Association for Information Systems
AIS Electronic Library (AISeL)

AMCIS 2008 Proceedings

Americas Conference on Information Systems (AMCIS)

2008

Power Operation in ISD: Technological Frames Perspectives

Christina Ling-hsing Chang
National Pingtung Institute of Commerce, zubada22@yahoo.com.tw

Power Operation in ISD: Technological Frames Perspectives

Christina Ling-hsing Chang,
Department of Information Management, National Pingtung Institute of Commerce
zubada22@yahoo.com.tw

Abstract

This paper investigates the power operation in information system development (ISD) processes. Due to the fact that key actors in different departments possess different professional knowledge, their different contexts lead to some employees supporting IS, while others resist it to achieve their goals. We aim to interpret these power operations in ISD from the theory of technological frames.

This study is based on qualitative data collected from ***KaoKang*** (pseudonym), a port authority in Taiwan. We attempt to understand the situations of different key actors (e.g. top manager, MIS professionals, employees of DP-1 division, consultants of *KaoKang*, and customers (outside users)) who wield power in ISD in different situations. In this respect, we interpret the data using a technological frame. Finally, we aim to gain fresh insight into power operation in ISD from this perspective.

Keywords

Information System Development, Power, Technological Frame

INTRODUCTION

Since the 1970s, there have been many academic studies on the effects of information technology (IT) innovation on different organizations from the perspectives of power and politics (Chang 2006, 2007; Lawrence et al. 2005; Silva 2003; Jasperson et al. 2002; Robey & Boudreau 1999; Sillince & Mouakket 1997; Markus & Robey 1995; Zuboff 1988; Markus 1983; Keen 1981; Pettigrew 1973). ISD quickly facilitates the changes in relationships, communication methods, influences, authorities and controls among different departments of an organization. At the same time, it also raises the level of political behavior. As IS enables information to be distributed among top managers, it can be used as their source of power to control staff. IS also reduces the bargaining chip of the staff, prompting strong resistance to managerial power to the point of failure (Kling 1987, Willocks & Mason 1987). IS professionals and managers have high levels of authority, using IT as an important resource in the negotiation process. Both information system implementation and innovation in technology are intensely political issues (Keen 1981). Zuboff (1988) believes IS influences the authority of middle managers, threatening their ability to control; thus, they will challenge and distort resource allocation, and finally resist the implementation of IS.

In light of this, people in different departments and positions have different perceptions of IT in the ISD process. Then, coexist with the support and against employees in ISD. For this reason, the present study seeks to interpret the power of ISD using a technological frame. Although a large number of scholars have studied the issue of power and organizational politics, it is surprising that to date, no one has adopted the technological frames perspective from which to analyze the way in which power is wielded in ISD.

Redding (1990, 1980), Tricker (1988) and Wong (1985) believe that Chinese leaders are widely perceived to have a natural right to determine organizational objectives. The apparent acceptance of authority could alternatively conceal an insidious exercise of power through manipulation. Nevertheless, Chinese businesses tend to use the entrepreneurial mode of strategy-making. Strategies emphasize the exploiting of opportunities rather than the solving of problems and are made by powerful individuals (rather than groups), who frequently rely on personal knowledge and intuition rather than objective criteria or formal and quantitative methods. In the Chinese business culture, although information is a key source of power, it is fundamentally a personal asset rather than an organizational resource. The power structure in a Chinese organization is

perhaps best represented as a series of concentric circles with the patriarch in the centre. Power is maintained by carefully controlling key information. Most management information really is information only for top managers. Much of it remains in a soft form – in the mind of the manager – and is verbally communicated. Key details, ideas and knowledge are selectively passed on to chosen individuals. This promotes a divide and rule strategy, since no other individual is privy to the full information set (Ko 1995; Redding 1990).

Using qualitative research methods, the aim of the present study is to analyze the power highlighted in the *technological frames* (Orlikowski & Gash 1994). With regard to the interpretation of the power used by these *technological frames*, there are five kinds of actor of *KaoKang*: top managers, employees of DP-1 division, MIS professionals, consultants of *KaoKang*, and customers (outside users). Through the utilization of technological frames, conclusions are drawn and the emerging intricate interrelationships are highlighted.

TECHNOLOGICAL FRAMES

Bolman and Deal (1991) point out that frames can create a "psychic prison" that inhibits learning because people cannot look at old problems in a new light and attack old challenges with different and more powerful tools—they cannot reframe. In view of this, Orlikowski and Gash (1994) believe that individuals have different interpretations of the same things, and thus make sense of things differently. These invisible rules are congruent with a tacit knowledge base. For this reason, applying the theory of frames to technology could have a significant influence on the interaction of people and technology.

