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## **Information Relevance and Availability: Toward Effective Management of Projects in Public Sector**

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### **ABSTRACT**

*Information plays a critical role in the different stages of managing a project. This study examines the views of one hundred and two (102) Portuguese Public sector officials on the relevance, availability and sharability of information as practiced in their organizations. Cluster analysis, gap analysis and confirmatory factor analysis procedures are utilized to analyze the collected data. The results of this study tend to underscore the growing need to have well-designed information systems, which are capable of enhancing the availability and promoting the sharability of relevant information.*

### **INTRODUCTION**

In recent years, public sectors in different countries have been under significant pressures to reinvent their operational models. In this context, the Portuguese public sector is no exception. To achieve the desired operational changes, public sector organizations have engaged in different types of projects, varying in scope and size. As such, these projects are viewed as change agents toward operational effectiveness. The success of these projects depends heavily on the ability of participants to obtain relevant and timely information (White, 2005; Chen *et al.*, 2006). In response to the growing demand for such information, many public sector organizations have invested in modern information systems. However, in many cases, such investments have not achieved desirable benefits (Tarafdar *et al.*, 2003).

In this context, investments in modern information systems must be coupled with organizational cultural changes aimed at promoting the effective utilization of such systems. Toward this desired goal, public sector organizations must understand the effective informational flow, which regulate the interaction between those who have the information and those who need such information. In this context, the promotion of sharability of information must be integrated into the design of information systems (Gangopadhyay & Huang, 2004; Fedorowicz *et al.*, 2004). Such design must not only enhance the collection of relevant and timely information, but rather it must also promote sharing such information with project managers.

With the discussion above in mind, the objective of this study is to shed some light on current informational practices in Portuguese public sector organizations, in relation to the utilization of information in project management context. Specifically, this study investigates issues relevant to the availability and sharability of information as viewed by project managers. Toward this

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end, the data collected from one hundred and two (102) Portuguese Public sector managers is analyzed using several statistical procedures. The organizational implications of the results to public sector organizations are discussed.

## **BACKGROUND**

Through the years, public sector organizations have promoted the perception that their operational systems are too unique to be managed based on operational and organizational practices found in the private sector (Dorsch & Yasin, 1998; Yasin et al., 2004). As such, it was argued that public sector operational systems have distinct constraints, which characterize their inputs, processes and outputs. These constraints included, among other factors, budgetary constraints, unmotivated employees, rigid operating procedures, and the influence of internal and external politics (Ward & Mitchell, 2004; Brown, 2001). Due to these operational characteristics and constraints, organizational effectiveness in the public sector has been traditionally equated with operational efficiency.

In recent years, managers of for-profit private sector organizations have been under considerable market pressures to re-orient the strategies, operations and business models of their organizations. In a response to these pressures, the organizational structures of these organizations have been steadily re-engineered from mechanistic, rigid and closed system-orientations to a more organic, flexible and open system-orientations (Gomes et al., 2006). In this context cross-functional teams utilizing project management practices have been deployed effectively to smooth re-engineering effort aimed at organizational changes (Box & Platts, 2005). This unmistakable and rapid pace of organizational re-engineering, and the organizational changes associated with it, have made project management tools and practices a subject of great practical interest to the management of private organizations. The proliferation of change-based projects made “management by projects” a practical phrase, in today’s business environment (Partington, 1996, Smith & Dodds, 1997).

Traditional project management practices are based on a closed system perspective of the organization. Some organizations are still adhering to this closed system orientation when it comes to project management, even in today’s organizational open system environment (Yasin et al., 2002). Perhaps this may explain the relatively high rate of projects failure. In today’s organizational environment, organizational change and related projects must be approached based on a well-designed and multifaceted strategy. Such strategy must not only adhere to time and budgetary constraints, but, more importantly, must aim at achieving competitive organizational advantage (Dietrich & Lehtonen, 2005). Toward this end, a broader organizational effectiveness-oriented strategy is required. Such strategy integrates project managers’ technical competencies, with leadership, communication, and other managerial skills to ensure the effectiveness of projects (Smith & Dodds, 1997; Zimmerer & Yasin, 1998; Muller, 2003).

