The reward effect: a case study of failing to manage knowledge

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Abstract *This article describes an organization that took great interest in the idea of knowledge management and launched such initiatives. Despite the success of five KM projects during the years 2000 to 2002, senior management decided to discontinue all such initiatives. The purpose of this article is to examine the reasons for such a phenomenon.*

Keywords *Organizational processes, Information exchange, Knowledge management*

Introduction

The purpose of this article is to show that a vital and critical element may be missing when discussing pure knowledge management. This element refers to the reward effect; detailed discussion will follow. The average organizational reward system causes a knowledge worker to reject almost all knowledge management initiatives, which is one of the reasons that a significant proportion of such initiatives fail.

This conclusion is based on the findings from one experimental system only. Additional research is still required in which several companies will be compared in order to verify this claim and to make certain that this is a behavioral pattern and not a special case study. The findings are not yet to be declared as a rule of nature but as an assumption that was examined and found true in one company. Nevertheless, the importance of the findings lays in its possible contribution toward the development of management tools which may help an organization better manage its knowledge management initiatives.

The findings are important to both, senior management as well as to CKOs. They are important because the organizational investments in knowledge management initiatives are increasing every year and in many cases more organizational resources are being dedicated to these initiatives. The author conducted the study in a company that agreed to act as the experimental test bed. The company was chosen because of its extensive internal documentation of both its organizational and information processes and the empirical study was part of the company's knowledge management initiatives.

The empirical study found that for coordination between information flow and organizational processes, three following variables must be controlled within prescribed ranges:

(1) the number of dependent editing transitions that the data must undergo during the management process;

(2) the delay time in which data value reaches the decision maker; and

(3) the availability of the information systems.

> **“The average organizational reward system causes knowledge workers to reject almost all KM initiatives.”**

The CKO started the initiative and received full support of the general manager. Senior management participated in a strategy debate that included the commencement of the company's knowledge management initiative. The meaning of the knowledge management initiative, its implications for the company and the type of action plans required were discussed and agreed on formally. All the KM projects got off to a promising start and a team was set-up to drive the initiatives forward. Each one of these projects succeeded and it became clear that the KM initiative, as a whole, succeeded. However, in spite of 40 months of successful organizational knowledge management and its importance to the company, all the initiatives were terminated and the company stopped managing its knowledge as an organizational resource.

This article aims to examine the reasons for such a phenomenon. In order to do so the article is divided into three parts:

(1) the background, which summarizes the findings of the empirical study;

(2) a description of the reward concept; and

(3) a description of management behavior and attitudes toward the findings of the empirical study.

Background

This paper presents some of the results of an empirical study conducted on a commercial company, Hazera Genetics which is located in Israel. There is also a description of management behavior and attitudes toward the findings. The empirical study was carried out as partial fulfillment of the request for the degree of Ph.D. of the author in the Department of Business Administration, School of Management, Ben Gurion University, Beer Sheva, Israel.

The aim of the empirical study was to prove that by proper coupling of information flow and organizational processes the management of organizational changes would be simpler. The company that was chosen as a case study has extensive internal documentation of both its organizational and its information processes. The company agreed to act as the experimental test bed and agreed to make the required data available for the research. The company is characterized by information-intensive, knowledge-intensive processes and the home page (www.hazera.co.il) of the company writes:

> Hazera Genetics is Israel's leading seeds breeder, producer and exporter and is amongst the world's prominent vegetable and field crop seed companies distinguished for its highly advanced research and development, its worldwide marketing and agro-technical presence. The company is well established, for over 60 years, as a leading company that combines life-science with environmental awareness. The company develops and maintains a wide scope of international activities, including marketing, research and development and production, in more than 50 countries around the globe. Some 10 percent of the company's total turnover is devoted to R&D investment, amounting to more than $6 million annually. More than 40 researchers are employed in the company's R&D division. 90 percent of the R&D budget is targeted for developing tailor-made seeds, particularly smart seeds that answer farmers' specific needs.

The empirical study conducted in Hazera Genetics assumes that coordination between the processes may be adversely affected by various metrics related to data accuracy and quality, even under conditions of ideal management commitment and an ideal socio-economic environment in the company. The empirical study was aimed to achieve the following:

- identification of essential quantitative and measurable metrics for coordination between organizational processes and information systems in a time-varying environment; and

- bridging between the literature in the subject and the real situation in which it is usual to assume that the essential metrics are only those that may be called socio-economic.

