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IS PERFORMANCE MANAGEMENT SYSTEMS: AN ACTION RESEARCH PERSPECTIVE

Summary

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Introduction

The evaluation of performance is critical in all functional departments (accounting, marketing and operations etc.); each department is involved in Performance Measurement and must demonstrate its contribution to Business. In particular, the control and governance of internal services such as Information System (IS) has become quite critical in organizations due to the large degree of expenditure and investment. So IS managers have faced growing pressure to measure the performance of IS department in order to justify such an appreciable investment and evaluate the IS Business Value.

IS Performance Management Systems could help IS departments to evaluate the outcomes of IS activities, practices and processes at all levels of the IS organization and, consequently, to face the issues presented above. They can also help IS departments to face a serious credibility problem due to lack of management practices that can provide real benefits in business operations and grant investment return. Although IS Performance Management Systems seem to be the right solution for the CIO and IS department's problems, they are not so widespread in companies (Perego 2006) and they do not cover all the dimensions of IS Performance evaluation. We believe that the difficulty in implementing this type of system has been determined by internal factors such as the culture and power balance. Furthermore, we believe that these factors affect the design and implementation process, and the shape of IS Performance Management Systems in terms of a set of measures used to measure IS performance. Thus our research questions are:

- What factors affect the design and implementation of IS Performance Management Systems?
- How do these factors influence the shape of IS Performance Management Systems, and how can they be managed?

Theoretical perspective

The assessment of IS effectiveness and its contribution to Business has been widely debated among both business scholars and practitioners. Interest in the debate has increased even though the conclusions of several studies in this area can be summed up using Robert Solow's famous remark: "*we see computers everywhere except in the productivity statistics*" (Solow 1987). Brynjolfsson called this phenomenon the "IT productivity paradox" (Brynjolfsson 1993) and he suggested that traditional measures of productivity may not be appropriate to estimate the contribution of IT to business outcomes.

Starting with Brynjolfsson's studies, several other researchers have tried to examine the relationship between investments in IS capital and labour and their effect on organizational performance. They have employed several theoretical paradigms based on the Microeconomic theory (Brynjolfsson 1996; Hitt and Brynjolfsson 1996, Lee and Barua 1999, Brynjolfsson and Hitt 2003).

Nevertheless the connection between IS and productivity is still elusive. One reason could be the aggregate unit of analysis at the organizational level, which makes it difficult to isolate the impact of any individual technology. As a matter of fact, the results of IS payoff studies show that "*the more detailed the level of analysis, the better the chance to detect the impact, if any, of a given technology*" (Deveray and Kohli 2003 p.275).

Other researchers have moved the debate "*from the question of whether IT creates value to how, when and why benefits occur or fail to do so*" (Soh and Markus 1995 p.29) and focused their attention on the construction of the IS Business Value generation process. One of the first to move towards this new direction was Weill (1992) who introduced the variable "conversion effectiveness" that represents the aspects of the firm's climate which influence IS or, as Weill said, the quality of the firm-wide management and commitment to IS. In 1995 Markus and Soh gave an extremely relevant contribution to the debate proposing a theoretical model of IS value creation. Their model synthesized prior contributions in a chain of three different process models which would specify a sequence of necessary (but not sufficient) conditions that explains how the IS outcomes occur or not. "*[…] organizations spend on IT and, subject to the varying degrees of effectiveness during the IT management process, obtain IT assets. Quality IT assets, if combined with the process of appropriate IT use, then yield favorable IT impacts. Favorable IT impacts, if not adversely affected during the competitive process, lead to improved organizational performance*" (Soh and Markus 1995 p. 39). The main result of their study was to highlight the distance between IS investment and organizational performance. Since then, a lot of researchers have undertaken studies on the factors which lead to IS Business Value. A synthesis of the major highlights can be found in the "Integrative Model of IT Business Value" proposed by Melville, Kraemer and Gurbaxani (2004). They identified the organization as the locus of IS business value generation and pointed out IS business value is generated by the employment of IS resources and complementary organizational resources. They also emphasized the role of external factors (industry characteristics, trading partners and political, regulatory, educational, social and cultural context) in generating of IS business value.