Although public sector organizations are not under the same market pressures as their private-sector counterparts, they have been recently subjected to demands advocating fundamental organizational changes. These demands have been, mainly, exerted by western governments since 1980s (Wisniewski & Ólafsson, 2004). The motivation behind such demands is to streamline the size of the public sector, eliminate non-value-added activities and promote organizational effectiveness (Brunetto & Farr-Wharton, 2003). With these pressures in mind, a

broader emphasis has recently emerged toward the complete transformation of public sector management. This broad management transformation trend has been labeled “New Public Management” (NPM). This “New Public Management” philosophy has advocated profound changes in the roles, management, staffing and delivery of public services (Lawton, 2005). Politicians, financial institutions, the media, management consultants and scholars around the world have all played important roles in creating and maintaining the pressure for the complete transformation of public sector organizations. World Bank, OECD-Organization for Economic Co-operation and Development, and International Monetary Fund has been in the forefront of the effort to promote such transformation (Torres & Pina, 2004).

The NPM reforms refer to the adoption of a market-based philosophies and practices within the public sector. These reforms involve the systematic use of strategic planning, program budgeting, risk management and increased use of accountability to achieve measurable outcomes (Brunetto & Farr-Wharton, 2003). Overall, the NPM philosophy promotes systematic changes in the delivery of public services (Hood, 1995). As such, NPM reforms have focused on the radical re-orienting of organizational thinking in the public sector from an input mode to an output mode (Emery e Giauque, 2003). NPM based practices have, in recent years, left their marks on the cultures and operations many public sector organizations in different countries.

Due to the complexity and the multifaceted nature of stakeholders in public sector operational contexts, difficulties can arise when attempting to apply standard project management practices to promote organizational change (Crawford *et al.*, 2003). In general, the literature tends to emphasize the role of the project manager in overcoming difficulties. However, such literature is not specific to public sector operational environments. Project managers in the public sector may have to deal with more difficulties relative to their counterparts in the private sector. These added difficulties are attributed to dealing with the non-responsive employees and non-traditional operating constraints. Thus, the task of handling these additional difficulties and complexities may pose more serious challenges to project managers in the public sector, relating their counterparts in the private sector. In a public sector operational context, politics and political decisions tend to shape the organizational culture. As such, the political context of these organizations tends to significantly interact with their strategic and operational decisions. This, in turn, tends to create operational constraints which are not typically found in private sector operational settings.

Despite the operational and organizational factors which tend to make public sector organizations unique operational systems, these organizations are being pressured to abandon the business as usual practices of the past. As these organizations attempt to undergo the required modifications, they must rely on proven project management practices carry out the change-based projects. In this context, information availability and sharability will determine the extent of effectiveness of these change related projects.

## METHODOLOGY

### *Instrument*

The research instrument used in this study was based on the works of Zimmerer and Yasin (1998) and Yasin *et al.* (2000). It was translated and adapted to the public sector in Portugal. A panel of experts viewed the instrument for modifications, before it was administered. The instrument utilized forced-answer questions that applied a traditional 5 point-Likert scale to get the data on key informational aspects of project management. The respondents were asked to indicate the information availability on key relevant project management-related variables and practices. The research instrument also collected description information related to the respondents.

### *Sample and data analysis*

The research instrument was distributed during several seminars conducted by the first author regarding strategy, performance measurement, and project management in the public sector of Portugal. The participants were public sector officials at the middle-level management rank. They represented sixty different local public institutions, mainly city halls. The participants represented fourteen of the twenty main administrative Portuguese regions (Districts). The research instrument was distributed to 120 participants at four seminars conducted in three cities in Portugal. However, only hundred-two (102) participants completed the research instrument. Thus, resulting in a response rate of 85%. In addition to the relatively high response rate, the sample is considered representative of the populations studied.

