

A FRAMEWORK FOR CULTURALLY INFLUENCED INFORMATION SYSTEMS MANAGEMENT

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ABSTRACT

This paper presents a framework for culturally influenced Information Systems Management (ISM), which is developed to resolve the increasing challenge of managing Information Systems (IS) in a complicated international environment. The framework consists of entities such as: ISM tasks, ISM actors, "Closed Loop", and cultural influential factors; each of these entities will be explored on the basis of prior research publications from both ISM studies and national culture studies. The objective of this framework is to study management patterns for culturally influenced ISM in a cross-cultural environment. The contribution of this framework is twofold: (1) to create clear relationships between national culture variables and ISM task domains, revealing how aspects of the national culture could impact ISM and what perspectives of the ISM might be influenced by national cultural variables; (2) to study critical factors of culturally influenced ISM and ascertain the management patterns of ISM in a cross-cultural environment. In this regard, the framework is helpful for ISM in a complicated multinational environment by taking into account cultural differences.

Keywords: Information Systems Management; ISM Framework; Global ISM; Internationalized ISM; National Culture Impact

1. INTRODUCTION

As evidence of the world becoming increasingly integrated, terms such as 'global' or 'globalization' occur in many management disciplines from managerial economics to marketing to management information systems (Ford et al., 2003). More and more researchers realize that globalization is particularly relevant for Information Systems (IS) practitioners and scholars because IS play very important roles in organizations' responses to globalization (King and Sethi, 1999). Carayannis and Sagi (2001) suggest that an IS designed in one country and used in other countries may not accommodate the system requirements because of differences in culture. This indicates that national cultural differences pose an emerging challenge to Information system Management (ISM), that is, the management of culturally influenced ISM.

In prior literature, significant research contributions have focused on culturally influenced ISM. For example, Robey and Rodriguez-Diaz (1989) studied how national cultural differences could affect the success of information systems implementation; Nelson et al. (1992) discovered that end-user computing is profoundly different in the U.S.A., compared to Japan; Shore and Venkatachalam (1994) tested the influences of culture on information systems applications; Straub et al. (1997) compared the use of fax and email in the United States and Japan, concluding that the different attitudes and behaviors between the two countries could be attributed to the differences of their national cultural factors. Kwon and Chidambaram (1998) studied how culture influences communication technology acceptance; Carayannis and Sagi (2001) investigated the relationship between national

cultural differences and the Systems Development Life Cycle. Recently, more research interest has moved to cross-cultural ISM, such as cross-cultural software production and use (Walsham, 2002), Cross-cultural information systems adoption in multinational corporations (Shoib and Nandhakumar, 2003); and cross-cultural implementation of information systems (Law and Perrez, 2005).

Despite the growing interest in cultural issues on ISM, the research output tends to be limited for culturally influenced ISM. Although many scholars concentrate on how national culture differences could influence ISM, most of them have approached it from a technology acceptance perspective, such as IS implementation, IS adoption and IS acceptance in a cross-cultural environment. In practice, it is important to learn whether IS are accepted, implemented, and adopted successfully in a cross-cultural ISM environment. Additionally, it is meaningful to find out key factors that may dominate ISM in a culturally influenced ISM environment. Therefore, the research questions addressed are the following:

- How can national cultural differences be linked to ISM?
- What factor is most crucial for culturally influenced ISM?
- How can IS be managed successfully in a cross-cultural environment?

Motivated by these research questions, this paper puts forward a framework for studying and managing IS in a cross-cultural environment. It is organized as follows. The first section introduces various components of the framework, based on reviewing prior publications from both ISM research and national culture perspectives. To apply this framework, two ISM cases are then presented, followed by an identification of the key factors of culturally influenced ISM. The study then focuses on discussions of management patterns of the culturally influenced ISM. The paper ends with implications and conclusions.

