative potential. Project sales and implementation processes, as well as purchasing processes, should be designed in such a way that they provide opportunities to renegotiate issues in later phases of the project, when there is more information available.

For the best outcome, negotiation parties should always seek opportunities to change the negotiation structure (e.g., issues under negotiation and their options) during negotiations for a better outcome. An important factor to consider is that all decisions made during the negotiations are based on subjective perceptions of negotiation parties. It is possible to influence the way that the other parties may value different outcomes (e.g., a customer can emphasize the value of a continuous business relationship resulting from this project).

In this study, we introduced different sample negotiation strategies to illustrate how the negotiation analytic approach could be used to describe and analyze project negotiations. Further empirical research is required for a more thorough understanding of different empirically applicable strategies and their effectiveness in different contexts and situations. We also need in-depth case studies about the effectiveness of various negotiation strategies in different cultural and institutional contexts.

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Negotiation Approach to Project Sales

Jaakko Kujala is a professor of project and quality management at the Department of Industrial Engineering and Management at the University of Oulu and an adjunct professor at the Helsinki University of Technology, where he is managing the project business research group at BIT research center [http://pb.hut.fi/]. He had over 10 years of international work experience in automation system project business before joining academia. His research interests include project sales and marketing process, global project networks and project stakeholder management, and business models for project-based organizations.

Jarkko Murtoaro is an associate in the buyout team at EQT Partners, Finland. His research interests include negotiations in project-based business, and public-private partnerships. He earned his MSc in industrial engineering from the Helsinki University of Technology and an MSc in economics from the Helsinki School of Economics.

Karlos Artto is a professor of project business at the Department of Industrial Engineering and Management at the Helsinki University of Technology, Finland. His current research interests include negotiations in project-based organizations and strategic management of multiple projects, portfolio, and programs; management of innovation, technology, R&D, new product development and operational development projects in different organizational contexts; project networks and project delivery chains; and risk management, with emphasis on management of business opportunities in uncertain business environments.
Measuring Performance in New Product Development Projects: A Case Study in the Aerospace Industry

Vittorio Chiesa, Politecnico di Milano, Italy
Federico Frattini, Politecnico di Milano, Italy
Valentina Lazzarotti, Università Carlo Cattaneo—LIUC, Italy
Raffaella Manzini, Università Carlo Cattaneo—LIUC, Italy

ABSTRACT

Implementing a performance measurement system (PMS) for research and development (R&D) is fundamental for supporting decision making and motivating researchers and engineers; however, this is a very challenging task, because effort levels are not measurable and success highly uncertain. Even if the subject has largely been debated in academic and practitioners literature so far, an acknowledged managerial approach is not available yet. This paper investigates the implementation and use of a PMS in new product development (NPD) projects, which represents a relatively unexplored issue in the R&D performance measurement debate. In particular, studying the case of a military aircraft development project, it provides a reference framework that integrates the major literature contributions’ findings and suggests a practical approach for the design and implementation of an effective PMS for NPD.

KEYWORDS: new product development; new product development project; performance measurement; aerospace industry

INTRODUCTION

Measuring business performance is largely acknowledged to be a critical task for supporting decision making, motivating people, stimulating learning, improving coordination and communication, and, ultimately, achieving the company’s objectives (Kerssens-van Drongelen & Bilderbeek, 1999; Neely, Platts, Gregory, & Richards, 1996; Schumann, Ransley, & Prestwood, 1995; Shank & Govindarajan, 1993). As a result, performance measurement systems (PMSs) have experienced a widespread diffusion, both for managing primary business processes, e.g., production and logistics, and supporting ones, e.g., administration and finance. According to this trend, a large consensus has been raised about the need to also measure R&D activities performance, especially in those market arenas where technological innovation is the main source of sustainable competitive advantage.

Much has been written on this subject, and several measurement approaches have been suggested (Brown & Svenson, 1998; Chiesa & Masella, 1996; Driva, Pawar, & Menon, 1999, 2000; Hauser, 1998; Pappas & Remer, 1985; Soderquist & Godener, 2004). Nevertheless, literature recognizes that designing a PMS for R&D is a very difficult task, because effort levels may not be observable in quantitative terms, and success is uncertain, influenced by uncontrollable variables, and can be assessed only after long delays (Brown & Svenson, 1998; Kerssens-van Drongelen & Bilderbeek, 1999; Loch & Tapper, 2002; Tipping, Zeffren, & Fusfeld, 1995). Furthermore, literature emphasizes that the term R&D includes very different activities (i.e., basic and applied research and development) that call for specific performance measurement approaches (Kerssens-van Drongelen & Cook, 1997). In this paper, the focus is on new product development (NPD) projects.

Literature on R&D performance measurement has so far concentrated mainly on the problem of designing an adequate PMS for NPD (Bremser & Barsky, 2004; Driva et al., 1999; Kerssens-van Drongelen & Bilderbeek, 1999; Kerssens-van Drongelen & Cook, 1997; Soderquist & Godener, 2004); not enough attention has been paid to implementation issues, i.e., to the problem of how to actually put into practice the designed measurement system. Moreover, the likely effects that the use of a PMS for NPD has on the project team and the company as a whole have not been explored yet, with few relevant exceptions, among which is the work by Godener and Soderquist (2004), who show that the use of a PMS for NPD may improve coherence and relevance of product portfolios, introduce corrective actions in projects,
and enhance learning and staff motivation. What is missing is the attempt to provide a systemic perspective on the issue of NPD performance measurement that is capable of integrating the three critical aspects R&D or project managers should confront with, i.e., the design of the PMS, its actual implementation, and the interpretation of its effects. This paper means to go a step further in this field; in particular, it aims to: (i) identify the guidelines for an effective implementation of a PMS for NPD projects; (ii) disclose the effects that its use is likely to have; and (iii) understand how these effects can be analyzed by the R&D or project manager and actually exploited for improving the effectiveness of the PMS itself. The ultimate purpose, then, is to provide a tentative comprehensive framework that would serve as a managerial tool capable of supporting R&D/project managers facing the issue of designing and actually using a PMS for their NPD projects.

In order to pursue the aforementioned objectives, the research was based on a literature review and an in-depth case study analysis. This choice was suggested by the complexity and wideness of the addressed managerial issue that claims to be intensively studied within a real context if an understanding that is precursory of practical suggestions is aimed at. Therefore, a real-world experience of an NPD project’s performance measurement was looked for; the selected case concerns an Italian aerospace company that started the development of a new airplane for military use in 2000. The success of the new product was considered critical within the company’s strategy to enrich product portfolio. Hence, a sophisticated system for performance measurement was put in place in order to strictly monitor the development process from many different perspectives (economic, functional, and technological). The NPD project is still in progress, the new product probably will be delivered in 2009, and the PMS is actually being used. The case allows us to closely study the problem of designing and using a PMS for NPD and to analyze all the effects of the system adoption over a long period of time.

This paper is structured as follows: Section Two synthesizes literature suggestions about the design of a PMS for NPD projects; Section Three discusses the problem of implementing a PMS in NPD and the relative expected effects, and Section Four analyzes the case study. Finally, the suggested design and implementation framework is discussed and, in the last section, some conclusions and managerial implications are outlined.

**Designing a PMS for NPD Projects: A Literature Synthesis**

The NPD process can be defined as the set of activities that, from the emergence of a technological opportunity or a new product idea, leads to an artifact that can be sold in the market (e.g., Ottosson, 2004; Ribbens, 2000; Wheelwright & Clark, 1992). A lot of literature has emphasized that successful NPD is crucial for the company’s competitive advantage (e.g., Ribbens, 2000; Ulrich & Eppinger, 2000; Wheelwright & Clark, 1992), as a result of shorter product life cycles, increasing pressures on time to market and costs, and globalization. Consequently, the use of management tools capable of supporting NPD activities has grown in interest as well; the PMS is recognized as one of the fundamental instruments in this respect.

The first critical issue that managers should confront when attempting to measure NPD projects’ performance is to design a system that fits the context where it is going to be used. A synthesis of the suggestions drawn from the literature about how to design an effective PMS for NPD projects is provided in Table 1. A possible systematization of the previously mentioned design suggestions is reported in Figure 1.

Such a framework basically outlines the need to adopt a contextual approach in the design of the PMS system. In other words, it suggests that project managers should carefully take into account: (i) the characteristics of the NPD environment where the PMS system is going to be used, in terms of the type of NPD activities that are internally undertaken, critical success factors in the NPD process, and organization/management of the NPD team; and (ii) the resources (both human and monetary) that are available for the PMS implementation. These two contextual variables, which in turn depend on a set of strategic and environmental factors at the overall firm level, should drive: the choice of the objectives for the PMS use and the design of its constitutive elements, i.e., dimensions of performance and relative indicators, structure of the PMS (i.e., the articulation of the controlled objects), and process aspects (e.g., frequency of the measurement, standards to measure performance against). Finally, an internal coherence among the PMS building blocks is shown to be a critical ingredient for its effectiveness.

Moreover, there are few literature contributions that investigate the problem of designing a PMS for NPD projects in the context of the aerospace industry. For instance, Haque and James-Moore (2005) studied five aerospace companies that were engaged in measuring the performance of their NPD processes; the cross-case comparison suggests several interesting design guidelines that, however, are coherent with those reported in Table 1. Furthermore, Busby and Williamson (2000) investigated the difficulties that an aerospace firm encountered in designing a PMS for its NPD activities, but confirming the benefits that performance measurement is likely to have in the studied environment.

The literature contributions reviewed in this section provide some practical guidelines for designing an adequate PMS for the NPD process. However, this is not enough for effectively measuring NPD projects’ performance; the designed PMS, in fact,
should be put into use, and this implementation phase deserves particular attention. The following section is specifically dedicated to this issue.

The Implementation of the PMS

After the basic elements of the PMS have been designed, project managers need to take care of its implementation; literature focusing on this issue is far more fragmented. Some scholars have studied the practical problems that the implementation of a PMS for NPD entails, and have provided some principles that could help overcome them (Bourne, Neely, Platts, & Mills, 2002; Driva et al., 2000; Kim & Oh, 2002; Nixon, 1998; Pawar & Driva, 1999; Sandstrom & Toivanen, 2002). The most widely acknowledged implementation guidelines are summarized in the following:

- **Clearness of the PMS features as they were thought in the design phase**: The PMS-designed features need to be clearly communicated to project members before the measurement system is actually used. In particular, the employment of unambiguous indicators, a clear identification of the controlled objects, and a plain statement of the PMS objectives turn out to be essential for avoiding frustration in the project team, which is very dangerous and may ultimately lead to the rejection of the PMS (Pawar & Driva, 1999). Nevertheless,
this implementation guideline does not imply that the PMS-designed characteristics are unchangeable; rather, the capability to proactively adapt them to the measurement context is a critical driver of a successful implementation, as discussed in the following point;

- **Acceptable incoherence**: A certain gap between the PMS designed features and the way in which they are actually implemented should be accepted; project managers should not try to put in place a measurement system that is perfectly coherent with the designed one. For instance, it often occurs that the indicators selected in the design phase would require, when implemented, an information-gathering effort that is not bearable by project members or a close interaction between different departments or laboratories that is too difficult to achieve (Bourne et al., 2002). In these cases, the project manager needs to adapt the characteristics of the PMS to the real measurement context, rather than imposing a pre-defined measurement system that is likely to result in people frustration and disappointment;

