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The moderating effect of risk on the relationship between planning and success

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Abstract

Project planning is considered to be critical for project success. However, recent literature questions whether planning has similar importance in various contexts. This paper investigates the effectiveness of planning through an analysis of 183 project manager–supervisor dyads. Results show that the level of risk moderates the impact of planning on success, and in different ways for various success measures. Practical implications of these results suggest project managers to put more emphasis on planning in high risk project situations in order to meet project efficiency, whereas project steering committees to be more involved in approving plans of low risk projects to support benefit realization.

Keywords: Planning; Risk; Project success

1. Introduction

Planning is a core element of management. Similarly, in project management, planning is considered one of the major contributors to project success (Pinto and Slevin, 1987), and as a result discussed in project management methodologies as the first step under the responsibility of project managers (e.g., OGC, 2007; PMI, 2013). However, recent literature suggests the importance of planning is overplayed. For example, in strategy, Mintzberg (1994) discusses the "rise and fall of strategic planning". In project management, Andersen (1996) raised doubts regarding the importance of formal project planning, while Dvir and Lechler (2004) underplayed the importance of planning in their paper entitled "Plans are nothing, changing plans is everything".

These conflicting findings in the literature regarding the importance of project planning can be better understood if the source of data is analyzed. For example, low effectiveness of planning was found in studies with samples heavily biased towards high risk projects, such as software and product development (Dvir and Lechler, 2004) and R&D projects (Bart, 1993). On the other hand, Zwikael and Globerson (2006a) found that in construction projects, planning had a positive effect on success. As a result, one may claim that risk influences the level of planning effectiveness. Recent literature provides some support for this line of thought (Zwikael and Sadeh, 2007). For example, De Meyer et al. (2002) claim that decisions about the best way of planning are influenced by the level of risk.

In order to understand these inconsistent results in the literature, this paper explores the circumstances under which planning is more effective as a tool to be used by project managers and organizations. In particular, this study analyzes the role of risk in the relationship between planning and project success. The paper consists of hypothesis development based on recent literature and a discussion of a field study aimed at testing these hypotheses.

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2. Theory and hypothesis development

2.1. Planning

Planning is a core element of management of various management areas, such as strategy, operations management, and human resources management. For example, in marketing, the marketing plan is a central instrument for directing and coordinating the marketing effort, which operates at two levels: strategic and operational (Kotler and Keller, 2006). In strategy, strategic planning is one of two dimensions of the strategic management process (Boseman and Phatak, 1989). The human resource planning requires forecasting personal needs for an organization and deciding on the steps necessary to meet these needs (Schuler, 1994).

2.2. Project planning

Project planning specifies a set of decisions concerning its execution in order to deliver a desired new product, service or result (PMI, 2013; Zwikael and Sadeh, 2007). Kerzner (2009) finds uncertainty reduction to be a core reason for planning a project. Russell and Taylor (2003) identify seven planning processes — defining project objectives, identifying activities, establishing precedence relationships, making time estimates, determining project completion time, comparing project schedule objectives, and determining resource requirements. Planning was found to be a critical process in project management (Pinto and Slevin, 1987; Turner, 2008). For example, based on an analysis of prior studies, Lechler (1997) concluded that planning has positive effect on project success. Narayanan et al. (2011) explain the positive effect of planning on success by highlighting the regular exchange of information with the customer, which occurs during planning. According to Jugdev and Muller (2005) project success is an integrative concept that includes short- and long-term implications, such as project efficiency, customers, business success, and preparing for the future.

Although there is an "almost unanimous agreement in the project management literature" regarding the great effectiveness of planning (Dvir and Lechler, 2004), some underplay its role in projects. For example, Bart (1993) indicated that the traditional approach to planning of R&D projects tends to fail because of excessively restrictive formal control, which curtails creativity as a factor contributing to project success. Consequently, Dvir and Lechler (2004) proposed to reduce formal planning to a minimum required level. Dvir et al. (2003) suggest that project success is insensitive to the level of implementation of management processes and procedures. It has also been claimed that "*the positive total effect of the quality of planning is almost completely overridden by the negative effect of goal changes*" (Dvir and Lechler, 2004:10).

Because of the different findings on planning effectiveness in the literature we raise two competing hypotheses: H_1 assumes a positive main effect of planning on success, whereas the null hypothesis assumes no significant cause and effect relationship exists.

H0. Project planning does not improve project success.

H1. Project planning improves project success.