Based on the obtained responses, about seventy-three percent (72.5%) of the respondents worked in the public sector for more than five years. On the other hand, thirty-three percent of the respondents (33.3%) were involved in more than 10 projects, while only about six percent (5.9%) of the participants never served as a project leader (See Table 1). Almost fifty-seven percent (56.8%) of undertaken projects were classified as routines projects, while almost twenty percent (20%) were classified as innovative projects.

**Table 1: Sample Profile.**

Item	Frequency	Percentage
<b>Years in public organizations</b>		
[0-2]	1	0.98
[3-5]	20	19.61
[6-10]	33	32.35
[11-15]	13	12.75
[16-20]	15	14.70
>20	13	12.75
Didn't answer	7	6.86
Total:	102	100.00
<b>Type of projects undertaken by the public organizations</b>		
At the routine type	58	56.86
Structured but not routine	37	36.27
Innovative projects	20	19.61
Substitution projects	21	20.59
Didn't answer	5	4.90
<b>Number of projects each respondent were evolved</b>		
0	0	0.00
[1-5]	20	19.61
[6-10]	16	15.69
[11-15]	7	6.86
[16-20]	7	6.86
[21-25]	2	1.96
>25	18	17.65
Several	7	6.86
Didn't answer	25	24.51
Total:	102	100.00
<b>Number of projects each respondent served as project leader</b>		
0	6	5.87
[1-5]	33	32.35
[6-10]	10	9.79
[11-15]	2	1.96
[16-20]	1	0.98
[21-25]	2	1.96
>25	13	12.75
Several	6	5.88
Didn't answer	29	28.43
Total:	102	100.00

In the first phase of the data analysis, exploratory factor analysis was used to extract the underlying informational dimensions (factors). The second phase of the data analysis utilized cluster analysis to verify the existence of groups of respondents with similar opinions regarding the identified informational factors. For this purpose, the hierarchical agglomerative technique (Wards's method) was used. As a result, the number of clusters was set to three (3). In the third

phase of the data analysis a confirmatory factor analysis was utilized to define and validate the extracted informational dimensions.

## RESULTS

### *Factor Analysis Results*

Using the Kaiser-Meyer-Olkin test, sample adequacy for all variables was analyzed. A sample adequacy overall value of 0.846 was obtained. This value reached the value considered acceptable in the literature for this type of analysis (Hair *et al.*, 1998). The principal component method with a Varimax rotation was used to extract relevant factors. The results of the Bartlett test confirmed the appropriateness of the factor analysis procedure as used. Based on the factor analysis procedure, a six-factor solution was extracted (Table 2). This factor solution explained 70.62 per cent of the total variance.

In order to evaluate differences with regards to information availability among participants based on project type (innovative vs. otherwise), an ANOVA procedure was used. Significant differences were found related to the Communication and Management dimension ( $\alpha=0.05$ ), and to the International dimension ( $\alpha=0.10$ ).

### *Cluster analysis results*

In the first phase of the data analyses, information availability for several management variables was grouped into several factors, representing informational dimensions. The existence of similarities with regard to the informational dimensions among the participants was investigated using cluster analysis in order to group the respondents. The observation unit for the cluster analysis was based on each extracted factor. Therefore, the average of the measures included in each factor was calculated. Based on the cluster analysis procedure, a three-cluster solution was obtained, with significant differences between all informational dimensions obtained (Table 3).

**Group A** This group included twenty-nine participants (28.4% of the sample). They were employed by their organization for the most time. This group of respondents classified the communication and management related information, as the most available, while information related to the international dimension was classified as the least available.

**Group B** This group included forty-eight participants (47.1% of the sample). It did not have any differentiating characteristics relative to the other two groups. This group of respondents classified the information on the technical dimension as the most available, while information on the international dimension was classified as the least available.

**Group C** This group included twenty-five participants (24.5% of the sample). They were employed by their organization for the least time. This group of respondents classified the information on the technical dimension as the most available, while information on the international dimension was classified the least available.