- **Gradual introduction and simplicity**: This implementation guideline suggests that project managers should gradually introduce the designed PMS. For instance, at the beginning they could start measuring a limited number of performance dimensions by using few performance indicators. Some authors suggest that if a company is new to measurement no more than five measures should be implemented initially. Between one and five is normally the recommended number to ensure that people gradually familiarize themselves with using performance measures and that associated administration efforts do not become unmanageable. Otherwise, managers could apply the measurement system to specific subgroups and not to the project team as a whole. In this respect it is very important that the first implementation of the PMS turns out to be successful, so that project members become more inclined to adopt the measurement system. Then, the complexity of the PMS should gradually increase and more demanding features added;

- **Data collection**: When implementing the PMS, the procedures that are established for gathering, validating, recording, and accessing information should be very simple to use and easy to understand. In this respect it could
be very useful to set up a central access point on a computer network that significantly reduce the time needed to gather and access information. Moreover, user interfaces should be kept at a straightforward level without jargon and abbreviations;

- **Top management commitment**: When implementing and actually using a PMS, it seems to be fundamental to obtain and maintain during the time a strong top management commitment toward performance measurement. There is ample empirical evidence outlining that a critical driver of a successful PMS implementation and use is the presence of this kind of commitment (Bourne et al., 2002). Furthermore, the authors show that higher levels of top management involvement are associated with a PMS declared purpose of “managing the business better.” This is found to improve the reliability of PMS introduction because it makes evident that directors believe in the PMS managerial relevance;

- **Top management culture**: A sort of paternalistic culture might be beneficial for the implementation of performance measures, as this would reduce the fear of measurement and, therefore, the resistance to implementation (Bourne et al., 2002). The authors found that technical professionals are more likely to accept and therefore support the use of the PMS when they believe that the gathered measures will not be analyzed and interpreted in a rigid way. This typically happens in cases where collaborative and sympathetic values are shared and believed in by top managers;

- **Change awareness program**: Notwithstanding top management commitment and paternalistic culture, the actual usage of the PMS can be streamlined through ad-hoc training and education sessions. They typically turn out to be very important in order to raise awareness and familiarize the organization with using performance measures for NPD projects. Furthermore, during these sessions, questions and concerns by technical people about the designed PMS should be encouraged; they are fundamental for tuning the measurement system so that it can fit the measurement context in which it is going to be used;

- **Monitoring and refinement**: Once the measurement system has been implemented, it needs to be monitored and refined to ensure ongoing success. In particular, once measures are made, they should not be regarded as unquestionable answers. Instead, they need to be continually reviewed and refined. More generally, it is important to ensure that the PMS positive effects are in some way visible, problems are monitored and solved, and suggestions for improvement taken into account.

Literature recognizes that these implementation principles might have a feedback impact on the PMS elements design; in other words, when a firm actually puts a PMS into practice for its NPD process, unforeseeable problems and difficulties frequently emerge that require a redesign of the PMS’s elements. Nonetheless, no concrete examples of these feedback impacts are available in literature, which would be instead highly useful for NPD managers.

A second stream of literature dealing with the implementation of a PMS for NPD has instead focused on the main effects that the measurement system is likely to have (Davila, 2000; Godener & Soderquist, 2004; Kerssens-van Drongelen & Bilderbeek, 1999; Loch & Tapper, 2002). In particular, Godener and Soderquist (2004) reviewed and categorized the main impacts acknowledged in the literature and investigated their presence in a series of cases in research and new product development (R&NPD) functions. The authors’ review distinguished between three main impacts: (i) improvement of those outcomes for which metrics are defined; (ii) increased motivation of the R&NPD staff; and (iii) improved communication/relations between R&NPD staff and management. Although they chiefly concentrated on an applied research group, Loch and Tapper (2002) described in depth the effects of a real PMS implementation. The empirical evidence they provided showed that the measurement system can contribute to shape behaviors and improve desired outcomes. Davila (2000) discovered that an intense use of management control systems has a positive effect on NPD project performance; the use of cost and product design information was also found to be positively related to performance. On the contrary, time information hindered the achievement of established goals, supporting the argument that too much emphasis on formal measurement may perhaps limit innovativeness. Furthermore, Kerssens-van Drongelen and Bilderbeek (1999) identified a relationship between the PMS-designed (and implemented) features and their impact. They found that the most effective systems are those characterized by a monthly measurement and that entail the involvement of representatives from marketing or (internal) customers in the measurement procedures. On the contrary, the least effective ones are based on a measurement each year or every six months carried out solely by R&D managers. In addition, whereas less effective systems aim chiefly at controlling and correcting the measured projects, the purposes of the most effective ones are broader, including the improvement of learning, communication, and people motivation. Nevertheless, there are almost no literature contributions suggesting how NPD project managers should look at the PMS effects and use them for improving the effectiveness of the measurement system, perhaps through a redesign of some of its building blocks or a modification of the adopted implementation principles. This is a
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fundamental aspect from a managerial point of view, considering the importance that literature on management control places on the concept of control feedback (e.g., Azzoni, 2006).

This brief literature overview shows that although the implementation phase is largely acknowledged to be a critical determinant of PMS effectiveness, empirical evidence in this area is scarce and fragmented. In particular, what is missing is an attempt to develop a comprehensive reference framework that can help managers during all the phases of effectively measuring NPD projects performance, i.e., the design of the PMS, its implementation, and in-process refinement. This is the major purpose of the case study analysis discussed in the following section. The analysis validates the implementation guidelines and the PMS effects that have been identified through the literature analysis. Moreover, a detailed investigation of a real and complex NPD environment, where a strong commitment toward performance measurement was in place is described. The analysis will study if and how a firm encounters obstacles when implementing a PMS for NPD and whether actual use of the system leads to an in-progress refinement of the measurement system itself, and will also develop a reference framework that is capable of providing managerial guidance to R&D managers involved in the design and actual usage of a PMS for NPD projects.

The Case Study

The purpose of the case study is to discuss actual design and implementation of a PMS for NPD activities, so that the principles and approaches suggested in the literature can be better understood, enriched, and systematized into a reference framework. The development project that has been studied is the M-346 project undertaken by Aermacchi, one of the most widely known Italian aerospace companies.

Research Method

Coherently with most literature dealing with R&D performance measurement, the empirical research we conducted is based on a single case study methodology. In spite of the largely acknowledged limitations of this approach, especially in terms of reliability and validity (Ginsberg & Abrahamson, 1991; Yin, 1994), the case study method has the capability to capture the whole complexity of the studied phenomenon and its softer aspects, which could hardly be grasped if quantitative methodologies (e.g., surveys) were applied. Considering the aim of the empirical study, i.e., to deeply study the actual design and implementation problems of a PMS, the aforementioned advantage of the case study methodology has turned out to be a critical point in the selection of the research approach.

Aermacchi was thought to be a very suitable company for the empirical analysis first because of its strong dependence upon R&D activities and, especially, upon the efficiency and effectiveness of development processes. Moreover, the choice to study specifically the M-346 project is mainly due to its strategic importance, which translated into a high level of top management commitment. Because of these contextual factors, top management clearly felt the need to implement an ad-hoc system for the measurement and control of the M-346 project’s advance and performance. These conditions defined an ideal context for studying PMS design and implementation problems.

Information was collected using three main sources: interviews, internal documents dealing with Aermacchi and its M-346 project, and publicly available data, systematically compared in an iterative triangulation process. The basic approach to data collection applied in the case study consisted of gathering, prior to personal contacts, as much information as possible from internal and publicly available documents. Direct interviews were used to discuss and analyze previously obtained data. Almost all interviews were conducted with the chief of the planning and control unit and with the chief of project engineering: they mainly focused on the design and implementation criteria of the PMS and on how each has been modified as a result of feedback analyses. Some interviews were also conducted with participants from human resource management and administration and control in which Aermacchi’s general features were discussed and the strategic and environmental contextual factors regarding the design choices for the M-346 project PMS were explained.

There are three main limitations to the applied research methodology. First, the empirical basis was mainly direct personal interviews with the company’s top managers, allowing for empirical results to be likely biased by distorted reconstructions and rationalizations. An effort has been made to mitigate these undesired effects, i.e., the triangulation of data drawn from different informative sources. Second, it has to be considered that the subject of the empirical study is a single project that is likely to last approximately nine years. As a consequence, the suggestions and insights it provides, in terms of PMS design and implementation, do not take into account the problems emerging when a company is simultaneously engaged in many development projects to be balanced. When a portfolio of R&D projects has to be monitored, in fact, the PMS design principles and implementation aspects differ from the case of a single project performance measurement and control, e.g., with regard to the risk and strategic factors (Nixon, 1998). Finally, as with most single case studies, the empirical research does not allow for any systematic generalization. However, it was not an intention of this empirical investigation to generalize from a single case study; the aim was to study the
suggestions given by the literature in an actual and extremely complex context in order to systematize and enrich them.

**Aermacchi and the M-346 Project**

Aermacchi is a leading Italian company in the design and production of trainers for military pilots. Aermacchi is able to offer a wide range of products that meet the requirements of all training phases: primary, basic, advanced, and lead-in fighter. Aermacchi has sold about 2,000 trainers to more than 40 countries so far, and has collaborated in major international military programs. The experience gained in the military sector has allowed the company to also extend its business to the civil aviation field, which currently accounts for 35% of its turnover. In July 2003 Aermacchi was integrated into the Finmeccanica Group, which now retains 99% of its equity. The company's facilities are located at Venegono Superiore (Varese province), and its workforce totals about 1,800. Facilities include laboratories and workshops for structural tests, a wind and a water tunnel, and an airfield for flight test activities. Aermacchi has always designed and developed its aircraft autonomously using highly qualified personnel and leading-edge technologies. Since its establishment, the company has constantly expanded and enhanced its activities to rank high in the sectors of military trainers, military, and civil programs.

The first new generation of advanced and lead-in fighter jet trainers, the M-346, is currently being developed. It represents the most important program for Aermacchi, particularly in view of the future joint re-equipment of European Air Forces training schools (Eurotraining program).

The strategic intent of the company is to reinforce its leadership in the business area of military trainers design and manufacturing, where it has been developing long-term and state-of-the-art competencies. Competition in this market arena is very strong, because many companies from the United States and other European countries compete with each other on a worldwide scale. These firms are far larger than Aermacchi, but the development and sale of trainer aircraft do not represent their core activity. The high degree of specialization of the Italian company's skills has proved to be a powerful competitive weapon in this sense. Moreover, the key to competitive advantage in the business of military trainers consists in the capability to design and implement aircraft features reflecting the evolution of combat aircraft developed by large firms or industrial consortia.