2.3. The moderating effect of risk

Project risk is defined as a "scenario in which a project suffers a damaging impact." (Zwikael and Smyrk, 2011: 311). High level of project risk is perceived to become a problem (PMI, 2013) and an obstacle to success (Kerzner, 2009). Although risk cannot be fully eliminated, Chapman and Ward (2004) found that organizations spend significant funds and resources in risk management. According to Wideman (1992), risks can be divided into five groups: (1) external, unpredictable and uncontrollable risks, (2) external, predictable and uncontrollable risks, (3) internal, non-technical and controllable risks, (4) internal, technical and controllable risks, and (5) legal and controllable risks. Shtub et al. (2005) and Couillard (1995) classified risk events into three groups: (1) risks linked to technical performance, (2) risks linked to budget, and (3) risk linked to schedule.

Because risk is considered to be an important moderator for the success of projects (Zwikael and Ahn, 2011), this paper aims at understanding the conflicting findings on planning effectiveness through an analysis of risk. The literature offers support for this line of investigation. For example, low effectiveness of planning was found in studies with samples heavily biased towards high risk projects, such as software and product development (Dvir and Lechler, 2004) and R&D projects (Bart, 1993). Moreover, Zwikael (2009b) found that development of project plans has more impact on success in construction projects (characterized with relatively low level of risk), compared with services and information technology projects (perceived as having higher levels of risk). On the other hand, Zwikael and Sadeh (2007) suggested planning to be more effective in high risk projects than in low risk ones. Hence, although the direction of the interaction is not clear from the literature, the next hypothesis suggests risk has a moderating effect on the relationship between planning and project success:

H2. Risk moderates the relationship between planning and project success.

3. Methods

3.1. The context

The literature has found major differences in project management in general and the perception of risk in particular across countries and industries (Hofstede, 2001; Zwikael and Ahn, 2011; Zwikael et al., 2005). This study was conducted in the unique context of the Fijian government — a public sector environment with strong Pacific culture influence. This section aims at shedding light on this context, and reasons for its selection.

Project management in the public sector is considered a challenge because of insufficient staff and increased pressure to justify funding and continuation of projects (Smith and Stupak, 1994). In particular, the need to improve the service quality of the public enterprises in Fiji under resource constraints, triggered

public sector reforms in the 1970s. The primary aim of the reforms was to improve the overall performance of the government entities (Sarker and Pathak, 2003). The Port Authority of Fiji was a reformed company resulting in successful practices such as staffing, new investment opportunities, and computerization (Narayan, 2011). However, the reform has improved only a few privatized entities while others remained unprofitable. Reasons for the failure of the reform include the economic and political environment in Fiji (Appana, 2003); in particular corruption and poor accountability (Lodhia and Burritt, 2004).

According to Singh et al. (2010a, 2010b), government programs for meeting community expectations in Fiji can be effective without being efficient and vice versa. Fiji's public enterprise reform of 1993 took off with high hopes for the struggling government commercial entities that had been posing a significant burden on the government's limited resources (Amosa and Pandaram, 2011). This reform also failed, because of political instability, bad governance, poor timing of reforms, institutional constraints, and lack of policy (Reddy et al., 2004), as well as lack of collaboration with employees, and transparency (Karan, 2010). This too-rapid reform (Narayan and Reddy, 2009) led to both the failure and buyback of the government shipyards and slipways. Sharma and Hoque (2002) suggested that project management could be improved in Fiji by implementing total quality management strategies.

Recommendations in the literature for the future include change of political culture (Lawrence and Sharma, 2009), better responsibility of fund management (Nath, 2010), and disclose of financial statements (Brown, 2009), as well as more funding of e-governance projects to improve government–citizenship relationship and reduce corruption in Fiji (Singh et al., 2010a, 2010b).

3.2. Sample and procedure

Participants in this study consist of employees of four Fijian government departments: Ministry of Works, Transport and Public Utilities; Ministry of Defence and National Security and Immigration; Ministry of Finance; and Ministry of Strategic Development National Planning and Statistics. These ministries were chosen to represent various and distinct areas of government.

Questionnaires were administrated in English, which is one of the three official languages in Fiji and is spoken well by all public servants. Separate questionnaires were administered to project managers and their immediate supervisors. Project managers were asked about project risk and planning of the most recent completed project, demographic questions, as well as to provide contact details of their supervisors, who were then contacted by the research team. Supervisors were asked to rate the success of the same project, hence avoiding 'same source bias'. Completed questionnaires were matched by the research team. In total, 202 pairs of project manager–supervisor questionnaires were returned. After deleting records with missing or unmatched data, a total of 183 matches were retained as the sample for this study. In this sample, project duration ranges between one and 80 months with an average of 17 months. Project cost ranged between US$2000 and US$9 M with an average of US$400,000.

