Information Technology Management Roles: A Comparison of IT Executives and IT Project Managers

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Abstract

This study investigates the emphasis placed on different managerial roles of information technology (IT) executives and IT project managers. Six managerial roles from Mintzberg's classic role model were applied in this research: resource allocator, leader, spokesman, monitor, liaison, and entrepreneur. Two surveys were conducted in Norway in 2000/2001 to investigate the management roles. The first survey, which focused on IT executives, obtained 128 usable responses, representing a response rate of 19 percent. Respondents emphasized the spokesman role significantly more than other managerial roles. The second survey, which focused on IT project managers, obtained 80 usable responses, representing a response rate of 14 percent. Respondents emphasized the leader role significantly more than other managerial roles. A comparison of IT executives and IT project managers found significant differences in four out of six managerial roles. IT executives emphasize the monitor role significantly more than IT project managers, while IT project managers emphasize the leader, resource allocator and entrepreneur roles significantly more than IT executives. The study found evidence that IT executives are more externally oriented than IT project managers, and that IT project managers are more internally oriented than IT executives.

1. Introduction

Information technology (IT) and IT leadership have undergone fundamental changes over the past decade [1, 2, 3]. IT is a changing force. The utilization of IT demands strong leadership and management. Heavy responsibility for managing IT lies with the IT executive of the IT department in the company. Despite increased interest in recent years [4, 5, 6, 7], little empirical research on IT leadership roles has been carried out. Hence, recommendations on how to succeed as an IT executive often lack empirical evidence [8].

In most companies functions or tasks within the IT department are organized as IT projects [9]. IT management is largely a project driven exercise. Whether the goal is to design, install or re-engineer, technology initiatives are often driven by aggressive deadlines and periods of frequent change. To get the job done, resources must be identified and allocated, and activities must be properly organized and structured in accordance with business and technical requirements [10]. Information technology projects come in many different shapes and sizes, e.g. feasibility studies, development projects, design projects, implementation projects, upgrade projects, migration projects and support services projects. The project management approach to solve IT problems and opportunities involve both leaders and end-users, and it defines activities, plans and milestones, and responsibilities [11]. In IT projects the project managers are important players in making the most out of the potentials of IT.

Successful use of IT within a company depends, to a large extent, on the IT department executives and the IT project managers. This paper investigates how the two groups of managers perceive their management roles, and discusses the implications of the differences between them. The following research question is addressed: What management roles do IT executives and IT project managers emphasize? This research is important because there is a lack of studies into the differences between IT executives and IT project managers regarding management roles.

2. Management Roles

The job of managing is complicated and demanding. Managers must undertake several types of activities to achieve the objectives of their organization. To better understand the pattern of activities of the manager, we will use the concept of management roles, which was introduced by Mintzberg in the 1970s [12, 13].

The job of the manager consists of several roles at the same time. At a certain point in time, the manager might perceive one role as more important than the others. Mintzberg [13] finds that it is a curiosity of the management literature that its best-known writers all seem to emphasize one particular part of the manager's job to

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the exclusion of the others. Together they cover all the parts, but even that might not describe the whole job of managing [14].

Mintzberg's role typology is frequently used in studies of managerial work. In the context of information technology management, Grover, Jeong, Kettinger and Lee [15] identified the relevance of six roles from Mintzberg's role typology: leader, spokesman, monitor, liaison, entrepreneur, and resource allocator. In this research, the same six roles are applied, both to the IT executive in charge of an IT department and the IT project manager in charge of an IT project. We are using the following role descriptions:

- **Leader.** As a leader, the manager is responsible for supervising, hiring, training, organizing, coordinating, and motivating a cadre of personnel as to reach the goals of the organization (which might be the IT department or the IT project). This role is mainly internal to the organization of the manager.
- **Resource allocator.** The manager must decide how to allocate human, financial and information resources to the different tasks of the organization. This role emphasizes planning, organizing, coordinating and controlling tasks. This role is mainly internal to the organization of the manager.
- **Spokesman.** When being a spokesman the manager extends organizational contacts to areas outside of his or her own jurisdiction. This role emphasizes promoting accept of the IT department or the IT project within the organization, which they are part of. For the IT executive it means contacts with the rest of the company, for the project manager contacts with the base organization. Frequently, he or she must cross traditional departmental boundaries and become involved in affairs of production, distribution, marketing, and finance.
- **Entrepreneur.** The manager identifies users' needs and develops solutions that change business situations. A major responsibility of the manager is to ensure that rapidly evolving technical opportunities are understood, planned, implemented, and strategically exploited in the organization.
- **Monitor.** This role emphasizes scanning of the external environment to keep up with relevant technical changes and competition. The manager identifies new ideas from sources outside his or her organization. To accomplish this, the manager uses many sources including vendor contacts, professional relationships, and a network of personal contacts.
- **Liaison.** In this role, the manager communicates with the external environment including exchanging information with IS/IT suppliers, customers, buyers, market analysts, and the media. This is an active, external role.