2. A FRAMEWORK FOR CULTURALLY INFLUENCED ISM

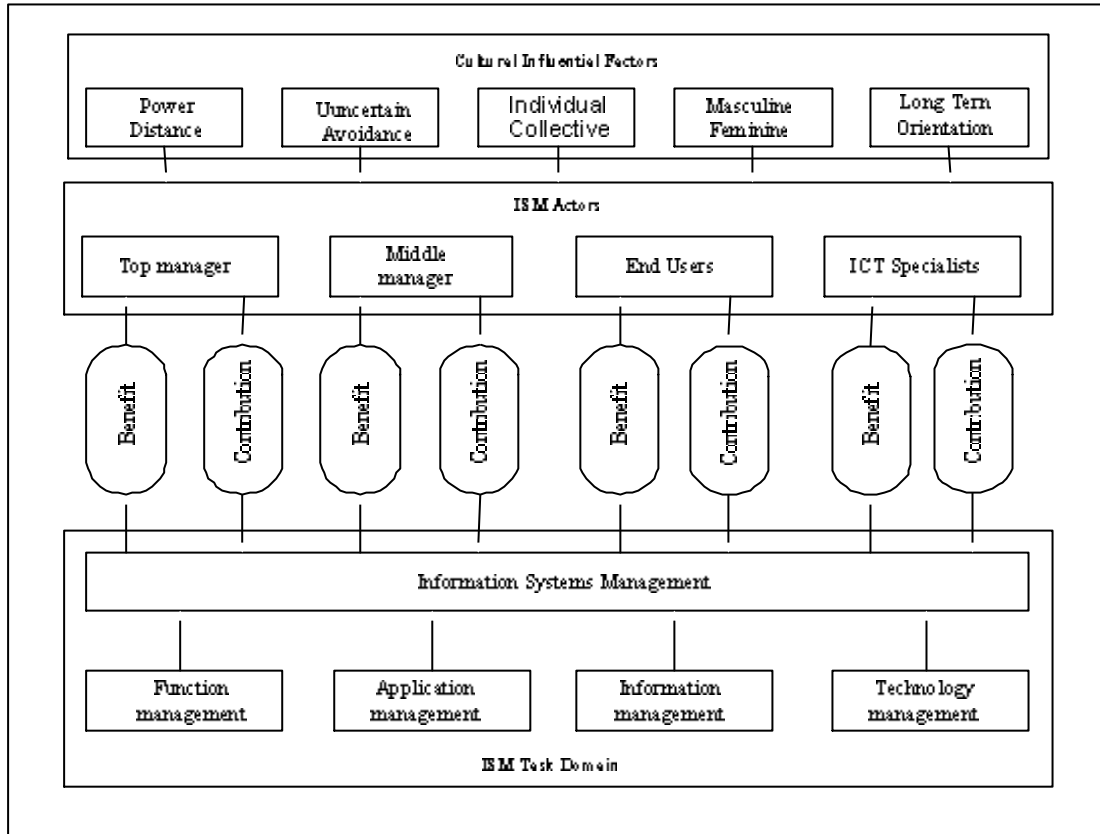
In order to study culturally influenced ISM, a framework is developed based on literature from both IS and national culture research. The following factors identified can be associated with culturally influenced ISM: national cultural influential factors (Hofstede, 1991, 2001), ISM actors (Zachman, 1987; Sowa and Zachman, 1992), the “Closed Loop Principle” (Bemelmans, 2000) and ISM tasks (Looijen, 1997; Feng, 2004). The framework is presented in Figure 1.

2.1 Cultural Influential Factors

Cross-cultural ISM refers to managing the design, development, and implementation of IS and technologies in a cross-cultural environment (Weisinger and Trauth, 2003). The cultural distinctions at the national or societal level may be expected to exert a significant influence on the management of IT and IS (Davison and Martinsons, 2003), and therefore on ISM. This means that national cultural differences might influence ISM by impacting people who are involved in each of the stages of ISM and the process through which ISM is carried out. Given this situation, substantiated by Davison and Martinson, that culture does matter when it comes to managing IT and IS, national cultural influences should be included in ISM.

“Hofstede’s proposed dimensions of national culture are very commonly used. These dimensions allow national-level analysis and are standardized to allow multiple country comparisons” (Ford et al., 2003). Many studies have confirmed the validity of these dimensions (Ronen and Shenkar, 1985; Shackleton and Ali, 1990) and employed them to account for empirical observations (Earley, 1993; Straub, 1994; Tan et al., 1998). Particularly,

“Hofstede’s dimensions are often employed by researchers when ‘international’ or ‘national culture’ issues are discussed within ISM and the management of IT (Ford et al., 2003). In this paper we also employ Hofstede’s model because in numerous studies across many disciplines it has been shown to be reliable and useful when identifying and explaining cultural differences.



styles of IS may exist between a larger power-distance culture and a smaller power-distance culture.