Orlikowski and Gash (1994) believe that an understanding of people's interpretations of a technology is critical to understanding their interaction with it. People have to make sense of it, and in this sense-making process, they develop particular assumptions, expectations and knowledge of the technology, which then serve to shape subsequent actions toward it. They mention that "this includes not only the nature and role of the technology itself, but the specific conditions, applications and consequences of that technology in particular contexts." In light of this, Orlikowski and Gash (1994) assert that different groups within an organization may have different technological frames, and introduce the notion of congruence to describe the nature and extent of differences among frames. For this reason, people's technological frames influence their actions toward technology, and different groups may have incongruent technological frames, which could lead to difficulties around technological use and change. This study draws on some findings from a field study analyzing the implementation and early use of a new information technology to examine key actors' interpretations of the technology. The different technological frames imply different ways of knowing and making sense of technology..

Altogether, the theory of frames asserts that people's behavior inhibits their cognitive frame. However, through socialization, interaction, or negotiation, individuals develop common and shared frames in each department. The subculture of each department is capable of influencing the sharing of a particular frame and impeding their capacity to make sense of problems outside their department. In view of this, we should consider that the problems may be induced from the different cognitive frame of employees, derived from their belonging to different departments.

The technological frames will be described in the following sections:

Orlikowski and Gash (1994) believe that the different cognitive frame of different departments and the resulting conflict is a major problem in ISD. There are three domains of technological frame: nature of technology, technology strategy and technology-in-use.

(1) Nature of technology: refers to people's images of the technology and their understanding of its capabilities and functionality. Due to the hugely divergent perceptions of IS between MIS professionals and users, MIS professionals cannot understand why users are scared of IT and fail to identify the benefits of technology, which would help them to accept it. At the same time, users fear redundancy as the consequence of the implementation of IS, and resent the effort required to learn the IS. Meanwhile, the conflicting cognitive frame between MIS professionals and users provides the seeds for failure.

(2) Technology strategy: refers to people's views of why their organization acquired and implemented the technology. It includes their understanding of the motivation or vision behind the adoption decision and its likely value to the organization. While MIS professionals regard the technical criteria of success as being focused on deployment, users emphasize the added value of technology, a quite different definition of technological success.

(3) Technology-in-use: refers to people's understanding of how the technology will be used on a daily basis and the likely or actual conditions and consequences associated with such use. Generally, MIS professionals are only concerned with the installation of new technology, not how to use it. On the other hand, users think that MIS professionals should teach them how to use it. Due to lack of training, the new technology is seen as an inhibitor to understanding and use. For this reason, these two actors display a different cognition.

To investigate turbulence and change in problem-setting activities, it can be instructive to consider socio-cognitive effects such as frame shifting (El Sawy & Pauchant 1988; Gioia 1986). Although frames, once formed, are resistant to change (Walsh 1995), contextual changes can trigger shifts that bring new knowledge to the forefront of sense-making (Davidson 2002; Barr 1998; El Sawy & Pauchant 1988; Gioia 1986; Bartunek 1984). El Sawy and Pauchant (1988) find that frame shifts can be abrupt and of short duration; nonetheless, these shifts in frame salience influence the way participants make sense of environmental information at that point in time, and the decisions and actions they subsequently take. Changes that trigger a shift in salient technology frames could lead to reinterpretation of information as well as to new understandings of IT requirements.

The concept of technological frames thus forms a powerful and useful complement to other forms of social analyses, such as power, control, and resource dependency (Grudin 1988; Gash 1987; Kling & Iacono 1984; Markus 1983). In an overall investigation of technology implementation and use in organizations, both interpretative analysis of technological frames and institutional analyses of structural, cultural, and political issues are valuable (Orlikowski & Gash 1994). Davidson (2002) also asserts that power can influence the ISD processes and its consequences.

RESEARCH METHOD

Interpretative Research Methods

This study found that IT shifts the resource and power allocation of an organization. For this reason, employees from different departments will wield power in ISD in order to protect their self-interests and influence the direction of IS. As these phenomena continue in a dynamic system and are context-dependent (Pettigrew 1985), this paper uses a qualitative method to understand the complicated and interactive processes and to provide fresh insights into the subject area.

The study focuses on the ISD of *KaoKang*. A large number of events were analyzed utilizing an interpretation method. Investigations were conducted into the cognition and action of these different actors, and their wielded power processes in ISD. Pettigrew (1985) believes that the researcher should continue to observe the action or structuration processes of individuals and groups in order to ascertain the historical and social change processes. It is necessary to use rational and political perspectives at the same time to understand the change in the organization and to explore the way in which complicated events occur in a specific organizational, social, economic and political context (Pettigrew 1985).

