A study of relationship between Environmental Factors and Project Performance

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ABSTRACT

This research aims to identify environmental factors that affect project performance. An extensive literature review and a pilot study found two types environmental factors related to project performance: organizational and project factors, each consists of three elements: structure, leadership and climate. In a survey of professional project managers or those who worked closely in project jobs, project structure, organizational climate and project leadership were identified as the most influential factors in effective delivery of projects. The findings are discussed and suggestions are made to improve the effectiveness of project performance.

Key Words: Project performance,organizational factors,project factors,project leadership

INTRODUCTION

Notable business and management writers, including Toffler (1970), Bennis (1979), Coulson-Thomas (1990) and Gaddis (1991), suggest that a project is a microcosm of a business environment, which is increasingly marked by change, uncertainty and ambiguity. Today, project organisation and management are widely used not only in traditional project-oriented industries, such as construction and defence, but also in telecommunications, finance, retail and manufacturing. Barnes (1991) and Steininger (1990) argue that the increasing importance of speed in product development and delivery is compelling more organisations to adopt a project-oriented structure and mode of operation in order to achieve business objectives more efficiently and effectively. Similarly, Graham (1997) suggests that most future growth in organisations will result from successful development projects that generate new products and services.

Therefore, it seems reasonable to suggest that as project management and associated skills become more important in future business success, more attention will have to be paid to its unique organisation and management issues. Thus, information about what makes an individual an effective project manager is necessary to help organisations formulate their human resource strategies more effectively and improve their business performance and competitiveness.

Job performance

Organisation performance is the sum of outputs of all organisation members (Boyatzis, 1982; Blumberg and Pringle, 1982; Anderson and Butzin, 1974). This highlights the importance of research into individual's job performance and the factors affecting it. However, despite the importance of job performance, which Ilmenran (1986) suggests is the most frequently analysed dependent variable in personnel psychology, attempts to research it in the last thirty years have failed to produce consistent results. The main difficulty is that job performance is situational, complex and unstructured. Another problem has been the ambiguity of terms that are used to describe performance, such as effectiveness, success, efficiency and competency. For example, while most management writers agree that effectiveness is related to accomplishment of organisation goals (Guion and Gottier, 1985; Kast and Rosenzweig, 1985),

interpretation of what constitute effectiveness and how to measure it differ among writers (Boyatzis, 1982; Roskin, 1975; Reddin, 1974; Campbell et al., 1970).

Performance is expressed as the ratio of output to input. This means that the fewer the resources used to produce the outputs, the higher the performance ratio and, therefore, effectiveness will be. Therefore, for a finite quantity of resources (human, capital and material), the performance depends on the *strategy* and *processes*. In other words, it is the effective integration of the leadership role (strategy direction and formulation) and managerial role (resource allocation and process control) that leads to good organisation performance. Performance is, therefore, the result of achieving organisational objectives, which serve as a yardstick for success.

Harper (1984) emphasises that since the performance of any unit in an organisation will be of interest to different people for different purposes, care must be taken to select suitable inputs that will produce the required outputs. Furthermore, it is widely recognised that one of the primary inputs that directly affects the outputs and performance in an organisation is the human input, particularly skills, brought to the job or developed on the job. Fitts and Posner (1967) relate the study of human performance to the analysis of processes involved in skilled performance and the development of skills. The key human skills are either universal (inherent in the genetic structure of humans) or learned (perceptual-motor skills and language skills). Most psychologists, however, see performance essentially in terms of two human-related factors of ability and motivation (Anderson and Butzin 1974). However, performance is also influenced by group and organisational performance. Blumberg and Pringle (1982) allude to the active management of work and organisational support in their performance formulae.

Performance = individual attributes x Work effort x Organisational support

But managers can seldom influence the organisational and environmental factors which may impact upon individual performance. What they can, and should do, is to identify performance factors that they can control (eg. organisational climate) and take action to influence them in the desired ways. In other words, managers should manage the performance of individuals and teams.

Armstrong (1994) defines performance management as a means of achieving better results from the organisation, teams and individuals by understanding and managing performance within an agreed framework of planned goals, standards and competence requirements. The aims of performance management are: 1) to achieve objectives, 2) to utilise and develop competence, and 3) to be effective. This implies that understanding of performance management is rooted in the notion that people perform better when they know what the objectives are, what is expected of them and have the opportunity to participate in forming those objectives and expectations. Armstrong (1994) suggests that three concepts of organisational effectiveness underpin performance management:

* The need to *clarify strategy* and values
* The importance of providing channels for *two-way communication*
* The benefits derived from operating as a *learning organisation*

On the other hand, Blanchard and Blanchard (1991) view good performance management from a training perspective, and suggest that it is comprised of three processes: performance *planning*, *coaching*, and *evaluating*.