“Uncertainty-avoidance” explains the willingness to cope with uncertainty and indicates “the extent to which people within a culture are made nervous by situations which they perceive as unstructured, unclear, or unpredictable, situations which they therefore try to avoid by maintaining strict codes of behaviour and a belief in absolute truth” (Hofstede, 1991). In countries with strong uncertainty-avoidance, people are more likely to shun ambiguous situations, and prefer a clear structure as well as clear rules of behaviour in organizations or institutions, since such structure and rules will help them make events clearly interpretable and predictable. In countries with weaker uncertainty-avoidance, there is more public acceptance of uncertain situations. To avoid uncertainty of ISM in a culturally influenced ISM environment, IS might be managed in different ways between strong uncertainty-avoidance cultures and weak uncertainty-avoidance cultures.

“Individual-collective” describes the priority of individualism or collectivism in a human society, which is not only a matter of ways of living together, but is also intimately linked with societal norms (in the sense of value systems of major groups of the population). In collective cultures, social identity is based on group membership. Individual cultures, however, emphasize the individual’s goals and initiatives. The major differences between collective and individual cultures can be presented as follows: “The social norms of the group count rather than individual pleasure; shared group beliefs are superior to unique individual beliefs; cooperation with group members is valued rather than maximizing individual outcomes” (Gudykunst and Ting-Toomey, 1988). In this case, the priority of individual interest relating to ISM might be treated fundamentally different between a collective and individual culture.

“Masculinity-femininity” refers to the attitudes towards gender roles from different cultural backgrounds. In masculine societies the traditional distinction of roles between males and females is strongly maintained; for example, males are considered to be assertive and decisive, in pursuit of material success, whereas females are modest, tender and concerned with quality of life. In feminine cultures such distinction between males and females is less visible, and both males and females might be not only modest, tender and concerned with the quality of life, but in the pursuit of material success as well. In a feminine culture, organizations stress more the physical working conditions and working climate (Hofstede, 2001). In a culturally influenced ISM environment, ISM might be evaluated differently between masculinity and femininity cultures.

“Long-term-orientation” is the fifth national culture dimension. In a low scored long-term-orientation culture, people show concern for the past and especially for the present. They believe that what people have held in the past and in the present is more important than that of their future. Therefore, in a low scoring long-term-orientation culture, people prefer to have an immediate gratification; they desire immediate results. In the high scored long-term-orientation culture, people are more concerned about the future. They generally accept that the most important thing is the future. Therefore, people are more patient in achieving results and goals. In a culturally influenced ISM environment, people may have different attitudes towards running information systems.

2.2 ISM Actors

As a significant component, people are involved in each of the stages of ISM and all kinds of ISM activities. In the following paragraphs, several actors such as Top Managers, Middle Managers, End Users and ICT Specialists are introduced according to their main ISM activities. The concept of ISM actors is derived from an existing theory, namely the

Framework of information system architecture (Zachman, 1987; Sowa and Zachman, 1992). A brief introduction to these different ISM actors is presented as follows.

Top managers can be identified at the strategic level of an organization and are responsible for the management supervision as well as control of business. Meanwhile, the top manager may interfere with ISM in certain circumstances. *Middle managers* work at the departmental level of an organization and are responsible for the ongoing business within the department or division. They can be involved in ISM activities or decision making regarding IS. *End users* use the implemented information systems on a day-to-day basis to support the business processes in an organization. Therefore, users should also be considered as ISM actors. *ICT specialists* include designers, builders and maintainers of IS and of the technologies involved. On one hand, they are responsible for the realization of the functionalities of an IS according to the requirements of a business. On the other hand, the dynamic characteristic of organizational goals and processes requires the IS to be flexible in order to respond to the organizational dynamics. In practice, such maintenance relates not only to several application packages, but also to ICT infrastructures and technical facilities.

