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**THE IMPACT OF INFORMATION TECHNOLOGIES ON
THE TEMPORAL DIMENSION OF ORGANIZATIONAL
CULTURE: A CASE STUDY**

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1. Introduction

It is generally accepted that information technology, when implemented in organizations, speeds up business processes at an enormous rate and thereby saves the adopting organizations a great amount of time. In spite of its significance in temporality, research on temporal impacts of information technology in organizations is still limited (Lee and Whitley 2002).

Empirical studies on this topic have started to appear regularly during the last decade (Sahay 1997, 1998; Lee 1999; Lee and Liebenau 2000; Sawyer and Southwick 2002; Scott and Wagner 2003; Kvassov 2003; Sarker and Sahay 2004; Prasopoulou et al. 2006), gaining a stable attention which has led in 2002 to the publication of a special issue of *The Information Society* on “Time and IT Speeding up the pace of work activities, foster workers’ polychronicity, promote shifts from “batch” logic to “flow” logic, improve synchronization among organizational units are just a few examples of some important objectives pursued by firms when they adopt systems like Workflows or ERPs.

Such objectives are related to potential changes in the temporal organization of processes and activities, but also to potential changes in mental attitudes people have towards time and time use in the workplace: in the course of this study we will refer to both these two kinds of objectives as “expected temporal performance”. That is to say, the results the management expects to gain from the introduction of an information system or a technology, with regard to the temporal dimension.

Organization studies have long acknowledged time as a fundamental dimension of organizational culture (Hofstede 1991; Schein 1985) and it has been underlined that, besides being a condition for the coordination of activities and the production of organizational outputs, the temporal organization of work activities, processes, routines constitutes a “pattern” which plays a fundamental role also as a template for organizing behavior: a cognitive and cultural framework which helps people make sense of actions and events in the workplace (Barley, 1988).

It has also been pointed out that temporal patterns are also an expression of the specific culture of different organizational units and professional groups within a firm (Gherardi and Strati 1988; Dubinskas 1988).thus conveying a strong symbolic value for both individual workers and groups.

Both these cognitive and cultural functions of temporal patterns contribute to their strength and permanence in organizational units and work groups, suggesting that changes in temporal patterns potentially conveyed by information systems are not to be taken for granted – on the contrary, they might affect, positively or negatively, the achievement of the expected temporal performance of the system.

The paper we propose intends to give a contribution to this area of studies presenting some preliminary results from a case study which investigates the impacts of the introduction of a workflow system on the temporal patterns of four organizational units within a company and tests

the hypothesis that the temporal patterns existing in organizational units before the introduction of the system can affect its implementation and can facilitate/hinder the achievement of the expected temporal performance conveyed by the system.

2. Temporal patterns as a dimension of organizational culture

Besides being a fundamental condition for the coordination of activities and the production of organizational outputs, the temporal organization of work processes, as pointed out by Barley(1988) plays a fundamental role also as “an interpretive framework for rendering action in the setting meaningful” [p. 125]. In other words, organizational actors evaluate and make sense of events occurring during their own activity or other people’s activity using the temporal framework as a scheme of expectations to judge whether results and behaviours are appropriate.

Zerubavel (1979) in his study on temporal patterns in the organization of activities in hospitals found that various types of schedules worked as “cognitive maps”, used by hospital’s personnel, providing a background, a “repertoire of what is expected, likely or unlikely to occur within certain temporal boundaries” [p.125].

Temporal patterns represent thus an expression of the specific organizational and professional culture which produces them, conveying a symbolic value, for the individual worker and the group of workers: according to Dubinskas (1988), the socially constructed character of time is such that all “times” existing within the high technology organizations of his study could be considered as “symbolic nexes around which coalesce issues of order, power, self definition and knowledge”

As an example, in Barley’s study (1988) the different temporal organization of work of two professional groups, radiologists and radiological technicians, was also a representation of the different hierarchical status of the two groups: given the “temporally unpredictable world” (p. 145) of the radiologists, the technicians never knew when radiologists would be available and had to hunt for them whenever they needed one, while on the contrary the radiologists, given the predictable and highly scheduled ”tempo” of technicians, always knew when they could summon up one of them.

