Knowledge in question : from Taylorism to Knowledge Management

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Introduction

The management sciences have accustomed us to seeing a succession of concepts and tools which are presented by some as revolutionary. For some years, Knowledge Management (KM) has been at the head of the class. Uncounted publications work at defining the concept and detailing the best ways to put it into practice. At a moment when people are making speeches (especially political speeches) which substitute the concept of an "information society" for that of a "knowledge-based society", this attention to knowledge by managers is of particular interest.

Today, knowledge is presented as a new object of management for theoreticians and practitioners, in the same manner as production by example - but the novelty is quite relative. In fact TAYLOR had already made the management of knowledge an important factor in the development of industrial societies. Analyzing the similarities between TAYLOR's work and work on KM is very instructive. If we examine the former, we see more clearly the vision of the world which TAYLOR had in mind. We will show that despite the separation in time and the great disparity of the contexts in which each appeared, the work of TAYLOR and work done on KM both depend on a certain vision of the world. We will also show that the two perspectives share a common concept of organization as reified, organization without conflict. And the two also share common principles concerning the execution of their projects. Both depend on transparency, and through a recourse to codification, they instrumentalize their projects. Finally, both set managerial goals which involve the reduction of uncertainties, which in both cases leads to consequences as regards the power relationships within a given organization.

Our examination of the original Taylorist writings and the current KM literature thus seeks a better grasp of what is at stake, and of the consequences which are likely to follow any inplementation of KM policies in organizations.

Origins in very different management environments

The context in which KM has developed shows numerous differences compared with that which confronted TAYLOR. We don't have to detail them all in order to clarify our objective. The differences can be described as economic, technological, and educational.

TAYLOR developed his ideas at a time which is usually accepted as that of a second industrial revolution. In this second phase of industrial development, according to HATCH [1997], who follows BURNS at this point in the identification of key periods in industrial sociology, the industrial system spread through industries like chemistry, metallurgy, and steel, all of which depended on complex production processes. In addition, during this period, nation-states were expanding the regulations which bore on their national economies, mass marketing arose, standardization of products increased, and these, along with the Welfare State, formed the chief characteristics of the management environment of the time [HATCH, 1997, p. 25-26].

These changes were accompanied by changes in the technological environment. Electric motors replaced steam, relatively low-price mass production was in operation, and important advances occurred with the development of large-scale steelmaking equipment and machine tools [POUGET, 1998, p. 8]. Mass production, the development of production routines, and market domination by manufactured products are the characteristic traits of that technological advance [HATCH, 1997, p. 25-26].

Educationally, worker schooling was low-level. “The workers which TAYLOR and his disciples ‘organized scientifically’ were not what we today would call professional employees, but laborers, unskilled, many illiterate, often immigrants” [DE MONTMOLLIN, 1981, p. 79]. Human resources departments handled a flood of untrained workers and a few experienced professionals [LIVIAN, 1998, p. 28]. In fact, industrial labor essentially was divided into groups of unqualified machine operators organized into work groups by trained and qualified operators [GUTIERREZ, 1993, p. 27].

Some authors do not hesitate to label the current period a third industrial revolution or a post-industrial period, and others are more careful or more skeptical. Most agree that some things have changed, but there is no consensus about the nature of the changes. There is agreement on the fact that the Ford Motor model which has prevailed since the Second World War is in crisis ; there is argument over what sort(s) of model(s) can succeed it [LIVIAN, 1998, p. 83]. But the majority of observers accepts the fact of a change in context which has had economic, technological, and social effects.

From an economic point of view, several authors, including TOFFLER [1970] and BELL [1976], think that the industrial base which depended, traditionally, on the textile and steel industries, has given way to advances in the high technology and service sectors. As regards demand for goods and services, we are seeing a move away from mass production and mass consumption toward the satisfaction of a more and more personalized demand side [PETIT et. al., 1993, p. 36]. From this point, the management environment is characterized by the emergence of global competition, dispersion of capital in relation to the nation-state, the fragmentation of markets, international decentralization of production, and increasing demand for made-to-measure products [HATCH, 1997, p. 25-26].

In technology, robotization and computerization became standard equipment in production and management techniques. The development of information technology and communications technology altered the constraints imposed by time and space, so that business organization models could be conceived anew. The development of new technologies brought flexibility and automation to production methods, and computers had a great effect on design, production, and inventory control, as well as making the practice of just-in-time delivery of parts and materials possible, and contributing to a general climate of innovation [HATCH, 1997, p. 25-26].

At the same time there has been a rise in the level of education of the average employee. Authors such as Drucker don’t hesitate to term these employees knowledge workers, as opposed to manual laborers. The changes in workers’ level of education has had an effect or human resources management models [PETIT et. al., 1993].

Instructive links

Comparing TAYLOR’s writings and KM texts allows us to clarify practices and gauge the likely effects of implementation of KM in organizations. This parallel analysis of texts such as *The Principles of Scientific Management* [1] with more modern KM efforts can be helpful, although the literature on KM is copious ; [2] many authors have studied the diffusion of the method, [3] and the number of articles has been increasing since 1995. For example, a

[1] The texts by Taylor to which we refer include : *Principes d’organisation scientifiques des usines*, Paris, Dunot et Pinat, 1912 (translation of *The Principles of Scientific Management*), The scientific management of businesses, paris, Dunod, 1957 ? ? ? ?

[2] For example, we have found that putting ‘KM’ into the Google search engine yields 703, 000 websites devoted to the matter (as of 1/15/02).

[3] Among those authors who have written on the diffusion of KM, we may cite : SCARBROUGHT and SWAN [2001], LITTLE, QUINTAS and RAY [2001].

search of the ' ISI Web of Science ' database using the keyword 'KM' yields 37 references in 1997, 68 in 1998, 121 in 1999, 151 in 2000, and 249 in 2001. [4] In the framework of the present writing, an exhaustive study of this literature seems unnecessary. We have preferred to concentrate on two reference works cited by many authors writing in the field of management studies, NONAKA and TAKEUCHI [1995] and DAVENPORT and PRUSAK [1998] [5]. We will cite particular individual studies as necessary to complete our analysis.