A third research stream concerns IS Success measurement. The first study that sough to impose some form of order on IS researchers' choices of success measures was the paper of DeLone and McLean (1992). In their paper they proposed an IS success Model based on six distinct constructs of information system: System Quality; Information Quality; Use; User Satisfaction; Individual Impact; Organizational Impact. Pitt, Watson e Kavan (1995) gave a relevant contribution to the development of the IS Success Model. They pointed out that IS department has expanded its role from product developer and operations manager to service provider. Therefore the quality of the IS department's service, as perceived by its users, is a key indicator of IS success which affects both use and user satisfaction. Grover (1996) also, in his studies, gave some inputs to complement and extend DeLone and McLean's IS Success Model, building a

theoretically-based construct space for IS effectiveness which encompasses three definitional dimensions: (1) evaluative referent; (2) unit of analysis and (3) evaluation type. Starting from the work of Grover et al. (1996), Seddon et al. (1999) proposed a new framework which summarized the seven questions proposed by Cameron and Whetten (1983) in two dimensions: stakeholders corresponding to the point of view using in the evaluation, and system corresponding to the domain under evaluation. Starting from this debate, recent studies have tried to empirically and theoretically assess these theoretical models of IS success in an IS use context (Rai et al. 2002) and address several areas of uncertainty with past IS Success research designing robust, economical and simple models which practitioners can put into practice (Gable et al. 2008). Finally, other research has deepened the relationships among constructs related to information system success and it has underlined the importance of user-related and contextual attributes in IS success (Sabherwal et al. 2006).

A last research stream proposes the adoption of the Balanced Scorecard concept (Kaplan and Norton 1996) to measure the value of IS and evaluate IS Performance. Martinsons et al. (1999) developed a Balanced Scorecards for Information Systems that "*allows managers to see the positive and negative impacts of IT applications and IS activities on the factors that are important to the organization as a whole*" (Martinsons et al. 1999 p.85). They pointed out that measurement is a prerequisite to management and, as a consequence, they proposed IS Balanced Scorecard as a strategic IS Management tool that can be used to monitor and guide performance improvement efforts. In particular IS Balanced Scorecard becomes IS Performance Management System which can be defined as the set of metrics used to quantify both the efficiency and effectiveness of actions (Neely 1999) used to evaluate the outcomes of IS activities, practices and processes. Therefore it suggests a new point of view of IS effectiveness evaluation which should support an IS Governance approach (Martinsons 1999, Van Grembergen 2000, Pasini and Canato 2005, Pasini et al. 2005).

Research Framework

Starting from the literature review, we have built a theoretical framework that has two aims: (1) to provide a wide set of IS Performance dimensions and measures which can support companies in the design of their IS Performance Management Systems and (2) to identify the factors which affect the choice of IS Performance dimensions and measures, and as a consequence the shape of IS Performance Management Systems.

In order to reach the first objective, we synthesized previous studies and built a model organized into four Measurement Areas according to the Balanced Scorecard concept (Kaplan and Norton 1996), but in these areas we attempted to gather all the measures and dimensions that we found in the literature. The four Measurement Areas are as follows: (1) Business Contribution and Value, (2) Customer Orientation, (3) IS Processes and (4) Change and Innovation.

The "Business contribution and value" Area is focused on the measurement of IS contribution to achieving business goals and to improving organizational performance. Here we especially gather measures proposed by the IS Payoff literature and by the stream research started with McLean and DeLone. This Area also includes measures on Control IS expenses and the Business Value of IS projects (Van Grembergen and Van Bruggen 1997).

Whereas the "Customer Orientation" Area is focused on the answer to internal and external IS users' needs. If the previous Area generally uses quantitative measures, in this Area perceptual measures are more common to measure User satisfaction (Weill 1992, DeLone and McLean 1992) and Service Quality (Pitt et al. 1995). The Individual impact measures (DeLone and McLean 1992) could be also included in this area. Notwithstanding this, it is also possible to use some of the quantitative measures that DeLone and McLean proposed to evaluate Information Use and quantitative measures on the IS Service Level in order to compare the perception of the Service Quality with the reality (Van Grembergen and Van Bruggen 1997).

The third measurement area, i.e. "IS Processes", is focused on the efficiency of the IS department in terms of technological and human IS resources (Melville et al. 2004) and their employment in IS processes. Therefore in this Area there are technical measures which evaluate what DeLone and McLean called "System Quality". Other relevant dimensions are: the workload of IS professionals and capacity saturation, the employment of IS Human resources on critical activities or projects, speed in execution, backlog, project management capability, application management capability, problem management capability and optimization of technological resources.