Again, Zerubavel found that a major aspect of the socio-temporal order expressed by the “schedule” of coverage in the hospital was that it functioned “as a moral order”, an expression of some fundamental organizational values like responsibility towards the patients, fairness towards staff members, and it was also a criterion to judge the appropriateness of personnel’s behaviour: some actions were considered “legitimate”, for example, only at the end of a shift, but not at the beginning. In this view, the temporal dimension appeared central for the definition of the “boundaries of norms”.

The above mentioned cognitive and cultural functions of temporal patterns can be considered as a factor which contributes to their strength and permanence within a given organizational context; consequently, the introduction of technologies which have the potential for changing temporal patterns entails a challenge to a multiplicity of cognitive frameworks and cultural values on which organizational actors rely.

On the other side, like all other social structures, temporal patterns have a provisional nature and change over time (Bluedorn and Denhardt 1988; Lee & Liebenau, 1999; Ancona et al. 2001), also in association with technological innovations .

3. Aim of the study and research questions

The purpose of the study we present is to investigate if and to what extent the introduction of a workflow system transforms the temporal patterns of the organizational units where it has been adopted, and to test the hypothesis that the temporal patterns shared by people in organizational units before the introduction of the system can affect the way it is used , thus facilitating/hindering the achievement of the expected temporal performance conveyed by the system.

According to these purposes, the study intends to answer two main research questions:

- 1) Does the introduction of workflow systems transform the temporal patterns shared by people in organizational units, thus achieving the expected temporal performance, and to what extent it does?
- 2) Do temporal patterns existing in organizational units before the introduction of the system affect the use of the system thus facilitating/hindering the achievement of the expected temporal performance?

Being this an exploratory study on an issue which is little investigated, we expect that the results will allow to further sharpen the initial hypothesis and to extend the research to more cases in order to increase the generalizability of results.

4. Research methodology

The research questions are investigated through a case study which is currently being conducted in a firm where a workflow system has been recently introduced, involving 4 different organizational departments.

The research design, summarized in the following sections, is aimed at describing changes in the temporal patterns of the organizational units involved by the system, measuring temporal patterns

through three different sources of data: semi-structured interviews; questionnaires based on Likert scales; company documents.

The unit of analysis of our research are the organizational departments where the system was introduced, and the specific temporal dimensions of organizational culture we investigate are referred to these departments.

4.1 Operationalization of temporal dimensions

In order to describe and measure the temporal dimensions of organizational culture, we have adopted a set of concepts which represent various dimensions of temporality.

Such dimensions are based on previous research in psychology of work and organizational culture (Schriber 1985; Schriber and Gutek 1987; Bluedorn et al. 1999) where Likert scales measuring different sets of temporal dimensions have been developed and tested and have already been used to describe temporal changes in business processes occasioned by the introduction of a new information system (Lee 1999; Lee and Liebenau 2000 Kvassov 2003).

Our research includes the following dimensions, derived from the work of Schriber and Gutek (1987); Bluedorn et al. (1999); the last two dimensions are derived from Zerubavel (1979):

1. Deadlines: the temporal start and stop points - its existence and importance
2. Awareness of time use : people's awareness of how they use their time on the job and expectations that they know how long they take to perform activities
3. Autonomy of time use: the amount of freedom the worker has in setting schedules for the completion of his tasks over time
4. Sequencing: the order in which activities and tasks take place
5. Speed vs. Quality: norms to which people adhere regarding trade-offs between the quality of work and the speed of work over time
6. Work Pace : rate at which activities can be accomplished: it concerns the speed of work and people's expectation to work fast.
7. Allocation: the amount of time devoted to a task or activity
8. Polychronicity: the extent to which people prefer to be engaged in two or more tasks simultaneously and believe that is the best way to do things
9. Temporal symmetry: the extent to which different groups/ organizational units share the same temporal order
10. Social cycles : the regular recurrence of events and processes: it attempts to profile the cycles in work activities experienced over time.

4.2 Data collection and phases of the research

The case study, still in progress, is being developed in two phases, which we briefly describe as follows.

Phase 1

- Investigation of the *temporal performance expected* by the managers adopting the system.

Data source: individual semi-structured interviews; project documentation.

Interviews were addressed to managers who adopted the system, in order to investigate several dimensions of the temporal performance they expected from its introduction.