At the beginning of the research, there was full support by the general manager and an almost ideal socio-economic environment. However, after three and a half years and five successful projects the general manager was replaced, because of exogenous reasons, and the socio-economic environment became hostile. Nevertheless, at least one important conclusion arises from the empirical study in addition, of course, to the importance of a supportive socio-economic environment. The study showed that for coordination between the information flow and organizational processes, the three previously mentioned variables must be controlled within prescribed ranges. The empirical study was conducted on several software development and operationalization projects in four stages:

(1) A combination of literature review and analysis of the extensive corporate documentation of the information and organizational processes was undertaken. The processes of four projects were examined so as to find the values of the metrics in order to locate those that are essential for coordination between the information and organizational processes.

(2) The essential metrics found were used to check seven additional processes in order to ascertain the validity of the conclusions from stage one.

(3) The processes of one project that had been uncoordinated were modified so as to bring the values of the three relevant metrics found in the previous stages into desirable ranges, and then the process was checked to see if it was coordinated. It did.

(4) A total of 40 processes and sub-processes of two projects that had been uncoordinated were modified so as to bring the values of the three relevant metrics into desirable ranges, and then the processes were checked to see if they were coordinated. They all did.

Apparently, it was a success since the target of the KM initiatives was achieved. But actually the company rejected all the benefits it could have gained.

A description of the reward concept

Is it a failed knowledge management initiative? Does the senior manager, an average one, after spending so much time and effort working his/her way up the ladder, really want to analyze what went wrong? Could it be that many organizations are taking a great interest in the idea of knowledge management and many are launching knowledge management initiatives and programs simply because it looks good? A significant proportion of such initiatives will indeed fail anyway. The real issue is, however, how to handle those that might turn out to be successful.

It is common knowledge that a high percentage of all KM programs will fail to have any real impact, for one reason or the other. Therefore, attention has been paid to why these initiatives fail but rarely does one learn about the inability of an organization to accept successful KM projects and to make the best out of them.

It is also common knowledge that working in an organization these days is more likely to mean manipulating information rather than working with raw materials. Thus, it means that while manipulating one's information to deliver it to the next editing transition, one is not fully concerned with his/her task. Even worse, the manipulation of the information might be aimed to benefit the knowledge worker's interests instead of the organization's declared mission. This happens because the rewards he/she receives are usually not as generous as the knowledge worker believes they should be, and it is not only in financial terms. From the organizational point of view, the knowledge worker is classified in a reference group. His/her rewards tend, in general, to improve according to the reference group. The rewards include many items in addition to cash, such as the size of office, number of windows it has, if at all, a company car, reserved parking place, the location of the parking place and so on.

Such a situation often creates a conflict of interests: the organization rewards the typical knowledge worker with an average reward of his/her reference group. After a trial and error period, the knowledge worker finds that if he/she stays within a maximum good level or a

minimum bad level of performance, no one will notice the difference. He/she is not going to be appreciated for extra efforts or be punished for lower work quality. It causes a typical knowledge worker to be as close as he/she can to the lower work quality level. It is economically very logical. Since he/she receives the average rewards of the reference group, delivering lower quality creates an immediate benefit for the worker. The knowledge worker puts less effort into the work for the rewards he/she received and Figure 1 shows the scheme of this mechanism. To change this pattern of behavior, an organization needs true leadership, vision and trust among the people that share the same mission.

Another aspect of this pattern of behavior is that the calculation a person does when acting accordingly is usually a short-term calculation. Since an organization with tight coupling of information to its decision making process and activities, is a complex system, a decision appearing optimal by local parameters only may cause a non-optimal global decision, or even failure of the entire system (Armistead, 1999; Axelrod and Cohen, 1999; Dixon, 1999; Sherman and Schultz, 1998). Consequently, sub-optimal functioning occurs in many organizations, a subject widely covered in the literature.

Sub-optimal functioning is related to the number of data editing transitions involved in the process. The organizational process is comprised of a number of serial stages, each a step on the route to achieve a result, as described in Figure 2. Achieving optimal performance at the comprehensive level requires a high level of performance quality at each stage. For example, an error rate of 5 percent at each stage in ten serial steps of information transition will bring about a total error of (1.00 to 0.05) to the power 10, 0.95 to the power 10, which is only 60 percent.

