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The Adoption of Workflow Systems and Their Impact on Organisations: The Results of a Case Study

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ABSTRACT

Organisational changes enabled by Workflow Systems are not always very clear. To study, and understand these changes, we have developed a framework of analysis that takes into consideration organisational factors (structure, politics, individuals, culture and technology) and also possible domains of impacts of these systems. We also considered that organisational change is a process rather than an event and that any technology might enact anticipated and unanticipated changes.

This paper presents the framework developed and the first results obtained in a Portuguese organisation.

1. INTRODUCTION

The adoption of any technology always means change. Being an organisation an open and dynamic system, we easily understand that change in any of its parts means changes in all the remaining ones, including its environment. Besides, the relationship between information technology and the efficiency and competitiveness of an organisation is not direct. The same technology may have different impacts, depending on the organisation and its characteristics. In this paper, we first describe organisational factors, followed by a description of domains of impact of workflow systems. We also develop the idea of change management. After that we present our proposal of a framework to analyse the impact of workflow systems on organisations. Finally, we present the first results obtained in the analysis of the impact of workflow systems in a Portuguese enterprise using the framework we have developed.

2. FRAMEWORK OF ANALYSIS

Literature shows that the adoption of a technology is mediated and conditioned by Technological Factors (characteristics of the technology to be adopted and the technology already existing in the organisation); Structural Factors (organisational design, complexity, number of hierarchical level, number of departments, centralisation or decentralisation of power and decision making, coordination of tasks, formalisation of procedures, design of tasks and jobs and specialisation); Social and Individual Factors (multidisciplinary work teams, geographically and temporally distributed, Educationeducation, training, work satisfaction, skills, individual characteristics),; Political Factors (who decides about the kind of technology to adopt, its design and implementation, who is going to use it, with what kind of purposes and objectives), ; and Cultural Factors (culture, norms, rules and reaction to change; knowledge and organisational learning capacity). The adoption of a technology is an ongoing process, which implies that these organisational factors do not influence the adoption of a technology at the same time.

The impact of Workflow Systems might be observed in several domains. According to existing literature we have identified the domains of Economy, Process Management and Knowledge and Organisational Learning like as the most the relevant ones to the analysis of impact of Workflow Systems in organisations [Khoshafian, 1995]; [Orlikowski, 1992]; [Orlikowski, 1996a]. In the Economic domain we have to consider the sub domain of Productivity. Workflow Systems have the potentiality to change productivity in terms of quantity, time of task accomplishment, reduction of costs and improvement in client's service. The implementation of these systems implies elimination of redundant tasks redundancy, of waiting and consulting time of waiting and consulting, reducing paper volume, which and improves improving the quality of product or service and have having profound consequences in productivity [Boersma, 1994; Kueng, 1998].

In Process Management we have also identified the sub domains of Coordination, of Communication and Collaboration. The impact of workflow in this domain is due to the routing and tracking capacity, to the possibility to of monitoring the progress of a transaction and the actions of the people work depend upon and to the uniformisation of outputs.

Using these systems, Communication among actors has no constraints of time and space. From presential interaction they can now act through an electronic media that allows the elimination of human barriers like shyness and nervousness. As for Collaboration, these systems contribute for a change in the way people do their jobs, leading to an increase necessityneed of communication and collaboration between employees. In spite of understanding their tasks in relation to the process, people tend to specialise in one task, which means a necessity in the interchange of ideas and knowledge. Besides, the need to know all the information about a product or service is no longer necessary since these systems provide a reservoir of abundant information. People only need to know how and where to find the information. This leaves space to do other activities and the consequent necessity in training in areas like communication and interpersonal skills. The automatic routing and tracking facilities of these systems attain the objectives of Coordination. Uniformisation of procedures and the correct fulfilment of documents help to reduce non-conformities. With these systems employees know from whom their work comes and to whom it will