The M-346 project was launched by Aermacchi in January 2000, and the first flight took place on July 15, 2004; the aircraft to be subjected to the FOC (Final Operation Capability) certification by the Ministry of Defense will be delivered in 2009. It is a great challenge to succeed in making a totally new military aircraft flight in five-and-a-half years, and requires incredible financial, organizational, and managerial efforts. This is especially true when the aircraft incorporates most of the state-of-the-art technologies available in the military aerospace industry. The first challenging objective for Aermacchi, therefore, has been to provide the best balance between high-training effectiveness and low life-cycle costs, making the aircraft truly representative of the next-generation combat fighters. The goal of building an aircraft utilizing simplicity of design and construction, standardization of components, careful selection of equipment, enhanced reliability, and maintainability resulted in an aircraft with lower acquisition costs than other advanced/pre-operational trainers, together with lower operating and support costs. The second challenging requirement was undoubtedly the tight timetable: about four years from the start of the program to completion of the first prototype. Given Aermacchi's size, there was no room for doubt about the strategy to be adopted. The only possible solution was to set up a dedicated integrated product team (IPT) responsible for operating decisions and to make available all the professional skills needed to complete the program. This took a little time, but a “modular” approach allowed all the necessary functions to be assembled gradually around a nucleus of people fully immersed in the original project and with program management expertise. The program management team was given considerable operating autonomy and had a free hand in designing, building, and testing prototypes, and in carrying out “administrative” (technical, operating, and commercial/contractual) functions to manage partners and suppliers, and in carrying out “administrative” (technical, operating, and commercial/contractual) functions to manage partners and suppliers (see Figure 2 representing the IPT structure). A concurrent engineering environment was adopted for the M-346, which meant organizing activities through a process approach and concentrating all work areas around the testing department where prototypes are built. Particular attention was paid to defining the ground rules—namely, specific procedures integrated within the company's normal standards, which aimed to ensure that the program proceeded according to plans. One of the program's most important aspects was related to the management of partners and suppliers, especially engineering companies, given the project's large number of interfaces and high volume of outsourcing, which in some areas exceeded 60% of total resource commitment. This was new territory for Aermacchi, and required it to monitor program activities and take great care in defining the relationship, logistic, contractual, and IT models needed to run a “networked” company that could share project data and documentation efficiently, while complying with the required standards of security and confidentiality. The idea was to establish a collaborative environment that would
allow an exchange of views between similar functions at Aermacchi and its suppliers, within the framework of the underlying contract.

A total of 336 people, some drawn from the firm’s stable workforce, and others who are specifically employed from different contractual forms (temporary or permanent), are part of the IPT. This structure has so far proved to be successful, especially in terms of the simplified product integration it allows. In any case, especially at the beginning of the program, the project members found it difficult to work in a team and according to a “process approach,” because they were used to belonging to a functional structure. The IPT’s internal structure was not stable over time; according to the needs that emerged during the project progression, work groups were created and dismissed, further enhancing the integration of team members with different professional experiences.

In other words, the IPT team acts as the “design authority” that is responsible for the entire M-346 program’s success. A planning and control team within the IPT was created, which directly reports to the chief of the M-346 program and is assigned the responsibility of designing a performance measurement system (PMS), and guiding its implementation. As previously clarified, the fundamental objective that Aermacchi’s top management and the chief of the M-346 project gave to the planning and control team was to strictly monitor the project’s advance, i.e., to evaluate the compliance with cost and time targets defined in the strategic planning phase.

The following section discusses the criteria that were adopted in designing the performance measurement system.

The PMS Design

In the design of the PMS, project time and costs were the basic performance dimensions to be monitored and were mainly intended in terms of respect of the scheduled milestones and budgets. However, the planning and control team thought that they were too aggregate and needed to be absolutely detailed into lower-level performance for effectively monitoring and controlling the project advance. The identification of the specific indicators and their hierarchical organization were supported by a WBS (work breakdown structure) approach, whose starting points were the three aircraft prototypes that guided the whole development process. The tasks to be undertaken for the realization of each prototype were then disaggregated with increasing detail, until sets of homogeneous activities were identified. These were called “orders” and aggregated all the activities necessary for building a specific aircraft component to be internally realized or outsourced to external partners.

For each of these orders a document was produced, called the “approved budget,” that indicated time and cost targets for the order itself. The objectives defined within these approved budgets deal with costs for internal working hours, direct material costs, equipment costs, internal set of activities completion date, cost for acquisition of external services, and delivery date for externally acquired technical services. The respect of these budgets was not evaluated only after the end of each set of activities; an in-progress monitoring process was designed with a monthly frequency. This was thought to be a prerequisite for the timely implementation of eventual corrective actions. The approved budgets and their periodical evaluation thus represented a first level of performance measurement in the PMS, at which the control of the several external partners’ performance takes place.
Furthermore, each order requiring internal (i.e., not outsourced) activities was further disaggregated into far more detailed tasks called “work packages,” which were subject to a physical control focused on their outputs. The interesting point is that this level of control was designed to have a dynamic nature; the applied indicators should vary according to the current phase of the development process, in the sense that metrics were selected for measuring the performance critical for internal clients involved in the downstream phases of the development process. For example, in the development phase before the assembling of the first prototype, selected indicators were: n approved drawings/month and n stipulated purchasing contracts/month. The standards to evaluate performance against were mainly drawn from Aermacchi’s past projects although these were modified in order to consider the strategic criticality of the M-346 program. The control of work package output during the assembling phase of the development process is, on the contrary, far more difficult, because assembly activities are harder to standardize. A chosen indicator was n built components/week, but in this case, the project advance and the reference standards were mainly estimated on the basis of experts’ opinion (subjective indicators). In the final phase of the assembly process, when the first aircraft prototype is available, it is possible to apply the metrics: n functional tests/week and n ground tests/week, and the reference norms are those commonly used in the avionic industry. During the flight tests phase (which is contemporary to the certification process) a selected indicator was n flights/month, to be compared with standards typical of military aerospace and Aermacchi’s past projects. The planning and control team thought that a monthly measurement frequency for these work-package measures would be optimal, but this was not considered as a fixed parameter. In other words, it was decided that this frequency could vary according to the progression of the project and to information gathered from previous measurements.

Furthermore, it was decided that, after the evaluation of the aforementioned indicators, a variance analysis should be conducted so that the reasons for an eventual misalignment could be identified. The results of the variance analysis would be shared and discussed with the IPT members, who were also involved in the definition of the standards to measure performance against (shared objectives).

The control team decided to integrate all of the described metrics into a single earned value indicator, a percentage that evolves over time with the project’s advance and describes its overall state of completion (Anbari, 2003; Barr, 1996; Hatfield, 1996; Singletary, 1996). It should be periodically compared to planned values so that the program’s advance could be comprehensively monitored. The earned value should be used to dynamically modify the measurement frequency of the work packages indicators; this frequency could be enhanced whether the percentage of completion is lower than scheduled values, and reduced in the opposite case. This way, the project is more strictly monitored when a critical situation emerges.

The planning and control team decided that all of the designed indicators would be applied to the IPT as a whole, or, at least, to the subteams that were created and dismissed according to the project’s needs. As a consequence, the designed incentive system was based on team performance and not on individual results.

The PMS Implementation

The analysis of the PMS implementation for the M-346 project reveals that many of the basic principles identified in literature as critical for guiding the implementation of management control systems were actually applied in the studied case.

First, commitment from high levels of top management was maintained throughout the project to create and foster a shared belief about the benefits of an effective performance measurement. Two different initiatives were undertaken for this purpose:

• A formal kick-off meeting was organized at the very beginning of the project for the purpose of communicating the basic features (especially, the objectives) of the PMS to the M-346 project team members. This turned out to be very useful for preventing the PMS to be considered as a hostile phenomenon capable of causing unfairness in individual evaluation.

• Training sessions and workshops were organized to familiarize the team members with using performance measures to encourage critical observations and discuss the system features for the purpose of increasing the team involvement. During these sessions, data collection procedures were illustrated in detail; it should be noted that data collection was facilitated by the establishment of a central access point on a computer network and by keeping the user interfaces at a straightforward level without jargon and abbreviations.

During the implementation of the PMS some difficulties emerged, that nevertheless did not impede the measurement system to be effectively applied. These problems made it impossible to implement all the PMS features as they were established during the design phase, but, at the same time, suggested how to redesign them in order to enhance the PMS coherence with its actual measurement environment. Some examples of these difficulties follow:

• Some indicators included in the PMS required high measurement frequencies because of their inherent nature (e.g., n approved drawings/month, n of functional test/week). Nevertheless, these metrics were perceived as too constraining by team members.

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and their precision often questioned. For instance, technical people believed that measuring the number of drawings released in one month was meaningless when used to control complex activities that inevitably require several iterations before a definitive version of the component can be released. As a consequence, the planning and control team actually decided to adopt a more flexible formulation of some critical indicators and to avoid compelling rigid time specifications.

- This entailed that some characteristics of the designed measurement process had to be modified; in particular, requirements about the control frequency were significantly “relaxed.” It was common to postpone measurement deadlines after the planned milestones in those periods that turned out to be critical, e.g., because of unforeseeable technical problems so that no performance measurement constraints could influence people’s commitment.

- During the PMS implementation, the planning and control team realized that, because of software development project problems, it was impossible to actually implement the earned value in-progress control. This specific element of the PMS that was envisioned during the design phase was gradually introduced in line with the availability of software releases.

As far as the PMS effects are concerned, the case study outlines some interesting impact areas. First, the visibility of the project team in the firm increased after the successful implementation and use of the measurement system. This was the first time that Aermacchi used such a sophisticated managerial tool, and this was publicly acknowledged by the firm’s executives. Second, thanks to the use of the PMS, the critical project performance was effectively monitored and possibly improved. Although quantitative measures are not available, the project managers strongly believed that the measurement system has significantly enhanced team members’ attention toward efficiency and effectiveness and improved communication and coordination. Third, it should be noted that project participants sometimes complained about the excess of control entailed by the measurement system, despite the previously mentioned efforts to prevent these negative effects. Furthermore, during the actual use of the system, the planning and control team realized the need to adapt some of the PMS designed features to unforeseeable measurement requirements that came into view. Some examples follow:

- Sometimes the variance analysis undertaken on gathered measures revealed that the designed standards were either impossible or too simple to achieve. The planning and control team hence realized that unpredictable events, typically occurring during the project advance, can significantly undermine standards’ adequacy. Therefore, they decided to redesign the established PMS standards through the use of a detailed risk assessment (scenario analysis) that brought far more reliable norms to measure performance against.

- With the project advance, an unpredictable necessity to motivate team members emerged due to the break in the positive tension that characterized the initial phases of the program. This new critical goal for the PMS brought the planning and control team to introduce, in the set of monitored indicators, some metrics to be individually assigned and connected to an incentive scheme, although team-based measures were still prevalent.

Another unpredictable effect of the PMS turned out to be its capability to effectively support company-level directional accounting. In parallel with the M-346 project, Aermacchi’s top management started the development of a “tableau de bord” that should collect and synthesize, at the overall company level, all the performance information gathered from the several responsible organizational units. In this context, the M-346 project team was capable of efficiently collecting and providing up-to-date information thanks to the PMS that was actually in place.

Another positive effect of the measurement system use deals with the accumulation of learning concerning NPD management and project monitoring techniques it has allowed. The project-control documentation and procedures established by the M-346 PMS turned out to be critical in fostering the organizational learning that has been very useful also in other development projects.

Finally and more generally, the measurement system turned out to be very useful in fostering project coordination and communication. On one hand, through the identification of the relevant development tasks and their sequence, it has in fact allowed a rational organization of the workflows. On the other hand, within the team it has facilitated the spread of relevant information about the project’s advance and fundamental achievements.

Designing and Implementing a PMS for NPD Projects: An Overall Framework

The literature review and the analysis of the Aermacchi case have allowed us to deeply investigate the challenge of measuring performance in an NPD project. The managerial implications of this research can be synthesized in the framework depicted in Figure 3, which is filled with information drawn from the Aermacchi case.

This framework basically suggests that R&D managers willing to effectively measure the performance of the NPD projects they are responsible for should focus on three fundamental elements of the PMS: features, implementation, and effects.

The first fundamental step for effectively measuring NPD performance is to design the PMS basic features
so that they fit within the context where the measurement system is going to be applied. The design of the PMS has not been specifically the subject of this paper; for example, refer to Frattini, Lazzarotti, and Manzini (2006).