Transitions between one working station to the next at an organizational process may involve slight deviances or mutations in the output of the process. Why does it occur so often? Precisely because of the mechanism of the reward function effect described above and in Figure 1. Consequently, in the transition from a to b, b′ is reached instead of b and so on till the

Figure 1 The scheme of the mechanism of the reward function

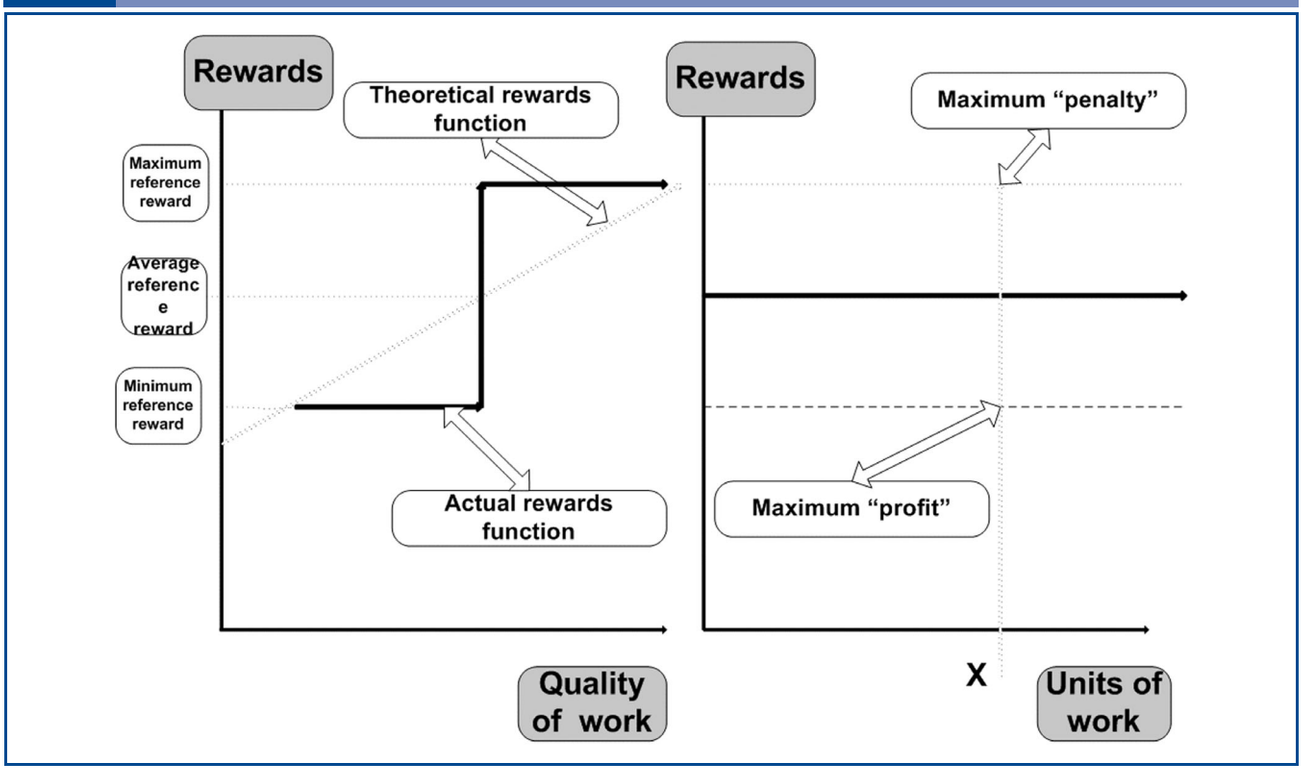
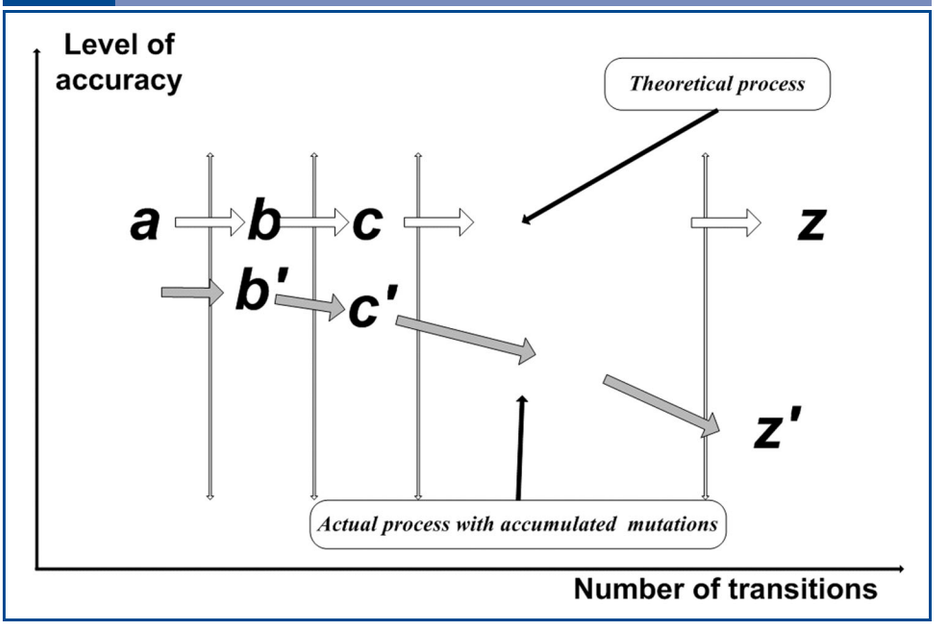


