The Relationship Between Information Systems Management and Organizational Culture

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ABSTRACT

This paper essentially presents an exploration of the relationship between organizational culture and information systems management. Three contributions are offered namely the findings of a study of the organizational culture and information management competencies of five organizations in the Netherlands, with particular reference to the reliability of the measurements tool that was used, as well as an exploratory study of the relationship between organizational culture and the ability of an organization to manage its information systems.

A brief review of the literature reveals that these two concepts in combination have been studied extensively, but that their conceptualization are somewhat fragmented in nature. In an effort to study the relationship using a more inclusive frame of reference the paper then presents a description of two models that were used the foundation for the design of a measurement tool to investigate the topic.

The results provides a description of the general culture and information systems management abilities of the organizations and also suggest that the measurement tool is indeed reliable. Further analysis reveals that several variables from within each of the two main concepts, organizational culture and information systems management, are correlated.

INTRODUCTION

It would be very hard these days to ignore the close connection between the social sub-system and the technological sub-system of organizations. This is not a new message (see, for instance, Lee, 1999) and it is likely that it remains relevant today.

What exactly these two subsystems may entail is open to debate, but one is likely find some agreement that the notion of a technological subsystem refers to information systems (IS) or information technology (IT) side of an organization, or even both (IS/IT), whilst the notion of the social subsystem could be argued to refer to business side of an organization, implying a variety of organizational issues including organization culture.

Research on the relationship between these topics is not uncommon but it seems that that there are a variety of perspectives and approaches to study this concept (Leidner & Kayworth, 2006). However this variety has also been responsible for creating a somewhat fractured view of the area of interest as a whole (Kappos & Rivard, 2008).

This paper presents the results of an exploratory investigation into the nature of the relationship between organizational culture and IS management. The purpose of the study was to investigate this area of interest from a more inclusive point of view. To achieve this two models were chosen that have strong foundations in their respective disciplines, but that also manage to capture broader, and perhaps more embracing perspectives of information systems and organizational culture respectively.

It has to be stated at this point for clarity's sake, that the notion of IS management has a fairly broad meaning, which will be discussed in the literature review. However it can be stated that the term IS management as it is used in this paper refers to the competency of the organization in several areas that will allow it to bridge the gap between the organization and its IT/IS and to derive the most benefit from its IT/IS.

Because this was an exploratory study and since these models have not been used for this purpose before, no hypotheses were stated. The goal was rather to determine if there were any noteworthy correlations between the variables and also to test some aspects of the models and tools that were used in the study.

The original project was to determine if there were any areas of concern regarding the organizational culture and management of customer relationship management systems (collectively referred to as CRM Status) of five organizations in the Netherlands and to provide feedback to them in this regard. This was done and the findings were reported to the client.

However it became apparent that the data that was collected was also useful to further explore the relationship between the social and technological subsystems of the organizations. The focus on CRM is thus acknowledged in this paper, but not discussed further.

The paper is therefore structured to first provide a brief overview of the literature on organizational culture, IS management and research on a combination of these concepts. This is followed by a description of the research method and of the findings. More specifically the findings focus on a discussion of the statistical qualities of one part of the measurement tool that were used as well as a description of correlations that were detected between some of the variables. Finally some recommendations for further research are offered.

LITERNATURE REVIEW

This section firstly describes the notions of organizational culture and IS management briefly and will conclude with a brief review of research where both constructs were combined.

Organizational Culture

There are many definitions, models and perspectives related to organizational culture. In terms of definitions the simplest and most effective still seems to be: "the way things are done around here" (Bower, 1966). When it comes to models and perspectives of organizational culture there are also many different ideas such as that there are levels of culture (Schein, 1991), dimensions of culture (Denison, 1990; Denison, 2000; Denison & Mishra, 1995; Hofstede, 1980) and types of culture (Handy, 1985, 1995). For the purpose of this project however the X Model of Organizational Culture (Smit, Ludik, & Forster, 2008) is used as the theoretical foundation. This is in part because the X Model acknowledges and was built on previously mentioned models, along with research conducted in the field. The model is therefore likely to be more comprehensive in nature.