Finally the "Change and Innovation" area is focused on the ability of the IS department to ensure up-to-date Information Systems from both the technical and organizational point of view, which are able to change with the company's needs and support Business Strategy. This Area collects measures on the permanent education of IS staff, the expertise of the IS staff and their skills, organizational climate, age of the applications portfolio and research into emerging technologies.

The second part of the Research Framework aims at highlighting the factors that affect the shape of IS Performance Management Systems in order to investigate their real impact on the choice of IS Performance dimensions and measures. In particular we have identified three types of variables: (1) contingency variables; (2) IS variables; (3) relational variables.

According to Weill and Olson (1989) the contingency variables are: (1) business strategy, (2) organizational structure, (3) size, (4) environment, (5) Technology, (6) Individual and (7) task. Several researchers introduced these types of variables in their Selection Model of IS success dimensions and measures (Saunders and Jones 1992, DeLone and McLean 1992, Myers et al. 1997, Sugumaran and Arogyaswamy 2004).

The second type of variables is IS variables which refers to specific characteristics of the IS department. As a matter of fact, in their IS assessment selection model Saunders and Jones (1992) included variables such as IS Executives Hierarchical Placement and the size and structure of the IS department. Other researchers suggested that other variables also referred to the IS department may impact on the relevance and usefulness of IS Performance measures: the maturity of the IS department (Mahmood and Becker 1985), IS management expertise, IS end-user skills, IS strategic role, IS budget size, climate (Davis and Hamann 1988; Harris and Katz 1991, McKeen et al. 1994, Premkumar and King 1994, Scott 1977, Weill and Olson 1989, Zmud 1979, Myers et al. 1997), IS operational and managerial capabilities (Francalanci and Galal 1998, Tippins et al. 2003, Banker et al. 2006, Tanriverdi 2005) and the IS sourcing strategy (Bardhan et al. 2006, Rai et al. 2006).

The last category of variables, i.e. relational variables, refers to the existing relationships inside the IS department and between the IS department and User departments. Previous studies suggest considering variables like Top management support, user participation/involvement, power balance and the delegation system with regard to IS contents and managerial decisions (Saunders and Jones 1992, Weill 1992, Myers et al. 1997, Sugumaran and Aroyaswamy 2004).

Research Methodology

The research methodology was defined considering two aspect: (1) the nature of the variables included in the Research Framework that requires a long period of observation in order to be investigated and (2) the companies necessity of help to face problems and of framework to use as guide in the design and development process of IS Performance Management Systems in order to improve the rate of successfully delivering these Systems.

According to previous considerations, action research methodology was chosen to undertake this research. As a matter of fact, action research methods place researchers in a helping role within the organizations that are studied (Schein 1987) and the discipline of IS seems to be a very appropriate field for the use of action research methods (Baskerville and Wood-Harper 1996) due to the fact that IS is a highly applied field. This link between theory/practice and research/consulting has been considered to be essential in undertaking this research and collecting consistent and reliable data on the design and development process. In particular, in our research we have applied the canonical form (Baskerville and Wood-Harper 1996) which is characterized by an iterative process model, a rigorous structure, a collaborative involvement between researchers and practitioners and has organizational development and scientific knowledge as primary goals. Furthermore, according to Baskerville and Wood-Harper (1996), canonical action research has been used with particular frequency to advance understanding of IS design and development.

Action Research Projects

Our research consists in four action research projects. In particular the action research has been undertaken in the following companies[1]:

(1) AudioEntertainment. It is a local subsidiary of a global electronic equipment corporation in which the Italian IS department needed to provide the required quantitative data about IS contribution to internal audit and local top management.

(2) MedicalSound. It is a global producer of health-related products whose aim was to evaluate IS contribution to business strategy, the service level of corporate IS and the efficiency of the global infrastructure.

(3) HomeMarket. It is a no-food retailer whose goal was to evaluate internal customers' satisfaction, IS activities and IS costs.

(4) MRI. It is a big Italian insurance group which started to manage IS as a service.