The six roles are illustrated as Figure 1. Leader and resource allocator are roles internal to the project for the project manager, or internal to the IT department for the IT executive. Spokesman and entrepreneur are roles directed towards the base organization for the project manager, and towards the company for the IT executive. Monitor and liaison are roles external to the base organization for the project manager, and to the company for the IT executive.

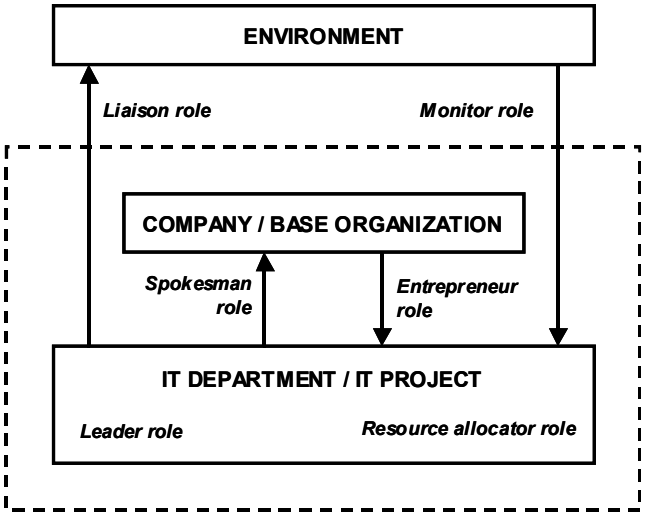

Figure 1. Management Roles in IT Dept. and IT Projects

3. Research Hypotheses

The challenges of the IT executives are changing as the use of IT within the company is maturing. The stage models of IT maturity demonstrate that the job of the IT executive is becoming more and more oriented towards external roles [16, 17]. The focus first changed from internal resource allocation tasks to corporate strategy work and contacts with the users. Then the focus moved to the use of IT to gain competitive advantages in the market place. This argument is supported by Karimi et al. [18], who claim that one important IT executive role is to spend time outside the IT department focusing on the strategic and organizational aspects of IT.

It is reasonable to believe that an IT executive is one step ahead of the IT project manager in the development towards emphasizing the external roles. The IT executive is instrumental in setting up IT projects. The IT manager must first see the needs for new orientations from a strategic perspective. Then later on this will materialize as projects with a change perspective.

According to this, we should expect that the most external roles (monitor and liaison) are more prominent and important among IT managers, than among the IT project managers. From the above discussion, we find it reasonable to propose the following hypotheses:

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H1: IT executives are more externally oriented than IT project managers.

H1a: IT executives emphasize the monitor role more than IT project managers.

H1b: IT executives emphasize the liaison role more than IT project managers.

During the past 30 years, project management knowledge and practice, e.g. planning and scheduling systems, has been devised to cope with the challenges project managers have faced. One characteristic for this development is a distinct focus on the internal activities within the project and the base organization. Very often, little or no attention is given to the project environment and other stakeholders, except the client [19]. Most of the project-planning models currently available consider the project as though it was developed in a vacuum. The project manager is responsible for planning, organizing, coordinating and controlling tasks to ensure successful project completion [20, 21]. In order to do this, the project manager has to allocate human, financial and information resources to the project.

According to Mintzberg's [12] role typology, we expect the internal roles – leader and resource allocator – to be more emphasized among IT project managers than among IT managers. From the above discussion, we find it reasonable to propose the following hypotheses:

H2: IT project managers are more internally oriented than IT executives.

H2a: IT project managers emphasize the leader role more than IT executives.

H2b: IT project managers emphasize the resource allocator role more than IT executives.

The last two management roles defined by Mintzberg [12] – spokesman and entrepreneur – are somewhat difficult to define, since they are external to the IT department/IT project and internal to the company/base organization.