This X Model suggests that the culture of an organization can be described in terms of 5 core elements namely, Leadership, Strategy, Adaptability, Coordination, and Relationships. They are briefly defined below:
- Leadership: The ability of leaders to have an influence on the culture of the organization;
- Strategy: The degree to which the organization has clarity about its strategic direction;
- Adaptability: The ability of the organization remain in contact with and respond to change;
- Coordination: The degree to which the systems within the organization is horizontally and vertically aligned;
- Relationships: The ability of people and teams in the organization to work together (Smit et al., 2008).

Each of these core elements contains sub-elements that serve to explain the core elements in more detail. When deriving a questionnaire from this model and applying it in practice, the sub-elements serve to provide a description of the organizational culture of the organization that is being studied.

This model has indeed been used as the basis for the development of an organizational culture diagnostic tool, and this tool has been validated (Forster, 2006).
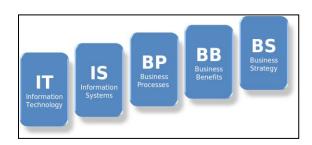
Information Systems Management

For the purpose of this project IS management is explained and studied using a frame of reference called the Information Management Body of Knowledge (IMBOK) as presented in Bytheway (2003, 2004). This framework addresses the question, and should essentially provide a guideline, of how one can bridge the well-known gap between the efforts to achieve business goals on the one hand and information technology (IT) initiatives on the other.

The term information management may be slightly misleading since the notion of information management usually implies a more concerted focus on information. However the reality is that one cannot talk about information without acknowledging the technology and systems that support the utilization and management of that information (Detlor, 2010). Nevertheless, on closer inspection it is clear that the IMBOK in fact clearly makes that acknowledgment and also

manages to smoothly integrate the traditionally disparate ideas of hard IT through IS, business processes, benefits, right up to strategy. The IMBOK is depicted in Figure 1.

Figure 1: The IMBOK.

The central argument of this framework is that one needs to understand and have (or develop) competency in all of these areas (referred to as knowledge areas) in order to bridge the gap between IT and the Business (Bytheway, 2004). Therefore it could for instance be suggested that one needs to know how to plan information systems strategically in alignment with business strategy. However, in order to know how you would reach your goals you need to understand and manage your business benefits. Business benefits are derived when there is a clear understanding of business processes and activities and how they are related to each other. Business processes in turn need to be supported by information systems, which in turn need to be supported by the right infrastructure (or IT).

The IMBOK served as the basis for the development of questionnaire on IS management issues in CRM. The reliability of the measurement tool is discussed in the analysis section.

Organizational Culture and IS

Research on the relationship between information systems in general and organizational culture abounds (see for instance Coombs, Doherty, & Loan-Clark, 1999; Dasgupta & Gupta, 2009; Doherty & King, 1998; Livari & Huisman, 2007; Martinsons, Davison, & Martinsons, 2009; Bradley, Pridmore, & Byrd, 2006; and Twati & Gammack, 2006).

Leidner and Kayworth (2006) presents the most comprehensive overview of research to date that covers culture and IS/IT as a topic of interest. Their review reveals that research has focused on both national and organizational culture and on the following research themes around this topic:
  - Information systems development;
  - IT adoption and diffusion;
  - IT use and outcomes;
  - Managing IT & IT strategy;
  - The influence of IT on culture; and
  - IT culture.

More recent research suggests a three-perspective view on the topic namely that of culture, IS itself and then its development and use (Kappos & Rivard, 2008). It is subsequently proposed

that that culture firstly influences the IS development process, and further moderates the relationship between characteristics of the IS and its development, acceptance and use. Finally it is proposed that IS use influences culture.