Research Design

Case selection and data collection

KaoKang has 2000 employees and has had an MIS department for more than twenty years. It is information-rich and has had many occurrences of power-wielding events in the context of ISD. Intensity sampling was used to select this case, after which the snowball sampling method was utilized, through informants, to select the key individuals as our subjects.

Actor	***KaoKang***	***Selected subjects***
Top manager	DP dept.	2
Employees of DP-1 Division	DP-1 division	4
MIS Professionals	MIS dept.	6
	DSE dept. (who were work for MIS dept.)	2
Consultants of *KaoKang*	DP-1 division	1
	DW dept.	2
Customers	Customer	5
Others	DRD dept.	1
	DW dept.	2
Total		2 5

Table 1. Selected Subject Cases

In order to understand the cognitive differences of five kinds of actor (top managers, employees of DP-1division, MIS employees, consultants of *KaoKang* and customers) and the way they used their resources to wield power in DSH-IS development processes, we had two interviewing phases: (1) The first phase: from December 2001 to May 2002, explored the detailed processes of antecedence, process, and failure outcome of DSH-IS. (2) The second phase: from January 2005 to

July 2005, sought to understand the second-time development processes of DSH-IS. A total of 25 informants at *KaoKang* were interviewed, with the duration of each interview ranging from 15 minutes to 4 hours, the average range being from 30 minutes to 1 hour. The selected case subjects are shown in Table 1.

All interviews were tape-recorded and transcribed. The data were collected from 6 different departments and 5 customers. Four types of data: document data, archival data, unstructured interviews, and observation, were acquired to satisfy the requirements of multiple data resource triangulation.

Case description

KaoKang, a port authority in Taiwan, was established in 1945. Employees are government officials and *KaoKang* has a bureaucratic culture. The salary of employees is higher than other institutions of substantial income. Employees are of the mentality, "the less they do, the fewer errors they make."

In the 1960s, the industry, business and economy were thriving, and *KaoKang*'s operations increased significantly. Due to the limited experience of a number of employees and the complicated business processes, the institution's performance and customer requirements could not be satisfied. For this reason, computerization was introduced to some aspects of the business in 1971 and gradually increased, leading to the establishment of an MIS department in 1974. The IS used a batch method initially, before developing an on-line process in 1977. The MIS department has three divisions: DM-1, DM-2 and DM-3. For a description of subunits and employee relationships in *KaoKang*, see Figure 1.

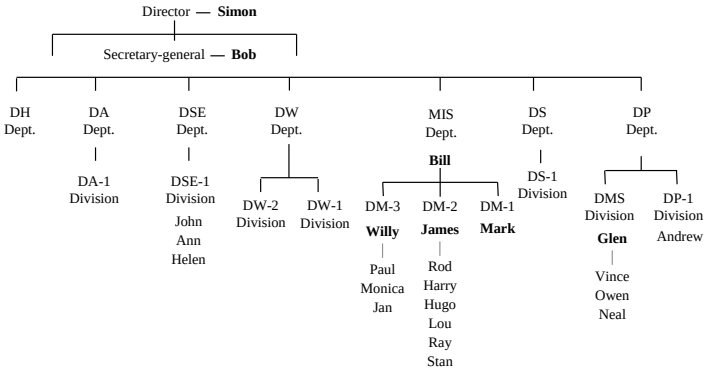

Figure 1: The Hierarchy Structure of *KaoKang*

Simon, the new director of *KaoKang*, inspected each department in 1996. He found that all but the very loud DP-1 division had been computerized. He then assigned the MIS department to the task of computerizing ship arrangement on the quay processes, called DSH-IS. Due to the fact that Simon had bragged about *KaoKang* having an IS capable of arranging ships' quays when entering foreign ports, it was necessary to computerize this task. Six years later, in 2002, the first DSH-IS development process was a total failure. From then on, the global competitive advantage of *KaoKang* diminished rapidly each year, causing the organization to lose its ranking from third to eighth in the world. In 2004, the director heard that even LongKang and ChungKang in Taiwan had IS capable of arranging the quay for a ship when entering a port. As *Kaokang* could not lag behind these two smaller ports, it began planning the DSH-IS once again in 2004, expecting it to be more successful the second time around.

Data analysis

Content Analysis was used in this research to analyze the data. In light of the fact that previous research had shown analysis of the steps to be most critical, each theme was defined very clearly, in order to avoid misclassification. This study analyzed data using thematic units elucidated from the respondents' description of the relevant events of the actors' cognition and power in ISD. Upon selection of the relevant sentences, each theme was analyzed, a task achieved by the collecting of themes and their codification. Since coding is subjective, it was necessary that all coders should agree on the coding criteria.