3.3. Measures

All scales used in the questionnaires have been validated and used in previous studies.

3.3.1. Project Planning

Project Planning was measured with an established 16-item scale validated and utilized extensively in the literature (e.g. Chin and Pulatov, 2007; Masters and Frazier, 2007; Papke-Shields et al., 2010; Rees-Caldwell and Pinnington, 2013; Zwikael and Ahn, 2011; Zwikael and Globerson, 2004, 2006b; Zwikael and Sadeh, 2007). This scale uses artifacts from particular planning practices, rather than the practices themselves. That is, rather than asking respondents whether a particular planning activity was undertaken (e.g., if scope was planned), the scale focused on whether the corresponding artifact was generated (e.g., whether a Work Breakdown Structure was produced). The measure focuses on the quality of the planning process by covering planning processes included in all project management knowledge areas mentioned in the Project Management Body of Knowledge. Project managers were asked to report on each planning process on a five-point Likert scale. Sample items include 'risk management plan' and 'communications plan'. In order for the project managers to make accurate estimates, the relevant planning artifacts were introduced to all participants in this research. The scale's alpha coefficient was .90.

3.3.2. Risk level

Risk level was measured as the perceived risk to project stakeholders, such as the public, and government. In the questionnaires, project managers were asked to estimate the level of risk at the start of the project using a seven-point Likert scale.

3.3.3. Project success

The management literature indicates that the influence of planning differs over different performance measures (Armstrong, 1982; Ramanujam and Venkatraman, 1986). Nevertheless, the difficulty of measuring project success from several viewpoints has driven researchers to aggregate separate measures of project performance success criteria into a single, overarching measure of project success (Scott-Young and Samson, 2008). This tendency does not allow for identifying which success factors drive different project outcomes. Following the importance of separating success measures, literature has identified project efficiency and effectiveness on stakeholder satisfaction as two important but distinct dimensions of project performance success (Shenhar et al., 1997). According to Pinto and Mantel (1990): the implementation process; the perceived value of the project, and client satisfaction with the delivered project outcome are three distinct aspects of project performance. Shenhar et al. (1997) have also used in their research 'benefits to customers' as one of the three criterions for the assessment of project success. The other two include commercial success and future potential. In other research, Lipovetsky et al. (1997) used four dimensions for measuring project success and they found that customer satisfaction is by far the most important criteria. Several other empirical studies show a strong correlation

between project efficiency and customer satisfaction (Lipovetsky et al., 1997; Pinto, 1986). A study by Shenhar and Dvir (2007) revealed that quality of planning positively affects both efficiency and customer satisfaction. Project efficiency refers to meeting both time and budget expectations, whereas effectiveness refers to the degree to which project specifications and customer needs are either met or solved (Jugdev and Muller, 2005). This separation is aligned with the approach undertaken by Pinto and Prescott (1990) who made a distinction between the implementation process (efficiency) and the perceived 'value' of the project (effectiveness), as well as with Zwikael and Smyrk (2012) who distinguished between project management success (efficiency) and project ownership success (effectiveness).

3.3.4. Project efficiency

Project efficiency was rated based on the extent to which the project deviated from planned schedule and cost (in percentages), in comparison to the initial values set at the start of the project, or their most recent approved modification (Dvir and Lechler, 2004). It was measured with a two-item scale consisting of "schedule overrun" and "cost overrun" (both in reversed codes). The scale's alpha coefficient was .75.

3.3.5. Project effectiveness

Project effectiveness was rated on a five-point Likert-type scale ranging from 1 (low) to ten (high). It was measured with two-item scale consisting of "project performance" and "customer satisfaction". The scale's alpha coefficient was .83.

3.3.6. Control variables

We included the number of full-time employees and number of projects previously managed by the project manager as the control variables to capture both organizational and project manager characteristics.

3.4. Data analysis

Following the widely used approach (Gellatly et al., 2006; Shalley et al., 2009; Shin and Zhou, 2003), we ran hierarchical regression analyses to test the main effect and moderating effect hypotheses. When testing the moderating effects, to minimize any potential problems of multicollinearity, we standardized the independent, moderating, and dependent variables before calculating the interaction terms (Aiken and West, 1991).