We conducted the four action research projects following the interventionist approach based on a cyclical process which consists of five stage (Susman 1983): (1) diagnosing, (2) action planning, (3) action taking, (4) evaluating, and (5) specifying learning.

The approach first requires the establishment of the client-system infrastructure which is the specification and agreement that constitutes the research environment. In particular, the four action research projects conducted in this research are characterized by a "client dominant" pattern (Avison et al. 2007). Formally researchers were active members of project team but they had not the authority to decide actions but the collaborative environment made it possible to share the power domination and together reach an action definition. The boundaries of action research projects were defined using construct space dimensions for IS Performance, which are a synthesis of those proposed by Grover (1996) and Seddon (1999). In particular in each action research project we identified: (1) evaluation perspective, (2) domain under evaluation, (3) unit of analysis, (4) purpose of evaluation, (5) types of data (objective or/and perceptual) and (6) evaluative referent (see Table 1). Finally, the agreement between the researchers and the client sets out that researchers can publish the results of the projects and use them in other research but only after the approval of the client organization in order to verify that no confidential information will be disclosed. There is no limitation in the use of the results as long as researchers do not disclose the names of the companies that participated in the research. For this reason, in this thesis, we have not used the real name of the client organizations.

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[1] The names of the companies are fictitious names in order to not have limitations in the use of the results coming from the analysis of the four action research projects.

		Audio Entertainment	**MedicalSound**	**HomeMarket**	**MRI**
Control	**Control over initiation**	by the researchers	by the researchers	by the researchers	by the researchers
	Authority	client dominant	client dominant	client dominant	client dominant
	Degree of formalization	formal contract	formal contract	formal contract	formal contract
	Use of research results	free if the company name is undisclosed	free if the company name is undisclosed	free if the company name is undisclosed	free if the company name is undisclosed
Project Boundaries	**Purpose of evaluation**	IS performance data collection for Internal Audit	IS Service Level Agreement establishment	Customer Satisfaction evaluation	IS Performance Assessment
	Project Sponsor	CIO	CIO and CEO	CEO	CIO
	Evaluation Perspective	CIO and department directors	CEO, Subsidiary Managers and CIO	CIO and CEO	CIO and Managing Directors of Group Companies
	Domain under evaluation	Italian IS department and all Italian IS Services	IS Corporate department and all IS Corporate Services	IS department and all IS services	IS department and all IS services
	Unit/level of Analysis	organizational and individual	organizational and individual	organizational and individual	organizational and individual
	Type of data	objective and perceptual	objective	objective and perceptual	more objective than perceptual
	Evaluative referent	improvement	improvement	improvement	improvement

Table 1 - Client-System Infrastructure of action research projects

The next stage is diagnosing, which corresponds to the analysis of organizational context. This involves a self-interpretation of the complex organizational problem that lead to the development of certain theoretical assumptions about the nature of the organization and its problem domain. In action research projects conducted in this research project team collected formal and informal documents about Business Strategy, IS Strategy and existing methods of performance evaluation. In order to understand the organizational context and praxis, which were not formalized, project team also conducted interviews with managers, professionals and key users who could explain "theory-in-use versus espoused-theory" (Baskerville and Wood Harper 1998). To avoid bias in the researchers' interpretations of the interview results, each researcher individually analyzed data and coded it so as to retrieve information on variables included in the Research Framework. Finally, the researchers compared their analysis and discussed about the differences so as to reach a common result. The same analysis approach was used in order to analyze data collected in the other phases of the action research projects. Therefore, this

phase allowed project team to identify possible problems and impediments to action research projects, build an understanding of the organizational context and working hypotheses, and provide the necessary information to the next phase: action planning.

Action planning specifies actions that should allow to reach the primary goals. The discovery of the planned actions was guided by the theoretical framework, which indicates both the desired final output and the actions/changes that would achieve such a final output. In the first cycle the aim of this stage was to design an initial set of IS performance measures based on data collected in the diagnosing stage, and then to plan the actions necessary to gather the data required to calculate the measures. The first step in the design of each Area was to evaluate the usability of measures included in the Research Framework. Consequently the project team sough to devise new possible measures in order that the researchers did not lose the opportunity to enrich their theoretical framework and the CIO could design a system completely fitting his company context.