The events were ranked based on a time axis, and the data related to actors' cognition and power were filtered and analyzed.

In cases of insufficient data for analysis, the researcher returned to the field to collect more. The analytic processes were repeated to elaborate the causes and interactions of these events. Each of the 3 analysts (two Ph.D. candidates, and one MIS assistant professor) analyzed these data independently, after which pictures and a matrix were used to present and discuss the results. The final results were accepted when two or more analysts agreed. Those sections that could not be agreed upon in this way were examined in greater detail by the MIS assistant professor. If agreement still could not be reached, the findings of that particular section were discarded. By means of this procedure, the themes selected and the reliability of the analysis unit satisfied the requirements of triangulation through multiple analyses.

RESEARCH FINDINGS ANALYSIS AND DISCUSSION

This study, based on collected data, found that three frame domains derived from the DSH-IS development processes of *KaoKang* could be analyzed. They were: *nature of technology*, *technology strategy* and *technology-in-use*. The definition of these three frame domains is as follows:

(1) Nature of technology: refers to people's images of the DSH-IS and their understanding of its capabilities and functionality.

(2) Technology strategy: refers to people's views of why their organization acquired and implemented the DSH-IS. It includes their understanding of the motivation or vision behind the adoption decision and its likely value to the organization.

(3) Technology-in-use: refers to people's understanding of how the DSH-IS will be used on a daily basis and the likely or actual conditions and consequences associated with such use.

Due to the specific setting of *KaoKang*, this study adopted the frame domains of Orlikowski and Gash (1994). Analyzed were the different cognition, conflicts and contradictions among five kinds of actor in DSH-IS development processes. The first stage of DSH-IS development processes was explained and the reasons for their negative effect on DSH-IS in the second stage were given.

The study analyzed the technological frame differences among five kinds of actor: (1) top manager: including: director, DP department manager; (2) employees of DP-1 division: including the leader of DP-1 division and its employees; (3) MIS professionals: including the manager of the MIS department and the MIS professionals related to DSH-IS; (4) consultants of *KaoKang*: they were the employees of DP-1 division and others departments with deep understanding of the ship arrangement processes; (5) customers (outside users): needed *KaoKang* to arrange ships on the quay for them.

Three technological frames did not occur in vacuum, being both time and context dependent on DSH-IS development processes. Therefore, the frame domains that emerged from the *KaoKang* data embody understanding of what the DSH-IS is (*the nature of technology*), why it was introduced (*technology strategy*), and how it is used to create various changes in work as well as to allow different actors to wield power to influence the direction of DSH-IS in order to protect their power and self-interests (*technology-in-use*).

This study was based on a two-staged DSH-IS development process, analyzed using three domains of technological frames among five kinds of actor. As the director of *KaoKang* did not assign the consultants in the first stage of DSH-IS (1997~2002), there were only four kinds of actor at this stage (top managers, employees of DP-1 division, MIS professionals and customers). However, in the second stage (2005~), the director of *KaoKang* assigned the consultants of *KaoKang* that were involved in the second stage of DSH-IS. It was found that different actors have different perceptions of technological frames at the same stage. The differences will be discussed in the following sections (see Table 2).

Stages / ***Actors***	***The First Stage (1997~2002)***	***The Second Stage (2005~)***
Top managers	*Nature of Technology*: DSH-IS could resolve all problems.	*Nature of Technology*: DSH-IS was possible due to the progress of technology; it would be successful this time.
	Technology Strategy: DSH-IS could raise the global image of *KaoKang*.	*Technology Strategy*: the latter will be the champion.
	Motivation: director told foreign port that *KaoKang* has the IS capable of arranging a ship's quay when ship enters port. This was related to the "face" of the director.	*Motivation*: If LongKang and ChungKang in Taiwan have the IS, *KaoKang* should have the same facility.