2.3 The Closed Loop Principle

According to ISM literature, one of the basic issues for an appropriate ISM is the so-called “Closed Loop Principle” (Bemelmans, 2000). The principle is based on the following concept: developing, using and maintaining IS will only be successful if ISM actors involved have incentives to do their ISM tasks in an appropriate way. In case (positive or negative) incentives are missing, one may expect that stakeholders will not be very committed to their ISM tasks, with the consequence that the IS will deteriorate over time and will become useless. In other words: stakeholders should have “benefits” from being involved in ISM. Graphically, the “Closed Loop” with its entities, as well as the relationships between the entities, can be depicted below in Figure 2.

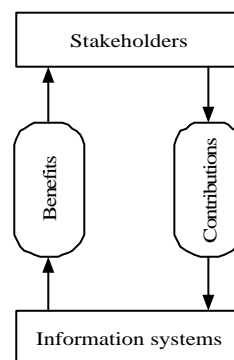


Figure 2: Closed Loop Model

The relationship between IS and their stakeholders can be divided into two parts: contributions and benefits. In effect, the stakeholders contribute to the relevant IS. The contributions differ from each other depending on the positions and responsibilities of the persons concerned. Contributions will be delivered if, and only if, stakeholders experience incentives for doing so. One of the best motivators is a direct positive benefit for doing the ISM tasks in a prescribed way. The closed loop principle emphasizes the importance of creating incentives for all stakeholders in an ISM design. It is believed that creating incentives for culturally influenced ISM would be more important and meaningful.

2.4 ISM Tasks

ISM has been confirmed as a key component of successful implementation and utilization of information and communication technology in an organization. Looijen (1998) defined ISM tasks as three domains based on Mintzberg's (1979) work on organizational structures, which includes Function-Management, Application-Management and Technology-Management. Feng (2004) extended these three ISM task domains into four by adding the additional task of Information-Management. The content of ISM tasks in four domains is briefly explained in the following subsections.

Function-Management is to deal with the management, control and maintenance of the functionality of IS. It has to cope with what are essentially two sides of the same coin. One deals with the requirements stemming from several business processes in an organization, translating this into IS functionality. The other is concerned with the utilization of the functionalities of IS in general. It includes the administration such as management instructions, rules and regulations, as well as tasks like delivering adequate instruction manuals and helping the controllability and interoperability of IS.

Application-Management is responsible for the management, control and maintenance of various application software (packages), that are developed based on the earlier described functionalities of the IS. The development of application software could be outsourced or internally designed, or provided by business partners because of the business collaboration or business merger. Application management is involved in updating and modifying software, including many subtasks such as revision, adaptation, correction, and improvement.

Technology-Management covers all issues regarding the technology of the systems' platforms, the communication facilities, the hardware and basic (system) software, as well as all kinds of ICT facilities and infrastructures. Technology management is mainly service-oriented. The objective of technology management is to support application and utilization of the implemented IS by all units of the organization.

Information-Management is involved in the management, control and maintenance of information resource as well as information content. Information resource can be databases, data warehouses, repositories, information banks etc., with internal or external data. Therefore, information resource management covers distribution management, backup management, retrieval management and linkage management. In addition, Information-Management also includes information content management, such as information acquisition, information extraction, information publication, information update, information dissemination, information access, and information assessment. The target of information management is to keep the information resources available, reliable, controllable, maintainable, as well as integrated and consistent.

To manage IS successfully, the four domains of ISM tasks specified above: function-management, application-management, technology-management and information-management, are essential and should be managed in a coordinated way. However, the importance of these four domains of ISM tasks could be very different from case to case in a culturally influenced ISM environment. Accordingly, more attention should be paid to how national cultural influences could impact ISM.

3. CASE STUDY: CULTURAL INFLUENCED ISM

To link national cultural factors and ISM, we chose one Chinese university and one Dutch university as a practical case. We explore how ISM can be conducted in different ways

because of national cultural differences. The reason we chose a university ISM is that business processes and information structures at universities are almost the same all over the world. For example, universities all have similar education programs accompanying administrative and managerial systems. The fact that a university setting is quite comparable in various countries is an advantage when studying the impact of cultural differences on ISM, which is also helpful in exploring the most crucial factor for culturally influenced ISM.

3.1 ISM at Xi'an Jiaotong University (XJTU) in China

Xi'an Jiaotong University (XJTU) was the first university in China to launch a project of management information systems in 1984. Since then, various Information Systems at XJTU have been developed, improved and updated. At present, the existing information systems cover almost all the transaction processes of XJTU.