A shared concept of organization

1st postulate: seeing organizations as reified

TAYLOR was familiar from his personal experiences and field studies with the common practice of 'slowdowns' (TAYLOR calls it 'underworking') as resorted to more or less systematically by workers. A slowdown is the voluntary slowing down of the speed at which work is done, which is transformed by workplace social pressure into a type of collective behavior. His opinion was that these forms of slowing the pace of work were rational from the point of view of the workers, whose rate of pay was determined by the laws of supply and demand. At that time, whether the worker was paid by the hour or by the piece, increased productivity brought him or her no guarantee of increased pay or other benefit. This appears more evident in the case of the hourly worker, but piecework workers also experienced drops in the amount of money they could make per piece. Slowdowns are thus seen by TAYLOR as a logical strategy on the part of workers. [6]

In his 1911 opus, *'The Principles of Scientific Management'* , and in all his works, Taylor's objective was to show that workers, just like employers and managers, have essentially convergent interests, namely a maximum of prosperity. The organization's prosperity will give all concerned what they want : "high wages for the workman, and a low labor cost for the employer" [Taylor, paraphrased by SEGRESTIN, 1992, p. 63]. For Taylor, that which is in the best interests of the organization is superior to that which is in the interest of the individual. From this comes the idea in Taylor's writings that the organization itself exists, over and above the behaviors and performances of individuals.

Many authors, including ERALY [1988], have shown that "social 'totalities' (companies, organizations, groups, etc.) are often seen as 'real' by human beings, as if they possess independent, supra-individual life, or the capacity to act upon individuals, influencing and limiting them" [1988, p. 11]. Based on the proposition of Durkheim according to which "the whole is greater than the sum of the parts", a vision of the organization as reified was developed [ERALY, 1988, p. 12]. Thus it is that some authors have attributed values and objectives to organizations as such. And relations between organizations and individuals have been described as if they were relations between individuals. But as ERALY demonstrates, "an organization does not act by itself, and does not have its own objectives, values, or feelings" [ERALY, 1988, p. 14]. He also refutes the classic argument according to which an organization, in order to maintain itself in formal terms while human beings come and go, must be seen as exterior to them and superior to them, because its existence in time lasts longer than theirs. For ERALY, "the persistence of a social form in time does not imply any exteriority or independence belonging to that form in relation to individuals, but only the recurrence of a number of activities" [1988, p. 13].

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[4] Search conducted 1/15/02.

[5] A search of the ISI Web of Science database indicates that 682 authors have referred to the works of I. Nonaka. T. Davenport has been cited 133 times.

[6] In *L'acteur et le système*, CROZIER and FRIEDBERG [1977] have given us analytical instruments which allow this kind of strategy to be understood.

The superior interest of the organization is also an idea which appears in KM. As we have noted above, the attribution of values to an organization is a sign of the tendency to see organizations as reified, as things which have an existence of their own and on their own.

> In the words of DAVENPORT and PRUSAK : "All healthy organizations generate and use knowledge. As organizations interact with their environments, they absorb information, turn it into knowledge, and take action based on it in combination with their experience, values, and internal rules. They sense and respond. Without knowledge, an organization could not organize itself; it would be usable to maintain itself as a functioning enterprise" [1998, p. 52].

In KM texts, the organization takes the form of a completely separate entity, onw which has knowledge, a memory, certain routines, and the ability to learn. In fact, when questions arise about individuals' knowledge and its transfer, a principal goal is to transform individual knowledge into organizational knowledge - or to create the latter.

> « By organizational knowledge creation we mean the capability of a company as a whole to create new knowledge, disseminate it throughout the organization, and embody it in products, services, and system » [NONAKA et TAKEUCHI, 1995, p. 3]. And INGHAM notes that "different authors have underlined this collective aspect of tacit knowledge, which has two parts. On one hand, individual tacit knowledge can involve collective knowledge which the individual has unconsciously interiorized. On another hand, organizations possess and create tacit collective knowledge" [NONAKA, TAKEUCHI et INGHAM, 1997, p. 5][7]. Similarly, for DAVENPORT et PRUSAK, "When we talk about knowledge generation, we mean the knowledge acquired by an organization as well as that developed within it. Acquired knowledge does not have be newly created, only new to the organization" [1998, p. 52].

Some research in KM has dealt with processes of individual learning within organizations, but much has also been concerned with the way in which organizations themselves learn. This is another example of the reifying notion of the organization, for which 'the whole is greater than the sum of the parts'.

> In fact, "most authors agree that it is of course individuals who learn, and are the agents of learning at various levels within organizational entities, but that the results of this learning, in terms of the organizational knowledge produced, is not equivalent to the sum of specialized individual learning which is used within the organizational context". [NONAKA I. and TAKEUCHI H. and INGHAM, 1997, p. 9].

The affirmation of the higher interest of the organization in TAYLOR's writings and in KM texts is part of their reification of organizations, which they treat as a "phenomenon real by speaking and acting in ways that give it tangibility" [HATCH, 1997, p. 54].

2nd postulate: organizations without conflicts

The division of labor and the measurement of time are the things which have most often been retained from the writings of TAYLOR, but it is not as often recalled that TAYLOR in effect promised an organization without conflict. In fact, there are no conflicts in TAYLOR's world; all is profound order and harmony [DE MONTMOLLIN, 1981, p. 115]. The particular division of tasks between workers and experts simply allows all to pursue the common goal of maximum prosperity.

> « The principal object of management should be to secure the maximum prosperity for the employer, coupled with the maximum prosperity for each employee. [...] It would seem to be so self-evident that maximum prosperity for the employer, coupled with maximum prosperity for the employee, ought to be the two leading objects of management, that even to state this fact

[7] Introduction to the French translation of the work of NONAKA and TAKEUCHI.

should be unnecessary. And yet there is no question that, throughout the industrial world, a large part of the organization of employers, as well as employees, is for war rather than peace, and that perhaps the majority on either side do not believe that it is possible so to arrange their mutual relations that their interests become identical. [...] Scientific management, on the contrary, has for its very foundation the firm conviction that the true interests of the two are one and the same; that prosperity for the employer cannot exist through a long term of years unless it is accompanied by prosperity for the employee, and *vice versa;* and that it is possible to give the workman what he most wants - high wages - and the employer what he most wants - a low labor cost - for his manufactures. » [TAYLOR [1911], p. 9-10, cited by SEGUIN and CHANLAT, 1983, pp. 79-80].