However, according to Grover et al. [15] we should to some degree expect that the spokesman role (with internal orientation to the company and other departments) is more emphasized by IT executives than IT project managers. The spokesman role is a management role that incorporates activities that require the IT executive to extend organizational contacts outside the department to other areas of the organization and top executives as well [22]. Frequently, the spokesman must cross traditional departmental boundaries and become involved in affairs of production, distribution, marketing, and finance. The spokesman role demands that the IT manager acts as an information disseminator and politician, ensuring that the IT department is properly connected to the top level of the company and to key decision- makers in other departments [23, 24]. Hence, we put forward the following hypothesis:

H3: IT executives emphasize the spokesman role more than IT project managers.

According to Davidson Frame [25], users' needs are the driving force behind projects. If articulating needs is done insufficiently, the project will be built on a poor foundation, and major problems will rise when implementing the system. As an entrepreneur, it is the project manager's role to identify the users' needs and develop a fully acceptable solution. This project management role is further emphasized by Edum-Fotwe and McCaffer [26], who state that the project manager is required to provide innovative solutions for both the product, as well as the business processes involved in the delivery of the project's outcome. Client consultation, communication, listening, and feedback activity, and client acceptance, are critical project success factors [27]. Hence, the fourth hypothesis is as follows:

H4: IT project managers emphasize the entrepreneur role more than IT executives.

4. Research Method

The Grover et al. [15] instrument, which operationalized the managerial roles identified by Mintzberg and adapted them to the IT context, was used as a basis to investigate the roles of IT executives and IT project managers. The rationale for choosing this instrument was based upon the high validity and reliability they and others have obtained within each of the managerial roles.

The present study consists of two surveys conducted in Norway in 2000/2001 to investigate the management roles. The survey instruments contain six five-point Likert scales, and it asks the respondent to rate the importance of each item as it relates to the management role. The complete survey instrument from the IT project management study is presented in the appendix.

In the first survey of IT executives, a study sample of 684 companies was selected from the listing of members of the Norwegian Computing Society. It was assumed that these firms would tend to have IT executives with job attributes consistent with our definition of management roles. The desired informant in this research was the highest ranking IT executive, often called chief information officer (CIO), to measure their perceptions of roles and possible explanations of roles. Based on the availability of correct addresses, 673 questionnaires reached their destinations. Questionnaires with incomplete responses were deleted, resulting in a total sample of 128 usable responses representing a response rate of 19 percent. The study's demographics revealed that an IT

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executive is on average 42 years of age with an average of 14 years of IT experience, 4.6 of which were in the current position.

The second questionnaire instrument focused on IT project managers, and was mailed to 673 companies selected from the listing of members of the Norwegian Computing Society. It was assumed that these firms would tend to have project managers with job attributes consistent with our management role classification. Based on the availability of correct addresses, 591 questionnaires reached their destinations. Again, questionnaires with incomplete responses were deleted. After two mailings, a total sample of 80 was returned, representing a response rate of 14 percent. The characteristics of the sample show that 7% of the respondents work within banking, finance and insurance, 13% within commerce and trade, 16% within manufacturing, 9% within service, 4% within transportation, 19% within public administration, and 32% within other activities. The study's demographics revealed that an IT project manager on average has worked 7 years for the organization.

Enclosed with both questionnaire instruments was a letter explaining the objective of the study and assuring respondents of the confidentiality of their answers. We have no indications of non-response bias. There is little reason to suspect that IT executives and IT project managers who did not respond to the questionnaire perceived their firm or project much differently from those executives and project managers who did respond, since the mix of the respondents included all sectors within the industry and public sector.

5. Statistical Data and Results

Tables 1 to 10 contain the results of statistical analysis (both descriptive statistics and ANOVA) of the comparison between IT executive roles and IT project management roles.

Table 1 shows descriptive statistics regarding IT project management roles, where the response scale ranged from 1 to 5 (1 = not important and 5 = very important). Means, standard deviation and t-tests (to assess statistical significance of the difference between two independent sample means) were used to examine the data from the survey. As can be seen from table 1, IT project managers emphasize the internal roles, leader and resource allocator, as the most important management roles. The mean score for leader was 4.33 and the mean for resource allocator was 4.04 (N = 80). The management roles of monitor and liaison, which have a focus outside the project and base organization, are the least important roles. The mean score for monitor was 3.11, and mean for liaison was 3.34 (N = 80). Using a t-test we found that there exist twelve significant differences between the management roles. Most interesting is that the leader role is significantly more important than all the other management roles. From table 1 we can observe that the internal management role leader is found to be significantly more important than the two external roles, monitor (t = 9.122, p = .00) and liaison (t = 8.216, p = .00). Statistical analysis also indicates that the resource allocator role is significantly more important than the monitor role (t = 6.334, p = .00) and the liaison role (t = 5.630, p = .00).