Moreover, the framework in Figure 3 shows that adequately designing the elements of the PMS is not enough for an effective performance measurement; R&D managers should also define appropriate implementation principles that allow them to translate the PMS designed features into practice. In this respect, the most important guidelines consist of: (i) accepting a certain degree of incoherence between designed and implemented PMS characteristics, which is critical because of the unforeseeable difficulties that often emerge when the measurement system is put into practice; (ii) ensuring a gradual introduction of the PMS, e.g., starting to use it for a limited set of activities within the NPD process and then extending it to a larger portion of the process; (iii) ensuring that data collection procedures are simple to follow; (iv) ensuring that top managers actually perceive and communicate throughout the company a compelling need to measure NPD performance; and (v) building awareness (e.g., through ad-hoc kick-off meetings) among team members about the features of the PMS and, especially, its objectives. Furthermore, the framework underlines the importance that project managers during the implementation of the PMS carefully analyze the eventual problems and difficulties that come into view (typically, complaints about the stiffness of the measurement system) and evaluate the possibility to modify certain PMS-designed features (e.g., the frequency of the measurement and the indicators to measure performance dimensions) to overcome them. In the Aermacchi case, for example: (i) some designed indicators would have implied unbearable efforts when implemented; (ii) the designed process aspects (i.e., the control frequency) would have led to an excessive rigidity in their application; and (iii) the implementation of the earned value would have required the immediate availability of an ad-hoc software to gather the necessary information to carry out calculations and elaborate the overall value.

![Figure 3: The overall reference framework.](image-url)
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As a consequence, PMS modifications or postponements were necessary to allow the practical operation of the system.

Finally, the framework outlines the need for project managers to carefully monitor the effects of the measurement system usage and to employ them for refining both the PMS features and the established implementation principles with the purpose of enhancing its overall effectiveness. Examples of refinements (drawn from the Aermacchi case) of PMS features are as follows:

• When analyzing the gathered performance indicators, one may discover that the designed standards are actually impossible (or too simple) to achieve; as a consequence, this process aspect needs to be appropriately revised.

• During the measurement system usage, the necessity to motivate team members may perhaps emerge (e.g., after a negative assessment of the project performance); this could lead to an enlargement in the set of the designed PMS objectives and to the introduction of some indicators to be individually assigned.

• During the PMS usage (e.g., when critical evaluation points get closer) team members may be disappointed about the excess of control entailed by the PMS; this should lead to a mitigation (perhaps temporary) of the control frequency.

Similarly, an example of redesign of an established implementation principle follows:

• In case of team members’ disappointment, it could be useful to foster a sort of paternalistic top management culture that reduces the fear of measurement and, therefore, the resistance to implementation.

All told, the framework developed in this paper underlines the importance of a flexible design and implementation of the PMS for NPD and a continuous and proactive analysis of the effects of its usage. In other words, once the PMS has been designed, it is not to be conceived as an unchangeable entity. Instead, its effectiveness is mainly due to a continuous readaptation of the designed features to the context where it is implemented and used.

Finally, the analysis of Aermacchi’s experience points into evidence some further effects of the PMS use—for example, improvement of the monitored performance, visibility of the project team, availability of information that supports corporate accounting practices, coordination, and communication within the project team. These effects outline the complexity of performance measurement in NPD: its ultimate outcomes are typically various and unpredictable, and can foster either the quality of the NPD project itself (e.g., in terms of communication and coordination within its participants or improvement of NPD performance), and the relationships between the NPD team and the rest of the company (e.g., in terms of improved consideration and visibility of the team or simpler accounting procedures at the overall company level).

Conclusions and Further Research Steps

This paper studied the problem of designing, implementing, and actually using a PMS in an NPD project. In particular, it aimed at inquiring the implementation of the measurement system, identifying its likely effects, and understanding how they can be actually exploited for improving the PMS effectiveness, since these topics have been almost totally neglected by scholars so far.

The literature contributions available on the subject were carefully reviewed; this allowed us to identify some general principles to be followed when implementing a PMS for NPD projects. Moreover, a list of the most likely effects of the system usage in an actual NPD environment was drawn. Then, a case study was conducted in order to investigate the identified design and implementation guidelines in action, within a real and extremely complex context. Moreover, the empirical study allowed us to identify some critical feedback impacts that the effects of the system’s usage should have on the design and implementation of the PMS itself. The development program for the new M-346 jet trainer by Aermacchi, which is at the moment still in progress, was selected because: (1) it represents an example of a complex NPD project; (2) it is critical for Aermacchi’s present and future competitive advantage and, consequently, is carried out under rigid time and cost constraints, that require the implementation of a sophisticated control system; and (3) it is still in progress, thus the possibility to study in real time the implementation and the operation of the designed PMS together with its effects.

The results of the literature analysis and, especially, information drawn from the case study, were organized within a reference framework that turns out to be a valuable managerial tool for R&D and project managers because it identifies: (1) the elements to be taken into account for a proper design and implementation of a PMS for NPD projects; (2) the likely effects that managers should expect from the PMS use; and (3) the necessity of an in-progress adaptation of the PMS designed features and implementation principles on the basis of the effects of the system operation.

Overall, it outlines that a critical point for the success of a PMS for NPD projects seems to be the capability to recognize that not all of the designed features can be directly translated into practice. During the system implementation, in fact, many problems and difficulties generally surface, together with new requirements for the PMS that is almost impossible to foresee in the design phase. This requires that, with the NPD project advance, the features of the PMS are modified according to the emerging problems and necessities. These types of feedback should not be hindered; besides, project managers should foster them so that an
improvement in the PMS performance is continuously achieved. Among the elements of the PMS, it seems that the process aspects (basically, the frequency of the measurement and the standards to measure performance against) are the most likely to be subject to continuous adaptation.

The suggested framework therefore turns out to be a managerial tool useful for supporting a flexible design of the PMS that adapts the features of the latter to the mostly unpredictable effect it shows during its actual application. During the system use, project managers should proactively identify the feedback its effects have on the designed features and implementation principles, and to adapt them to the circumstances that emerge.

Furthermore, the case study showed that the PMS helped enhance the project visibility within the company, because it allowed for the gathering of quantitative and objective data that could undoubtedly state the NPD process success. Moreover, it emerged that the PMS was actually an important instrument for supporting communication and coordination among project members, because it required that the set of project activities was clearly identified and understood before the project started. Finally, it proved to be capable of stimulating organizational learning: the generated documents, project reporting, and measurement procedures represented an important body of knowledge that Aermacchi can apply to other future development projects.

Obviously, the results of this paper have an exploratory nature; a first possibility to validate them would be to study NPD performance measurement initiatives undertaken by other aerospace firms. As far as this issue is concerned, we believe that the performance of their NPD processes (as confirmed by the managers we interviewed at Aermacchi).

They would represent, therefore, an ideal setting for studying the issues addressed in this paper, for identifying possible differences and similarities with Aermacchi’s experience, and, therefore, for understanding the impact that very dissimilar contextual variables (e.g., in terms of firm size and governmental influence) are likely to have on NPD performance measurement practices. Furthermore, we believe the results discussed in this paper are useful across several industries; this assumption needs to be corroborated by studying NPD performance measurement initiatives undertaken by firms operating in other industrial settings. Finally, a further topic that is worth investigating in order to improve our understanding of NPD performance measurement is the integration of the PMS for NPD projects and, more generally, R&D activities, within the management control system implemented at the overall company level. This is a prerequisite for the identification of valuable process measures capable of controlling the performance of the firm’s innovation efforts.

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Vittorio Chiesa is a full professor of R&D strategy and organization at Politecnico di Milano. He is a member of the Management Council and of the Faculty of MIP (the Business School of Politecnico di Milano), where he is responsible for the technology strategy area. He is the chairman of the Italian Association of Management Engineering and a member of the Steering Committee on Biotechnology of the Italian Ministry of Industry and of the Network of Biotech Officials at the European Commission.
He is the author of several books and of more than 100 publications in the fields of R&D management, R&D internationalization, and technology strategy.

Federico Frattini is a PhD candidate in management, economics, and industrial engineering at Politecnico di Milano. He was a lecturer in business economics and organization at Università Vita-Salute San Raffaele (Milano) and previously at Università Carlo Cattaneo—LIUC (Castellanza, Varese). His research interests concern the management and organization of R&D activities, R&D performance measurement, and the commercialization of innovation in high-tech markets. He has published papers in the *International Journal of Innovation Management*, the *International Journal of Technology Management*, and the *R&D Management Journal*.

Valentina Lazzarotti is an assistant professor at Università Carlo Cattaneo—LIUC (Castellanza, Varese). She teaches economics and business organization and management control systems at LIUC. She obtained her master’s degree in economics from Università Bocconi (Milano). Her research interests concern R&D performance measurement and organization.

Raffaella Manzini is an associate professor at Università Carlo Cattaneo—LIUC (Castellanza, Varese). She teaches economics and business organization and technology strategy at LIUC and Politecnico di Milano. She obtained her master’s degree in management engineering from Politecnico di Milano. Her research interests concern technology strategy and planning, R&D management, and organization.
Motivation: How to Increase Project Team Performance

Tonya M. Peterson, Kohl’s Corporation

ABSTRACT

Stimulating team member performance requires a project manager to harness many different interpersonal skills. The level of enthusiasm applied toward project efforts has a direct impact on the project results. Because motivation can inspire, encourage, and stimulate individuals to achieve common goals through teamwork, it is in the project manager’s best interest to drive toward project success through the creation and maintenance of a motivating environment for all members of the team.

KEYWORDS: team performance; project success; motivation

INTRODUCTION

Motivation can inspire, encourage, and stimulate individuals and project teams to achieve great accomplishments. Motivation can also create an environment that fosters teamwork and collective initiatives to reach common goals or objectives. The level of motivation an individual and/or team applies to project efforts can affect all aspects of project results, including a direct impact to the triple constraint project success factors (i.e., on time, within budget, high quality, met scope/customer expectations). Knowing this, it is in the project manager’s best interest to understand the reason for demotivation in order to achieve project success through the creation and maintenance of a motivating environment for all members of the team.

The book Essentials of Supervision defines management as “achieving results through others” (Simpson, Gould, Hardy, & Lindahl, 1991, p. 5). Stimulating team member performance requires a project manager to harness many different interpersonal skills, including good communication and the ability to train others, make decisions, lead by example, and create a positive, motivational environment by understanding and associating with the key components of motivation. Unlike most tangible project management functions, motivation is not designated by the project manager to a team member; instead, motivation is internal to each team member and derived from a team member’s desire to achieve a goal, accomplish a task, or work toward expectations. Motivation can be considered the conduit of ambition applied to the desired accomplishment.

Just as some teams are stimulated to achieve great success throughout all project efforts and assignments, other project teams may remain uninspired and shuffle meekly, quietly, and unpretentiously toward project completion. With this in mind, there are two opposing questions that have often been raised when reviewing drivers and motivators of individual and team performance. These resounding questions are “Can a project manager motivate others to perform?” or is it more accurate to ask “How does the project manager create an environment conducive to outstanding team synergy and peak individual performance?” (Scholtes, 1998). The subsequent research provides the answer to these questions as well as a further exploration of motivational approaches a project manager can apply to the project team environment.