Phase 2

- Measurement of temporal dimensions of culture existing in the four departments involved *before* the introduction of the system.

Data source: individual semi-structured interviews; questionnaires based on Likert scales measuring several different dimensions of temporal patterns.

Questionnaires and interviews involve both managers and employees working in the four departments where the system was introduced.

- Measurement of temporal dimensions of culture *after* the introduction of the system in the four departments.

Data source: individual semi-structured interviews; questionnaires based on Likert scales measuring several different dimensions of temporal patterns.

Questionnaires and interviews involve managers and employees working in the four departments where the system was introduced.

This phase of the research has two aims: first, describing and measuring differences in temporal patterns *among units* before the introduction of the system.

to the second objective is to measure to what extent the expected temporal performance has been actually achieved in different organizational units, and to test the hypothesis that the different temporal patterns existing in the units have affected in different ways the achievement of the expected temporal performance.

5. Case study and preliminary results

The case study is currently being conducted in the Italian branch of a multinational manufacturing company, where a workflow system (Lotus Notes) has been introduced in order to improve the Customer Service processes.

This system was selected for the study because, a few months before the fieldwork started, it had contributed to change customer service processes and procedures in the company, a change whose

objectives were highly related to temporal performance: as the director of the IT and Organization Department pointed out, “our aim was to give faster answers to customers, speeding up the process; but we also wanted people to change their mentality and shift from a ‘batch logic’ to a ‘one piece flow logic’”.

Among customer service activities, one domain to which Notes has been applied was chosen for this research: the Complaint management service, because it is the most prominent customer service activity, and because it requires the coordination of four different departments.

The field sites are thus the departments which use Lotus Notes in order to cooperate to the Complaint management process: the so called “Customer Point”; the Sales Department; the Storehouse and logistics Department; the Accounting Department.

5.1 Preliminary results

As pointed out before, the work is currently in progress and what we present here are some preliminary results which emerged from phase 1 of the research and the beginning of phase 2.

Temporal performance expected

The semi-structured interviews conducted in the first phase with the IT and Organization manager and the four department managers allowed to assess their perceptions about the objectives of the introduction of the system.

Three objectives, which can be considered relevant from a temporal point of view, turned out to be widely shared by all the managers:

Speeding up the process of Complaint management service. This meant accelerating single activities which are part of the process, like the gathering of documents about the customer’s order, the gathering of information about the specific problem, monitoring single customer’s “complaint dossier” and “finding bottlenecks” in the process. It also meant reduction of duplications; reduction of time dedicated to produce and store physical documents: “less paper to be produced for the archives”.

Enhancing temporal symmetry among different departments: Customer Point managers and operators felt the customer’s pressure and were much more aware of delays in giving answers to the customers (“closing the dossier”), compared to other departments, which had other priorities and followed their own cycles of activity. A single dossier could be left “standing by” for days, waiting for an answer on the nature of the problem from another department, for example storehouse. The introduction of the workflow system, was expected to foster the “alignment” of the departments on priorities, deadlines, cycles of activities. This kind of objective can be better explained using Zerubavel’s concept of temporal symmetry: the different departments didn’t share the same “temporal order”, and this affected the process of complaints management.

Shifting from a “batch logic” to a “one piece flow logic”: the system was expected to make it easier for people to deal with the activities instantly, as they showed up, without waiting to have a “pile of dossiers” on their desk. As the IT and Organization manager said: “people here used to wait until the “pile” was high enough, before deciding it was time, for example, to write letters to customers for a whole afternoon. or to check a heap of transport documents ...if you asked a manager what an employee of his was doing that day, he would answer: ‘It’s Wednesday: today she writes the letters’. We want people to change their mentality, from a “batch logic” to a “one piece flow logic”. These remarks refer to the tendency to organize the activity in recursive “cycles”, occurring in some cases up to once a week (as an example, the storehouse operator checked the queries coming from the customer service only once a week) and also to a preference in doing one type of activity at a time (monochronicity). Reduction/ elimination of such cycles and enhancement of polychronicity were the objectives in this case.