**Table 2: Information availability on key project management variables.**

<b>FACTORS</b> (Cronbach's alpha value)	COM (0.894)	LEA (0.857)	INT (0.789)	PMS (0.774)	TEC (0.697)	ORG (0.767)	Comm
<b>COM – COMMUNICATION AND MANAGEMENT DIMENSION</b>							
Quality management	0.794						0.819
Scope management	0.774						0.685
Integration management	0.749						0.734
Time (Schedule) MGT	0.719						0.620
Communication	0.711						0.684
<b>LEA – LEADERSHIP DIMENSION</b>							
Cultural sensitivity		0.717					0.693
Technical competence		0.715					0.665
Leadership ability		0.703					0.743
Organizational skills		0.695					0.693
Leadership by example		0.617					0.683
<b>INT – INTERNATIONAL DIMENSION</b>							
International finance			0.841				0.714
International marketing			0.825				0.764
International economics			0.776				0.698
<b>PMS – PROJECT MANAGEMENT-SPECIFIC DIMENSION</b>							
Cost management				0.747			0.721
Project organization chart				0.606			0.600
Risk management				0.597			0.662
Environmental regulations				0.591			0.691
<b>TEC – TECHNICAL DIMENSION</b>							
Standard/codes (quality, safety, etc.)					0.869		0.810
Technical requirements					0.786		0.733
International law/regulations					0.497		0.660
<b>ORG – ORGANIZATIONAL DIMENSION</b>							
Organizational constraints						0.848	0.768
Top management support						0.674	0.641
Organizational policies						0.619	0.758
Eingvalues	3.92	3.45	2.48	2.22	2.14	2.04	
Percent of total variance	17.04	15.00	10.77	9.64	9.29	8.88	
Cumulative percent	17.04	32.04	42.81	52.45	61.74	70.62	



**Table 3: Dimensions of information across groups of respondents.**

	Group A	Group B	Group C	F	Duncan grouping ( $\alpha=0.05$ )
Number of cases:	29	48	25		
Communication and Management	4.17 (1)	3.30 (2)	2.26 (3)	92.32*	A, B, C
Leadership	3.84 (1)	2.95 (2)	2.42 (3)	42.43*	A, B, C
International	2.40 (2)	2.53 (1)	1.60 (3)	14.61*	A-B, C
Project management-specific	3.71 (1)	2.97 (2)	2.49 (3)	37.71*	A, B, C
Technical	3.09 (2)	3.36 (1)	2.61 (3)	6.45*	A-B, C
Organizational	3.46 (1)	2.71 (2)	2.41 (3)	15.79*	A, B-C
Characteristics:					
Years in the public organization***	14.5 (1)	11.5 (2)	10.1 (3)	2.33**	A-B, B-C
Participation in projects****	14.3 (3)	20.9 (1)	21.8 (2)	0.77	A-B-C
Leader of projects*****	12.3 (2)	15.7 (1)	11.7 (2)	0.27	A-B-C

Notes: Numbers in parentheses are ranks of scores of strategic dimensions in descending order along the groups