Figure 2 Accumulated errors formed as a result of transitions in the organizational processes



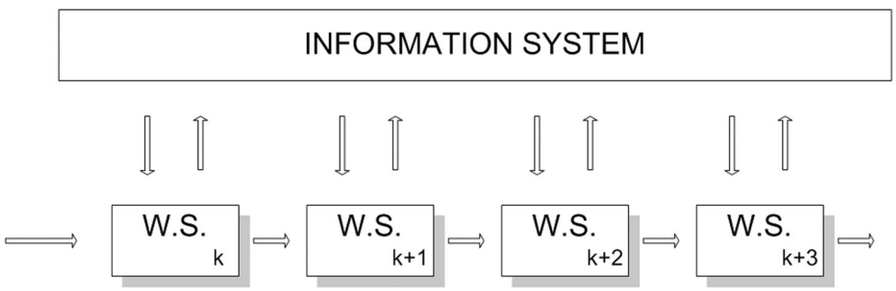
end of the process where z′ is reached instead of z, which is frequently an outcome very far from the desired outcome. The awareness of the decision maker at point b to the fact that a deviation has occurred, would enable him/her to take corrective action by moving to the original point c instead of the new erroneous location. But since he/she acts as if no deviation at all has occurred, in actuality the work will reach point c′ when further mutations have been accumulated, and so on.

The vast majority of knowledge positions require individuals to interpret, analyze and/or synthesize information. Today, these terms can be used as synonyms for managing the organizational processes. A process in which humans become responsible for inferences, diagnoses, judgments and decision making, often under severe time limits (Dixon, 1999). Since manipulating information is the knowledge worker's main task, everybody, including senior management, is ''manipulating'' information. Theoretically, the knowledge worker does it for the benefit of the organization, but in practice for his/her own interests. In addition, members of the organization have to integrate information into the organizational context. Therefore an infrastructure is needed to create an ongoing collective interpretation that means another tool to manipulate information. The infrastructure includes technology fairs and electronic networks. In other words: computerized information systems.

The organizational process and the information flow in the organizational information systems are aimed to manage explicit knowledge that can be codified, written down, retrieved for use by someone else and shared across organizational boundaries. As work progresses from working station to working station in an organization, information flows between the workstations and the information system. The organizational and information processes hence constitute a single coupled system.

If erroneous data enters the organizational process it creates an erroneous action and the erroneous action creates wrong data that leads in turn to a wrong action and so on. Under time-varying external conditions, for example time dependent sales rates, propagation of the errors can lead to diverging behavior. If the information flow and organizational processes are not coordinated, the coupling of information flow and organizational processes drives the business away from efficiency and profitability. Figure 3 shows a model of the information system and organizational process function as one coupled system.