Since managers' performance is inextricably linked to work team performance, Jones (1995) points out that managers should pursue a management strategy that creates the right work environment for their workers/teams to grow, learn and develop.

Measuring managerial performance

Performance measurement is an essential role of managers. It provides the necessary information to control processes and quality by establishing mechanisms to assess organisation effectiveness. Thorndike (1949) was the first one to measure effectiveness by initially defining some ultimate criteria. However, it was Campbell (1974) who identified 19 different variables used to measure effectiveness. The most

commonly used univariate measures are: 1) overall performance (measured by employee or supervisory rating); 2) productivity (actual output data), 3) employee satisfaction (self-report questionnaires), 4) profit (accounting data), and 5) withdrawal (turnover or absenteeism data). However, due to the lack of objectivity and comprehensiveness of univariate measure (Steers, 1975), researchers have been attracted to multivariate models of effectiveness that include measures such as adaptability, flexibility and productivity.

Despite these efforts, researchers have recognised the complexity of performance construct and its measurement. In response to this, Mintzberg (1973), Kotter (1982) and Lothans et al. (1988b) argue for a more practical approach that examines the relationships between specific observable managerial activities and organisational effectiveness. However, this approach provides only a partial solution and doesn't lead to the development of a comprehensive model of organisational effectiveness involving the analysis of numerous variables.

Project organization

One of the major concerns of organisations today is the coordination of work across many independent units and functions. However, specialisation, one of the pillars of the classical school of management, is essentially self-serving and parochial, and therefore is not suited to coordinated and collaborative efforts. Lawrence and Lorsch (1967a,b) refer to this organisational dilemma as the problem of integration versus differentiation. They define *differentiation* as the specialisation of individuals and units, while *integration* is the quality of the state of collaboration among departments for achieving unity of effort as demanded by the environment.

Walker and Lorsch (1968) found that functional specialists are goal-oriented, time-oriented and have a perception of the formality of organisation, while integrators achieve more effective communication flow and conflict-resolution. However, what has preoccupied numerous theorists over the past few decades is the issue of how to create a collaborative environment in a competitive and changing world, and how to overcome the difficulties facing by the integrators, who have the responsibility to create such an environment. The root of these challenges lies in interplays between many factors and conditions that affect collaborative or team effort, including leadership style, organisation culture, group composition and the extent of differentiation among members and groups. Lawrence and Lorsch (1967b) suggest that integrators have little low authority and primarily rely on their ability to persuade others to support them. Therefore, their effectiveness largely depends on their ability to secure the trust and respect of others. Another factor affecting the role of integrators is the nature of groups and their goals. Lawrence and Lorsch (1967b) and Galbraith (1977) suggest that the more different the members are, the more different their goals are and the more difficult it is to integrate them effectively. Similarly, Landsberger (1961) identifies four classic dilemmas in coordinating dissimilar groups: 1) flexibility vs stability, 2) short-run vs long-run, 3) individual's goals vs organisation's goals, and 4) operationality of subgoals (whether organisational decisions should be based on factors considered important, but difficult to measure, or only on factors that can be properly measured).

An effective integrator keeps not only the long term interests of the organisation in mind but also balances the interests of different people and adjusts to changing circumstances and conditions. These latter roles, as Morris (1979) points out, reveal the importance of interface management in project management. He applies relevant organisation theories to management interfaces to highlight key managerial principles in project management that includes system approach, boundary management, organisation's objectives, environment, technology and integration.

Morris concludes that the size, speed and complexity of a project influence the degree of integration required. Furthermore, the degree of differentiation and interdependence across an interface determine the type of integration required. The ability to balance the two functions demands multi-perspective views of project tasks and functioning, political sensitivity and negotiation skills (Wilemon and Cicero, 1970).

Effective project management

In the context of traditional management, project management is about managing several key processes or functions: planning (to identify project objectives and the end product), coordination (to match tasks and

resources), controlling (to ensure quality individual and team performance), reporting (to inform and communicate key issues and problems), and implementing (to deliver project objectives). It is widely agreed that effectiveness of these processes depends on several factors from the outset, including: top management support, realistic goals, appropriate project structure, an effective information management system and leadership. The main difficulties of project management, however, as Taylor and Watling (1970) describe, is related to the difficulty of the job (change, complexity, technology), the attitude of senior managers, and external factors such as subcontractors and suppliers. However, of all these factors, lack of authority is considered to be the most critical factor inhibiting project managers from performing effectively. While authority is the power granted to individuals, responsibility is the obligation incurred by individuals in their roles in the formal organisation. Accountability, on the other hand, is the state of being totally answerable for the satisfactory completion of a specific assignment. Kerzner and Thamhain (1984) suggest that while authority and responsibility can be delegated downward to lower levels in the organisation, accountability usually rests with the individual manager. It is evident that a project manager, who lacks authority, cannot be expected to be fully responsible and accountable to the stakeholders.