Motivational Theories

McGregor’s Theory X and Theory Y

McGregor’s Theory X and Theory Y motivational approach identifies polar differences in subordinates. Theory X team members are classified as individuals who require constant attention, do not want to work, need punishment to achieve desired effort, and avoid added responsibilities. In contrast, Theory Y individuals are classified as team members who want to work, find the job satisfying, are willing to participate, do not require a controlling
environment, and seek constant improvement or opportunity (Kerzner, 2003, pp. 194–195). An additional suggestion for managers who implement the use of Theory X and Theory Y is that they must apply flexibility when assigning an individual to one of these two categories as each person has the potential to change mannerisms, work habits, and enthusiasm toward work throughout years of service, within each project, and for various positions, assignments, or responsibilities.

• **Roles and Responsibilities**—A project manager using a Theory X motivational approach will naturally create an authoritative and controlling work environment. Within the project manager role of a Theory X environment, the project manager will dictate decisions. The role assumed by project team members within a Theory X environment is to evade added responsibility and do as minimal amount of work as possible to achieve the project goals without punishment. On the other hand, Theory Y motivation naturally creates a participative environment with strong manager-employee relations. Within the project manager role of a Theory Y environment, the project manager will seek input and assistance from the project team to obtain the best possible alternative for project implementation. The camaraderie exhibited between the project manager and the project team is one of teamwork, agreed-upon separation of duties and responsibilities that will collectively be achieved through the competence of the individual team members involved as well as the desire for the team to ultimately obtain project success (Kerzner, 2003, pp. 194–195).

• **Advantages**—Theory X and Y identifies a gap commonly found between different types of individuals within the workplace. Based on the differences, a distinctive motivational approach may be applied to achieve the desired results. For example, a new employee with minimal exposure may commonly fall within the Theory X category as the team member may not initially understand project tasks, may feel overwhelmed with current efforts (thereby avoiding further responsibility), and may need guidance throughout assigned work efforts. These new employees may also require clear forms of punishment for nonperformance. Having the project manager provide individualized attention to the Theory X team member will ensure the team member stays “on-task” and progresses according to plan. On the other hand, an experienced individual may naturally fit into the Theory Y category as the team member may understand both expectations and consequences, have a desire to learn and grow, and generally find work fascinating and enjoyable. Having the project manager provide an environment that allows the Theory Y team member to be challenged, grow, participate, and take ownership for project responsibilities, will allow the project team member to stay motivated and achieve project goals or objectives.

• **Disadvantages**—Knowing that a manager may have a collection of both Theory X and Theory Y individuals on the project team, leadership and decision-making efforts may become more difficult. For instance, Theory X team members require more of an authoritative environment neatly controlled by the project manager. However, an authoritative environment will be demotivating to the Theory Y team members as there is minimal need for such a degree of control. For Theory Y team members, a participative environment is more conducive for motivation, thereby requiring a project manager to implement a balanced leadership style to accommodate all types of team members (Kerzner, 2003, p. 195).

**Herzberg’s KITA Motivation**

Herzberg’s KITA motivation, or “kick-in-the-pants” approach, is based on the idea that both positive and negative external motivators exist. KITA is built on the idea that the manager requires the use of “carrots” (positive KITA) or “sticks” (negative KITA) to drive task completion. Often, the positive KITA inspires a competitive work environment that creates both winners and losers (Scholtes, 1998, pp. 38–39). An alternative suggestion to KITA implementation may be to create a collective competition where the teamwork drives the achievement of project goals, objectives, and team success.

• **Roles and Responsibilities**—As mentioned, KITA motivation naturally creates a parent-child relationship between the manager and team members (respectively). Within the parent role, the manager applies both the responsibilities of encouragement and regulation. At times, the manager will personally assist with the team member’s success to support the project efforts. While at other times, the manager will consider the need to control the situation as the team members are viewed as undependable and inept. For the role of the team member, KITA motivation stirs both productive and malevolent attitudes. The team member may exhibit constructive tendencies while competing for the “carrots.” In some situations, team members may lean toward spiteful acts as a result of a low-trust, low-respect environment (Scholtes, 1998, p. 41).

• **Advantages**—The KITA motivational approach allows the project manager to define the degree of control implemented within the project for adherence to project requirements and consistency with project methodology and efforts (negative KITA). The manager is also given flexibility to be the team champion. The team members are given the opportunity to obtain special recognition for personal goals and project achievement (positive KITA). The drive toward goal achievement produces important project or task completion.

• **Disadvantages**—The atmosphere that is created through this parent-child
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environment clearly aligns with an “I’m OK—you’re not OK” relationship position (Scholtes, p. 42). In other words, “I” (the manager) am competent and “you” (the subordinate) are not. Low trust quickly ensues. The subordinates believe the manager does not care about the team members as individuals. The distrust demotivates the team members to focus on themselves, rather than supporting each other, due to a lack of reasseurances for the collective importance of each individual within the team based on the negative KITA. The competition made available through the positive KITA can dissolve a team or a collective approach to accomplishing project objectives.

McClelland Achievement, Affiliation, and Power Motivation

Achievement Motivation

McClelland’s achievement motivation is driven by a need to succeed (Rad & Levin, 2003, pp. 80–81). Accomplishment, personal ambition, and a need to be good at what they do are additional attributes that are common among achievement-oriented individuals. Individuals who are driven by achievement are more likely to define clear goals as well as a course to goal attainment.

• Roles and Responsibilities—Because an individual who is motivated by achievement is self-driven, he or she is able to perform and function well both alone and within a team. The reason for this ability is that he or she is able to identify a clear objective and develop a “line of sight” to get there. In order for an “achievement” individual to flourish, provide an environment that will give him or her the ability to be creative, an opportunity that will expand beyond his or her current position or role, and tasks that are challenging: all components that provide a prospect of growth, success, and enhancement must be present.

• Advantages—Similar to “power”-driven individuals, “achievement”-driven individuals appreciate a challenge and are self-sufficient (Rad & Levin, 2003, pp. 80–81). To an achievement-motivated individual, life is about a personal challenge rather than a challenge with others.

• Disadvantages—On the flip side, individuals who have a tendency to be achievement-oriented may not know when to stop, quit, or accept failings. This constant battle to go beyond personal boundaries and extend individual abilities does have a price. The costs may result in signs of mental stress or physical fatigue.

Affiliation Motivation

McClelland’s affiliation motivation is driven by relationships and a need to work well with others. Individuals who are motivated through affiliation are drawn toward a friendly work atmosphere and will strive for team unity, team success, and commonality of team norms. Motivation through affiliation will steer an individual to assist others while promoting a collective team effort (Rad & Levin, 2003, pp. 81–82). At a glance, a person motivated by affiliation tends to be a “people” person, or an individual who would rather be with others than be alone.

• Roles and Responsibilities—An individual who is motivated by affiliation will naturally identify his or her role as a fellow team member willing to assist and support project efforts or decisions. Individuals drawn toward affiliation work well in roles requiring a high degree of internal or external communication, gaining team agreement, and presenting material to others. Without others to work with, communicate with, or support, the affiliated individual may actually lack motivation (Rad & Levin, 2003, p. 82). When working with an individual motivated by affiliation, the project manager is responsible for assigning project work that will naturally involve contact or collaboration with others and the creation of a project environment built on team support and common goals. Other areas within the company that “affiliated” individuals may be drawn toward are company-sponsored athletic teams or volunteer organizations. The project manager may also want to consider putting this individual in charge of all team lunches or other department events to further inspire the ability to associate with others.

• Disadvantages—On the flip side, individuals who are motivated by affiliation will result in an environment built on a sense of harmony, teams driven toward common goals, and a genuine desire to help each other (Rad & Levin, 2003, pp. 81–82). A direct result of affiliation motivation is less conflict for the project manager to resolve. The storming stage of team development may evolve quicker as individuals with an affiliation motivation want to work well with others.

Power Motivation

McClelland’s power motivation is driven by the ability to dominate and manipulate goals, direction, or decisions. Individuals who are motivated by
power are drawn toward the ability to offer input and access into a variety of situations from risk review and competition to a general need for appreciation or personal acknowledgment. Motivation through power will naturally steer an individual toward leadership opportunities (Rad & Levin, 2003, pp. 82–83). Most individuals driven by power will gravitate toward positions that include a level of control. Common “power” roles may be management, group leader (technical, business, etc.), mentor, or even process owner.

- **Roles and Responsibilities**—As previously mentioned, an individual who is motivated by power will naturally fill a leadership role within the project team. Individuals drawn toward power can be given ownership of broad tasks to drive toward collective team agreements, overcome inherent risks, and adhere to specific project objectives. Again, the project manager may want to place the power-driven individual in a role that would capitalize on the individual’s natural motivational tendencies yet be mindful of the need to manage conflict and ensure suggestions provided comply with project needs while offering personal visibility (Rad & Levin, 2003, p. 82). After assigning efforts to “power”-driven individuals, constant balance between appropriate levels of control and consistency with project direction are required to avoid rework, added costs, and conflicts.

- **Advantages**—A project manager has the ability to rely on the natural leadership tendencies of individuals who are motivated by power. The project manager can exude confidence in and seek assistance from power-driven individuals by assigning tasks to focus on reviewing alternatives, overcoming risks, and steering other team members toward common project-consistent objectives. Training of others, compliance with project objectives, and cultivating agreements are additional strengths of power-driven individuals (Rad & Levin, 2003, pp. 82–83). An individual motivated by power is self-driven and tends not to require a great deal of prodding for performance. These individuals will likely rise to challenges presented in order to apply additional control and influence in those areas surrounding them.

- **Disadvantages**—An alternative view of individuals who possess a strong desire for power includes the need to dominate, control, or have influence in all aspects of the project. Authority struggles may result between power-driven team members and the project manager, resulting in the need for the project manager to champion the power-driven team members through the assignment of specific tasks, ownership, or control. The project manager may also experience a higher degree of conflict with power-driven team members based on the need for power, a desire to persuade others, a skewed interpretation of project efforts (i.e., personal agendas), and an essential need for recognition (Rad & Levin, 2003, pp. 83–84). Knowing that power-driven individuals tend to influence directions, it is important for the project manager to offer clear lines of control or decision-making capability, as well as an assurance that consistency of direction is followed. Without these key steps, the project manager may need to spend additional time to refocus individuals on the proper inputs, alternatives, considerations, and/or decisions that are in alignment with the project direction.

**MBTI Personal Style**
The Myers-Briggs Type Indicator (MBTI) provides an ability to identify personal style based upon responses to a series of questions that collectively determine preferences and motivation tactics of each individual (Flannes & Levin, 2005, p. 43). MBTI provides a review of four common traits: (1) need for personal contact with others, (2) application of realism, (3) ability to apply logic, and (4) influences of judgment (Flannes & Levin, 2005). A combination of these four attributes helps to define an individual’s personality type. Knowing this information provides the project manager with the most motivating communication approach, task direction, and level of detailed project information that will stimulate each individual, thereby creating a functional working relationship or environment.

- **Advantages**—A clear advantage to the MBTI is the unique guide to team member motivation and preference that is made available. As a project manager, it is far easier to shape communication and interaction with each individual based upon his or her known personality style than it is to guess at what approaches work best. Because there is a percentage of preference applied to each of the four common traits, there is a delineation of primary and secondary personality preferences.

- **Disadvantages**—Not everyone is interested in taking an MBTI personality assessment. Without this information, the project manager would be guessing as to which personality style or preference the individual would fall into. Also, because the MBTI can be environmental- or situational-based, if the individual taking the MBTI assessment is not applying the questions to the work environment, the results may not be fruitful. Also, throughout the course of a lifetime, an individual’s MBTI tendencies can change, thereby resulting in the need to change the motivation methods.