Figure 3 The information system and organizational process function as one coupled system (Four decision points or editing workstations in the organizational process are shown here)



A description of management behavior and attitudes toward the findings of the empirical study

Previous studies have recognized the importance of coordinating information flow and organizational processes. But they did not define the principles and theory required in order to coordinate information flow and the organizational processes when viewing the organizational processes and information flow as a single linked or coupled system (Bhatt, 2001). Most studies relating to the coupling between the information system and the organizational processes focus either on the human factor and its responsibility for the organization's success or on the engineering factors of hardware and/or software. In the few instances that the coordination requirements have been addressed, the discussion revolved around solving the problems of the socio-economic factors, or referred in general to organizational and cultural issues (Pliskin *et al.*, 1993; Pliskinn and Shoval, 1989). The author could not find any reference to quantitative studies of coordination between the organizational processes and information flow.

Literature on the subject of coupling the organizational processes and the information system indicates that successful coordination between the two depends on the support of senior administration, the level of support by outside consultants, avoidance of unattainable expectations, and similar considerations (Ptak and Schragenheim, 1999). Therefore, when an information system does not succeed in becoming successfully operational, there is often a tendency to view the reasons for failure as weak organizational support (Van-Wegen, 1996), even though the technological systems are technologically viable, capable, stable, user-friendly, use mainstream technology, and may even be of central importance to the organization.

Most of the discussion in the literature (Storey and Barnett, 2000; Swan *et al.*, 1999) that deals with combining organizational processes and information systems refers to information technology, while disregarding the complexity of the organizational processes (Sherman and Schultz, 1998). The general approach is that the technology can be defined as an organizational resource (Burgelman *et al.*, 2001) similar to other organizational resources that rely on organizational capabilities, on development policy and accumulated experience.

Another definition is that technology is embedded in the organization's products and turns capital and information inputs to higher-value outputs (Christensen, 1992). However, focusing exclusively on the information technology or the information system is a supply perspective that assumes that if information is made more easily available and accessible people will use and share it. This is a doubtful assumption since most managers suffer from oversupply of computerized information. As a result the existence of information technology does not assure coordination between the information flows and the organizational processes.

The empirical study was based on the assumption that an organizational system consists of a technological infrastructure, organizational infrastructure, organizational culture, and the people

that they are comprised of (Meso and Smith, 2000). The work flows along an organizational system, with data flows between it and the information system at various decision points, or workstations. This is in fact a single, tightly coupled, system and should be analyzed as such. An analysis that treats the technical information system and the organizational processes as separate or loosely coupled will lack an important attribute since the effects of coupling the two systems would not then be present.

The results of the empirical study show that there are three essential metrics that define a range within which coordination exists between the information system and the organizational processes. These are:

(1) the number of workstations at which data may be edited should not exceed six;

(2) the delay time between when data is created and when, having been fed into the information system, it is used, must be tolerably short – no general rule was found for the recommended value of this variable; and

(3) the unavailability of the information system to the particular organizational process being considered should not exceed 10 percent of the total time the system is on line.

When at least one of these variables deviates from the allowed range, then even with perfect organizational sociology, it is unlikely that coordination will be achieved. It is then likely that the information system will in practice be unused. From the results in the company observed, it appears that in order for the information flow and the organizational processes to be coordinated, not only must there be positive socio-economic conditions, but also the three essential metrics must be within the correct ranges. Generality of this conclusion should be sought from similar studies on other companies. Also, a positive organizational sociology is a pre-condition and regrettably, this condition is terribly difficult to maintain.

Despite the success of the KM projects, senior management decided to discontinue all such initiatives. Now, a few questions can be asked, for example: Is it a failure in this case or was it a success? What are the parameters to define success or failure of such KM initiatives? The answers are not simple since all the systems that were modified worked perfectly and they saved a lot of time as well as money. However, they did something else: the organizational changes forced senior management to lift up all the barriers they so carefully built to protect their positions. Unfortunately, changes among stocks holders, replacement of the general manager and members of senior management caused the organizational vision/mission to turn into a useless banner nobody believed in and the general behavior of the reward function model returned. So, on one hand, it became clear that all the organizational changes had succeeded in achieving the desired coordination and that the systems worked perfectly. However, on the other hand, some of the senior managers did their utmost to prevent these projects from continuing to evolve.