According to TAYLOR, prosperity or profit is the common goal all pursue, but it can only be reached through high productivity on the part of employees and machines. Using the example of the production of pairs of shoes, he develops the notion of a virtuous spiral toward maximum productivity, to which maximum prosperity corresponds [TAYLOR, *The Principles of Scientific Management* [1911], cited in SEGUIN and CHANLAT, 1983]. In order to solve the problems which exist between the employees of an organization, TAYLOR tries to proceed scientifically. Only a 'scientific' understanding of the ways a particular business functions can determine the most rational way to organize it, that is, the way to organize it for maximum profitability. The scientific study of work allows us to put effective work and wage levels into their proper relation. "There is no possible negotiation, there can only be a rational search for solutions to the problems which exist, which once found are obvious to everyone" [DE MONTMOLLIN, 1974, p. 378]. Thus the development of 'scientifically' defined procedures was intended not only to optimize the results obtained, but to eliminate all the sources of conflict [SEGRESTIN, 1992, p. 63]. Employers and workers share the same interests, namely prosperity for all, which is a direct result of scientific management.

KM texts portray trends in the business environment of companies as more and more competitive and more and more complex. The themes of globalization and acceleration of change are often evoked in order to describe the new economic context, within which companies must try to develop competitive advantages.

« The interest shown in the creation of knowledge and in organization-wide learning is generated by the observation according to which organizational environments are characterized by rapid change, increasing complexity, and increased uncertainty. This requires a kind of strategic development which allows a greater capacity for action and reaction, and which thus also requires a capacity for quicker and more effective learning. It is for this reason that an increasing number of studies emphasize the analysis of organizational processes and behaviors, and take more interest in the creation and proper valuation of organizational resources, among which knowledge occupies an important place. » [NONAKA, TAKEUCHI and INGHAM, 1997, p. 1].

« Recently, though, many firms have come to understand that they require more than a casual (and even unconscious) approach to corporate knowledge if they are to succeed in today's and tomorrow's economies » [DAVENPORT and PRUSAK, 1998, p. ix].

In such texts, the menace is presented as coming from outside. In order to survive in the global economic context, the members of an organization must pool their knowledge. But many authors have shown that the idea of an external opponent reinforces the relationships within a particular organization.[8] That's why descriptions of KM appear to refer to a conflict-free environment within organizations. The absence of internal conflict is indispensable for the realization of the goals pursued through KM. A serene climate within is necessary in order to promote the knowledge-sharing between individuals the method calls for. Pressure from the external environment and the need for innovations are portrayed as problems which challenge the organization in a positive manner.

The effect of KM on organizational power relationships has drawn equally little attention. The majority of authors who deal with the question of power in organizations have demonstrated the links between the exercise of power and the possession of knowledge.

[8] See especially MINTZBERG [1983).

Modernist authors who consider the topic have stuck with a relational definition of power according to which power inhabits the relationship between social agents rather than existing as a specific attribute of any of them. [DAHL 1957, CROZIER and FRIEDBERG 1977, PFEFFER 1981, FRIEDBERG 1993]. In order to wield power, agents draw on resources, including knowledge [CROZIER and FRIEDBERG 1977]. For FRIEDBERG as well, "general uncertainty, or better, specific uncertainties which bear on the search for satisfactory solutions confronted by agents, are also their main resource in negotiations with each other. If there is some uncertainty, the agents who can at least partially control it can gain an advantage and get their way in relation to those who are depending on them. That which is uncertainty in terms of the problem is power from the point of view of agents." [1993, p. 260].

KM texts rarely deal with the connection between power and knowledge, which nonetheless appears to be essential for the authors who have studied the question. Quite the contrary. The transfer of knowledge between individuals and the making available of an individual's knowledge to the organization as a whole is portrayed as natural and non-problematic. DAVENPORT and PRUSAK do support the setting-up of structures which promote the interest individuals have in adding to their knowledge, but they do not fundamentally question the KM project [1998]. As for NONAKA and TAKEUCHI, they do not address the problem of eventual restrictions on the creation of knowledge due to its status as a power resource [1995]. One can thus raise the question : why is this connection ignored ?

It still appears that the success of KM implementation, as with that of Taylorian business models, depends on the absence of conflict within an organization. In both cases, that absence appears to be a basic postulate related to the successful operation of an organization.

Execution of projects

Our interest in comparing Taylorian and KM texts goes beyond their shared vision of the organization. Following further our examination of the basic postulates concerning the concept of an organization, which the two projects we are studying share, we find that an examination of the execution of such projects also reveals interesting similarities, not only as concerns the objective of transparency which is pursued, but also in relation to the type of instrumentalization which is employed in the implementation process in each case.

The world of transparency

TAYLOR considered slowdowns as a logical strategy on the part of workers, but the situation remains highly problematic. In fact, in this context, the terms of the exchange remain largely unknown. The social partners are forced to negotiate salaries on the basis of "a reciprocal misunderstanding of the mutual capacities (of each side) to pay or to work" [PAVE ,1989, p. 261]. These negotiations lead to unfavorable results for both management and labor. Of course, for Taylor, the interests of both groups are the same, namely prosperity. In *"The Principles of Scientific Management"* [1911], TAYLOR demonstrated that workers and management/owners owed it to themselves to realize that their respective interests were in fact convergent.

But since they did not, TAYLOR's objective in the face of their refusal was to try to bring about a reversal of perspective. That is why he recommends a scientific knowledge of work which would allow the problems of slowdowns and salary negotiations which dominate social relations within companies to be resolved. Using practices of the world of labor of that time period, company managers were unable to determine the potential productivity level of workers. But it is the increase in that level of productivity which would allow maximum prosperity to be attained. The introduction of scientific methods into the operation of an

organization would furnish management with the tools necessary for determining the optimal level of productivity. By observing the know-how of workers, and through using scientific techniques, scientific managers would be able to design procedures allowing orgganizations not only to increase their level of productivity, but to attain the maximum possible. Through the implementation of such procedures, TAYLOR intended to transform a personal science into an organizational one. The know-how of workers needed to be analyzed, broken down, and explained through scientific methods applied by organizational experts, in order that it might be converted into rules of 'best practice' which each worker would be made to follow. This is how transparency functions in a Taylorian company, and according to TAYLOR this is an essential condition for social peace within a company.