**Motivational Mistakes**
As a project manager, you are exposed to a wide variety of personalities, different levels of expertise, and ranges of positional seniority along with unique backgrounds, cultures, and personal experiences of each team member. In addition, with today’s global business environment, it is extremely common for a team to be virtual. Merely
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beginning any project may be overwhelming to a project manager, outside of the diverse motivational needs presented by each team member involved in the project. Some project managers rely on existing work relationships that have gradually developed through hallway conversation and face-to-face contact that offers a project manager the opportunity to understand a variety of individuals’ drives and reward preferences. With limited involvement and minimal personal exposure with virtual team members, a project manager may begin to generalize or make assumptions on the needs and directions of the virtual team.

Unfortunately, a project manager may easily become trapped by introducing errors when preparing an inspiring project team environment. Too often, project managers may begin project efforts with intent to offer a stimulating environment; however, they may fall short by implementing common motivational mistakes. These common management mistakes as well as possible strategies to overcome the motivational gaps are explored next (Flannes & Levin, 2005).

“Whatever motivates me will motivate others.”
• Impact—At times, a project manager’s initial perception may be that everyone would be motivated just like he or she is. A common result of this mistake is a disappointment in team members who do not react to the stimulation provided.
• Resolution—Begin to identify the differences in others by initially providing a more personalized approach to motivation.

“People are motivated primarily by money.”
• Impact—Often, project managers have limited input on and availability to monetary rewards. Unfortunately, project managers often feel restrictive by this limitation.
• Resolution—Begin by focusing motivational tactics beyond monetary rewards. Consider offering input into team member performance for those individuals who do control monetary rewards for your project team members.

“Team members love to receive formal awards.”
• Impact—Though “praise in public, punish in private” is a common phrase within the management arena, a project manager must be very mindful of the fact that not everyone will desire a formal reward for completed efforts. The main concern is to avoid any negative response from the recognition offered either by the individual receiving the recognition, fellow team members, or other project teams.
• Resolution—if a formal award is deserved, be sure the team member would accept this form of recognition in advance. A wider acceptance of public awards may be gained through an entire “team” recognition for celebrations or accomplishments reached together, thereby avoiding the display of high regard for one team member. Influence a broader application of public recognition that could be applied or expressed by fellow project managers for their project team efforts.

“Give them a rally slogan.”
• Impact—The main premise of using a slogan is to provide a common theme the entire team can support to create some level of unity, resulting in greater motivation. However, the use of a slogan may provide only marginal benefit.
• Resolution—Consider using slogans as part of an environmental focus rather than as a project focus. Again, individualization is the key.

“The best project leader is a strong cheerleader.”
• Impact—Hype, positive attitude, generous support, and plenty of smiles. Though this can offer an encouraging environment, the consistent upbeat approach may not always be applicable to the project situations experienced, may become annoying to others, or may merely result in only a marginal impact.

• Resolution—Look at project management as a mentoring opportunity. Work with team members through situations by applying clarifications and understandings to provide a good learning opportunity of what to continue to do in the future and what to change. When things go well, look for the strong foundation, steps, effort, and application of knowledge/experience that was applied and resulted in the accomplishment. When things do not go as planned, look for the components that resulted in failure to seek out the learning opportunity in a desire to improve similar situations within the future.

“These people are professionals. They don’t need motivating.”
• Impact—Many project managers look at their team as a group of professionals who are educated and have some level of work experience. By not considering the importance of team motivation, the project manager may merely be trusting in assuming that the team requires minimal supervision or support. However, not everyone is a “self-starter” or driven, and many individuals work better when motivated to reach a goal and/or reward.
• Resolution—Treat the project team members as professionals, yet foster a motivating environment through those tools or rewards you have within your authority as a project manager.

“I’ll motivate them when there is a problem.”
• Impact—Waiting for a problem to arise may be too late for some team members and will likely result in the application of vast changes in order to create a motivating environment. Overall, this approach to motivation is a very detached managerial style.
• Resolution—Knowing that project management employs leadership as a key skill and leadership requires involvement, guidance, and support. Do not wait for a problem to occur prior to motivating your team. Instead, remain focused on the team.
and their individual motivational needs.

“I’ll treat everyone the same. People like that, and it will be motivating for them.”

• **Application**—Knowing that there are differences (i.e., culture, experience, education, personal, professional, position, etc.) in each team member instills a need to motivate each team member uniquely or individually. A reward or stimulus that suits an individual may be unappreciated or discouraging to another.

• **Impact**—Provide individual motivators based on unique, personal desires and drives of each team member. Again, when there are times that the team has attained key project milestones, a common team reward may be shared or celebrated.

### Applying Motivation to the Team Environment

Throughout the study and application of motivation, the project manager must realize the importance of individuality. Knowing what motivates each team member will provide the project manager the ability to connect team members to environments, assignments, responsibilities, and objectives that foster personal motivation. The encouraging impact of a human needs analysis provides the project manager with the ability to understand what teams and individuals desire most from their work and allows an ability to track personal work drivers to uncover the variety of basic human needs and motivators that exist within your project team.

As a project manager, the focus of motivational efforts should be applied to motivating others by ensuring a goal is attainable while breaking down any obstacles that may be preventing goal attainment. Another component of project manager focus should be the need to understand the individual motives of the project team members in order to assist in the alignment of rewards to personal preferences. Refer to Appendix A on motivational approaches for project team members, which can be used as a tool to assist in creating a motivating environment for each individual to work, while personalizing team member rewards.

### High-Performing Teamwork

An empowered team environment can assist in fostering greater motivation within the project team, department, and organization. Empowerment provides a key ingredient to building a self-directed work team or a high-performing team. Empowerment consists of four key components, including team member authority, capable resources, accurate information, and accountability for completed work. The collection, balance, and application of the empowerment components can associate a project team’s performance to a mixed stage of adherence within the People Capability Maturity Model (P-CMM; Fisher, 2000). The P-CMM defines the levels of high-performing team maturity as (1) Initial, (2) Managed, (3) Defined, (4) Predictable/Empowered, and (5) Optimizing (SEI_CMU, 2007). Some of the benefits of applying a People CMM focus within an organization or a team is the ability to create consistent practices, a means to implement process improvement, promote higher quality, and provide a motivational project environment (SEI_CMU, 2007). Refer to Appendix B for a guide on how to assess the company, department, project team, and individual level.

Rolling out a new project with clearly defined expectations and required processes for the project team to adhere to promote a consistent knowledge of performance objectives and project goals. The project team plays an important role in planning the project efforts from requirements, risk review, and quality plans to tasks, estimates, and order of task completion. The involvement of the project team within these critical project planning efforts provides two obvious benefits to the project manager: (1) the project manager will gain insights into the components, arrangement, and complexities of the project efforts for a more accurate overall project plan; and (2) project team members will feel greater ownership and acceptance of the project efforts. The result of the team’s involvement with the staged approach to project planning efforts provides a more realistic plan that the entire project team could agree to support (SEI_CMU, 2007).

Even with all the needed planning, well-defined processes and clear, known expectations, employee performance problems may still occur. To overcome potential performance problems, the project manager must continue to work with the team leads to monitor and measure employee performance according to defined expectations. When variance occurs, the project manager and/or team lead should mentor the employee by providing details regarding the agreed-upon expectations and performance exhibited to identify where performance or knowledge gaps exist and what changes need to be implemented to achieve performance objectives. This cycle of performance measurement, as referenced in Figure 1, includes variance identification, mentoring, and monitoring to continue to improve operations and eliminate performance problems.

![Figure 1: Performance measurement diagram.](image-url)
How to Increase Project Team Performance

Developing Team Culture
There is a variety of components that will help foster a positive team culture resulting in high team performance and team success. The implementation of the following directives will assist with overcoming the barriers to establishing a high-performance team.

- **Team Charter**—The preparation of a team charter will assist in defining individual and stakeholder roles. This document will clear up any ambiguity existing with the project needs, focus, objectives, common procedures, deliverables, and success criteria, allowing the project team to understand the common goals, objectives, and division of responsibilities (Rad & Levin, 2003). Refer to Appendix C for an example template available for team use.

- **Team Processes**—Define common team processes that will be used to accomplish project requirements, define standards, and clarify performance expectations. Ensure process documentation is available for all relevant identified processes within the organization, department, and project team. Provide identification of how performance will be validated and tracked for performance measurement/metrics purposes. Offer mentoring between project team members to allow all to be knowledgeable of the process (SEI_CMU, 2007).

- **Develop a Motivational Environment Built Upon the Unique Team Member Needs**—As the project manager, take the time to understand the differences and uniqueness with each team member. Personalize motivational strategies according to individual needs, desires, and goals.

- **Reward the Team and the Team Members**—Personalize rewards according to individual motivators and accomplishments achieved while celebrating team success. A good source of reward options can be found within 1001 Ways to Reward Employees (Nelson, 1994).

- **Foster Trust, Teamwork, and Open Communication**—Promote open communication and dialogue standards among team members through team meetings and general project communication. Allow all to provide input into project conversations. Require the team to respect each other. Accept all constructive comments made. Promote a participative leadership style that provides greater ownership of project tasks and decision-making authority (within defined guidelines). Engage in team building and team celebration activities.

- **Recognize Team Member Strengths**—Assign project tasks and roles according to individual strengths, knowledge, motivation, and development strategies. These approaches can assist in individual and/or team empowerment.

- **Develop a Mature Team**—After obtaining high team performance through the implementation of clearly defined standards, consistent, well-understood processes, team involvement with initial project planning efforts, and a motivational environment, the project team will have the possibility to focus on implementing process improvements to streamline, expand, and/or simplify tasks, responsibilities, processes, and/or project approach (Caltech, 2007).

- **Promote Project Success**—Continue to identify successes the team has accomplished (no matter the size). Be consistent with this team recognition to help the team feel accomplished and experience achievement no matter what the stage of project life-cycle development (Flannes & Levin, 2005).

Conclusion
Throughout the study and application of motivation, the project manager must understand the importance of individuality. To foster motivation within each team member on a project, the project manager must take the time to understand how every individual is motivated. Knowing what motivates each team member will provide the project manager the ability to connect team members to environments, assignments, responsibilities, and objectives that foster personal motivation. In other words, the project manager should avoid applying a broad application of motivation to all team members based solely on the manager’s perception. Taking the time to work with each team member to understand personal work drivers will allow the project manager to uncover basic human needs and individual motivators.

References


Tonya M. Peterson, PMP, MSPM, currently is PMO Project Manager at Kohl’s Corporation. She has over 18 years of information systems experience primarily in the financial and insurance sectors, with the past 12 years focused on project management. Her expertise encompasses strategic planning, project management, portfolio management, process improvement, quality direction, productivity metrics, instruction, and organizational efficiency. She is a college instructor and business consultant and has prepared and presented a variety of corporate training courses within the project management discipline.