Table 1: Statistics for IT Project Management Roles

Variable	Mean	t-values				
		2	3	4	5	6
1 Leader	4.33	2.65*	2.56*	4.38**	9.12**	8.21**
2 Resource allocator	4.04		0.30	2.20*	6.33**	5.63**
3 Spokesman	4.00			2.04*	5.79**	4.88**
4 Entrepreneur	3.70				4.45**	2.30*
5 Monitor	3.11					-1.54
6 Liaison	3.34					

Note: The statistical significance of the t-values is ** for p<.01 and * for p<.05

Table 2 displays descriptive statistics (means, standard deviations and t-test) for IT management roles, using a response scale ranged from 1 to 5 (1 = not important and 5 = very important). The empirical analysis shows that the IT executives choose the spokesman as a top priority role. The mean score was 4.17 (N = 128). Using a t-test between the six different management roles, indicates that the spokesman role is significantly more important than the other roles (p = .00 for all t-tests). Surprisingly, the liaison role, which focuses on developing contacts and personal relationships with people outside the IT department, is given lowest priority (Mean = 3.21, N = 128).

Table 2: Statistics for IT Management Roles

Variable	Mean	t-values				
		2	3	4	5	6
1 Leader	3.92	1.27	-3.38**	7.27**	2.46	8.15**
2 Resource allocator	3.82		-4.81**	7.27**	1.26	7.17**
3 Spokesman	4.17			3.32**	6.43**	10.80**
4 Entrepreneur	3.41				-8.86**	13.49**
5 Monitor	3.72					6.98**
6 Liaison	3.21					

Note: The statistical significance of the t-values is ** for p<.01 and * for p<.05

The statistical technique used for testing the research hypotheses was univariate analysis of variance (ANOVA). The principal consideration in the use of the two-group ANOVA is the samples size in each of the groups. In this

study, one group had 128 respondents, while the other group had 80. Because of this unequal group size, the statistical tests are more sensitive to violations of the assumption, especially the test of homogeneity of variance in the dependent variables. Testing of the assumption for using ANOVA was conducted, and criteria were met.

Hypothesis 1 examines whether IT executives are more externally oriented than IT project managers. This hypothesis had two sub-hypothesis (H1a and H1b). In table 3 statistical results of the test of hypothesis H1a are shown. The analysis of variance (ANOVA) gives sufficient statistical evidence to conclude that IT executives emphasize the monitor role significantly more than IT project managers. The hypothesis is significant at the 0.05 level of significance (F = 24.041, p = .00).

Table 3: Analysis of variance; Monitor role

Source	DF	SS	MS	F	P
Factor	1	17.59	17.59	24.04**	0.00
Error	201	147.09	0.73		
Total	202	164.69			

Note: The statistical significance of the F-values is ** for p<.05 and * for p<.1

The statistical test of hypothesis H1b is shown in table 4. The hypothesis is not supported since the analysis of variance (ANOVA) does not give statistical evidence to conclude that IT executives emphasize the liaison role more than IT project managers (F = 1.070, p = 0.302).

Table 4: Analysis of variance; Liaison role

Source	DF	SS	MS	F	P
Factor	1	0.79	0.79	1.07	0.30
Error	195	145.47	0.74		
Total	196	146.27			

Note: The statistical significance of the F-values is ** for p<.05 and * for p<.1

To test hypothesis 1 we have defined the monitor and liaison roles as the external roles and combined them into one external role. In table 5, the statistical analysis of variance between IT executives and IT project managers regarding the external roles are shown. As we can see from the table, IT executives are significantly more externally oriented than IT project managers (F = 4.751, p = 0.031). Therefore hypothesis 1 was supported.

Table 5: Analysis of variance; External roles

Source	DF	SS	MS	F	P
Factor	1	2.26	2.26	4.75**	0.03
Error	192	91.58	0.47		
Total	193	93.85			

Note: The statistical significance of the F-values is ** for p<.05 and * for p<.1

The second main hypothesis (H2) proposed in this paper was whether IT project managers are more internally oriented than IT executives. To further our understanding of which management roles IT executives and IT project managers emphasize, this main hypothesis was de-composed into two sub-hypothesis (H2a and H2b).