4. Results

4.1. Descriptive statistics

Table 1 presents the means, standard deviations, correlations, and reliabilities of the study variables for descriptive purposes. Project planning was not significantly correlated with project efficiency or project effectiveness. Risk level was positively and significantly correlated with project efficiency, but weakly with project effectiveness.

4.2. Main effect test

A regression analysis was conducted to test the main effect of project planning on success. The analysis was controlled for organization size and project manager experience. Insignificance coefficient values for project planning in Table 2, i.e. −.14 for efficiency and .14 for effectiveness, suggest no main effect of project planning on efficiency or effectiveness. Following these results, a contingent effect of planning on success was tested and presented in the following section.

4.3. Moderating effect tests

Table 3 presents the results of the regression analysis examining the moderating effect of risk level on the relationship between project planning and project efficiency and effectiveness. We entered the variables into the regression analysis at three hierarchical steps: (1) the control variables; (2) project planning and risk level; and (3) the interaction term of project planning and risk level. Results show that risk level moderates the influence of planning on project efficiency ($\beta = .20, p < .05$). In addition, risk level moderates the influence of planning on project effectiveness ($\beta = -.20, p < .05$). Hypothesis 2 was thus supported.

We created interactions figures by following the widely used procedure outlined by Aiken and West (1991). Specifically, we calculated regression equations for the relationship between planning and the two project success measures at high and low levels of risk. Fig. 1 shows that planning was positively related to project efficiency when risk level was higher. Fig. 2 shows that planning was positively related to project effectiveness when risk level was lower.

5. Discussion

While professional bodies of knowledge (e.g. OGC, 2007; PMI, 2013) advocate planning as a core process for all projects, literature is inconsistent regarding the importance of planning for success. While some studies have found a positive contribution of planning (Pinto and Slevin, 1987), others have suggested weak relationship between planning and success (Bart, 1993; Dvir and Lechler, 2004). Conflicting evidence in the literature and no evidence for main effect in this study suggest that planning may not have similar importance in all project scenarios, and that more advanced analysis is required.

Research has suggested that project management factors impact distinctly different success measures. For example, Pinto

Table 1
Means, standard deviations, reliabilities, and correlations.

	Mean	S.D.	1	2	3	4
1. Project planning	4.03	.75	(.90)			
2. Risk level	5.62	1.69	.15	(NA)		
3. Project efficiency	29.69	25.87	−.14	.18 *	(.75)	
4. Project effectiveness	7.19	1.54	.11	.03	.22 **	(.83)

N = 183 with listwise deletion.
* $p < .05$.
** $p < .01$.

Table 2
Results of main effect test.

	Project efficiency	Project effectiveness
Number of full-time employees	−.02	−.21 **
Number of projects	.02	.00
Project planning	−.14	.14
ΔR^2	.02	.06 *
ΔF	1.08	3.58 *

N = 183 listwise deletion. Standardized regression coefficients are shown.
* $p < .05$.
** $p < .01$.

and Prescott (1990) found that planning factors have stronger impact on 'external' success measures (perceived value of the project and client satisfaction) than on efficiency. For this reason, this paper analyzed the impact of planning on two common success measures separately — efficiency and effectiveness (Jugdev and Muller, 2005; Pinto and Prescott, 1990). Efficiency measures the extent to which time and cost targets mentioned in the project plan have been met (Dvir and Lechler, 2004), whereas effectiveness focuses on the realization of target benefits included in the business case (Pinto and Prescott, 1990; Zwikael and Smyrk, 2012). Following recommendations in recent literature (De Meyer et al., 2002; Zwikael and Sadeh, 2007), this paper has also considered the moderating effect of risk. Indeed, the results of this study suggest that risk moderates the relationship between planning and various success measures. In particular, we found that in the presence of high risk, increasing the quality of planning improves project efficiency, whereas in the presence of low risk, it improves project effectiveness.

In high risk projects, successful delivery of outputs is a major challenge. Hence, planning focuses on approaches to deal with uncertainty in product or service development. As a result, quality planning helps in delivering project outputs efficiently, but because risk is high, very little consideration is given to ensure effective realization of long term benefits. In low risk projects, because efficient output delivery is more secured, planning has a lower level of importance for the efficient delivery of benefits. Moreover, too-detailed planning can increase project duration without noticeable contribution. On the other hand, there

Table 3
Results of moderating effect test.