For the purpose of the research reported in this paper the focus however aims to be more encompassing by considering the management of IS as viewed through the IMBOK framework (Bytheway, 2004) and its relationship to organizational culture as viewed through X Model (Smit, et al., 2008). The conceptual research model that was used in this investigation, and by implication the relationships to be investigated, are presented in Figure 2.
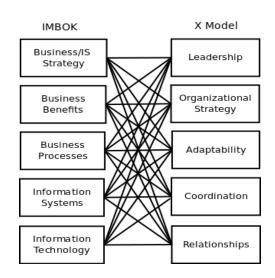
Figure 2: The Conceptual Model.

The next section describes how this model was applied and investigated.

RESEARCH METHOD

The Questionnaire
During the preparation phase the questionnaire itself was prepared and the survey software and information technology environment was prepared for the survey. The final questionnaire consisted of 4 sections:
- Biographical items
- Organizational culture items
- IMBOK items

The biographical items consisted of several types of questions including selection of managerial level and entering of organization name.

The organizational culture section of the questionnaire consisted of 27 questions related to the 5 core elements of the X Model of Organizational Culture (Smit et al., 2008). This organization culture section of the questionnaire has previously been validated (Forster, 2006).

The IMBOK section contained either 4 or 5 items for each of the knowledge areas of the framework resulting in a total of 24 items. These items were designed to explore CRM related issues in terms of these 5 knowledge areas.

All the items, save for those in the biographical section were of the Likert scale type, where respondents had to select to what extent they agree or disagree with statements offered in the questionnaire.

Sampling and Data Collection

Five organizations in the Netherlands were selected to participate in the study. They were identified through convenience sampling as they were past or current clients of a local CRM consultant. As a result all participating organizations already had a CRM system or was in the process of upgrading their existing system. One of the organizations was from the retail industry, while the other four were from the services industry. The organizations ranged in size from medium to large.

Research assistants collected the data from the five organizations and the data was captured into a spreadsheet. An average of 38 respondents from each organization completed the survey resulting in a sample size of 192 respondents.

For the analysis the data was imported to SPSS and several tests were conducted. This is described in the next section of the paper.

Analysis

The analysis consisted of three activities namely:
- An analysis to determine the reliability of the IMBOK aspect of the measurement tool (the culture section has already been validated as mentioned earlier);
- An analysis of the general status of the organizations in terms of their culture and CRM systems management, and
- A correlational analysis to investigate the relationship between the variables.

To investigate the measurement tool item analysis and exploratory factor analysis were used. In addition, the original factor structure of the IMBOK construct was evaluated using structural equation modeling for the purpose of confirmatory factor analysis.

To obtain a description of how well organizations manage their information systems and to get a view of the organizational culture of the participating organizations all the positive responses to the Likert type responses were counted and expressed as a percentage (%) of the total number of responses. For a simple example: if 3 out of 10 respondents agreed with the statement: "My organization adjusts well to change", then it would mean that 30% of the respondents agree with the statement. This in turn could be interpreted as a low rating which means that the organization/s in question do not respond well to change.

In order to investigate the relationship between information systems and organizational culture a correlational analysis was done using Pearson r.

FINDINGS AND DISCUSSION

In this section the findings are presented in three parts, namely the results of the reliability testing, a description of the CRM status of the organizations and a description of the correlations between the variables.

The Reliability of IMBOK

In terms of reliability the results reveals the scores as depicted in Table 2. Of the 51 items in the questionnaire 24 focused on information systems management.

Six items were identified that may negatively impact the reliability of the instrument. The second and third column of Table 1 presents reliability before and after these items were removed. In both instances it is clear that the tool remains reliable with scores of 0.649 and higher.

Table 1: The Reliability of the IMBOK Questionnaire.

	Reliability Original Structure	Reliability Items Removed	
Information Technology	0.649	0.689	2 items removed
Information Systems	0.832	-	0 items removed
Business Processes	0.792	0.810	1 item removed
Business Benefits	0.655	0.696	1 item removed
Business Strategy	0.799	0.842	1 item removed
Overall Reliability	0.905	0.890	6 items removed

The results of the factor analysis and reliability testing reveal an overall reliability of 0.905 and when the relevant items are removed the reliability drops slightly to 0.890.