	Criteria of success: using computers was the goal.	*Criteria of success*: expected customers could do this job on-line in their own company.
	Vision: to raise the global competitive advantage of *KaoKang*.	*Vision*: Wished also that *KaoKang* could raise its global competitive advantage.
	Accommodated planning: supported the budget of DSH-IS totally and assigned the MIS department to take responsibility for it.	*Accommodated planning*: supported the budget of DSH-IS totally, outsourcing it and assigning a DP department and MIS department. Consultants of *KaoKang* and customers could work together. The manager of DP department piloted the proceedings.
	Technology in Use: Irrespective if how it was done, it was necessary to use the computer.	*Technology in Use*: control the function of DSH-IS, which could help top managers maintain good relations with privileged clients in order to ensure their future promotion.
	Priority: Directed to do it immediately. And accepted customers delegated some powerful individuals to resolve issues. DSH-IS was a phantom system.	*Priority*: asserted DSH-IS should be implemented in two phases: prearrange ship on the quay before it enters port till everyone has been familiarized with DSH-IS; then arrange ship on the quay at the time it enters port. Then they could respond to privileged clients' requests.
	Policy for quality: If computerized this job would be good enough.	*Policy for quality*: the function of manual modification could not be eradicated
Stages / ***Actors***	***The First Stage (1997~2002)***	***The Second Stage (2005~)***
Employees of DP-1 Division	*Nature of Technology*: DSH-IS was very rigid and inflexible and so would not work.	*Nature of Technology*: Computerization was possible at this time.
	Technology Strategy: could be manipulated like a puppet.	*Technology Strategy*: simplify the rules of ship arranging, but with no guarantee of success.
	Motivation: must comply with top managers' directives.	*Motivation*: there was a global *computerization* trend, and so the manager of the MIS department was co-opted, with the expectation that he could share the responsibility with them.
	Criteria of success: doubt the ability of DSH-IS.	*Criteria of success*: the extent to which DSH-IS is accepted by customers.
	Vision: it was a good idea, but it did not work and there were no expectations for it.	*Vision*: Wanted to have automation and preserve their power and self-interests at the same time.
	Accommodated planning: formulated the rules of ship arrangement processes for MIS department, but only provided superficial effort to avoid punishment.	*Accommodated planning*: modified the complicated rules and simplified them. Did each in response to directive of top managers with no judgment.
	Technology in Use: created problems for other employees.	*Technology in Use*: avoided involvement in conflict of customers for reasons of self-preservation.
	Priority: the critical information controllability would be transparent after computerization, and their jobs would be wound down. Thus, a hit-or-miss and make-shift approach to computerization.	*Priority:* wrote request for proposal (RFP) according to top managers' requirement, in order to keep good relationship with top managers.

	Usefulness: this job was too complicated, DSH-IS was too rigid and had no flexibly.	
	Policy for quality: distrusted the result of DSH-IS.	*Policy for quality*: adhered completely to top managers' orders.
		Limitation of job duty: expected customers would be able to resolve the problems of ship arranging conflicts by themselves.
Stages / Actors	***The First Stage (1997~2002)***	***The Second Stage (2005~)***
MIS Professionals	*Nature of Technology*: Due to complicated nature of the rules of ship arranging and the small chances of success, it was not the right time to develop DSH-IS.	*Nature of Technology*: The rules of ship arranging were simplified, DSH-IS should achieve its goal.
	Technology Strategy: technique had not come to maturity.	*Technology Strategy*: only accommodated DP-1 division and did not guide it.
	Motivation: the failure of DSH-IS was not his responsibility, then passively did this job.	*Motivation*: MIS department only accommodated DP-1 division in order to avoid responsibility for its failure.
	Criteria of success: DSH-IS should be associated with GIS, and the employees of DP-1 division and customers accommodated it.	*Criteria of success*: supported DP-1 division and let the contract of DSH-IS for them be successful.
	Vision: hopelessness.	*Vision*: no comment.
	Accommodated planning: Hugo used the strategy of "the less he did, the fewer errors he would make" to introduce DSH-IS.	*Accommodated planning*: from promoter to auxiliary actor, and obeyed the order of top managers only.
	Technology in Use: had second thoughts, then did it.	*Technology in Use*: supported the technical side of the project only.
	Priority: according to the schedule and did not coerce users to use DSH-IS	*Priority*: according to the budget schedule.
	Usefulness: the rules of ship arranging were complex, difficult and inflexible. DSH-IS was slow with frequent auto-shutdown. Finally, James wrote a web homepage showing the results, accessible to anyone with Internet facility.	
		Limitation of job duty: supported the technical, outsourcing to third-party and allowed a contract of DSH-IS for DP-1 division only.
Stages / Actors	***The First Stage (1997~2002)***	***The Second Stage (2005~)***
Customers	*Nature of Technology*: Task too complicated and DSH-IS too rigid.	*Nature of Technology*: Although the technology was progressive, the complicated and flexible nature of ship arrangement processes could not be accommodated in DSH-IS.
	Technology Strategy: distrusted DSH-IS.	*Technology Strategy*: should achieve the three goals of fairness, equity, and transparency.
	Motivation: resisted DSH-IS totally.	*Motivation*: computerization is the world trend.