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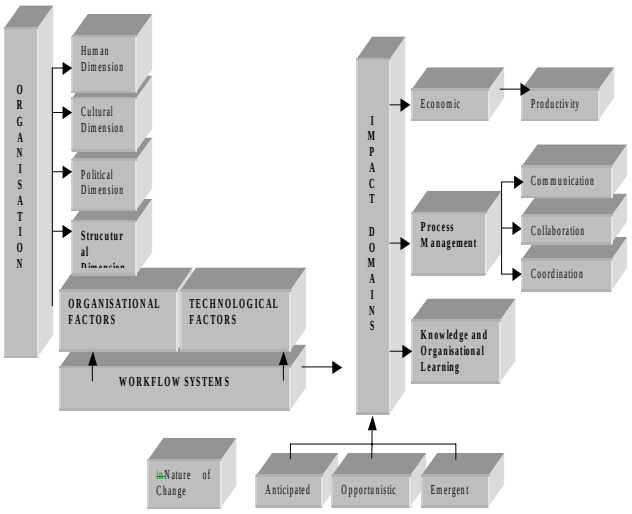

Figure 1- Framework to Analyse the Impact of Workflow Systems on Organisations

goes. That implies everyone must be responsible and more autonomous in doing his or her tasks.

In Knowledge and Organisational Learning, Workflow Systems help to pass from a tacit, implicit and individual knowledge to an explicit and collective one as all the tasks, procedures and rules are formalised and included in the system. This helps to constitute an information reservoir, shared by all the participants, accessible to all and with correct and good quality information. Malhotra [Malhotra, 1996] says that these systems can contribute enormously for organizational learning as they gather, process and distribute information as well as they have a reservoir of information.

We also have to consider that change is not an event but rather an ongoing process and that it is not possible to anticipate all the consequences of the change process. Change occurs through the evolution of an iterative series of steps, producing outcomes that management could not have predicted at the very start. Orlikowski and Hofman [Orlikowski and Hofman, 1997]identify three kinds of changes:

1. Anticipated changes: changes that are planned ahead of time and occur as intended;
2. Opportunity-based changes: changes that are not anticipated but intentionally introduced during the process of change in response to an unexpected opportunity, event or breakdown;
3. Emergent change: changes that arise spontaneously and that are not originally anticipated or intended.

Both anticipated and opportunity-based changes evolve deliberately, in contrast, to emergent changes that arise spontaneously. Furthermore, these three changes are not independent of each other as they are usually built iteratively into an undefined order over time. There is no predefined sequence in which the different types of change occur.

In order to see what organisational changes arise after the adoption of a workflow system, as well as to understand how these changes happen, we used our conceptual framework and applied it to a case study done in a Portuguese enterprise.. We accompanied an implementation of these systems in a Portuguese organisation referred in this paper as Beta Organisation. In the next section we present and characterise the organisation as well as the methodology used to gather and analyse data.

3. METHODOLOGY

3.1. Data Collection and Analysis

Data collection was done made between May 1999 and July 2000. We used observation, document review and semi structured interviews. We accompanied the person responsible for the development and implementation of the system. We also collected several documents about the enterprise and also about the purchase process. As for interviews, they were done made in two different moments. The first moment occurred before systems' adoption. We wanted to know in what way people worked, their vision of the enterprise and their expectations regarding this system. The second moment occurred one month after the beginning of the use of this system and we wanted to know what changes people had identified.

The interviews spanned all levels of the enterprise and all the potential users of the system. They were totally fully recorded and transcribed.

We used qualitative techniques to analyse data (Miles and Huberman, 1994), namely the Nud-Ist programme.

3.2. The Organisation and the Process

Beta organisation was settled incorporated in December 1985 and it is located at the nNorth seaside of Portugal. In the beginning, the business was mostly related to microfilmmicrofilming of hospital radiological filesimages. Later on, in 1996, it was re-oriented to consultation consulting and programming activities in Electronic Documentation Storing. In 1998, the company developed a Document and Database Archiving System, which constitutes an element of their Electronic Document Management System (EDMS) that has been internally developed as is fully compatible the well known ERP made by SAP. Two years ago this product was certified by SAP itself. . Although it was a family business when it was born, this organisation currently employs 45 workers, whose average age is 28 years old. They are now distributed in a linear and functional hierarchical structure with three levels that comprise the following departments: Administrative and Financial (AFD), Commercial, Quality, Research & Development (R&D), Marketing, SAP, Technical Support and Production. This growth was due to a great development of the market in the area of microfilming and digital archive and also due to the development and success of their EDM System.