> "The division of tasks is subordinated to the perfect knowledge of the whole set of production processes and its programmatic arrangement, and to the elimination of any obscurity created by its execution. The eye of the designer can see all, because all is known in advance. Transparency also operates between social groups, because it is allowed by a social contract which seals the different parties' recognition of their identical interest in a prosperous world [...] whose foundations would be scientific" [PAVE, 1989, p. 266].

The objective of KM is reasonably similar to that of Taylorism. Knowledge is to be created and transferred from individual to individual in order to create common knowledge, and in order to form organizations in which knowledge is immediately available to the individual who needs it.

> For NONAKA, "The primary activity of a knowledge-creating business is to make individual knowledge accessible to others. This happens at every moment, and at all levels of the structure" [1991, p. 41]. "New knowledge always begins with the individual. [...] Every time, individual knowledge is transformed into knowledge which is useful to the entire company" [NONAKA, 1991, p. 41].

The theme of transparency is also present in KM, then. The techniques may differ, but the project is the same : the object is to render the organization transparent by giving every employee access to others' knowledge, and to the knowledge of the organization. The idea underlying these descriptions is that of the organization, transformed into a gigantic warehouse of knowledge into which each employee puts his or her knowledge at the disposition of all the others, and from which each draws knowledge at the moment when it is needed to resolve whatever potential problem he or she might face. This image is supposed to function by means of tools based on information systems such as (for example) expert systems or Intranet networks. But the idea of transparency is present in other techniques as well. For example, knowledge flow charts are intended to show the locations of knowledge within the organization in order to facilitate access to it when employees need it, and also to evaluate the stock of knowledge the organization possesses [DAVENPORT and PRUSAK, 1998, p. 72-80]. And transparency is also the basis of the brainstorming experiments presented by NONAKA and TAKEUCHI as facilitating the creation of knowledge [1995].

The importance of the theme of transparency is thus not negligible. For TSOUKAS, "Indeed, a society in which information has become the most valuable resource holds out the promise, or so it seems, for the realization of one of the most cherished values in the Western tradition : the making of a transparent, self-regulated society" [1997, p. 828]. The contribution of this author allows us to understand how KM has been able to legitimate itself in the field of management sciences.

On one hand, KM is based on the nobility of knowledge in Western culture. The philosophy which ranks among the founding disciplines of the Western scientific tradition came early to the question, 'what is knowledge ?' [9]. STENGERS [1987] has shown the legitimating effect which occurs when a particular subject of study is transferred from one scientific discipline to another. By taking an interest in knowledge, the management sciences

[9] See RUSSELL [1961].

legitimate their procedure, because they are importing a concept which has already given rise to much scientific analysis in other disciplines which are recognized by the scientific community. On another hand, in giving the highest place to Reason, the Enlightenment reinforced the legitimacy of the object of knowledge. TSOUKAS reminds us that since that time, it has been supposed that "the more humans know, the more they will be able to control their destiny" [1997, p. 828]. That is why he is loath to call in question the entire KM enterprise, whose object is one of the noble and legitimate resources in our contemporary societies.

The emphasis on transparency is also important as regards the perception of the concept of knowledge implied by some KM techniques. There are a variety of KM tools, but researchers have shown great interest in the use of Information Technology (IT) as a support for KM. IT occupies a leading place 10 among the various things which are generally cited to explain the sudden expansion of this area of management science. KM techniques utilizing IT have contributed to the image of an organization which is a 'knowledge system'. This idea is close to that developed by REDDY, who put forward a concept of communication as "the metaphor of the conduit" in which ideas are seen as objects that can be sent out via distribution channels [conduits] toward receptors which reconstitute their original form [TSOUKAS, 1997, p. 830]. In this way, like the perception of knowledge developed by the metaphor of the conduit, the perception of knowledge which is usually developed in KM texts is "objectified, decontextualized, time-less, impersonal, value-free representations to be used instrumentally » [TSOUKAS, 1997, p. 839].

Our analysis of the texts and practices of KM have allowed us to understand that as in the Taylorian society, transparency is important in KM, which also attempts to convert a personal science into an organizational one.

Codification as a process of the instrumentalization of projects

There is a similarity between Taylorian and KM texts with regard to the objective of transparency, but the commonalities which we are able to discern do not end there. The concept of knowledge itself has generated interest in some quarters. At the center of the analysis of problems of workplace organization carried on by TAYLOR we find not only the problem of slowdowns, but also the value of the know-how used by workers.

The principal mode of the creation of knowledge within the workplace is empirical, and the main type of learning is limited by the know-how of the most experienced workers. TAYLOR shows that there is a gap between the effectiveness in completing work of the employees, and their desire to perform [SEGRESTIN, 1992, p. 64]. This author here identifies another cause of non-optimal functioning of the workplace, like slowdowns. Time and motion studies raise questions about the effectiveness of the transmission of knowledge within the workplace from more experienced to less experienced workers.

> "…owing to the fact that the workmen in all of our trades have been taught the details of their work by observation of those immediately around them, there are many different ways in common use for doing the same thing, perhaps forty, fifty, or a hundred ways of doing each act in each trade, and for the same reason there is a great variety in the implements used for each class of work. Now among the various methods and implements used in each element of each trade there is always one method and one implement which is quicker and better than any of the rest. And this one best method and best implement can only be discovered or developed through a scientific study…"[TAYLOR, *The Principles of Scientific Management*, p. 24-25, cited by POUGET, 1998, p. 79-80].

[10] See also SCARBROUGHT and SWAN[2001], LITTLE, QUINTAS and RAY [2001] for example.

For TAYLOR, oral transmission from worker to worker of recipes for making things in workshops should be replaced by workplace education set up by management and made available to all. The study of workers' knowledge thus is at the center of TAYLOR's proposed system.