Generally speaking, the existing information systems at XJTU were all self-designed. All of these systems were designed to facilitate business processes within business units, such as administrative offices, affiliated divisions and departments. In other words, information collection, information storage, information process, information maintenance and information dissemination are conducted within each business unit. Although the information technology infrastructure is quite advanced as evidenced by the campus Internet at XJTU, there is very little electronic information exchange among different information systems of business units.

Managers of business units are responsible for the ongoing business within the department or division. Since existing information systems were designed to facilitate business processes within each business unit, the manager of a business unit is also responsible for supervision of existing information systems to ensure that the systems are well-functioning. Generally speaking, managers of business units are knowledgeable of the current information systems in their business units because information systems are designed according to their requirements. From time to time, those managers evaluate the functions of current information systems in their business units. As soon as the managers are not satisfied with the functions of current information systems in their business units, they will initiate a proposal of requirements for an improvement of IS.

The proposal can be approved either at the university level or within a business unit depending on the available budget resources. As soon as the proposal is approved, some ICT specialists will be assigned to the project to start studying the proposal and the current relevant information systems within the business unit. Thereafter, they will provide a design plan for the new system and not until it is accepted by the manager of business unit will they start programming. After the new system coding and technical tests are finished, the manager of the business unit will confirm whether the functions of the new information system are in accordance with the requirements proposed previously. If the evaluation of the manager is positive, the next step is to provide training courses for end users; the final stage is the conversion from the old system to the new system. If managers are not satisfied with the IS designed, the whole procedure will be repeated. From time to time, this can happen because a new business process may require a completely new information system or updating of the current information system. It is important to note that at XJTU the manager of the business unit is wholly responsible for initiating the requirements for information systems.

As one part of ISM at XJTU, the personal homepage is a standardized template designed by the personnel office. According to this template, employees provide the contents of their homepages to the personnel office of the university. This information is then subsequently passed to the information management center by the personnel office where the

collection of information is accomplished. This updating of the personal homepage is conducted from time to time as a standard routine.

3.2 ISM at Technische Universiteit Eindhoven (TUE) in The Netherlands

There are many management information systems at the Technische Universiteit Eindhoven (TUE), supporting the many business processes on campus. The objective of all the information systems at TUE relates to the internal business processes. The information systems are either self-developed or standard software purchased from external suppliers. Most information tasks are carried out by TUE personnel or students, but some applications such as salary payments are completely outsourced. Generally speaking, the information systems function at university, department, and sub-department levels.

At TUE, the users are the masters of ISM. They evaluate the current information systems and initiate requirements of information systems for improvement. In other words, it is up to the users to decide whether a particular information system is necessary, or a newly introduced information system / updated information system is acceptable. Meanwhile, the ease of use is, in that respect, quite an important feature. Next to that, and even more important, is the usefulness of the information system itself for the users.

The TUE Campus network is linked to all offices at the university, highly facilitating various applications. As a matter of fact, all databases and IS are connected to each other according to the users' business process requirements. Modification of those links, such as adding, changing and deleting, has to be done according to the users' requirements.

Backup facilities are well developed through the campus network at the TUE. All the existing IS and relevant databases, as well as the backups are distributed by the campus network at both departmental and university level. Normally, users make their own initial back up at the department level whenever they like. Afterwards, both department and university level backup will regularly and automatically proceed according to a preset schedule.

At TUE the personal homepages are managed by employees themselves, based on the assigned links. In this way, employees can upload the contents of their homepage whenever they feel an update is necessary. Although a template is provided for guiding employees to prepare the contents of their homepages, employees are free to design their own templates and to decide what they want to include on their homepages.

4. DISCUSSION

We further discuss the case study above to shed light on the management patterns of culturally influenced ISM for both XJTU and TUE. The relevant findings are numbered sequentially in the following subsections.