Results of ANOVA analysis of hypothesis H2a is presented in table 6. As we can see from the data, IT project managers emphasize the leader role significantly more than IT executives. The hypothesis is significant at the 0.05 level of significance (F = 13.041, p = .00), and thereby providing support for hypothesis H2a.

Table 6: Analysis of variance; Leader role

Source	DF	SS	MS	F	P
Factor	1	8.00	8.00	13.04**	0.00
Error	200	122.73	0.61		
Total	201	130.73			

Note: The statistical significance of the F-values is ** for p<.05 and * for p<.1

The result of analysis of variance (ANOVA) regarding test of hypothesis H2b, is shown in table 7. The empirical results give statistical evidence to conclude that IT project managers emphasize the resource allocator role significantly more than IT executives. The hypothesis is significant at the 0.10 level of significance (F = 3.575, p = .06), and thereby providing support for hypothesis H2b.

Table 7: Analysis of variance; Resource Allocator role

Source	DF	SS	MS	F	P
Factor	1	2.37	2.37	3.57*	0.06
Error	201	133.65	0.66		
Total	202	136.03			

Note: The statistical significance of the F-values is ** for p<.05 and * for p<.1

To test hypothesis 2 we defined the leader and resource allocator as the main internal roles and combined them into one internal role. In table 8 the statistical analysis of variance between IT executives and IT project managers regarding the internal role is shown. As we can se from the table, IT project managers are significantly more internally

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oriented than IT executives (F = 9.825, p = 0.002). Therefore hypothesis 2 was supported.

Table 8: Analysis of variance; Internal roles

Source	DF	SS	MS	F	P
Factor	1	4.52	4.52	9.82**	0.00
Error	195	89.71	0.46		
Total	196	94.23			

Note: The statistical significance of the F-values is ** for p<.05 and * for p<.1

Hypothesis 3 examines whether IT managers emphasize the spokesman role more than IT project managers. Table 9 displays that this hypothesis did not found support in the sample (F = 2.284, p = 0.132).

Table 9: Analysis of variance; Spokesman role

Source	DF	SS	MS	F	P
Factor	1	1.47	1.47	2.28	0.13
Error	205	132.18	0.64		
Total	206	133.66			

Note: The statistical significance of the F-values is ** for p<.05 and * for p<.1

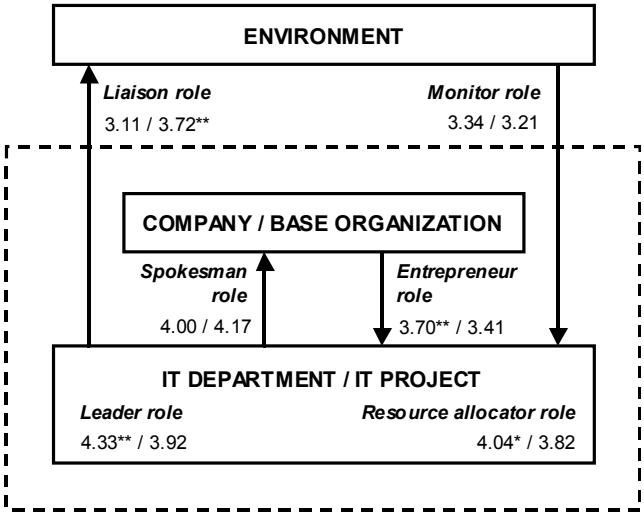
In table 10 statistical results of the test of hypothesis 4 is shown. The analysis of variance (ANOVA) gives sufficient statistical evidence to conclude that IT project managers emphasize the entrepreneur role significantly more than IT executives. The hypothesis is significant at the 0.05 level of significance (F = 33.381, p = .00), and thereby supports hypothesis 4. These results provide some interesting empirical insights into IT project managers role importance, and possible role explanations.

Table 10: Analysis of variance; Entrepreneur role

Source	DF	SS	MS	F	P
Factor	1	24.77	24.77	33.38**	0.00
Error	204	151.41	0.74		
Total	205	176.19			

Note: The statistical significance of the F-values is ** for p<.05 and * for p<.1

To summarize the statistical analysis, we have illustrated the importance or priority of each management role in Figure 2. The first number is the mean score from IT project managers, and the second number is the mean score from IT executives. The response scale ranged from 1 to 5 (1 = not important and 5 = very important). The statistical significance values are ** for p<.05 and * for p<.1.