Experts in the field of project management emphasise different aspects of project management processes as critical for effective project delivery. They variously argue that effective project management is related to the effectiveness planning and control systems (Mustapha, 1990; Ashley et al., 1987), leadership and competent people (Gilbert, 1983), and goal-orientation and communication (Barnes, 1991). However, as noted in the previous section, the perception of effective performance and factors affecting it differs among the project stakeholders. Furthermore, some researchers have found that there is no universal set of project success factors. The concern over compatibility of project success and project effectiveness has led many researchers to relate effectiveness factors to the roles or skills attributed to project managers.

Given that the project manager is an individual who is responsible for coordinating and controlling project processes across multiple and functional lines, it is reasonable to argue that the project manager will require some specific competencies not required, or required to a lesser degree, by say, a functional manager. For example, while a typical functional manager has been taught to standardise all operations, a project manager must learn to adapt and implement change to control work processes. Morton (1975), therefore, describes the project manager as a *change agent* who should have people skills to keep project teams focused on tasks and goals. In this role, they also often act as a buffer between higher management and the numerous external organisations, and therefore have to play different roles, sometimes at the same time, to hold the project together. Effective project managers often have a fairly long practical experience in the industry and display many skills and attributes in communication (Coulson-Thomas, 1990; Posner, 1987; Einsiedel, 1987), leadership (Zimmerer and Yasin, 1998; Tilley, 1997; Chan, 1994), result-orientation (Kerzner, 1987) and planning (Cicmil, 1997).

Environmental factors

In any social system, each component has specific tasks and responsibilities. However, system components are interdependent, which means that they depend on each other to achieve their individual goals and system objectives. In organisations, people are allocated tasks according to their specialisation and contribution. They organise and synchronise their work with others in the chain of tasks to facilitate smooth running of operations and effective delivery of products or services. However, organisations are affected by many other factors (Kakabadse and Kakabadse, 1997; Jones, 1995 Mintzberg, 1973; Selznick, 1957). While some of the factors are organizational and hence can be controlled or eliminated, others are environmental or situational which are often unpredictable or outside of organization's control. This research focuses on the former type of factors and investigates the effects of project and organization structure, leadership style, and climate on project management.

RESEARCH METHOD

A survey questionnaire was designed and pilot-tested. It was then mailed out to 625 managers from major industries (construction/property, communication/information technology, defence, finance, government

administration, and others) in public and private sectors in Australia. The rate of returns and useable returns were 52% (322) and 48% (301) respectively. The highest number of useable returns came from construction and property (136 or 45%), followed by public administration (54 or 18%) and communication and information technology (48 or 16%). Only categories with at least thirty cases of returned questionnaires were analysed so that plausible inferences can be made (Sekaran, 1992, and Gay and Diehl, 1992). The analysis of personal data suggests that the average respondent was male, 35-55 years old, with at least 5 years of work experience. He was likely to have a bachelor degree in engineering and was working as a manager in the construction/property or communication/information technology industry.

The mean scores of items or elements for each factor were used to rate the perception of their importance. Spearman's correlation and One-Way ANOVA showed no significance differences (p<0.05) between the respondents, enabling the study to proceed without the need for separate analysis of each category.

FINDINGS

Organizational factors

The findings indicate that an overwhelming majority of respondents associate project managers' performance with either professional (109) or teamwork (90) organisation structure. They are followed by entrepreneurial (34) and network (23). The evidence suggests that today's organisations value professional behaviour and collaborative efforts over rigid control and hierarchy.

Further, the ideal organisational leadership style is perceived to be supportive of team members (86). However, a significant number of respondents identify participative (78) and achievement-oriented (74) to relate to effective performance. As expected, directive leaders are not ranked highly since the majority of today's employees are professionals with a great degree of autonomy and self-motivation.

The findings also show that 93 (33.7%) of all respondents prefer open climate to other types of organisational climate. This is followed by task-orientation (64) and supportive culture (62) respectively. There is very little support for controlled (6) or closed (0) organisation climate.

Project factors

The findings identify matrix structure to be the most appropriate type of project organisation. Almost 2/5 of respondents (126) correlate project matrix with effective performance followed by project team (86), balanced matrix (42) and functional matrix (5). As expected, functional structure has no place in project management.

Almost 1/3 of respondents (102) think that project managers improve their performance if they adopt an achievement-oriented leadership style in their projects. Other respondents, however, relate participative (76) and supportive (63) leadership style to effective performance. Again, directive leadership style is perceived to be inappropriate when managing project team members who are often independent subcontractors and suppliers, or senior managers such as functional managers and project director.