Appendix A: Motivational Approach for Project Team Members

<table>
<thead>
<tr>
<th>Team Member</th>
<th>Role</th>
<th>Location</th>
<th>Development Goal</th>
<th>Motivation Factors—Employee Wants/Needs</th>
<th>Application Approach—Reward Considerations</th>
</tr>
</thead>
</table>

Appendix B: People CMM Process Areas

KEY:  

<table>
<thead>
<tr>
<th>Id</th>
<th>Organizational level</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>Corporate Management</td>
</tr>
<tr>
<td>D</td>
<td>Department Managers</td>
</tr>
<tr>
<td>P</td>
<td>Project Managers / Team</td>
</tr>
<tr>
<td>I</td>
<td>Individual</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maturity Levels</th>
<th>Developing Individual Capability</th>
<th>Building Workgroups &amp; Culture</th>
<th>Motivating &amp; Managing Performance</th>
<th>Shaping the Workforce</th>
</tr>
</thead>
<tbody>
<tr>
<td>5—Optimizing</td>
<td>Continuous capability improvement</td>
<td>Competency integration</td>
<td>Organizational performance alignment</td>
<td>Continuous workforce innovation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Empowered workgroups</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4—Predictable</td>
<td>Competency-based assets Mentoring</td>
<td>Competitiveness</td>
<td>Quantitative performance management</td>
<td>Organizational capability management</td>
</tr>
<tr>
<td></td>
<td></td>
<td>integration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3—Defined</td>
<td>Competency development Competency analysis</td>
<td>Participatory culture Workgroup development</td>
<td>Competency-based practices Career development</td>
<td>Workforce planning</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2—Managed</td>
<td>Training Development</td>
<td>Communication Coordination</td>
<td>Compensation Performance management Work environment</td>
<td>Staffing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Note. The areas of concentration and mastery are listed for each of the various stages of People CMM development.
How to Increase Project Team Performance

Appendix C: Team Charter

<table>
<thead>
<tr>
<th>Project Manager</th>
<th>Department</th>
<th>Phone</th>
<th>E-mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corporate Direction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corporate Mission</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corporate Vision</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corporate Values</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Commitment Statement</td>
<td>To:</td>
<td>In a way that:</td>
<td>So that:</td>
</tr>
</tbody>
</table>

Stakeholders

- Description of Project Sponsor Role
- Description of Product Manager Role
- Description of Project Manager Role
- Description of Development Team Role
- Description of Project Board Role
- Description of Change Management Role
- Description of Client Role
- Description of Client Support Role

Project Team

- Description of Project Manager Role
- Description of Project Coordinator Role
- Description of Team Lead [Developer, Quality Analyst, and Business Analyst] Roles
- Description of Business Analyst Role
- Description of Developer Role
- Description of Quality Analyst Role
- Description of Technical Writer Role

Project Direction

- Performance Objectives: Application
  - Team member performance
- Measures of Success: Success criteria:
  - Customer expectations
  - Project guidelines
- Scope and Boundaries of the Team’s Works: Inclusion statement:
  - Exclusion statement:
- Project Time Frame: Start date:
  - Implementation date:
  - Finish date:
### Appendix C: (continued)

<table>
<thead>
<tr>
<th>Deliverables</th>
<th>Deliverables: Milestones:</th>
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</thead>
<tbody>
<tr>
<td>Conflict Management</td>
<td>Purpose: Process:</td>
</tr>
<tr>
<td>Decision Making</td>
<td>Purpose: Process:</td>
</tr>
<tr>
<td>Communication</td>
<td>Purpose: Process:</td>
</tr>
<tr>
<td>Administrative Activities</td>
<td>Action Items: Prioritization: Time off:</td>
</tr>
<tr>
<td>Issue Escalation</td>
<td>Purpose: Process:</td>
</tr>
</tbody>
</table>

#### Approvals

<table>
<thead>
<tr>
<th>Project Sponsor</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Manager</td>
<td>Signature</td>
<td>Date</td>
</tr>
<tr>
<td>Project Manager</td>
<td>Signature</td>
<td>Date</td>
</tr>
<tr>
<td>Project Coordinator</td>
<td>Signature</td>
<td>Date</td>
</tr>
<tr>
<td>Team Lead—Business Analyst</td>
<td>Signature</td>
<td>Date</td>
</tr>
<tr>
<td>Team Lead—Quality Analyst</td>
<td>Signature</td>
<td>Date</td>
</tr>
<tr>
<td>Team Lead—Developer</td>
<td>Signature</td>
<td>Date</td>
</tr>
<tr>
<td>Team Members</td>
<td>Signature</td>
<td>Date</td>
</tr>
</tbody>
</table>

S
ince Thomas Friedman’s 2005 runaway success, The World Is Flat, there has been a need for a practical guide to surviving the flat world. If you have ever wondered how to better manage in a flat world without falling off the edge, The Rise of the Project Workforce is for you. Rudolf Melik offers up this book as a practical guide that provides project managers a road map consisting of recommendations of tools, technology, and supporting software. The goal of the book is to provide an introductory view of project workforce management that can be applied by employees in various domains such as human resources, finance, and compliance. Executives, system implementers, project managers, payroll administrators, HR directors, compliance officers, and consultants alike will benefit from this book.

The immediate and striking feature of this book is the easy-to-read manner in which Melik has laid out the facts, the project management dictums, and the on-the-ground reference guide to a successful implementation of project workforce management. Part 1 is aimed primarily at setting the stage for the reader—introducing possible flat-world challenges in the format of symptom, cause, threat, and the solution. Sadly, being an introduction, the author has only provided a basic framework for these challenges. A more in-depth analysis would have better suited this section, as it would have provided the reader with a more comprehensive understanding of the travails of project management in the recently redefined level playing field. The chapters describing highlights of the Sarbanes-Oxley Act and the Labor Laws and Accounting regulations are a must-read for every project manager who has only a minimal knowledge in these areas.

Part 2 serves as the deep dive into the actual management of the project workforce. The author’s premise is that clearly defined, integrated processes are the key to success in project workforce management. The author views this form of management as processes that are distinct, yet intersecting. For example, he provides a solid case for the process nodes among timesheet management, expense management, and, rather obviously, budgeting. Melik is onto something when he cites that “Elite IT performers weren’t just two or three times better than median performers—they were seven or eight times better”—and that this success can be attributed to the fact that these performers function in a process-driven project workforce.

As you continue reading through this book, you develop a strong sense of why project workforce management is an easily justifiable investment for any organization. Part 3 of the book reinforces this justification by providing certain tips for building a robust business case for implementing project workforce management software in your organization. Change management agents within organizations will be happy to see that Melik has neatly compartmentalized software implementation challenges into five common types: sponsorship, finance, politics, process, and resistance to change. However, for a practical handbook such as this, not a lot has been provided on how to handle these typical challenges. One other criticism of this book is that the author did not give justice to the explanation of how organizations may actually calculate or project the return on investment for what, most definitely, is a cash-intensive implementation. As an aside, one could justify this miss, as this book is simply a guidebook and not necessarily a detailed, checklist-heavy, how-to manual.

The entire book is built on the premise that you as a reader, buy into the concept of a flattened/flattening world. In the case that you do not subscribe to the flat-world theory, you may not find this book convincing. Nonetheless, this book is peppered with opinions, quotes, and facts from reliable authorities such as Peter Drucker (on time and workforce planning), President Dwight D. Eisenhower (on plans and planning), and Colin Powell (on data and judgment). Overall, Melik is on target by asserting that project workforce management, and the supporting software platform, is an appropriate solution in bringing together collaborators from around the world. Such project workforce management is key to succeeding in a location-irrelevant, team-oriented, globally collaborative flat world.
Modern Corporate Risk Management: A Blueprint for Positive Change and Effectiveness
by Glenn R. Koller

Modern Corporate Risk Management by Glenn R. Koller is a distinctive new entry into the field of risk management. This text advances toward the very necessary portfolio/corporate approach to all aspects of risk that have both positive and negative impact. The author’s extensive experience in the real-world application of managing risk is evident in the examples as well as process description, clarity, and depth.

Chapter 1 baselines the reader on the concepts and terminology involved in risk management. It also takes a deep look into Monte Carlo analysis, which is the center of the risk-based methodology promoted in the book.

Chapter 2 focuses on fundamental problems with project risk management and project execution inherent in many organizations. The author identifies 16 challenges that represent a majority of the fundamental problems and inefficiencies that exist today. The first challenge is a company’s reward system, which Koller notes is “at the heart of it all.” He explains that positive and negative behaviors can be ultimately traced to a corporation’s reward policy, promoting what is best for individuals and not always in the best interest of the company.

This is displayed in a company that rewards the firefighter: a scenario where a project team member identifies a malevolent problem that has developed and creates an edgy approach to solving it, at a significant cost to the project. Koller notes that corporate leaders are so pleased the project didn’t fail that they present the team member with great rewards. Contrast this with team members who effectively executed a consistent risk management process, minimizing adverse consequences and maximizing opportunities. In the end, everything went as expected and the team simply “did their job.” The team does not receive recognition for an outstanding job of managing risk. Koller advocates it is this approach that promotes a fire-fighting mentality and fails to support a good risk management process.

It is also in this section where Koller introduces the concept of BSI: Bugs → Symptoms → Illness, which becomes the primary analogy used in the balance of the text. The bugs (viruses) represent the challenges that projects or corporations can “catch” and are evidenced by the symptoms displayed (fever, dizziness, aching). The illness is the problem resulting from the bug (flu). He then uses this analogy to detail the symptoms and illnesses that can result from the 16 corporate challenges. Later, Koller provides proposed solutions to each challenge.

In Chapter 7, Koller attempts to summarize the book in two statements: (1) project management is risk assessment and risk management and (2) it is all about changing behaviors. Projects without risk are either routine tasks that are well understood and not projects, or are unrealistic. There is widespread agreement that project management is about managing risk—if we didn’t need risk management, everything would simply fall into place and no project would fail. Therefore, good project management is good risk management. His second point is that in order to effect positive change in the corporate environment, we must change organizational behaviors. Koller makes it clear that overcoming cultural barriers in risk identification and management within firms is more often a greater hurdle than the technical challenges project managers face and is the key to real success in managing risk.

Like all J. Ross Publishing texts, there are free “web-added value” downloads available for this book. One is a presentation that provides an interesting example of a typical go/no-go decision on a fictional chemical plant construction project based on net present value alone, and a second example when a fully risk-weighted basis is applied. This is an excellent example of using the risk process early on in the decision-making process and the value it brings.

Modern Corporate Risk Management is useful for those interested in more than probabilistic methods by taking the reader to a level above project risk management to the modern corporate environment.

Reviewed by J. Steven Waddell, PMP, Vice President of Strategy, Reed Integration, Inc., Smithfield, VA, USA.
Right-Brain Project Management: A Complementary Approach
by B. Michael Aucoin

This book addresses a very important topic. Those who have run or overseen many projects understand that successful project management is as much art as it is science. Baseline control, risk management, and supplier management certainly rely on tools of the trade, but teamwork, open communication, and a can-do attitude are absolutely vital to success. Aucoin gets it.

Aucoin begins with a discussion of contemporary projects, then quickly shifts to a tutorial about how people grow and develop as creative thinkers and then about individual and team motivation. He ties the two threads together by relating that creativity and motivation to project challenges.

He includes a chapter about tools for right-brain activity. These tools include creativity and pattern discovery, metaphor and storytelling, nonverbal communication and storytelling, and intuition. The hardcore left-brainers will find it difficult to relate to these as tools, but the passionate right-brainers will likely cheer.

Aucoin then includes a chapter of what he calls “case studies of phenomenal projects.” He shares tidbits from the famed Lockheed Skunk Works, Apollo 13, Hurricane Katrina and the Houston Astrodome fiasco, and a Texas A&M student initiative in the aftermath of the 9/11 tragedy to highlight points he made earlier in the book.