Table 2 presents also presents the results of the confirmatory factor analysis for two measurement models namely the original structure as well as a measurement model where the previously mentioned 6 items were removed. The last column provides an indication of the criteria that must be met where applicable.

Table 2: Results of Confirmatory Factor Analysis.

	Original Structure	**6 Items Removed**	**Must be…**
χ^2	432.88	201.04	Lower is better
df	242	109.0	
RMSEA	0.064	0.066	Smaller than 0.08
SRMR	0.96	0.97	Bigger than 0.9
CFI	0.92	0.94	Bigger than 0.9

The results of the factor analysis and confirmatory factor analysis confirm the credibility of the dimensions and the items. The tool is reliable and will remain so with minor adjustments.

The Organizational Culture of the Sample

The findings in terms of organizational culture are depicted in Figure 3. The focus is on "how things are done in the organization" in terms of the 5 core elements of organizational culture.
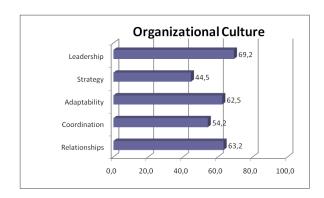
Figure 3: Organizational Culture Results.

As can be seen in Figure 3 **Leadership** (69.2%) seems to be rated high in these organizations which implies, in terms of the X Model (Smit et al., 2008), that leaders in the organizations are able to influence people positively towards a specific goal. **Relationships** (63.2%) is also rated high which indicate that teams and individuals in the organizations are able to work together well. **Strategy** (44.5%) and **Coordination** (54.2%) are rated lower, implying that these organizations do not have a clear view on its strategic direction, and are also struggling to align their processes and systems.

Figure 4 present the findings relating to IS Management. In this case the focus is on how well organizations manage information systems.
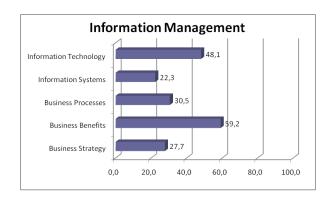
Figure 4: Information Systems Management Results.

For the purpose of this study there were several items in the questionnaire for each of these competency areas. The score for each knowledge area, as presented in Figure 4 depicts the average rating of all the items related to that specific knowledge area.

From Figure 4 it is clear that ratings for some of the knowledge areas are quite low. The ratings for **Information Systems** (22.3%) and **Business Strategy** (27.7%%) are particularly low.

When it comes to Information Systems a closer look at responses to individual items reveal that respondents believe that:
- Their information systems do not support their efforts to reach CRM related business goals;
- Reports from CRM related information systems do not help them to achieve their results;
- Their information systems do not provide them with all the information they need about customers or partners.

In terms of Business Strategy most respondents believe that:
- They do not have good information systems and technology strategies;
- Information system and technology strategies are not aligned with business strategies;
- Decisions regarding investment in systems and technology are not guided by business strategies.

Correlational Analysis

The correlational analysis reveals the results presented in Table 3.

Table 3: The Correlations for the Full sample (192 Respondents).

	Leadership	Strategy	Adaptability	Coordination	Relationships
Information Technology	0,215(**)	0,308(**)	0,188(**)	**0,443(**)**	0,255(**)
Information Systems	0,087	0,310(**)	0,082	0,293(**)	0,197(**)
Business Processes	0,246(**)	**0,466(**)**	0,243(**)	**0,562(**)**	0,314(**)
Business Benefits	**0,461(**)**	**0,480(**)**	0,322(**)	**0,637(**)**	**0,516(**)**
Business Strategy	0,182(*)	**0,455(**)**	0,172(*)	**0,450(**)**	0,240(**)

* Significant at the 0.05 level (2-tailed). **Significant at the 0.01 level (2-tailed).

The results clearly indicate moderate to strong correlations (above 0.400) that are significant at the 0.01 level between several organizational culture and information systems management variables. These are highlighted in bold text in the grey cells of Table 3.

Business Benefits has a moderate to strong correlation to all but one of the five organizational culture elements, which implies that organizations who can manage the benefits that they derive from business processes well also have a fairly strong positive culture particularly in terms of **Leadership**, **Strategy**, **Coordination**, and **Relationships**.