The Action taking stage implements the planned actions. In these action research projects planned actions consisted in: (1) data retrieval from management tools identified in the previous stage and (2) building new management tools. Some problems arose whilst performing these two activities. As a matter of fact, some data was not available in Management tools, other data was scattered over several spreadsheet or required manual elaborations. Anyway, in some cases IS staff members proposed changes, improvements and broadening of the proposed IS Performance measures.

In Evaluating stage, the researchers and practitioners then evaluate the outcomes. In this research the results could be one of three types: (1) measurement results, (2) problems that arose and (3) new opportunities. From all these outcomes could start a new research cycle so as to find meaningful measures, if the identified measures were not relevant and significant in order to demonstrate a phenomenon, solve problems and evaluate new opportunities and, if reasonable, add in the action planning. During this stage researchers improved their understanding of organizational context by analyzing the results obtain through observing (done in previous stages) the social dynamics, reactions to proposals, and the existing obstacles to carry out some of the planned actions. Whereas host organization learnt more about itself and its informal mechanism, and was able to improve its management capability through the development of new tools or the improvement of the old ones.

Finally the specifying learning stage is formally undertaken last but it is usually an ongoing process. As a matter of fact, in all the action research cycle stages researchers collected data by document analysis, interviews and observation and sough to relate behaviours, actions, and results to variables included in the Research Framework and investigate what factors affect the choice of IS performance measures, and consequently the shape of IS Performance Management System.

Discussion

In order to investigate if and how the variables included in the Research Framework affect the shape of IS Performance Management Systems, we have analyzed the evidence from the four action research projects. We have also analyzed if Client-system infrastructure contains factors that affect the choice of IS performance dimensions and corresponding measures, and the design process of IS Performance Management Systems.

The Client-system infrastructures of the four action research projects are rather different, especially in relation to purpose of evaluation, project sponsor, and evaluation perspective. The analysis of the four cases shows that the purpose of evaluation impacts on the sequence of measurement areas. The existence of a primary goal also affects the amount of effort made on specific measurement area in terms of the time and willingness to find the most appropriate measures. As a matter of fact, the analysis of the results of the four action research reveals that the first and second measurement areas under scrutiny are better constructed and include a wide set of measures or more innovative and personalized measures. The analysis also shows a connection between purpose of evaluation and project sponsor. In MedicalSound and Home Market the purpose of evaluation implied sharing of IS performance measures with users or users' involvement in the data collection necessary to calculate the measures, and the sponsor was the CEO. Instead, in the other two cases, the primary project goal was internal to IS department and the project sponsor was the CIO.

Moving on to the variables proposed in the Research Framework, the shape of IS Performance Management Systems is first of all affected by contingency variables such as business strategy, organizational structure, size, environment, technology, individual and task.

The existence of a clear and precise Business Strategy with an extremely clear connection to Information Systems led to the definition of IS performance measures related to the achievement of business goals, directly connected to the Company Success Key Factors, as in MedicalSound. At the same time, these Success Key Factors were the basis for the construction of the IS Service Catalogue. IS strategy was also clear in the MRI case and it had strong connection to Business Strategy, and thus affected the definition of measures related to the "Business Contribution and Value" area.

The "Business Contribution and Value" measurement area is also affected by the organizational structure. In the AudioEntertainment case, measures which attempted to highlight the difference between the local IS department and EMEA IS department were introduced. Other impacts were felt in the "IS expenses control" dimension where the index of IS budget allocation between subsidiaries was introduced, and in the "Customer Satisfaction" dimension where the defined measures were calculated taking each subsidiary into consideration, and as a result each measure was calculated for each subsidiary.

The analysis of the action research results only shows a link between company size and the choice of IS performance measures in MedicalSound case. The size of the user population led to the CIO's decision not to carry out a customer survey because it was deemed too time consuming. In the other cases, none of the meeting or interviews with people involved in the project highlighted company size as justification of a particular decision about performance measures.

On the contrary, the environment, explained as company culture and management style, clearly affects the design of measures set. In AudioEntertainment, for example, Human Resources Care was part of company culture due to the fact that people were considered an important factor in the company's value and great effort had been made in order to develop the potential of each employee. As a result the "Expertise and skill of IS staff" contains measures like the percentage of necessary skills covered by IS staff and the percentage of competence development goals reached during the year. Another factor that determines company culture is the propensity to innovation. In AudioEntertainment, it led to the introduction of a specific dimension (i.e. Research in emerging technology) in the "Change and Innovation" measurement area as relevant element of the IS department's evaluation. On the other hand, in MRI case, there are measures (i.e. the number of new products based on IS services and the percentage of projects on innovative channels) that highlight the innovation capacity of the IS department but as related to its capacity to support business innovation.