TAYLOR was writing at the beginning of a wide movement toward codification of knowledge. The process of codification aims essentially at codifying workers' know-how. But this knowledge is not codified as it stands. The knowledge of the worker must be analyzed, tested, and modified by experts, who by introducing scientific procedure into the workplace intend to improve the production process which once was governed by the experience of workers alone. Upon this point a conflict has emerged between a number of authors over the question of the expropriation of the worker's knowledge. [11] Authors who are inclined to defend him say that while TAYLOR may have learned from workers' know-how, he went beyond it and increased its value at the same time through systematic experimentation and critical synthesis. "Taylorism is the conviction that rational study of phenomena, and to the extent possible, experimentation with them, are the only ways to achieve a progressive improvement in knowledge" [DE MONTMOLLIN, 1981, p. 70].

The ' best practices' recommended by TAYLOR are a synthesis of workers' knowledge and expert knowledge. This is the knowledge which is codified, retained under the Taylorian system, and instituted as a procedure to be followed by all the employees of the organization. " TAYLOR concluded that neither knowledge which was handed down from worker to worker, nor the best intentions of the employees, nor their bond to the employer, afforded any particular guarantee of efficiency" [SEGRESTIN, 1992, p. 64]. Through formalization of knowledge, TAYLOR hoped to increase the productivity of organizations. Thus, 'scientific organization' consisted in an attempt to formalize know-how, that is, the tacit knowledge of workers, transforming it into objective knowledge that could be transmitted to all the employees of the organization. Through the introduction of scientific procedures, experts intended to formalize the knowledge that up to that time had been interiorized in the movements of workers.

> "(The management) develop a science for each element of a man's work, which replaces the old rule-of-thumb method" [TAYLOR, *The Principles of Scientific Management*, p. 36, cited by POUGET, 1998, p. 87]. "The managers assume the burden of gathering together all of the traditional knowledge which in the past has been possessed by the workmen and then of classifying, tabulating, and reducing this knowledge to rules, laws, and formulae which are immensely helpful to the workmen in doing their daily work." [TAYLOR, *The Principles of Scientific Management*, p. 36, cited by POUGET, 1998, p. 87]. " [...] a deliberate gathering together, by those in management, of all the great mass of traditional knowledge which in the past was found in workers' heads, in their physical abilities, in their deft handling, all of which they had acquired through years of practice. The duty of gathering together this great mass of traditional knowledge, then recording it, then classifying it, and in many cases reducing it to laws, rules, and even to mathematical formulae, is taken on willingly by the management" [TAYLOR, *Testimony*, p. 40, cited by POUGET, 1998, p. 87].

Taylorism was centered essentially on its interest in knowledge of the 'know-how' type, and this concentration came from Taylorism's focus on the application of know-how in the industrial workshops which it studied. KM texts on the other hand insist on the multiplicity of types of knowledge, for example, explicit and tacit knowledge. The latter category is defined as being more than know-how, because it also includes intuition and individual impressions, as in the version by NONAKA and TAKEUCHI [1995]. « The "scientific management" was an attempt to formalize workers' experiences and tacit skills into objective and scientific knowledge. However, it failed to perceive the experiences and judgments of the

[11] Concerning the question about expropriation of knowledge, see among others Braveman cited by DE MONTMOLLIN [1981], DE MONTMOLLIN and PATSRÉ [1984], VATIN [1990].

workers as a source of new knowledge. Consequently, the creation of new work methods became the responsibility of managers only. Managers were shouldered with the chore of classifying, tabulating, and reducing the knowledge into rules and formulae and applying them to daily work» [NONAKA et TAKEUCHI, 1995, p.35-36].

Many authors have pointed to the particular nature and the importance of tacit knowledge in the process of the management of knowledge.

> For NONAKA and TAKEUCHI « [...] the key to knowledge creation lies in the mobilization and conversion of tacit knowledge» [1997, p.56]. « [...] But the subjective and intuitive nature of tacit knowledge makes it difficult to process or transmit the acquired knowledge in any systematic or logical manner. For tacit knowledge to be communicated and shared within the organization, it has to be converted into words or numbers that anyone can understand. Its is precisely during the time this conversion takes place – form tacit to explicit, and, as we shall see, back again into tacit- that organizational knowledge is created» [NONAKA et TAKEUCHI, 1995, p.9].

Underlying the theme of conversion of knowledge from tacit to explicit, there is hidden the same desire observed in Taylorism, namely that of formalization and exteriorization of personal knowledge, for the purpose of converting it into organizational knowledge. Authors often insist on the importance of this kind of knowledge, but they also emphasize the difficulty of managing it. For DAVENPORT and PRUSAK, the conversion from tacit to explicit is a laborious process, though they maintain that tacit knowledge can be codified. That is why they recommend limiting the codification of tacit knowledge within the organization to the localization of the person who has the knowledge [1998, p. 70].

Throughout these texts, codification appears as one of the dominant subjects concerning KM practices.

> “ The aim of codification is to put organizational knowledge into a form that makes it accessible to those who need it. It literally turns knowledge into a code (thought not necessarily a computer code) to make it organized, explicit, portable, and easy to understand as possible. [...] Codification in organizations similarly converts knowledge into accessible and applicable formats. Knowledge managers and users can categorize knowledge, describe it, map and model it, simulate it, and embed it in rules and recipes » [DAVENPORT et PRUSAK, 1998, p. 52].

NONAKA and TAKEUCHI also take an interest in tacit knowledge, and underline the difficulty of managing it. They recommend transforming it into explicit knowledge, which in this case amounts to formalizing it and making it less dependent on individuals.

> « The critical assumption underlying our model of knowledge creation favors the Japanese view that human knowledge is created and expanded through social interaction between tacit and explicit knowledge. [...] But we felt that externalization, which has been somewhat neglected in the literature, holds the key to knowledge creation. It is in this mode that tacit knowledge, which is personal, context-specific, and therefore hard to formalize and communicate to others, is converted into knowledge that is transmittable and articulable, such as words or numbers.» [NONAKA et TAKEUCHI, 1995, p.237-238].

But codification is accomplished in more than one way. In some KM texts, the initiative regarding the transfer of knowledge is left up to the employees as a group. Individual knowledge is codified by them, and made available to others through an Intranet system, for example. Under such procedures, there is no value added, strictly speaking, to individual knowledge via further contributions from the knowledge of other individuals. All knowledge is considered to be ‘ interesting’ in itself, and therefore there is no procedure for verifying its validity. Thus, contradictory knowledge may be made available to the other employees in the organization. Such is the case with the REX system, for example, which does not provide for the input of an expert in order to decide which practices are the best. [12]

[12] For an explanation of the REX system, see especially BEZ [1998], PRAX [2000].