\* F significant for  $\alpha=0.05$

\*\* F significant for  $\alpha=0.10$

\*\*\* Average of years that respondent were in the organization

\*\*\*\* Average number of projects that the respondents participated

\*\*\*\*\* Average number of projects where were respondent were leaders

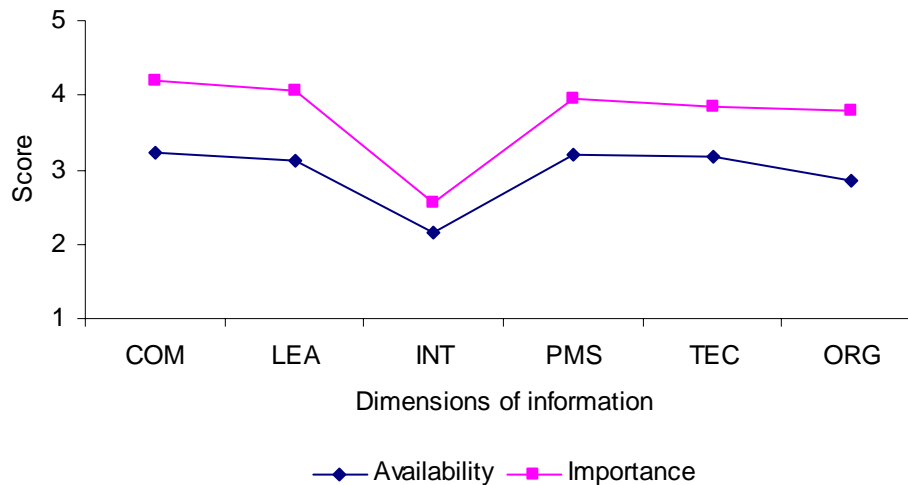
Based on the results in Table 3, two groups of respondents (A and C), with different opinions on information availability were identified. Group A, representing participants with the most organizational experience. This group reported information deficit on only the international dimension. On the other hand, group C representing participants with less organizational experience, reported deficit on all informational dimensions.

The next phase of the data analysis focused on identifying and validating extracted informational dimensions for the sake of improving the analysis. After analyzing both information importance and availability for the dimensions identified in the exploratory factor analysis, gap analysis was performed. The graph in Figure 1 shows similar gaps for all dimensions, with the exception of the international dimension. The international dimension received low importance and low availability by the participants. This result provoke an interesting question: Are the participants given the international dimension low importance due to the lack of information, or is it the other way around? Due to this inconsistency the international dimension was dropped from further analysis.

In order to cross validate the information availability with the importance, a confirmatory factor analysis (CFA) procedure was performed using the AMOS 7.0 software. Through an iterative process, three items were considered for omission based on the magnitude and the significance of parameters estimates. For this purpose, the squared multiple correlations, standardized residuals and modification indices were examined. Two other items were removed from other

dimensions due to cross-loadings. The four resulting dimensions based on this CFA are presented next.

**Figure 1: Gap analysis information availability and importance.**



COM - Communication and management dimension  
 LEA - Leadership dimension  
 INT - International dimension  
 PMS – Project management-specific dimension  
 TEC – Technical dimension  
 ORG – Organizational dimension

**Communication and Management Dimension** In the context of the organizational change process, communication is considered as one of the most important tools to motivate employees. However, communication needs to be effective in order to achieve this end. This dimension reveals the importance of incorporating communication with time management, integration management, scope management, and quality management in order to make all communication flow effectively.

**Leadership Dimension** At a time of change, leadership is very important due to organizational uncertainties. Organizational changes tend to contribute to organizational uncertainties. In this dimension, leadership ability is combined with three other characteristics. These characteristics include technical competence, organizational skills, and cultural sensitivity. Perhaps these project managers are stressing these characteristics as they pertain to them and top managers also. So in essence, these project managers are sending a message to their upper management.

**Project Management-Specific Dimension** This dimension included the three main traditional components of project management, which are cost management, project organization chart, and risk management. This dimension reveals specific elements of the technical expertise needed to manage a given project. Thus specific technical skills are still valued by the participants. However, such skills may be viewed as given, rather than differentiating factors.

**Technical Dimension** This dimension included two characteristics, reflecting the technical dimension of the organizational change process. It also included the environmental regulations concern. In this dimension participants appear to be stressing two important concerns. The first one is the importance of technical competencies to project effectiveness. The second is the concern for the natural environment and linking that to the overall effectiveness of the project.