The results of the four action research projects show that technology affects the shape of the IS performance Management System because there are more sophisticated technologies in use and the technological environment is complex and overall performance measures are less meaningful. As a matter of fact, when there are more than 100 software applications in a company, such as in MRI or in MedicalSound it is necessary to calculate measures regarding the System Quality for each category of software application. The same observations are relevant for measures regarding service levels and the user satisfaction index. If the IS service Catalogue is very well-structured and includes several items, it is necessary to split the SLA and User Satisfaction measures in order to provide a meaningful picture of Service Levels and really highlight the points of strength and weakness.

In the same way, the variety of tasks supported by IS affects the choice of IS Performance Measures because it increases the number of user clusters, and thus it becomes necessary to split IS Performance Measures representing a phenomenon. Furthermore it requires more attention to the construction of the user survey and IS performance results to be shared with user departments. As a matter of fact, great task specialization means that employees are involved only in a subset of tasks, and thus they use only some software applications and IS services. As a result of that, it is essential to provide only the IS performance

measures the receiver is involved in, because the other parts become rumour or can generate bias in the measurements.

The last contingency variable considered is individual, which is referred to individual differences, personality factors, social support, and organizational stresses, according to Weill and Olson (1987). The analysis of the four action research projects shows that these types of variables impact client-system infrastructure and only consequently the shape of the IS Performance Management System.

The second type of variables that the Research Framework identifies as affecting the choice of the IS Performance measures set is IS variables, which refer to IS departments: hierarchical placement and strategic role, size and structure, IS sourcing strategy, climate, maturity in terms of managerial expertise and capability, rules and procedures, differences between espoused practice and practice in use, management tools and skills.

In the four action research projects the hierarchical placement of the IS department does not seem to affect the shape of the IS measures set.

On the contrary, the role of IS appears to be extremely relevant in the design of IS performance measures. In the MedicalSound and MRI cases, IS played a strong strategic role, and as a result IS departments were able to translate Business strategy into IS strategy and link IS activities and projects to Success Key Factors. The perception of relevance and the motivation to design specific measures connected to Business Strategy were higher than in the other cases.

The Size and Structure of the IS department directly affects measures that relate to the Organizational Climate, Permanent Education of IS staff and Expertise and skill of IS staff. As a matter of fact, in small departments, like HomeMarket's IS department, measures such as the index of turn over and absenteeism are not meaningful as they generally equal zero; measures relating to permanent education could also be less relevant because the IS budget allocated for these activities is usually low and thus the opportunity to attend training or management courses is not so frequent; finally in such a small department it is not so common to perform an analysis of IS staff skill and plan skill development courses. The Size also has an indirect influence on the shape of the IS Performance Management System for two reasons. The first reason is that it affects the Maturity level of the IS department in terms of the standards and policies definition, procedures formalization, and the use of management tools. The second is related to internal relational complexity that increases with the size of the IS department. As a result the size of the IS department also affects the climate inside the IS department. In the AudioEntertainment and HomeMarket IS departments, which are the smallest ones, the climate inside the IS department was rather good and relational problems were directly managed by the CIOs. The effects of a good climate on IS performance measures are shown in different measurement areas: "Change and Innovation", "IS Processes" and "Customer Orientation". If there is a good climate IS staff will be in favour of

the delivery of an internal customer survey, as in the AudioEntertainment case. In the same way, a good climate avoids the likelihood of the IS staff considering the IS evaluation project as an exam, as occurred in MedicalSound case, and the IS Performance Management System as a Control tool seeking to manipulate the design of the measures, especially referred to the efficiency of IS processes, so as to highlight only some aspects and not others, as in the MRI case.