Aucoin then discusses seven principles of right-brain project management:
1. Find the compelling purpose—finding emotional energy and motivation;
2. Make sense of the project—exploring what the project should be;
3. Experiment and adapt—adapting to what is learned;
4. Create the new reality—discovering new and useful patterns;
5. Exercise and fulfill trust—making decisions that foster leadership;
6. Hit the sweet spot—improvising within the project framework; and
7. Leave a legacy—developing and fulfilling a lasting vision.

Aucoin devotes a chapter to each of the seven principles, relating them to real-world projects and experiences. He then closes with a challenge to the reader to become more competent right-brain as well as left-brain project managers and leaders.

The book is well written and entertaining. Aucoin writes with a flowing narrative style that suits the material and keeps the reader engaged. He mixes personal experience, real-world examples, and theory to deliver his message.

The book falls short in two ways. First, some of Aucoin’s right-brain creativity leads him to discourse about human behavior, meta-cognition, world views, stages of ego development, etc. There are points where the material seems gratuitous rather than a relevant part of the story line. Second, Aucoin includes quite a bit of traditional business school material that is no longer seen as valid. For example, he describes Maslow’s needs hierarchy even though it has now been largely discredited by subsequent research. Such lapses make the message less credible than it could be.

Finally, the content of the book does not live up to the assertions on the cover and introductory material. The title infers that the reader will learn about the blending of right-brain and left-brain project management. The back cover asserts that the reader will “learn how you can call upon resources from both the right and the left sides of the brain to enhance project success through innovation and flexibility.” However, Aucoin admits in the preface that this is a right-brain tour with barely a nod to the integration of the two perspectives. Although he handled the right-brain topic well enough, he passed up an opportunity to help us better understand where the two must work in tandem.

In summary, Right-Brain Project Management is an entertaining reminder and cheerleader for greater use of right-brain thinking by project managers and leaders. It is probably a worthwhile read for many and should be considered by all.

Reviewed by Jerry L. Wellman, PhD, PMP, Vice President, Honeywell Technology Solutions, Inc., Columbia, MD, USA.
Projects are not like day-to-day operations. Organizational processes that support day-to-day operations may not serve well in a project environment. Researchers J. Rodney Turner, Martina Huemann, and Anne Keegan address this issue in *Human Resource Management in the Project-Oriented Organization*, a report of a recent study sponsored by the Project Management Institute. Their comprehensive research plan included a literature search, interviews, and case studies. The results should be relevant to many who endeavor, even struggle, to apply traditional human resource management (HRM) practices to project needs.

The authors sought to explore if, and to what extent, project organizations require specific HRM practices, and what such practices might mean for organizations, individuals, and projects. First, they examined the work environment in project organizations and identified eight key features. Many are obvious and will be familiar to readers. Some are more subtle, such as the “spiral staircase” career framework, which differs from the typical “ladder” in hierarchical organizations.

The authors conducted an extensive search of HRM, general management, and project management literature. They found some HRM literature on “project-intensive” industries, but little to none on project-oriented organizations. Project management literature over the last 20 years shows a shift from technical to people focus, but usually in a conventional HRM context.

Combining the results of the first two steps, the authors developed a research model of HRM practices for project-oriented organizations. In the model, they suggest several new practices unique to projects. They also suggest that several traditional line practices should be adapted to projects.

Readers will probably be most interested in Chapters 5–7, which describe the study findings. Chapter 5 deals with HRM practices adopted by project-oriented organizations. Of the five practices discussed, disbursement from the project was the least understood and unmanaged in many organizations. Of the line HRM practices adapted to projects, the authors suggest that appraisal and rewards remain in the line, but include and reflect project performance. Recruitment of new organization employees should take into account broad project management competencies—things that are not well understood in many organizations. And when temporary workers are utilized on projects and released, one must consider knowledge capture because the workers take with them the benefits of their experience upon release.

In Chapter 6, the authors address the roles of the HRM department, line managers, and project managers. They emphasize the need for formal links between line managers and projects, to overcome the forces of tradition and to ensure appraisals and rewards that reflect project performance.

Employee well-being is the subject of Chapter 7. This issue is a particular challenge in organizations doing smaller projects with durations of less than one year. In these situations, the demands of profit and client response can overcome concerns for well-being and work-life balance to the detriment of the workforce and the project organization.

The authors summarize their final set of hypotheses in Chapter 8. As with many studies, the results suggest additional work. They started with two questions and end with 10 more. Human resource management in project organizations is not a well-codified practice. This report presents practical things that can be done to improve project performance today and points the way to things to be done in the future for a better tomorrow.

Reviewed by Kenneth H. Rose, PMP, Director, Peninsula Center for Project Management in Hampton, VA, USA, and winner of the 2006 PMI David I. Cleland Project Management Literature Award.
For most readers, Introduction to IT Project Management by Cynthia Snyder and Frank Parth will be a valuable reference. For the growing number of universities adding project management to their curricula, this is an excellent textbook. A key point is that this book is consistent with A Guide to the Project Management Body of Knowledge (PMBOK® Guide)—Third Edition.

This volume is well organized both as a reference and even more so as a textbook. Each chapter contains the terminal learning objectives, the content supporting those objectives, a chapter summary, key terms, a key term quiz, review questions, and end notes. The answers to the review questions are provided in the appendix. Scattered throughout the chapter are text boxes entitled “In Practice,” “What do you think?,” “PM in Action!,” and specially marked paragraphs with tips and warnings.

These additional inserts really bring the material to the real world and allow both the experienced project manager and the novice/student to better understand the concept and application. The reader should not skip over these sections. A cogent example of “In Practice” focuses on the globalization of project management and projects:

While the 777 jet was being developed, almost as much work was put into designing and developing the maintenance program as was put into the jet itself. During this project, Boeing created a fictional maintenance engineer by the name of Achmed. Achmed was born in the Middle East, raised in China, currently lives in Africa, and does not speak English. The design requirement was to develop a maintenance system Achmed could understand.

“Napoleon’s Corporal” has now become multinational and plans have to be understandable by a more complex and diverse audience.

The volume follows the sequence of a project beginning with an overview of project management, history of IT management, and more importantly the value of IT project management. It logically progresses through the steps involved, appropriately ending with “Project Audit and Closure.” Along the way, the authors provide sample forms, charts, flow diagrams, charts, and tables that facilitate understanding and assist in project management.

One of the most useful chapters is Chapter 6, Creating the Work Breakdown Structures and Project Schedule. To use the authors’ words, the WBS “will help define activities for the schedule, assign resources, develop time and cost estimates, identify risks, and assess make-or-buy decisions for project components.” It often seems that once the WBS is completed, the toughest part is out of the way. This chapter provides detailed task breakdowns, a comprehensive guide to defining and assigning resources, and a matrix displaying the effects of changing resources, work, or duration on the other two. This information is then used to develop cost estimates. The chapter closes with an insightful and thought-provoking discussion of the problems of accurate costing with IT. Even historical data, often the basis of cost estimation, is suspect. “For one thing, the technology keeps changing. A program upgrade in 2007 is totally different from one that was done in 2003.”

This text is extremely well written with a smooth flow and easy-to-follow examples. All of the charts and diagrams augment the text and contribute to a better understanding of the material. All of the tools presented are fully explained. For example, the explanations of the Ishikawa diagram and Pareto chart are aided by examples of real project management issues that make it more useful for project managers and students. The writing style and ease of reading may lead some to underestimate the amount and detail of the information presented.

Introduction to IT Project Management would serve well as a reference book for experienced project managers and as an excellent textbook for project management classes.

As an addition to this text, the authors have also produced a loose-leaf binder entitled Introduction to IT Project Management Forms with accompanying CD-ROM.
Calendar of Events

DECEMBER 2007

3–6 December
PMI® SeminarsWorld® San Diego, California, USA. For more information, please visit www.pmi.org and click on Career Development, and then click on Training and Events

6–20 December
eSeminarsWorld. Effective Project Communication and Control for Virtual Teams. For more information, please visit professionaldevelopment@pmi.org

JANUARY 2008

10–24 January
eSeminarsWorld. Human Factors and Team Dynamics for Project Managers. For more information, please contact professionaldevelopment@pmi.org

MARCH 2008

3–5 March
PMI® Global Congress 2008—Asia Pacific. Sydney, Australia. For more information, please visit http://congresses.pmi.org

17–20 March
PMI® SeminarsWorld® Miami, Florida, USA. To register, please visit www.pmi.org and click on Career Development, and then click on Training and Events

APRIL 2008

7–10 April
PMI® SeminarsWorld® Denver, Colorado, USA. To register, please visit www.pmi.org and click on Career Development, and then click on Training and Events

14–15 April
Call for Papers—PMI Nashville, TN Chapter 4th Annual Symposium. The PMI Nashville, TN Chapter has scheduled its 4th Annual Symposium, 14–15 April in Nashville, Tennessee, USA. The chapter is looking for leaders in project management to provide presentations for the following education tracks:

- Project Management Advanced Tools and Techniques
- Project Management Methods
- Project Management 101
- Project Management for Healthcare

If you would like to submit a proposal to present, please visit www.pmnashville.com or email symposium-education@pmi.org. The deadline for submission is 15 January 2008

22–25 April
PMI® SeminarsWorld® Scottsdale, Arizona, USA. To register, please visit www.pmi.org and click on Career Development, and then click on Training and Events

MAY 2008

19–21 May
PMI® Global Congress 2008—EMEA. Marrakech, Morocco. For more information, please visit http://congresses.pmi.org

AUGUST 2008

14–18 August
SNEC-PMI 2008 Seminar @ Sea. The PMI Southern New England Chapter invites you to join us aboard Carnival’s Victory as we sail from New York, USA to St. John, New Brunswick, Canada. Seminars on leadership and team building by Dr. Jerry Brightman and Frank Saladis, PMP. For more information or to register, please visit http://www.snecon.org
Notes for Authors

SCOPE
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Opinion presents thoughtful discussion of project management issues.

Correspondence pertains to the project and program management profession, including references to literature, practice, and scholarship as well as discussion and replies related to articles published in the Journal.

Book Reviews express opinions about books related to the project management profession, or about general management or technical books that cover topics of particular value to the project manager.

Calendar of Events offers notices of forthcoming meetings and calls for papers.

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All manuscripts must be submitted electronically via the journal’s Manuscript Central site (http://mc.manuscriptcentral.com/pmj). Questions regarding submission guidelines and manuscript status should be sent to Natasha Pollard (natasha.pollard@pmi.org).

Manuscripts should include the following in the order listed:

A title page that includes the title of the manuscript and each author’s name, affiliation, mailing address, and phone, fax, and e-mail address. Correspondence will be directed only to the first author listed.

An abstract of 100 words or less that outlines the purpose, scope, and conclusions of the manuscript, and selected keywords.

Text (use headings and no more than two levels of subheadings). To permit objective reviews by two referees, the abstract and first page of the text should not reveal the authors and/or affiliations, but only the manuscript title.

References.

Illustrations and Tables. These should be titled, numbered (in Arabic numerals and captions), and each on a separate sheet, and the preferred location indicated within the body of the text.

Biographical details of each author.

Upon manuscript acceptance, authors must also provide a signed copyright agreement.

REFERENCES

STYLE OF TEXT
You should write in clear and concise English. Spelling should follow Webster’s New World Dictionary. Authors whose native language is not English are assured that in-house editorial attention to their manuscript will improve clarity and acceptability to readers. For questions regarding style and format of text, refer to the Publication Manual of the American Psychological Association, Fifth Edition.

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