4.1 Different Main Roles of ISM

Who should play the main role in ISM is an essential topic for culturally influenced ISM, which is closely related to power-distance acceptance. At XJTU, Managers and Administrative officers are responsible for supervising and controlling the functions of their information systems within their business units. They are expected to initiate requirements of information systems according to the business process of their business units. End users are real users of information systems within the business units, working on the systems according to predefined procedures. Managers consider their dominant roles in ISM as normal. Additionally, all other actors of ISM accept this dominance as normal. Therefore, the

decision-making is apt to be a top-down mechanism, in which the managers play the most significant roles for ISM decisions. This is consistent with the high power-distance score of Chinese culture which indicates that managers will play main roles for ISM in large power-distance acceptance Chinese cultures (1).

In our study, the users are actively involved in all kinds of ISM activities at TUE. Apart from the regular evaluations of their working conditions, including information systems that they are using, users may propose new functions to improve their business procedures regarding information systems. They are also involved in designing new information systems or in modifying existing information systems. Finally, the satisfaction of users is the measure for a newly implemented information system or updated existing information system. In this way, users could and should play the most significant role for ISM which is consistent with small-power-distance of the Dutch culture. This means that users play the main role for ISM in small-power-distance cultures (2).

4.2 Different Primary Contributions and Benefits

In different cultural backgrounds, ISM actors play different roles. However, the main actor's contributions and benefits are primary (3). It is crucial to identify these primary contributions and benefits because they are more important than the other's contributions and benefits. For example, if managers play the main roles for ISM, the involvement and attitudes of managers are dominant in ISM decision making. If users play the main roles for ISM, the acceptance of users is the dominant factor for implementing information systems. This means that the contributions and benefits of managers are more important in large power-distance culture (4), like the Chinese culture. The contributions and benefits of users are more important in small power-distance cultures (5), like the Dutch culture. In practice, the primary contributions and benefits deserve more attention since the main roles could be the driving force for running culturally influenced ISM. In this case, the power-distance is the most crucial factor (6) for culturally influenced ISM because it relates to who will play the main roles of ISM.

4.3 Different Orientations of ISM Tasks

The ISM tasks will be oriented differently because of the different main roles in different cultural backgrounds. If managers play primary roles, the main benefits will be in the area of constituting and continuously confirming their management responsibilities. The first question that managers will ask themselves will always be "What is in it for my management work?" A design of ISM has to consider such benefits explicitly. In this case, the ISM will be administration driven and management oriented (7) if managers play the main roles of ISM, because the contributions and benefits of the managers will be closely related to the (daily) administrative and managerial processes.

If users play the main roles of ISM, the benefits of users deserve more attention. Because generally users are closely related to all the business processes at the operational level, the ISM could be expected to be business driven instead of hierarchical administration driven. Since users pay more attention to the applications, the ISM is expected to be application-oriented (8).

4.4 Different Distributions of IS

Such different orientations of ISM in different cultures further an understanding of the different distributions of information systems between XJTU and TUE. As mentioned before, information systems at XJTU is mainly located in and reserved for specific business units. At the university level, there are few existing links or connections among these information systems. Databases do not span cross the business units so there is no practice of sharing common data directly. In this case, the existing information systems are distributed but at the

same time isolated, not integrated. However, those systems are functioning very well to support the internal business process in business units. The non integrated systems are easy to manage and control from the management perspective (9), which is consistent with strong uncertainty-avoidance in Chinese culture. In this way, managers could shun ambiguity and make ISM interpretable and predictable.