Another IS variable which has been shown to affect the IS measures set is IS sourcing Strategy. Its effects are clear and evident in HomeMarket and MRI case. In the former, the outsourcing of a relevant part of the IS activities, e.g. the Help Desk and new software development, led to these activities not being considered for measurement of in the "IS Processes" area; in the latter it determined the introduction of a specific dimension to the "IS Processes" area, i.e. IS sourcing efficiency, with its corresponding measures (Concentration index of IS suppliers and Percentage of contracts with the IS supplier including SLA), and again in this area the body rental use led to add a new measure, i.e. the percentage of external FTE. In the other cases its effects do not seem so evident as the main activities were done in-house and the use of external IS professionals was not as high as in MRI, and thus no gaps are not noticed in the IS measures.

The last IS variable is the maturity of the IS department. This variable affects the shape of IS Performance Management System in an extremely strong way because the availability of input data necessary to calculate the measures depends on it. Therefore the design of the IS performance measures was an opportunity to verify and improve the supervision and the management of IS processes. According to the analysis of the action research projects, one of the main results of the design and development of the IS Performance Management System is not only the definition of IS measures but the development of a solid system of IS governance and systems that produce input data. The four CIOs involved in the projects did not consider it to be a by-product of the project but rather one of its main outputs.

The last category of variables that the Research Framework proposes to affect the shape of the IS Performance Management System is the relational one. All the four cases show how much this category of variables affects the choice of IS measures.

The first piece of evidence is that the climate between the IS department and user departments has an impact on the decision to share the results of the IS evaluation with users, such as in the AudioEntertainment and HomeMarket cases.

However, the MRI case shows that an apparent good climate is not enough because power balances are also relevant in order to decide whether or not to involve users in the project. MRI's IS department decided not to involve users because doing so would have given them useful information which could have changed the power balance. As a matter of fact, MRI's IS department was more powerful than user departments due to the lack of users' interest, which led users

to not negotiate better IS service levels with IS department. Therefore IS department wanted to maintain this advantage. Whereas, in the other cases user departments were more powerful than IS department and thus IS department sough to build trustworthy relationship with users through IS performance measures. This is evident in MedicalSound where IS department would have had objective data on which to discuss with user departments and define the quality value threshold beyond which users would have been satisfied. Also HomeMarket's IS department wished to improve relationship with users through the sharing of IS performance measures. In MedicalSound and HomeMarket the Top Management support was also important. On the one hand, they considered the Top Management support to be a guarantee that this project was the starting point of a change process and they were also confident that Top Management would have helped them to manage critical situations with user departments; on the other hand this factor forced them to speed up the design of the IS performance measures and extend the set of measures which would have been shared with user departments. Finally in the AudioEntertainment case, the power of user department was stronger than in the other cases because user departments had an own IS budget which they could spend without involving Local IS department, and thus the context was rather critical. Therefore IS department decided to introduce a new dimension, i.e. IS preferred supplier, in the "Customer Orientation" measurement area.

Furthermore, power can affect the choice of IS measures in order to maintain, as long as possible, the existing information asymmetry between the IS department and user departments. Therefore, IS department seeks to highlight not all possible process measures in order to have no controlled part of process which can guarantee buffer where to behind possible inefficiencies. In all the four cases, IS department behaved in this way.

Finally the analysis of the four cases shows that the design of IS Performance Management System triggers the opportunity to start activities of communication and internal marketing of IS to internal customers.

Contributions and Conclusions

We believe that this research has some managerial implications. First, it presents the experience of four companies and the difficulties that arose in terms of necessary organizational preconditions and required input data, and thus it can give some recommendations to companies which intend to launch this type of projects. Second, it proposes a set of measures which are the results of practical rather than theoretical studies. Therefore we believe that it can contribute to the establishment of a robust and complete model with which to evaluate IS Business Value that practitioners can apply in their companies.

Notwithstanding this, the research has the limit to be conducted involving only IS staff in decision making process. We believe that the users' involvement would have changed the final IS Performance measures set because the user

perspective would have been more relevant and the role of power balance would have been different. As a matter of fact, the interaction between IS department and user departments would have changed relational variables evaluation continuously. Therefore further research could involve both IS staff and users in order to investigate how the impact of variables analysed in this research changes. In order to improve the understanding of IS Performance Management Systems, we also suggest that future research investigates the impacts of these systems on IS Management activities over time. In particular it is possible to approach the research from two perspectives: on the one hand it would be interesting to see how IS Performance Management Systems change in order to become more effective and aligned with company's needs; on the other hand it would be relevant to evaluate their real contribution and support to IS decision making process.

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