3.3. Process

The process chosen to implement the workflow system was the purchase process and in particular the stewardship purchase process. Stewardship concerns the material necessary to employees to perform in the enterprise activity. For administrative employees it concerns paper, pen, archives files etc, and for production employees it concerns all the material to microfilm and digitalise clients' documents. Two sub processes compose this process: the one concerning internal demand and the command to the supplier. When we started this study, the enterprise

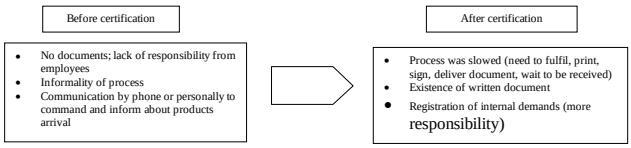

Figure 2 - Comparison of the situation before and after Certification

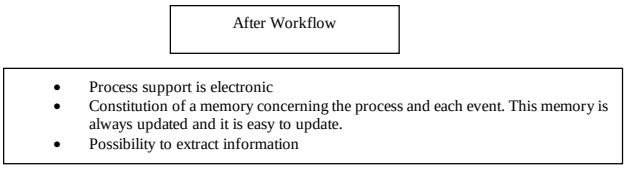

Figure 3 – Situation after workflow

was beginning a quality certification process according to ISO 9100 standards. Between this moment and the moment before workflow systems was implemented, some changes occurred. The next figure summarizes the most important features in the process, before and after certification.

We notice that certification brought more transparency and responsibility to the process due to the need of registration but it also brought more bureaucracy and slowness.

In May 1999 the firm decided to adopt the Metro Workflow System, from Action Technology.

4. RESULTS

After the adoption of the Workflow System, the process still has two sub processes: the one regarding internal demands and the other to the external supplier. However, some characteristics have changed, as shown in figure 3:

Now, we will present changes in the several domains of impact presented in our conceptual framework.

Productivity

The use of workflow system eliminated paper, as employees no longer need to print, sign and deliver a paper document containing their demand. The support document is now electronic. There was also a task accomplishment time reduction, as employees no longer have to leave their offices and go to AFD just to deliver a paper. The times, as well as the tasks of printing, signing, going to AFD, waiting to be received, were eliminated. This leaded to an employees' satisfaction as they always complained about having to move to deliver the internal demand.

Management of Process

There were small changes in the process: change in the process support (from paper to electronic); accomplishment of all the tasks from one place (people do not have to move just to deliver a paper); no need to print, sign and deliver paper and reception of product is done electronically.

Communication

As for communication, people referred that the number and the time of personal contacts with employees of AFD was reduced. Now they use more electronic channels to communicate.

Collaboration

People also refer that they collaborate more to solve problems concerning the use of the system (when and if the system brakes down, to know the web address of ~~the~~ a document, etc.) and also to help to fulfil the document (there is just an employee that is having difficulties in fulfilling the electronic document).

Coordination

With workflow all the employees can know the status of their orders. From the point of view of AFD, orders are now standardised, which facilitate their management. They also point out that now all the orders are registered allowing a better control.

Knowledge and Organisational Learning

The system registers all the orders as well as their history. The information is available, it is always updated and it is easy to update. People also can extract all kind of information which was not previously available like the number of order by person / department / month, the products more ordered, and so on.

Economic	Productivity: Eliminate paper; Support document is electronic; Reduction of task accomplishment time; increase in employee's satisfaction
Management of Process	Change in the process support; accomplishment of all tasks from one place, elimination of some tasks. Communication: reduction in the number and time of personal contacts with employees of AFD. Increase in the use of electronic channels to communicate. Collaboration: people collaborate to solve problems and fulfil documents. Coordination: Know the status of orders. Orders are standardised and registered allowing a better control.
Knowledge and Organisational Learning	Registration of orders and their history. Information available, updated and easy to update. Possibility to extract information not available before.

Table 1 – Summary of the Changes Observed in the Several Domains (according to our conceptual framework)

5. CONCLUDING REMARKS

We still are in an early stage of our research project. Nevertheless, with the conceptual framework of analysis already developed we were able to analyse organisational changes due to the adoption of a workflow system. In the next phase we want to understand how, and why, these changes happened.

Notation: References are available upon request. Please contact the authors.