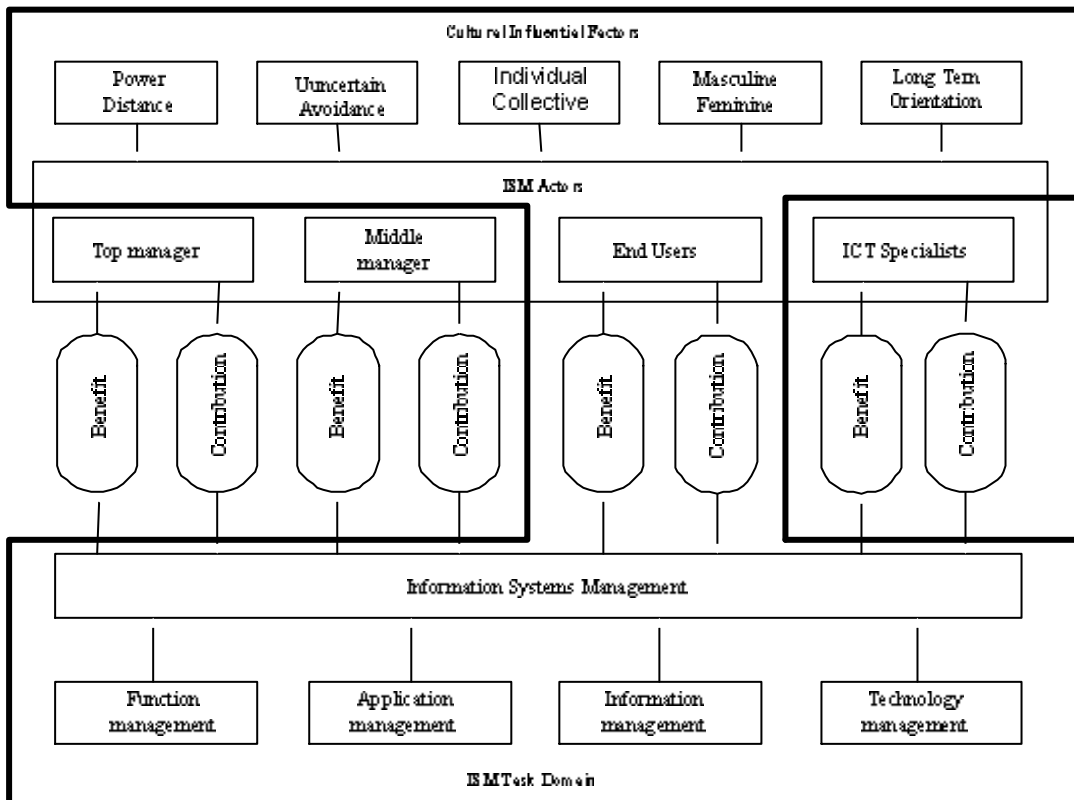
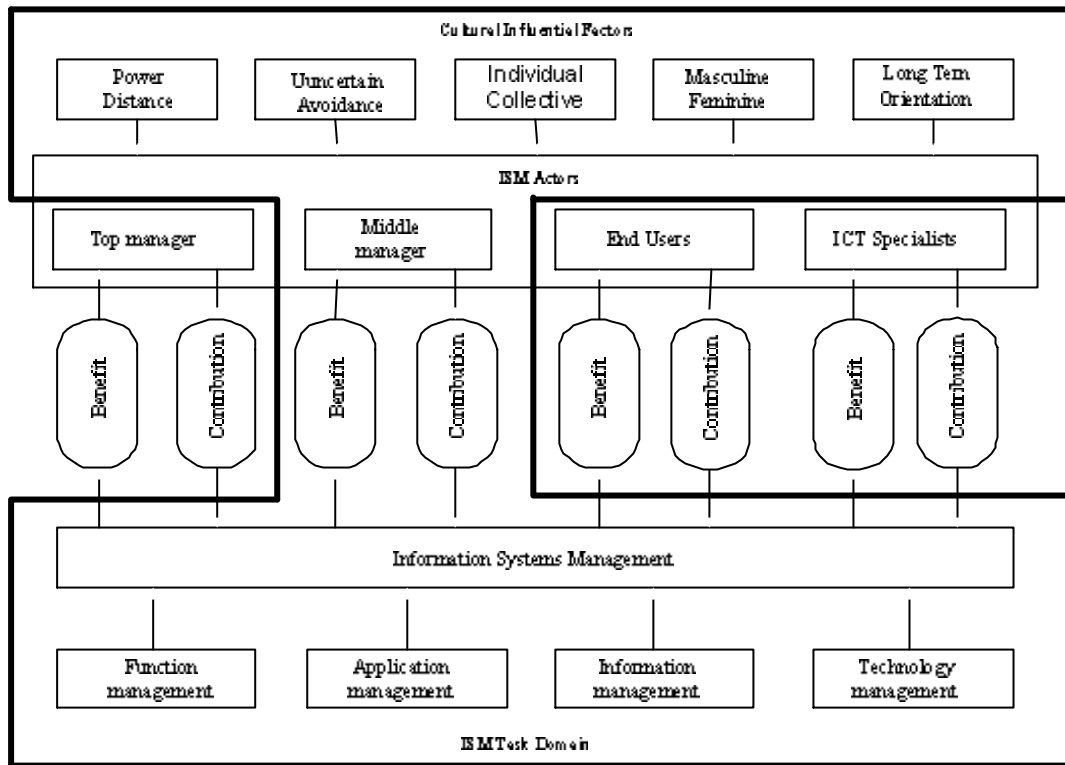
Although information systems at TUE are also decentralized and distributed in the several business units, they are all connected together according to business process requirements. The links between the existing systems and databases are numerous and quite sophisticated. In this way, the TUE systems as distributed, but at the same time highly integrated. The integrated systems and databases are useful and easy to use from the users' perspective (10), which is in accordance with femininity in Dutch culture because working conditions are more important for employees at the work place.