**Table 4 – Standardized parameter estimates and fit indices for the CFA first order model.**

Dimensions		COM	LEA	PMS	TEC		
<b>COM – COMMUNICATION AND MANAGEMENT DIMENSION</b>							
Integration management		0.830					
Communication		0.749					
Quality management		0.775					
Time (Schedule) MGT		0.656					
Scope management		0.634					
<b>LEA – LEADERSHIP DIMENSION</b>							
Leadership ability			0.632				
Organizational skills			0.772				
Cultural sensitivity			0.669				
Technical competence			0.653				
Top management support			0.503				
<b>PMS – PROJECT MANAGEMENT-SPECIFIC DIMENSION</b>							
Project organization chart				0.791			
Cost management				0.620			
Risk management				0.817			
<b>TEC – TECHNICAL DIMENSION</b>							
Technical requirements					0.565		
Standard/codes (quality, safety, etc.)					0.885		
Environmental regulations					0.641		
Composite Reliability (CR)		0.851	0.780	0.706	0.750		
Average Variance Extracted (AVE)		0.537	0.419	0.559	0.510		
Cronbach alfa		0.859	0.770	0.788	0.737		
$\chi^2$	df	p-value	$\chi^2/df$	GFI	TLI	CFI	RMSEA
96.21	94	0.42	1.02	0.899	0.996	0.997	0.015

All estimates are significant ( $p < 0.01$ )

Evidence of convergent validity was provided by the composite reliability (CR) scores for each factor (Table 4). The CR scores obtained are all above the 0.70 which is the acceptable value for this index (Fornell and Larcker, 1981). The construct validity was assessed using the average

variance extracted (AVE) index. According to Fornel and Larcker (1981), the acceptable value for this index should be above 0.5. All, but one, of the results are above 0.5. The Cronbach alphas are all above 0.74 which is considered acceptable (Hair *et al.*, 1998). The discriminant validity of the measures was confirmed, thus verifying that the correlations between any two constructs are lower than the corresponding Cronbach alphas. All standardized factor loadings were highly significant ( $p < .01$ ), and all were higher than .5.

Based on these results, it is concluded that all constructs are uni-dimensional and meet acceptable levels of reliability and convergent validity. Table 4 shows the most used goodness of fit measures. The chi-square and relative chi-square statistics indicate a good fit. The most conservative value should be less than 2 for the relative chi-square statistics (Hair *et al.*, 1998). The Goodness of fit index (GFI) of 0.899 is very close to .9, the level suggested by Schumaker and Lomax, (1996). Turcker-Lewis Index (TLI) and Comparative Fit Index (CFI) indicate a good fit with all values greater than .99, which is above the recommended .9 (Hair *et al.*, 1998). The Root-Mean Square Error of Approximation (RMSEA), with .015, also indicates a good fit of the proposed model (Browne & Cudeck, 1993).

### **CONCLUSIONS AND IMPLICATIONS**

Based on the results of this study, which utilized a sample of one hundred and two (102) Portuguese public sector project managers, the following conclusions and implications are in order.

First, while the participating project managers appear to understand the relevance of information to the effectiveness of projects, they are not sure that their organizations are making such information available. This is especially the case for the project managers with less seniority in these organizations. If the lack of availability is due to insufficient information systems, then Portuguese public sector organizations are called upon to investing in the implementation of the needed information systems. However, if the lack of availability of information is attributed to organizational policies which restrict the sharability of information, then managerial actions aimed at changing such information sharing practices are called for.

Second, the gaps between information importance and availability on key informational dimensions are evident based on the results. These gaps should be eliminated through the implementation of systematic organizational information systems and associated utilization strategy (Evans & Neu, 2008). Such strategy should promote the effective sharing of the informational resources available to the organizations (Jitpaiboon *et al.*, 2006). In this context, the problem may not be hardware/software related. Rather, it could be attributed to the lack of an organizational strategy, which views information as organizational resource (Tesch *et al.*, 2008).

Third, participants tended to value non-technical information. Thus, organizations should stress the availability of information, which relate to the managerial and people aspects of projects. In this context, training project managers to utilize such information is called for.

Portuguese public sector organizations appear to be in need of re-inventing and modernizing their information systems. Such investment is needed in order to make critical information on

key aspects of project management and organizational change readily and systematically available to project managers and other decision-makers (Travica, 2005).

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