	Criteria of success: the extent to which it could achieve fairness, equity, and transparency.	*Criteria of success*: the extent to which it could achieve fairness, equity, and transparency.
	Vision: DSH-IS always inconsistent with the on-site situation, thus customers distrusted DSH-IS. Therefore, they encouraged its failure.	*Vision*: waited for the second failure of DSH-IS.
	Accommodated planning: the employees of customers told their bosses the shortcomings of DSH-IS. These bosses requested some privileges, pressing *KaoKang* and resisting DSH-IS.	*Accommodated planning*: customers raised as many questions as they could without explicitly standing against DSH-IS, and waited for a good presentation. Customers still needed to have good relations with employees of DP-1 division in order to secure a good quay for their ships, and to benefit from other privileges.
	Technology in Use: job rights were jeopardized.	*Technology in Use*: suggested that *KaoKang* should replace the make-shift approach and eradicate the flaws in the ship arrangement processes.
	Priority: DSH-IS was threatening their job rights. Most of them were relatives of their bosses. These bosses could not fire them and so accepted all suggestions made by them about DSH-IS in order to relieve pressure.	*Priority*: *KaoKang* should study the successful experiences of Hong Kong and Singapore. Resolve the problems of *KaoKang* first, then computerize.
	Usefulness: could not modify the function of DSH-IS to accommodate day-to-day problems.	*Usefulness*: impossible to replace ship arrangement job by DSH-IS forever.
Stages / Actors	***The First Stage (1997~2002)***	***The Second Stage (2005~)***
Consultants of KaoKang	Had not assigned the consultants at this stage.	*Nature of Technology*: It was absolutely certain that computerization could arrange the quay for a ship if the rules were simplified.
		Technology Strategy: there was a good chance of achieving the four goals of fairness, equity, transparency, and preservation of public rights.
		Motivation: this was a good chance to simplify the complicated rules of ship arrangement.
		Criteria of success: the function of manual modification should never be replaced by the new DSH-IS.
		Vision: this was a good chance to avoid the loophole, and an opportunity to achieve the four goals of fairness, equity, transparency and preservation of public rights.
		Accommodated planning: auxiliary DP-1 division revised the RFP and persuaded top mangers in each meeting.
		Technology in Use: no substantial power.
		Priority: suggested eradication of the manual function. However, because top managers rejected their ideas totally, consultants eventually gave up. Because they had no

		decision power, they felt incapable.

Table 2. The Different Technological Frames of Five Actors in Two Stages of DSH-IS

IMPLICATIONS

This study has analyzed the power highlighted in the technological frames perspective of DSH-IS in *KaoKang*. As a result, we are able to understand the insights of the technological frames gap among different actors over time from a theoretical perspective, and offer practical ways of managing those differences.

Implications for Theory

Technological frames have been used to understand the cognitive structure of organizations in the early stages of technology development. Davidson (2002), Olikowski and Gash (1994) analyzed the cognitive gap among different kinds of actor in ISD. Although they emphasized that power was the critical factor in the analyzed processes, they did not have enough data to support their view. For this reason, the present paper not only adopted the technological frames of Olikowski and Gash (1994), but also enhanced the interpretation of power operative processes. The paper interpreted the gap in *technological frames* among five kinds of actor (top managers, employees of DP-1 division, MIS professionals, consultants of *KaoKang*, and customers). The paper emphasized how the subjects wield their power, and why the gap in technological frames among different actors in DSH-IS development processes occurs.

Qualitative research cannot offer an independent interpretation without relative organizational characters and social cultural context. In view of this, although this study adopted the same domains of technological frames with regard to Olikowski and Gash (1994) (*nature of technology*, *technology strategy* and *technology-in-use*), the findings have produced totally different insights. Different methods of sense-making are used with the five kinds of actor present in *KaoKang* in the DSH-IS development processes. In particular, the DSH-IS development processes have been shown to greatly influence some of the actors' job rights, power and self-interests. These events prompted the failure of the first stage of DSH-IS development processes, and was responsible for the unpredictability in the second stage. Finally, with the exception of top managers, none of the actors had confidence in the success of the second round of DSH-IS development processes.

Making longitudinal observations, this study finds that the cognitive technological frames of some actors changed due to time and technological developments, findings consistent with the perspective of El Sawy and Pauchant (1988), Gioia (1986), namely:

(1) The *technology strategy* of top managers changed from "assigned MIS department was to take responsibility for it" in the first stage to "assigned DP department, MIS department, consultants of *KaoKang* and customers to form a coalition together" in the second stage. In order to show their absolute power with respect to DSH-IS development processes, the strategy of top managers from one stage to another was driven by two equally important needs: to be successful and to save face.