In contrast, other KM techniques have provided for systems which are intended to verify the validity and applicability of knowledge before it gets transmitted throughout the organization. These procedures for knowledge codification are similar to those recommended by TAYLOR, since there is validation of individual knowledge by an expert. In the case of the MKSM system, a third party is responsible not only for collecting knowledge from hands-on specialists, but also for making this knowledge available to other employees within the organization, through a tool which is called a book of knowledge.[13] Thus there is a third party intervening in the procedure.

As for NONAKA and TAKEUCHI, they hold that each employee within the organization is a potential creator of knowledge, but they distinguish various roles in the process of gaining knowledge, and they provide for the involvement of a third party.

> « Who is responsible for creating new knowledge ? Another unique feature of Japanese companies is the fact that no one department or group of experts has the exclusive responsibility for creating new knowledge. Front-line employees, middle managers, and senior managers all play a part. But this is not to say that there is no differentiation among these three roles. In fact, the creation of new knowledge is the product of a dynamic interaction among them. Front-line employees are immersed in the day-to-day details of particular technologies, products, or markets. [...] Giving them the freedom makes sense, since no one is more expert in the realities of a company's business than they are. But while these employees have an abundance of highly practical information, they often find it difficult to turn that information into useful knowledge. [...] Senior managers provide a sense of direction by creating grand concepts that identify the common features linking disparate activities or businesses into a coherent whole. [...] Middle managers serve as a bridge between the visionary ideals of the top and the often chaotic reality of those on the front line of business. [...] They synthesize the tacit knowledge of both front-line employees and senior executives, make it explicit, and incorporate it into new products and technologies.» [NONAKA et TAKEUCHI, 1995, p.15-16].

Furthermore, for DAVENPORT the organization in which KM can be most successfully implemented is one in which this dimension is integrated into the work of each employee : "Knowledge management requires knowledge managers" [DAVENPORT, 1996]. So they propose instituting various new functions within organizations such as "knowledge-oriented personnel", "knowledge management worker , "managers of knowledge projects" and " chief knowledge officer".

A comparative analysis of the concept of knowledge according to TAYLOR and according to KM is very instructive. The analysis shows that in both cases, the idea of knowledge, like that of organization, is completely reified. Items of knowledge appear as separate objects, which can be analyzed, broken into parts, formalized, and stored. In this reified world, knowledge is something which can be dissociated from individuals, which can be exchanged, and which has its own existence.

What is at stake for managers : toward changes in the location of power ?

While the objective of any management tool or technique is to help an organization control its environment, and in particular the uncertainties it must confront, these tools and techniques differ according to the particular uncertainties they are supposed to help bring under control. Although Taylorism and KM have been implemented in very different contexts, here too the two have common traits.

13 For an explanation of MKSM, see especially ERMINE [1996].

In order to analyze variations of power relationships, we will proceed based on the works of DAHL [1957], EMERSON [1962], CROZIER [1963 and 1977], CHAZEL [1983], and FRIEDBERG, who define power as "an agent's capacity to structure more or less stable processes of exchange in his or her favor, by exploiting the constraints and opportunities inherent in the situation in order to impose terms of exchange which are favorable to his or her interests" [1993, pp. 127-28]. In their work, CROZIER and FRIEDBERG show that an individual's power in a process of exchange comes from resources upon which he or she can draw. Thus, in attempts to control uncertainties which affect an organization, the Taylorian project modifies individuals' access to power resources, and thus modifies pre-existing equilibria.

Taylorism, like KM, aims on one hand at eliminating the negotiating leverage workers get from their expertise in relation to their particular job, and on the other hand at eliminating the uncertainty linked to this individual expertise, and at freeing the organization from the element of human uncertainty in production relationships. Carried to a logical conclusion, these projects conceal a desire on the part of management to make any human being within an organization capable of being replaced by any other. So, when we reread TAYLOR, we can see that for him the root cause of slowdowns and organizational uncertainties in terms of worker productivity is found in "…the profound ignorance of employers and their foremen as to the proper time in which work of various kinds should be done, an ignorance which is largely shared by the workers" [TAYLOR, *Shop Management,* p. 30, cited by POUGET, 1998, p. 78]. "Having set himself the task of analyzing the time and the movements proper for the completion of any given task, TAYLOR concluded that neither knowledge handed down from generation to generation, nor the good intentions of the workers, nor the bonds which united them to the employer furnished any particular guarantee of efficiency" [SEGRESTIN, 1992, p. 64]. That is why he recommends the scientific management of businesses, the objective of which is the separation of the conception and the execution of any given job. Thus, decisions which have to do with the planning or conception of a given job are the responsibility of management, not the workers, who are to be limited to carrying out their tasks. By introducing scientific method into the organization, TAYLOR hoped to determine the best form of organization possible through the substitution of scientific knowledge for workers' know-how. But his project entails serious repercussions regarding the negotiating leverage of workers.

The know-how which once was the exclusive possession of workers thus gets transmitted to experts. Under Taylorism, the mastery of workers' knowledge is obtained by management, and specialized workers can be replaced by non-specialized workers. In order to control the uncertainties faced by organizations, the taylorian project thus promotes human mediators, that is, the experts, who are given access to the power resources once held by workers.

The economic environment in which KM has developed is characterized by a demand for personalized products and services, by greater and greater competition as regards production capacity and specialized competencies, and by increased complexity of the various technologies which must be mastered [JACOB, 2000]. The basis of a Taylorian competitive advantage lies in control of productivity, but what is at stake in the economic context of KM has to do with innovation. Studies on inovation within organizations have shown that an organization's capacity to innovate is linked to its capacity to transform its base of knowledge, knowledge which is more or less organized and more or less individual, into "strategic collective knowledge". The objective of the tools and techniques of KM is thus indeed to gather, store, spread, transmit, and create knowledge in a way that involves all the members of an organization.