4.5 Different Types of Information Management

As presented in the case study section, the personal homepages are managed in different ways between XJTU and TUE. Not surprisingly, the personal homepages of XJTU are very standardized, reflecting the characteristics of Chinese culture: collectivity. The standardized layout of homepage symbolizes formality and seriousness of an organization, which reconciles with Chinese collectivity culture (11). In contrast, the personal homepages of the TUE are more diverse in style and versatile in functions, which include working messages, personal interests and hobbies, and even family information. In this way, it reflects an important aspect of Dutch culture: individualization. The individualized style of homepages shows individual identity and personal interest (12). In addition, the system of updating personal homepages also reflects the national cultural influences on ISM. Personal homepages at XJTU are updated regularly according to the planned procedures. In fact, this is the way of centralized information management and information publication, which is consistent with the high score of long-term orientation of Chinese culture (13). Although it takes a long time to update information of personal homepage, the Chinese accept that it is necessary to have better prepared, well planned and carefully organized information management within an organization. At TUE, employees can upload the contents of their homepage whenever they need an update. Employees are gratified with the quickly updated message whenever needed (14). This is consistent with the low scored long-term orientation of the Dutch culture.

4.6 Different Management Patterns of ISM

Based on the discussion above, it is confirmed that information systems are managed in different ways because of different national cultural backgrounds. For ISM at a Chinese university, managers play the main roles for ISM, which is manager-centred, management oriented and administration driven. Therefore, it is crucial for Chinese ISM that managers be sufficiently involved. At the same time, the highlight of Chinese ISM is how information systems could support management in general. This is the case that Chinese culture influences the managers' behaviour, and also the attitudes of Chinese employees because managers are expected to take their responsibilities seriously at their work place. Since Chinese culture is deeply embedded in the way of Chinese thinking and working, the same applies to managing and running information systems. The management pattern of Chinese ISM can be presented in Figure 3.



involved effectively. Meanwhile, the focus of Dutch ISM is ‘usefulness to business unit’ and ‘easy to use’ for end-users. If end-users are not interested in the implemented information systems, they will resist anyway. In this case, the project will certainly fail because it won’t work out by trying to change the attitudes of Dutch users through regulations or managerial supervision. A better way of Dutch ISM is to provide end-users with sufficient “benefits” if they will use the system because the system could make their work more interesting and much easier, in return, they “contribute” the ISM as expected. Figure 4 introduces the management pattern of the Dutch ISM.

5. CONCLUSIONS

Culturally influenced ISM is complicated because it is involved in management issues from both the technical and behavioral perspective. In this paper, a framework was developed to guide the culturally influenced ISM. The major contribution of this framework is twofold: (1) it creates clear relationships between national culture variables and ISM task domains, revealing which aspects of national culture could impact ISM and what perspectives of ISM might be influenced by national cultural variables; (2) it can be used to study critical factors of culturally influenced ISM. Especially, the management patterns of ISM can be used to study and compare ISM in a cross-cultural environment, which reveal the fundamental differences of ISM because of cultural differences. In addition, the framework explores the main role of ISM and identifies primary relationships among cultural factors, ISM task and ISM actors. Differences in management patterns of culturally influenced ISM are highlighted between a Chinese university and a Dutch university. Particularly, power-distance, as one of the five culturally influential factors, is the most crucial factor for culturally influenced ISM because it relates to the main role of ISM. In this regard, the framework facilitates an approach that is meaningful and helpful for setting up an internationalized ISM, taking into account the enormous impact of national cultural differences.

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