Finally, more than 1/3 of respondents (102) perceive that project managers who create a task-orientation climate in their projects perform more effectively than other types of project climate. Supportive and open project climates are ranked second and third with 68 and 42 responses respectively. While most respondents (93) think that openness characterises effective organisation, a larger number of respondents (102) choose task-oriented project to be the ideal project climate.

Regression with optimal scaling

The goal of categorical regression with optimal scaling is to describe the relationship between a response and a set of predictors. By quantifying, values of the response can be predicted for any combination of predictors. In this research, the response is the score that each respondent assigns to their actual performance and predictors are the actual responses for organisation and project factors of structure, leadership style and climate. The relative importance is used to interpret

predictor contributions to the regression. Large individual importances relative to the other importances correspond to predictors that are crucial to the regression. This measure defines the importance of the predictors additively, that is the importance of a set of predictors is the sum of the individual importances of the predictors. Table 1 displays the importances for the actual organisation and project factors (predictors).

Table 1. Actual organisation and project factor importances

Factor	Standardised Coefficients			Correlations				Tolerance	
	Beta	St.Error	F	Zero-order	Partial	Part	Importance	After transformation	Before transformation
Organisational structure	7.47E-02	0.066	1.249	0.098	0.076	0.071	0.061	0.937	1.032
Organisational leadership	6.33E-02	0.083	0.962	-0.022	-0.066	-0.062	0.032	1.067	1.032
Organisational climate	-0.13	0.067	4.934	-0.221	-0.148	-0.141	0.282	1.086	1.034
Project structure	0.186	0.084	6.330	0.231	0.168	0.16	0.327	0.932	0.660
Project leadership	0.123	0.083	4.125	0.163	0.136	0.129	0.18	0.966	0.988
Project climate	-0.107	0.066	2.611	-0.189	-0.109	-0.103	0.126	0.923	0.97

The largest importance corresponds to project structure (0.327) followed by organisation climate (0.282), with project structure, organisation climate, project leadership style and project climate accounting for 92.3% of the importance for this combination of predictors. The results highlight that project factors have the greatest impact on project manager's performance.

DISCUSSION

The analysis indicates that a project manager's performance is influenced more by project factors than organisation factors. The only organisation predictor that significantly affects performance rating is the organisational climate. In contrast, all three project predictors, particularly project structure, affect performance rating.

The evidence shows that an overwhelming number of respondents correlate open, professional and supportive organisation with effective performance. This is consistent with the description of project-oriented jobs and project managers' position within organisational hierarchy. Given the nature of project jobs, including geographical distance from the head office, the lack of project managers' authority over project team members, and their reliance on others—particularly functional managers and their staff—to obtain resources, the project manager would prefer to deal with people who prioritise the organisation's interests over the organisation/functional politics or personal grudges. The rapid pace and urgent demands of a project, particularly in the implementation phase, require organisation members to see themselves as the members of project team and provide their professional advice speedily and impartially. This means that project managers need the active support of the top management for their project. However, Black (1996) points out that top management support is often insufficient and a major cause of project failure. The priority that top managers place on a project can influence the relationship between project managers and organisation members and ultimately the project success. Despite the importance of these factors, an overwhelming majority of research in project management focuses on project activities and processes, rather than project-organisation relationships. For example, while project leadership style has been studied (Adams and Barndt, 1988; Bronsen et al., 1986; Lansley et al., 1974), no empirical research has been conducted into the relationship between organisation leadership and project managers' performance. The evidence from this study also shows that project managers who work in a project matrix and adopt an achievement-oriented leadership style get the job done more effectively.

Research in project management has shown that project managers tend to be task-oriented (Djebarni and Lansely, 1995; Bresnen et al., 1986). However, a direct comparison between the findings of this study and previous studies is not possible as researchers use different leadership style taxonomies and the context of research may also be different. The findings in this study show that project managers' performance is correlated with a task-oriented project climate. This is because just as projects are building blocks of businesses, tasks are building blocks of project delivery. Kerzner and Thamhain (1984) suggest that project managers can significantly influence project climate by their actions. They should aim to create and maintain an organisation climate that supports project teams in completing their jobs. This can be facilitated by project managers' ability to communicate and solve problems effectively. Galbraith (1971, 1977), Lawrence and Lorsch (1967b, 1969) and Davis and Lawrence (1977) point out that horizontal communication in a matrix organisation requires an open and problem-solving climate. Given the criticisms that have been laid against customer organisations for not being proactive and organised (Frane 1994; Chem and Bryant, 1984), it is critical that channels of communication between project manager and customer organisation, preferably through a knowledgeable customer representative, are established early in the project in order to inform and synchronise efforts.

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