The preparation of the first, out of five KM projects included in the empirical study, began in October 1999. The project was coded as project #A.1 and started to work in April 2000 successfully. The author started by investigating the causes of the company's lack of coordination in between the organizational processes and the information systems. Four months earlier the development program of the software in the company was declared to be a false investment. From 1995 to 1999 the company managed software development projects on an accumulated scale of investments exceeding US$3.5 million.

The second project, which was coded as project #A.2, was managed using virtually the same rules. However, when it began, difficulties were discovered. These difficulties prevented in practice the capability of coordination between the organizational processes and the information systems. The problem was caused by incorrect training of the users and insufficient support by

“It is common knowledge that a high percentage of all KM programs will fail to have any real impact.”

one of the managers of the organizational processes. The problems of the socio-economic factors, previously mentioned and addressed by many research papers, appeared here also. It took approximately two weeks to overcome these difficulties, but when this had been accomplished the project was well coordinated with the organizational process.

The conclusions drawn from the management of projects #A.1 and #A.2 emphasized the importance of the number of editing transitions and the delay time in influencing the capability of coordination between the organizational processes and the information systems. This of course does not ignore the importance of the organizational sociological variables.

In March 2001, upon completion of the analysis of the management of projects #A.1 and #A.2, the next stage commenced. This stage lasted until December of that same year, with the aid of two working teams which the author directed. The teams included managers belonging to the company's managerial staff, who were requested to review additional projects and the coordination with the organizational processes.

The first team reviewed more than 30 projects, which were carried out between the years 1997 to 2001. Each project controls one or several organizational processes. The findings indicated that about 40 percent of the organizational processes examined were not coordinated with the information processes. In addition, the team evaluated in detail six projects and interviewed managers and knowledge workers involved in these projects, totaling 15 position holders. The bottom line of the findings from the replies to the questionnaires indicated that organizational processes which were not coordinated with the information processes received a low grade for at least one of the basic factors: number of editing transitions, delay time, and availability of the information systems. In contrast, coordinated processes received a high grade for all the three factors. In other words, the empirical study showed that for coordination between the information flow and organizational processes, the three variables must be controlled within prescribed ranges.

The second team made an in-depth examination of the influence of the three essential metrics in one organizational process in which the coordination with the information systems caused continuous complaints by process customers. During the examination, the team learnt that it was possible to split the process into three sub-processes:

(1) the first sub-process lasted between 4 and 18 days and the value time lasted 3 to 4 days only – the rest of the time was spent waiting;

(2) the second sub-process actually took between 10 and 52 days and the value time lasted a few minutes – the rest of the time was spent waiting; and

(3) the third sub-process was the final approval of the data value in the information systems and the conversion of the lab test results into an official result obligating the company's marketing and sales division, and in practice this process took between 10 and 27 days, where the value time lasted a few minutes – the rest of the time was spent waiting in between the workstations.

Although the process was characterized by high delay times the first sub-process was essential and the lab test result was very important for process customers. The process customers accepted the delay time of the first stage, but with many complaints. However they were not prepared to accept the delay times of the second and third sub-processes. As a result the coordination with the information systems was limited and computerized reports were bypassed, not using the information system. The sales division received the results through phone calls, e-mail, and visits to the lab, etc., where the information systems were fed after a great delay and, in many cases, at a time when the data was no longer relevant.

After an analysis of the findings, the process manager decided to shorten sub-processes that added no value. From the literature it is known that waiting time is totally redundant for the process customer and it should be reduced as much as possible (Preiss *et al.*, 1996). The process in this project, from the beginning until the moment test results entered the information

systems, took between 23 and 55 days, and after the modifications, delay time was reduced to between 3 or 4 days. However, this action was not enough, since the number of editing transitions in the process was still greater than 10.