> "Intellect and innovation are the source of virtually all economic value, growth, and strategic edge today… despite much popular discussion about 'knowledge creation' and 'managing knowledge', few managers systematically understand the basic interrelationships between intellect, professional knowledge, technology and innovation" [QUINN cited by JACOB, 2000]. "The secret, for an organization, thus lies in its capacity to promote processes which permit

interaction between different kinds of individual or compartmentalized knowledge, in order to generate new kinds of collective knowledge which underlie broad-based innovation" [JACOB, 2000, p. 7]. « Recently, though, many firms have come to understand that they require more than a casual (and even unconscious) approach to corporate knowledge if they are to succeed in today's and tomorrow's economies » [DAVENPORT and PRUSAK, 1998, p. ix]. "Clearly, the knowledge-based activities of developing products and processes are becoming the primary internal functions of firms and the ones with the greatest potential for providing competitive advantage"[DAVENPORT and PRUSAK, 1998, p. 13].

In order to follow an innovation-based strategy, an organization must be able to depend upon kinds of competence which are long-lasting. But the mobility of experts, which is due especially to a globalized economic context, represents a source of uncertainty for organizations, because it also represents the volatility of their knowledge and the fragility of the kinds of competence they possess in regard to innovation. The objective of KM is thus to combat the volatility of knowledge.The uncertainties which organizations must confront in the case of Taylorism and in the case of KM are different, but in both cases bringing these uncertainties under control has to do with tools and techniques of management which are centered around various kinds of knowledge held by employees within the organization. The implementation of KM tools such as (for example) databases linked to an Intranet allows employees of an organization to deposit knowledge and to retrieve it quickly and easily at the moment when it is needed. The objective is not only to minimize risks in terms of loss of knowledge, and thus over the longer term to minimize loss of capacity for innovation which might occur as the result of the loss of an employee. In other words, the objective is to free the organization from too much dependence on experts or other knowledge-holders.

Thus, the tools and techniques developed by KM indeed aim at reducing the uncertainties which organizations must confront, but they also modify the access to power resources which are available within organizations. In fact, as we have seen, the objective of KM is to promote the transfer of knowledge between individuals, and even to promote the creation of knowledge which is the property of the organization as a whole. That is why KM texts promote the involvement in this process of all the employees within an organization.

« [...] the availability of certain new technologies such as Lotus Notes and the World Wide Web has been instrumental in catalyzing the knowledge management movement" [DAVENPORT and PRUSAK, 1998, p. 52]. "For example, networked computing provides new ways for individuals to exchange information and knowledge within and outside their organizations. Technologies such as Lotus Notes and the World Wide Web have made certain forms of structured knowledge easier to collect, store in repositories, and distribute to desktops» [DAVENPORT and PRUSAK, 1998, p. xi].

« Another unique feature of Japanese companies is the fact that no one department or group of experts has the exclusive responsibility for creating new knowledge. Front-line employees, middle managers, and senior managers all play a part. » [NONAKA et TAKEUCHI, 1995, p. 15].

KM projects thus indeed alter the dependence of an organization on personal knowledge held by individuals, through designating various kinds of knowledge as a group of 'collective goods' accessible to all.

At this point it seems in order to ask ourselves about the meaning of this modification of the access to power resources. The implementation of a KM system modifies access to knowledge, and thus to power, if we hold with FOUCAULT that knowledge and power are connected : "It is not possible for power to be exercised without knowledge, it is impossible for knowledge not to engender power" [FOUCAULT, 1980, p. 2, cited by TOWLNEY, 1993]. Thus when KM texts recommend participation by all employees within an organization, we have the right to think that we are seeing a movement in which knowledge is no longer the possession of experts alone, as was the case with the Taylorian project, but rather is made available to all the employees of an organization who can access it when they need it. Still, this analysis seems a bit Utopian, since the principle of limited rationality developed by MARCH and SIMON reminds us that the important thing is not simply to access knowledge, but to be able to use it. We have seen that the communitarian vision of

knowledge as a collective good produced by all and accessible to all is considered by many authors as relatively theoretical.

In fact, though KM texts recommend participation by all the employees in an organization, this new collective good, in order to be efficient, requires a restructuring of roles and responsibilities, which resembles to some extent the scientific division of labor recommended by TAYLOR.

> Thus for NONAKA and TAKEUCHI, « Creating new knowledge in the knowledge-creating company requires the participation of front-line employees, middle managers, and top managers. Everyone in a knowledge-creating company is a knowledge creator. Indeed, the value of any one person's contribution is determined less by his or her location in the organizational hierarchy than by the importance of the information she or he provides to the entire knowledge-creating systems. But, this is not to say that there is no differentiation among roles and responsibilities in the knowledge-creating company. [...]Knowledge practitioners are responsible for accumulating and generating both tacit and explicit knowledge. They consist of " knowledge operators", who interface primarily with explicit knowledge. Knowledge engineers are responsible for converting tacit knowledge into explicit and vice versa, thereby facilitating the four modes of knowledge conversion. Knowledge officers are responsible for managing the total organizational knowledge-creation process at the corporate level. » [NONAKA and TAKEUCHI, 1995, p.151-152].

It is clear that for certain authors the introduction of KM in companies would entail the creation of a new class of experts, namely, knowledge experts. In such situations, the changes would amount not so much to making knowledge available to all employees within an organization, but to the installation of new agents, the directors of the KM program, who would control certain resources which are considered strategic in terms of the organization as a whole.

These two leading tendencies in KM, the communitarian tendency and the tendency which has to do with the "scientific division of labor" , both lead to important changes in power relationships within companies.

At the current stage of the implementation of KM practices within organizations, it seems premature to conclude that one or the other tendency will gain the upper hand over the other. But a reading of KM texts can lead to the conclusion that even if KM implementation in companies risks running up against significant resistance from workers who would be affected by the changes, as happened in Taylorism – a resistance which has been largely underestimated in the literature – the project itself indeed intends to free organizations from their dependence on experts, and from the fragility which results from that dependence.

Conclusion

The parallel reading of texts by TAYLOR and texts detailing KM has allowed us to clarify the likely result of the introduction of a KM project within organizations, especially as concerns what may be at stake in power relationships. The analysis shows that the vision of the workplace under KM is not new.