(2) The *technology in use* of top managers changed in the course of the DSH-IS implementation process. It started as "irrespective if how it was done, it was necessary to use the computer" in the first stage. This changed to "control the function of DSH-IS; it could help top managers maintain good relations with privileged clients in order to ensure future promotion." Top managers changed their perspective when they discovered that "maintaining good relations with privileged clients" was their power resource. This became their top priority, superceding the four goals of fairness, equity, transparency and preservation of public rights, and the practical effectiveness of DSH-IS.

(3) The *nature of technology* for the employees in DP-1 division and MIS professionals from "DSH-IS was a mission impossible" in the first stage. This changed to "DSH-IS should be able to replace the manual ship arrangement process" in the second stage. This change was due to the fact that both of these groups found that DSH-IS could be developed without their having to take responsibility for it, and that it would not affect their professional (domain) power.

(4) The *technology strategy* of employees in DP-1 division changed from "could be manipulated like a puppet" in the first stage to "simplify the rules of ship arranging, but with no guarantee of success" in the second stage. This change was made in order to preserve their power and self-interests after DSH-IS had been developed.

(5) The *technology in use* of employees in DP-1 division changed from "coalesced with customers to avoid losing their jobs" in the first stage to "wrote RFP according to top managers' requirement, but avoided involvement in customer conflict for reasons of self-preservation" in the second stage. They refused to take responsibility for DSH-IS, and also retained their

official power in the "ship arranging" job. This result demonstrates the officials' desire utterly to shirk their responsibilities.

(6) The *technology strategy* of MIS professionals changed from "advocated DSH-IS" in the first stage to "only accommodated DP-1 division and did not guide DSH-IS" in the second stage. This resulted from their understanding that there were many reasons that would influence the success of DSH-IS development processes and that the chances of success were very low. They changed their strategy to retain their professional power. This result betrayed the principle these officers were adhering to: the less they did, the fewer errors they would make.

(7) The *technology strategy* and *technology-in-use* of customers changed from being "afraid of losing their job, distrusting computers and resisting DSH-IS in the first stage" to "cooperated superficially and undertook indirect fault-finding in the second stage." In both stages, customers always cared about their job rights and the fairness of "ship arranging." The ship arranging result of DSH-IS also affected their position and power in the company, if the operation of DSH-IS is black box.

With these technology frame changes, which can help management to understand how to employ usable factors as well as provide an appropriate method to change the perceptions of IS of employees in their difference positions within the organization, IS can be accepted more easily in the future.

This paper offers the following three insights with regard to these phenomena: firstly, due to the fact that IS can change an organization's power structure and benefits' allocation, some resource allocators will use their relations to influence the direction of IS in order to protect their power and self-interests, as illustrated by the actors of employees of DP-1 division and customers in this study. Secondly, some resource allocators will not consider the difficulties of implementing their ideas, leading them to shape the development of IS in a way that will ensure the saving of his/her face, as illustrated by the actor of top managers in this study. Thirdly, some actors must satisfy the requirements of Chinese culture in order to maintain interpersonal harmony, giving face to rather than spiting others, and helping them to do their best. In so doing, they expect others to repay their effort in the future (Bond & Lee 1981). This is illustrated by the actors of top managers, MIS professionals, and consultants in this study.

Implications for Practice

This study reminds us that ISD can fail due to the wielding of power and self-interests in different organizational structures and cultures, even if it is a good and meaningful IS. However, the failure could occur for different reasons in a western context. This paper also finds that even an actor who is just, objective and unselfish (such as consultants in this study) cannot direct IS successfully if they are living in the context of public organizational culture. In light of this, there are five suggestions to management:

(1) Managers should consider adopting a team work approach in which team members take collective responsibility to avoid the danger of employees serving self-interests in different situations.

(2) Before ISD, the plan, direction, content and goal of IS should be announced and explained in considerable detail. This will help to avoid different actors wielding power and political behavior in the ISD and overshadowing the future direction of IS by actions driven by self-interest and power.

(3) Managers should explain the extent to which the formal rules of the organization are flexible to avoid employees of different departments using these rules to control ISD. This is a particularly important strategy in the public department.

(4) Managers should have clear reward and punishment standards before ISD, in order to avoid employees of different departments exploiting ISD and shirking responsibility for decisions.

In light of this, management should understand the different kinds of cognition among actors (technological frames). Finally, management should also recognize the way in which these key actors will use their status and expert knowledge to wield power in ISD. In-depth understanding from this perspective will promote smoother ISD and will avoid unnecessary manipulated power events.