The strongest correlations can be found between the culture variable **Coordination** on the one hand and **Business Processes** (0.562) and **Business Benefits** (0.637) on the other hand. This in turn implies that organizations who are able to properly align systems in the organization are also likely to understand their business processes well and are able to derive the benefits that these processes should offer and manage them well. This is also true for the correlation between **relationships** and **business benefits** (0.516).

The findings represented in Table 3 were calculated on the whole sample of 192 respondents. These 192 respondents hail from five organizations. These organization could be regarded as a somewhat diverse since one is a retail organization and the others not and because they also differ in size. It could be assumed that these organizations also differ in the nature of their organizational culture. Furthermore the sample sizes for each organization was also different.

For interest sake therefore the correlations for the organization with the largest sample was also tested. The assumption was that this offers a more homogeneous sample. Table 4 represents the findings of this test.

Table 4: Correlations for one Organization (87 Respondents).

	Leadership	Strategy	Adaptability	Coordination	Relationships
Information Technology	0,255(**)	0,299(**)	0,255(**)	0,398(**)	0,342(**)
Information Systems	0,100(*)	0,195(*)	0,079	0,229(**)	0,210(**)
Business Processes	0,218(**)	**0,416(**)**	0,268(**)	**0,491(**)**	0,361(**)
Business Benefits	**0,497(**)**	**0,547(**)**	**0,515(**)**	**0,719(**)**	**0,549(**)**
Business Strategy	0,187(*)	**0,403(**)**	0,182(*)	**0,414(**)**	0,295(**)
**. Correlation is significant at the 0.01 level (2-tailed).					
*. Correlation is significant at the 0.05 level (2-tailed).					

As can be seen when comparing the moderate to strong correlations (above 0.400 in the grey cells) in Table 3 and Table 4 a roughly similar pattern emerges. It is worthy to note that for this single organization **Business Benefits** is moderately to strongly related to all of the organizational culture elements. The correlations between the individual variables do differ when calculating it for one organizations. The relationship between **Business Benefits** and **Coordination** is still the strongest however at 0.719, which is also higher for the full sample. The interpretation of this similar pattern could be once again be that organizations who have a strong organizational culture are also able manage the benefits that they derive from their business processes better.

CONCLUDING REMARKS

This paper presented the results of an investigation into the CRM status of five organizations in the Netherlands, the reliability of the tool that was used to study this construct as well as an exploratory study of the relationship between organizational culture and the ability of an organization to manage its information systems.

A brief review of the literature reveals that these two concepts in combination have been studied extensively, but that the conceptualization of these concepts vary greatly. In an effort to study the relationship using an more inclusive frame of reference the paper then presented a description of two models that were used as the foundation for the design of a measurement tool to investigate the topic. The methodology was described including the results of an analysis to determine the reliability of the tools.

Finally the results of the general culture and information systems management abilities of the organizations were presented, followed by a description of a correlational analysis.

Some limitations of this study was the size of the sample and the fact that it consisted of a heterogeneous sample. In addition the potential for spurious relationships or intervening and/or moderating variables can also not be excluded.

It would be recommended for future research to use larger samples as well as a more homogeneous population and to also conduct some multi-variate analysis. In addition it would be most useful to use the findings of a correlational analysis as the basis for hypotheses to study the relationships between these constructs.

The most useful finding of the study was that the measurement tool is reliable and that some moderate to strong correlations do exist between organizational culture variables and information systems management variables.

Because the measurements tool is found to be reliable the contribution to practice is therefore a tool that may be used with some confidence to diagnose or describe the culture and information systems management capabilities of organizations. Furthermore a more immediate contribution of this research to practice is the indication that there is a reasonably strong relationship between organizational culture and the ability of an organization to manage its information systems. In general it is therefore possible to predict that organizations with a strong positive culture are likely to have strong information systems management capabilities. Practically speaking this in turn implies that organizations who address organizational culture issues or problems are likely to see an improvement in their ability to management information systems.

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