Changes in the temporal dimension of the organizational culture

The findings of phase 1 helped us focusing the data collection in phase 2, where so far we collected 9 in depth interviews (4 with managers and 5 interviews with operators) of the different departments, aimed at investigating the temporal patterns existing *before* the introduction of the system in the different organizational units involved, and the perceptions of change *after* the introduction.

The results are reported in Table 1.

10	<i>Work pace</i>	= -	=	=	=
	<i>Temporal dimension</i>	CUSTOMER	STOREHOUSE	SALES	ACCOUNTING
		POINT	& LOGISTICS	DEPARTMENT	DEPARTMENT
1	<i>Allocation</i>	-	-	-	-
2	<i>Deadlines</i>	+	+	+	+
3	<i>Simmetry</i>	+	+	+	+
4	<i>Polychronicity</i>	+/=	=	+	=
5	<i>Cycles</i>	=/-	=/-	-	=
6	<i>Autonomy of time use</i>	+	=	+	=
7	<i>Sequencing</i>	+ -	-	-	=
8	<i>Awareness of time use</i>	+	=	+	=
9	<i>Speed vs. quality</i>	=	=	=	=

Table 1. Changes in temporal dimensions

The table summarizes the perceptions managers and employees reported during the interviews about the changes in the above temporal dimensions, which occurred after the introduction of the workflow system (it had been used for 9 months at the time of interviews).

The first three dimensions show the same sign: throughout the 4 departments, the interviewees stated that the allocation of time to the single activities of the complaint management process had reduced: there was a general expression of satisfaction towards the fact that the use of the system speeded up many operations. At the same time, the perception of importance of deadlines had increased significantly in all departments. According to the interviewees, this was due to the combined effect of two factors: the introduction of a formalized system of priority and clear deadlines for the resolution of complaint dossiers (four classes of complaints were established: to be solved in 8, 16, 24, 32 hours) and the fact that the system automatically shows the date and time when departments give their contribution to the resolution of the problem. As many operators stated, “there was no formalized priority and deadline before...everyone knew complaints were ‘important’ but how urgent and when everyone was expected to answer...that was unclear”.

A better understanding of deadlines and the possibility to check the timing of answers from the departments also represented a driver to enhance symmetry among the different organizational units: every department share the same 8/16/24/32 framework, within which the due checks must be made and the answers must be forwarded to the Customer point. “Now they do answer us in good time”, said two Customer point operators.

The three dimensions are strongly associated with the some of the expected temporal performances expressed by the management: speed (underlying dimensions: allocation; deadlines) and temporal symmetry among departments.

On the other side, both dimensions associated with the third expected output (passing from a “batch logic to a “one piece flow logic”) were reported to have changed only in some departments; moreover, within the same department or within the same interview contradictory opinions were given. Since the data gathering on phase 2 is still in course, we’ll be able to account better for this effect when the interviews will be completed and the questionnaires returned.

6. Conclusion

The interviews conducted in phase 1 of the case study allowed to account for three types of temporal performance expected by the management as a result of the introduction of the workflow system.

Such results were associated to 5 underlying temporal dimensions of organizational culture of the departments : allocation, deadlines, temporal symmetry, polychronicity, cycles.

The preliminary results of phase 2 showed some significant changes in the temporal dimensions of the culture of the organizational departments involved by the introduction of the workflow system.

In particular, three dimensions strongly associated with the expected temporal performances did change in the desired direction: allocation and deadlines (associated with speed) and temporal symmetry among departments.

However, in most interviews it was made clear that, though the system could occasion the fulfilment of some temporal performance (for example to adopt a “one piece flow” logic) there were some dimensions of temporal patterns which proved to be very persistent, such as the tendency to work according to cycles and with a “batch logic”.

Such dimensions of temporal patterns started to change when the introduction of the workflow system was supported by an internal workshop, aimed at sharing the objectives of the project and re-design some aspects of the process (i.e. the introduction of the four classes of complaints)

This kind of evidence supports the hypothesis we want to test by our second research question, that is if temporal patterns existing in organizational units before the introduction of the system affect the implementation and use of the system thus facilitating/hindering the achievement of the expected temporal performance

Such hypothesis is less probable to be to fully testable through the chosen methods of data gathering (interviews and questionnaires don't allow to observe directly behaviours) and this is a limit of the present research design.

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