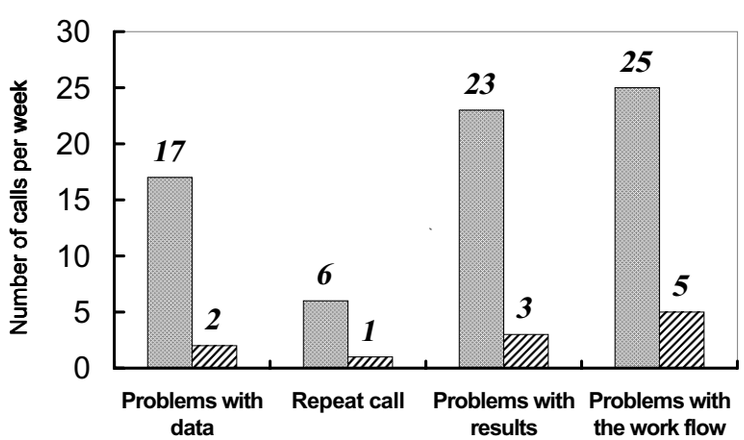
At stage number three, in order to examine the influence of an initiated change, the author chose a major organizational process of the quality control in the company. It was coded as project #C.1. The factor examined was the number of editing transitions, where the unavailability of the information systems was kept below a level of 2 percent and the delay time did not deviate from the requirements of the process customers. During the months of October, November, and December 2001 a change was made under the author's direction as to the number of editing transitions of this project.

Figure 4 presents the influence of the change in the number of editing transitions using the average number of applications per week in the period preceding the change, compared to the average number of applications per week after re-organization of the process and reduction of the number of editing transitions. Figure 5 describes the effect of a reduction in the number of editing transitions on quality control in reference to the office personnel's overtime work hours.

Project #D.1 and project #D.2 at stage four was quite difficult to manage but the easiest to report on. At this stage, 40 processes and sub-processes of two projects that had been uncoordinated were modified so as to bring the values of the three relevant metrics into desirable ranges, and then the processes were checked to see if they had become coordinated. They all did.

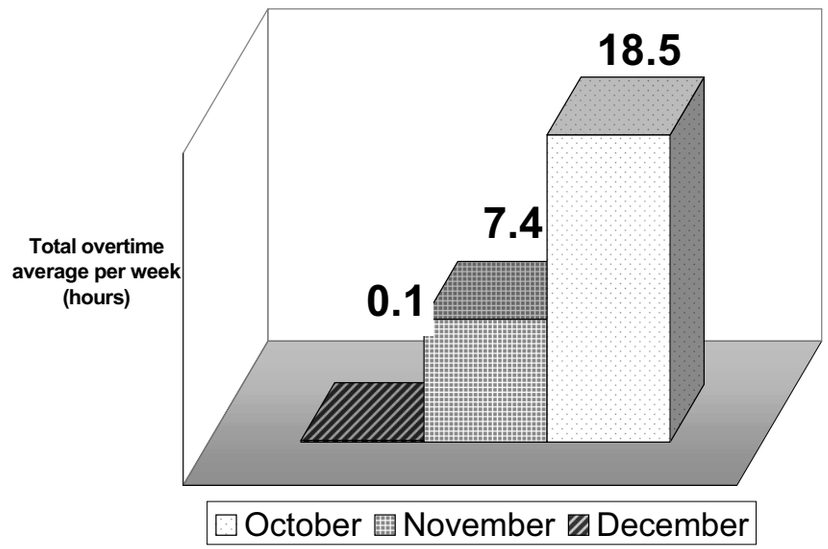
During a three year period, five KM projects: project #A.1, project #A.2, project #C.1, project #D.1 and project #D.2 were managed and all five projects achieved their goal of coordination between information and organizational processes in a time-varying environment. However, from the overall organizational point of view it was a total loss. The KM initiatives created new working teams, new procedures of work, new methods and it shortened delay time. But also, as described earlier, the organizational changes forced some of the senior management to destroy the barriers they had so carefully built to protect their positions. The new general manager, who arrived in the last quarter of 2002, withdrew the support his predecessor gave to the KM initiatives and in two months he terminated all the KM initiatives and declared that there was no need for a CKO or KM initiatives in the company.

Figure 4 The effect of a reduction in number of editing transitions in project #C.3 on the effort of the Quality Assurance Department for that project



Note: The fill pattern columns represent values before reduction, and the line pattern columns represent values after reduction
Source: Company data

Figure 5 The effect of a reduction in the number of editing transitions on overtime work hours



Source: Company data

Conclusions

From a pure KM point of view, the experience gained during the last years in the experimental system shows that in an organization where information and organizational processes tightly coupled but when lack of coordination in the flow of data between the information system and the organizational processes exists, it is likely to create tangible business inefficiency. The results from the empirical study show that there are three essential metrics that define a range within which coordination exists between the information system and the organizational processes. These are:

(1) the number of workstations at which data may be edited should not exceed six;

(2) the delay time must be tolerably short – no general rule was found for the recommended value of this variable; and

(3) the unavailability of the information system to the particular organizational process being considered should not exceed 10 percent of the total time the system is on line.