Though separated by several decades, and arising in very different management environments, Taylorian and KM texts share a certain vision of the world. The comparison of these texts has allowed us to see that both base their projects on a common vision of organizations. That vision includes two postulates. On one hand, by attributing values and objectives to the organization as such, TAYLOR and KM adopt a reified vision of organizations. On another hand, both positions assume that organizations are conflict-free. By presenting changes in the economic environment as the main threat to the organization, and by minimizing any eventual impact on power relationships, KM texts show an even

greater dependence on a conflict-free organization. The comparison of the two positions also shows similarities with regard to implementation. In both cases, transparency is presented as a global objective of the system. It is also noted that the instrumentalization of the respective projects is supposed to be accomplished through codification. Knowledge is seen as an object which can be applied to a procedure (as in Taylorism) or extracted from individuals for purposes of transfer or even storage (in KM).

	TAYLOR	**Knowledge Management**
A shared concept of organization		
❑ *Seeing organization as reified*	« It would seem to be so self-evident that maximum prosperity for the employer, coupled with maximum prosperity for the employee, ought to be the two leading objects of management, that even to state this fact should be unnecessary. » [TAYLOR [1911], p. 9-10, cited by SEGUIN and CHANLAT, 1983, pp. 79-80]. « Il semble évident que la prospérité maxima pour l'employeur et l'employé devrait être le but principal de l'organisation (…) » (TAYLOR (1910), cité par SEGUIN et CHANLAT, 1983, pp. 79-80).	« As organizations interact with their environments, they absorb information, turn it into knowledge, and take action based on it in combination with their experience, values, and internal rules. They sense and respond. [Davenport et PRUSAK 1998, p. 52]. « […] On another hand, organizations possess and create tacit collective knowledge » [NONAKA, TAKEUCHI and INGHAM, 1997, p. 5-14].
❑ *Organization without conflict*	« Scientific management, on the contrary, has for its very foundation the firm conviction that the true interests of the two are one and the same; that prosperity for the employer cannot exist through a long term of years unless it is accompanied by prosperity for the employee, and vice versa; and that it is possible to give the workman what he most wants - high wages - and the employer what he most wants - a low labor cost - for his manufactures. » [TAYLOR [1911], p. 9-10, cited by SEGUIN and CHANLAT, 1983, pp. 79-80].	« Recently, though, many firms have come to understand that they require more than a casual (and even unconscious) approach to corporate knowledge if their are to succeed in today's and tomorrow's economies » [DAVENPORT and PRUSAK, 1998, p. ix].
Execution of the project		
❑ *The world of transparency*	« The division of tasks is subordinated to the perfect knowledge of the whole set of production processes and its programmatic arrangement, and to the elimination of any obscurity created by its execution. The eye of the designer can see all, because all is known in advance. Transparency also operates between social groups, because it is allowed by a social contract which seals the different parties' recognition of their identical interest in a prosperous world […] whose foundations would be scientific .» [PAVE, 1989, p. 266].	« The primary activity of a knowledge-creating business is to make individual knowledge accessible to others. This happens at every moment, and at all levels of the structure » [NONAKA, 1991, p. 41].
❑ *Codification as a process of instrumentalization*	« The managers assume the burden of gathering together all of the traditional knowledge which in the past has been possessed by the workmen and then of classifying, tabulating, and reducing this knowledge to rules, laws, and formulae which are immensely helpful to the workmen in doing their daily work. » [TAYLOR, *The Principles of Scientific Management*, p. 36, cited by POUGET, 1998, p. 87]. « L'encadrement assume la charge de rassembler	« Codification in organizations similarly converts knowledge into accessible and applicable formats. Knowledge managers and users can categorize knowledge, describe it, map and model it, simulate it, and embed it in rules and recipes » [DAVENPORT and PRUSAK, 1998, p. 52].

[14] Introduction to the French translation of the work of NONAKA and TAKEUCHI.

	tout le savoir traditionnel qui dans le passé appartenait aux ouvriers, puis de classer, de cataloguer et de réduire ce savoir en règles, lois et formules qui seront d'une extrême utilité pour l'ouvrier dans l'accomplissement de sa tâche quotidienne » (TAYLOR, The Principle of Scientific Management, p. 36, cité par POUGET, 1998, p. 87).	

Synthetic presentation of TAYLOR and Knowledge Management's speeches

The analysis of the two positions also points out the impact of each project on power relationships in an organization. Faced with uncertainty regarding productivity in a business, the Taylorian position modifies the access to power that individuals have, and in so doing alters pre-existing equilibria. By introducing scientific procedure into an organization, assigning specialists to define tasks and also how workers are to perform them, and by substituting scientific knowledge for workers' know-how, TAYLOR hoped to determine the best form possible for organizations. Taylorism intended on one hand to suppress the negotiating leverage workers' expertise had given them, and on the other hand to get rid of the uncertainty which such expertise created, when possessed by certain individuals, and thus to get rid of the uncertainty related to human beings' participation in production relationships. In its attempt to overcome uncertainty in organizations, the Taylorian project promotes human mediators, the experts, giving them access to resources of power formerly held by workers.

The strong point of Taylorian competitive advantage is in a mastery of productivity. What is at stake in the economic context in which KM arises is related to the practice of innovation, and this is why organizations must be able to depend on competencies which will last for some time. The mobility of experts represents a source of uncertainty for organizations, because it points to the volatility of their knowledge and the fragility of their competencies in regard to innovation. The tools and techniques developed by KM are intended to reduce the uncertainty which confronts organizations, but also to modify the access to various kinds of power which are available within organizations. The objective is not only to facilitate the transfer of knowledge but also to minimize risks in terms of loss of knowledge, leading eventually to loss of capacity for innovation. As with Taylorism, the idea is to free the organization from too much dependence on experts or those who possess knowledge.

By modifying the access to certain kinds of power, KM projects modify power relationships within organizations. Our analysis shows that two tendencies are present. On one hand, KM projects modify the dependence of organizations with regard to the personal knowledge of some individuals by designating knowledge as a "collective good" accessible to all. On the other hand, alongside this communitarian vision, the introduction of KM into an organization is seen as the occasion for the introduction of a new class of experts, namely knowledge experts. It may be premature to conclude that one or the other of these tendencies will prevail, but we can conclude that the KM project is certainly one which frees organizations from their dependence (and thus its fragility) with regard to experts.

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