	Project efficiency	Project effectiveness
Step 1: Controls		
Number of full-time employees	−.03	−.18 *
Number of projects	.01	.01
Step 2: Main variable		
Project planning	−.16 *	.14
Risk level	.21 **	−.01
Step 3: Two-way interaction term		
Project planning × risk level	.20 *	−.20 *
ΔR^2	.03 *	.03 *
ΔF	3.30 **	3.46 **

N = 183 with listwise deletion. Standardized regression coefficients are shown.
* $p < .05$.
** $p < .01$.

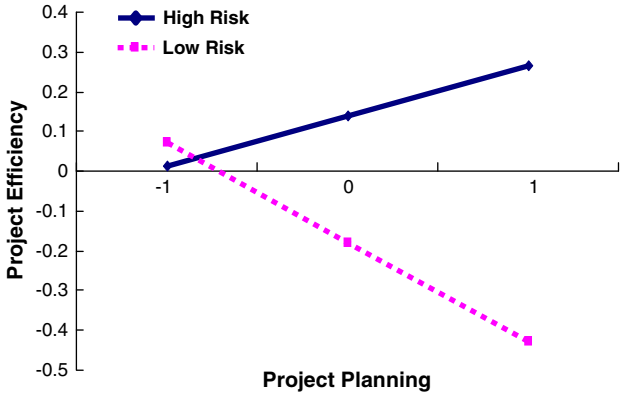

Fig. 1. The moderating effect of risk level on project efficiency.

is an opportunity for senior executives to be more involved in benefit realization planning. In addition, they would be expected to work closely with project managers to ensure value generation and benefit realization (Zwikael and Smyrk, 2012).

6. Conclusions

This paper has shed light on the inconsistent literature on the importance of project planning. Bridging conflicting views ranging from "recognized importance" (Zwikael and Globerson, 2004) to "plans are nothing" (Dvir and Lechler, 2004), this paper suggests that the importance of planning is contingent upon the type of success measures employed and the level of project risk. In other words, the importance of planning depends on the level of project risk and the success measure being targeted. This paper contributes to theory by proposing a robust theoretical framework for the impact of planning on project success.

Practical contribution of this study targets both project managers and senior executives. While project managers tend to use planning tools regardless of risk levels, they may benefit from using more advanced planning tools in high risk projects and for short term predictable periods. In particular, this behavior will contribute to enhanced project efficiency, which is a common measure to evaluate project managers' work. Organizations, on the other hand, may become more actively involved in low risk

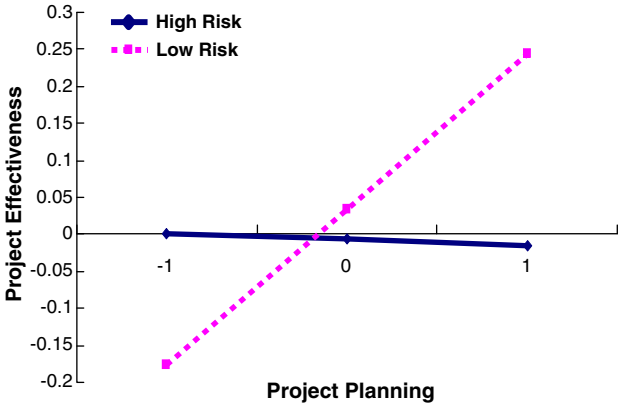

Fig. 2. The moderating effect of risk level on project effectiveness.

projects. This approach may specifically support project effectiveness, e.g., by focusing on planning the realization of target benefits. Senior executives can provide additional resources and specialized teams for project planning, as well as ensure project benefit realization plans are properly discussed and approved by project steering committees.

Finally, some methodological limitations and future research opportunities should be highlighted. First, due to lack of understanding of the relative importance of each planning process in the literature (Zwikael, 2009a), the planning index used in this paper assumes equal weights. Future research can develop relative weights for various planning knowledge areas in different project scenarios. Second, project managers were asked to estimate retrospectively the level of risk at the start of the project. Their answers might be biased by the way they managed the project and its outcome. Future research should be conducted using a longitudinal design to allow capturing the non-biased level of risk at the start of the project using a multiple-item measure. Third, this study was limited to the planning phase of projects and results reflect projects that have been performed in the government sector of only one country, with data collected in a cross-sectional design. In particular, the Fijian government is relatively immature in the project management arena and extensive training and mentoring of personnel is required in this area. For greater generalizability of the study conclusions, further research should be conducted in other countries and industries, testing additional potential moderating variables.

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