When at least one of these variables deviates from the allowed range, then even with perfect organizational sociology, it is unlikely that coordination will be achieved. It is then likely that the information system will in practice be unused. From the results in the company observed, it appears that for the information flow and the organizational processes to be coordinated, not only must the correct socio-economic conditions referred to in the literature be obtained, but the three metrics referred to in this paper must be within the correct ranges. Nevertheless, generality of the conclusion should be sought from similar studies on other companies.

Since a pure KM point of view does not exist, the reward effect caused the company to reject all the benefit it could gain from continuing to improve its organizational processes and their coordination to the information systems. In spite of the fact that all the KM initiatives were a success and could even be measured economically, the senior management, in accordance with the reward effect model, rejected and eliminated all the KM initiatives from the company.

References

Armistead, C. (1999), ''Knowledge management and process performance'', *Journal of Knowledge Management*, Vol. 3 No. 2, pp. 143-54.

Axelrod, R. and Cohen, M.D. (1999), *Harnessing Complexity: Organizational Implications of a Scientific Frontier*, The Free Press, New York, NY.

Bhatt, G. (2001), ''Knowledge management in organizations: examining the interaction between technologies, techniques and people'', *Journal of Knowledge Management*, Vol. 5 No 1, pp. 68-75.

Burgelman, A.R., Maidique, A.M. and Wheelwright, C.S. (2001), *Strategic Management of Technology and Innovation*, 3rd ed., McGraw-Hill Irwin, New York, NY.

Christensen, M.C. (1992), ''Exploring the limits of the technology S-curve. Part I: Component technologies'', Christensen M.C. ''Exploring the limits of the technology S-Curve. Part II: Architectural technologies'', *Operation Management*, Vol. 1 No. 4, Fall, from Burgelman, A.R., Maidique, A.M. and Wheelwright, C.S. (2001).

Dixon, M.N. (1999), *The Organizational Learning Cycle: How We Can Learn Collectively*, 2nd ed., Gower, ISBN 0-566-08058-3, pp. 3-4.

Meso, P. and Smith, R. (2000), ''A resource based view of organizational knowledge management system'', *Journal of Knowledge Management*, Vol. 4 No. 3, pp. 224-34.

Pliskin, N., Romm, T., Lee, A.S. and Weber, Y. (1993), ''Presumed versus actual organizational culture: managerial implications for implementation of information systems'', *The Computer Journal*, Vol. 36 No. 2, pp. 143-52.

Pliskinn, N. and Shoval, P. (1989), ''Responsibility sharing between sophisticated users and professionals in structured prototyping'', *Information and Software Technology*, Vol. 31, pp. 438-48.

Ptak, C.A. and Schragenheim, E. (1999), *ERP: Tools, Techniques and Applications for Integrating the Supply Chain*. The St. Lucie Press/APICS Series on resource management, ISBN 1-57444-270-8.

Preiss, K., Goldman, L.S. and Nagel, N.R. (1996), *Cooperate to Compete, Building Agile Business Relationships* Van Nostrand Reinhold, ISBN 0-442-02253-0.

Sherman, H. and Schultz, R. (1998), *Open Boundaries, Creating Business Innovation Through Complexity*, Santa Fe center for emergent strategies, Perseus books, ISBN 0-7382-0005-0.

Storey, J. and Barnett, E. (2000), ''Knowledge management initiatives: learning from failure'', *Journal of Knowledge Management*, Vol. 4 No. 2, pp. 145-56.

Swan, J., Newell, S., Scarbrough, H. and Hilsop, D. (1999), ''Knowledge management and innovation: networks and networking'', *Journal of Knowledge Management*, Vol. 3 No. 4, pp. 262-75.

Van-Wegen, B. (1996), ''Impacts of KBS on cost and structure of production processes'', University of Amsterdam, Faculty of psychology (Thesis).