CONCLUSION

This paper has investigated the power operation in information system (IS) development processes, exploring the psychological mechanism of individuals from the micro perspective. The study analyzed the gap in *technological frames* among different actors, assessing how these actors wield power to achieve their self-interested goals and impede DSH-IS development process. To this end, the study collected data from –***KaoKang*** –a port authority. We attempted to understand different key actors in a particular context with technological frame gaps in ISD, to help other similar organizations to avoid similar problems when implementing ISD. It is hoped that the study will further reduce the number of negative outcomes of

ISD in organizations.

References

1. Avgerou, C. (2002) Information Systems and Global Diversity, Oxford University Press.
2. Bond, M. H. and Lee, P. W. H. (1981) Face Saving in Chinese Culture: A Discussion and Experimental Study of Hong Kong Students, in *Social Life and Development in Hong Kong*, edited by A. Y. C. King and R. P. L. Lee, Hong Kong: Chinese University Press, 288-305.
3. Bostrom, R. P. and Heinen, J. S. (1977) MIS Problems and Failures: A Socio-Technical Perspective, Part I-The Causes, *MIS Quarterly*, 1, 17-32.
4. Chang, C. L. H. (2006) The Political Behavior Intention in Information System Development from MIS Professionals Perspective: A Study Based on the Theory of Planned Behavior, *International Journal of Innovation and Technology Management*, 3, 4, 341-360.
5. Chang, C. L. H. (2007) The Political Behavior Intention of User in Information System Development, *Human systems management*, 26, 2, 123-137.
6. Davidson, E. J. (December 2002) "Technology Frames and Framing: A Socio-Cognitive Investigation of Requirements Determination, *MIS Quarterly*, 26, 4, 329-358.
7. El Sawy, O. and Pauchant, T. (1988) Triggers, Templates and Twitches in the Tracking of Emerging Strategic Issues, *Strategic Management Journal*, 9, 445-473.
8. Gash, D. C. (1987) The Effects of Microcomputers on Organizational Roles and the Distribution of Power, Ph. D. Dissertation, Cornell University, Ithaca, N. Y.
9. Gioia, D. (1986) Symbols, Scripts, and Sensemaking: Creating Meaning in the Organizational Experience, in *the Thinking Organization*, H. Sims Jr., D. Gioia and Associates (Eds.), Jossey-Bass, San Francisco, 49-74.
10. Jasperson, J., Carte, T. A., Saunders, C. S., Butler, B. S., Croes, H. J. P. and Zheng, W. J. (December 2002) Review: Power and Information Technology Research: A Metatriangulation Review, *MIS Quarterly*, 26, 4, 397-459.
11. Lawrence, T. B., Mauws, M. K. and Dyck, B. (2005) The Politics of Organizational Learning: Integrating Power into the 4I Framework, *Academy of Management Review*, 30, 180-191.
12. Markus, M. L. (June 1983) Power, Politics, and MIS Implementation, *Communications of the ACM*, 26, 6, 430-444.
13. Markus, M. L. and Robey, D. *(*May 1988) Information Technology and Organizational Change: Casual Strutcute in Theory and Research, *Management Science*, 34, 5, 583-598.
14. Orlikowski, W. J. and Gash D. C. (1994) Technological Frames: Making Sense of Information Technology in Organizations, *ACM Transactions on Information System*, 12, 2, 174-207.
15. Pettigrew, A. M. (1985) Contextualist Research and The Study of Organizational Change Processes, in *Research Methods Information Systems*, edited by E. Mumford, R. Hirshheim, G. Fitzgerald and T.W. Harper, North-Holland.
16. Redding, S. G. (1980) Cognition as An Aspect of Culture and Its Relation to Management Process: An Exploratory View of the Chinese Case, *Journal of Management Studies*, 17, 2, 127-148.
17. Redding, S. G. (1990) The Spirit of Chinese Capitalism, New York, DeGruyter.
18. Robey, D. and Boudreau, M. C. (June 1999) Accounting for The Contradictory Organizational Consequences of Information Technology: Theretical Directions and Methodological Implications, *Information Systems Research*, 10, 2, 167-185.
19. Silva, L. and Backhouse, J. (2003) The Circuits-of-power Framework for Studying Power in Institutionalization of Information Systems, *Journal of the Association for Information Systems*, 4, 6, 294-336.
20. Soh, C., Neo, B. S. and Markus, M. L. (1993) IT 2000: A Critical Appraisal of Singapore's State-Wide Strategic Planning Process for Information Technology, *Journal of Strategic Information Systems*, 2, 351-372.
21. Walsh, J. (1995) Managerial and Organizational Cognition: Notes from a Trip Down Memory Lane, Organization Science, 8, 5, 280-321.
22. Zuboff, S. (1988) In the Age of the Smart Machine, New York: Basic Books.