Figur 2. Differences between management roles in IT departments and IT projects

6. Discussions and Implications

This study has found a number of interesting observations and results for better understanding of the management role priorities of IT executives and IT project managers. First, the empirical analysis indicated that IT executives emphasize the spokesman role as most important. Previous research has reported that IT executive rated the entrepreneur role (creating and managing change) as most important [15]. However, much of the research on the IT executive function has focused on the leader role, with special attention to supervising, hiring, training, and motivating a cadre of specialized personnel.

Second, the study has provided empirical evidence that IT executives are more externally oriented than IT project managers. When CIOs first entered the executive suite some 15 years ago, they were not exactly a popular addition. "More comfortable with computers than people" was a common verdict on CIOs who had risen through the information systems ranks. Employers seemed to face a simple tradeoff: CIOs with depth and breadth of technology expertise, or those with general business and interpersonal skills, such as the ability to exercise influence within the organization. In a short space of time the role of information technology has changed enormously, going from back-room business functions to re-inventor of business processes and key driver of competitive strategy. A recent study of 1400 CIOs from a stratified random sample of US companies found that the areas of greatest change in job functions for today's IT executives include increased interaction with other departments and greater involvement in strategic planning [28].

Third, the findings indicate that IT project managers rate the leader role as most important. This observation is

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supported by Edum-Fotwe and McCaffer [26], who emphasize that the leader function is essential for project success. We will argue that even under the simplest of organizational structures, the IT project manager must possess a leader role. According to Pinto and Slevin [27], troubleshooting and the project manager's ability to handle unexpected crises, which are leader activities, are critical success factors.

This study has also provided evidence that IT project managers are more internally oriented to the IT project or IT department, than IT executives. However, although research in project management has generally acknowledged this proposition as a reality, change within this line of business force a change to other priorities. It has been argued in several articles that project managers need to look more to the users' and other stakeholders' perception of success and failure. According to Baccarini [29] stakeholder satisfaction is a crucial part of project success. This view is particularly emphasized by Cleland [30, 31] in his discussion of leadership essentials, where he underlines the external roles. Surprisingly, the data from this survey show that IT project managers do not agree with this change in focus, since they point out the internal roles – leader and resource allocator – as the most important, rather than the externally focused roles of monitor and liaison. The result of this focus may imply that benefit for the stakeholders is given a lower priority by project managers.

This empirical research has shown that IT executive's and IT project manager's prioritize different management roles. However, due to new demands from more complex and dynamic business environments, we expect a trend towards more project-oriented companies. This management approach is called "Management by Project". The specific feature of this approach is that in addition to management of single projects, the management of network of projects, performed simultaneously by the company, and the management of relationships between the company and the single project are considered [32, 33]. In this project-oriented company, we believe that the difference or border between IT executive's and IT project manager's roles is somewhat artificial, and will therefore be reduced over time.

7. Conclusions and Future Research

This study provides some empirical insight into the emphasis placed on different managerial roles of the IT executives (CIOs) and the IT project managers. The different management roles that have been studied consist of two internal roles to the IT department or IT project (leader and resource allocator), two roles with focus on the company or base organization (spokesman and entrepreneur), and two roles external to the stakeholder environment (monitor and liaison).

Our survey results display that IT project managers emphasize leader and resource allocator as the most important roles, while IT executives give highest priority to the spokesman and leader roles. Overall, the survey data confirmed two conclusions: (1) that IT project managers are significantly more internally oriented than IT executives, and (2) that IT executives are significantly more externally oriented than IT project managers. However, our findings should be interpreted with some caution before developing any universal theory of the roles of IT executives and IT project managers.

Several suggestions for future research are relevant, based on concerns of the current study. First, contingent factors need to be further investigated as to their effect on IT executive and IT project manager role importance. Such contingent factors can be company size, industry, project size and characteristics, and personal characteristics. Second, more empirical research is needed to develop our understanding of the "new" project oriented company, and how the trend towards "Management by Project" will influence on IT executives' and IT project managers' roles. Will future research experience that the border (distinction) between base organization/IT department and IT project is erased? Third, key constructs should be explored. More evidence should be provided for the reliability and validity of the measures used.

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