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# Management and Learning in the Knowledge Society

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## 1. Introduction

In the 1980s we experienced several cases where companies working in knowledge-intensive areas were sold for a higher price than their book value. This was seen as a reflection of the fact that usual accounting principles did not correctly reflect the market value of the company. The equity of a company is usually the basis for a computation of its market value – within certain limits and based also on experience in the actual industry or business sector in which the company functions. But even with these usual principles it was impossible to account for the actual market value of the company when actually sold. Of course some of the flashier initial public offerings from the middle of the 1980s and onwards could be examples – perhaps the best example was Genentech (Jacobs 2008). The hidden value that the company possessed was commonly thought to be its intellectual capital.

The existence of intellectual capital, and its importance, was one of the inspirations for the developments in theory and practice of management principles that account for this hidden value. Managerially, it is important to account for intellectual capital to secure its capitalization. Intellectual capital remains dynamic and interacts with financial and human capital in various ways. Management controls attempt to affect this interaction in a manner that makes the company as valuable as possible (Rooney et. al. 2005, Stankosky 2004).

But there were other developments that focused attention on the renewed role of knowledge and learning. One example could be the business strategy of General Electric in the area of jet engines – their production and maintenance. By producing jet engines GE developed an abundance of knowledge about such engines. The re-use of this knowledge was central in

the maintenance on these engines, thus providing the company with a distinct competitive advantage. Indeed, GE is successful in bidding for maintenance of engines made by other producers, the basic technology being the same. Thus knowledge gained in one area can provide the basis for profits in another area. It could even be the case that profit was made not through using the basic knowledge acquired – the design and production of jet engines. But profits could also result through the application of knowledge in new business areas – like maintenance of jet engines in large fleets of aircraft. Thus the strategy of GE was changed from not only producing and selling the engines, but also on selling the knowledge about engines. This phenomenon of the 1980s had now advanced knowledge to a systematic business strategy.

The idea of a knowledge based company goes back to the era when new scientific theories made new products and processes possible. Two industries where this was particularly pronounced were the chemical industry and the electrical industry. The emergence of successful scientific theories of chemical reactions and of electricity and magnetism in the middle of the 19<sup>th</sup> century created the possibility for new science-based industries. Soon after, the idea of organizing and managing a manufacturing process became based on scientific management. The influential mathematician and inventor Charles Babbage had of course already begun a focus on the scientific management of factories with his book “On The Economics and Machinery and Manufacture” early in the 19<sup>th</sup> Century (Babbage 1835). But knowledge was mainly present as a factor that made new products possible (e.g. pharmaceutical drugs, new processes such as the production of gasoline, etc.).

With the increased importance of science in the creation of new products and processes it gradually

became possible to create businesses that were basically laboratories rather than factories, and to have an integrated research and development department. Financing for such ventures was also available, especially after the Second World War, when the potentials of research had been clearly demonstrated in the invention and development of radar, of the computer, of transistors and of course of the atomic bomb. Laboratories such as Bell Labs, Radiation Lab and RAND Corporation were close to being independent businesses. The RAND (Research And Development) Corporation, is a good example. The first venture capitalists emerged investing in research based companies. This got a boost in 1978-79 when the prudent man rule was introduced (Gompers 1994) making it possible for pension funds to invest in research and knowledge production. The accompanying rapid technological development in the areas of IT and biotechnology created multiple investment possibilities. This led to the development of an economic system based on new information technology and innovative forms of economic use of knowledge (Böhme and Stehr 1986; Stehr 1994).

The background for this situation can be analyzed by looking at several factors that changed during the mid 1980s:

1. Increased global competition
2. The Information & Communication Technology (ICT) revolution
3. The situation in relation to highly skilled labor
4. The role of the State

We have several statements on the increased role of knowledge. One such statement from the OECD about the role of knowledge in a knowledge management framework is captured in the following:

*“For industrialized countries the ability to produce, select, adapt, commercialize and use knowledge has become critical for sustained economic growth and improved living standards. Knowledge is now the most important factor in economic development. Long term growth in OECD economies depends on maintaining and expanding the knowledge base. The real growth of value added in knowledge based industries has consistently outpaced overall growth rates in most OECD countries in the past two decades. For example, the share of knowledge based industries in the total national value added has increased from 51 to 59 % in Germany, from 45 to 51 % in the UK and from 34 to 42 % in Finland. The process of globalization is accelerating this trend as knowledge and skills – in the form of technical, innovation and human capital – are increasingly at the*

*core of a country’s competitive advantage.” (OECD 1998).*

Changes in communication structures and the accompanying changes in the transport system have made the international trading system truly global. This has created one common global financial system and one common production and transport system. Companies are structured to take advantage of regional advantage where design and marketing take place from a base in, for instance, Northern Europe. They produce in China, and they transport via Singapore using global container carriers. This global distribution system combined with the emergence of a large number of global brands contributes to the phenomenon usually referred to as globalization. This has also meant increased competition, and in many business areas – like software – the market is identical to the global market. Competition is global.

This, of course, also has to do with the ICT development. The computer emerged as a significant technology in business in the 1960s. The 1970s saw the development of large mainframes with a network of local terminals and software based on relational databases, and the 1980s saw the emergence of the personal computer and thus, the introduction of the computer as a normal tool in a large number of workplaces. Simultaneously, a number of other technologies were digitalized, and thus ready for inclusion in digital networks, such as those that emerged as the backbone of a large number of companies.

The 1990s saw the emergence of the Internet, changing from a tool for research institutions to a system generally available to all organizations and households. This made totally new business models possible and provided new forms of services. Google and Amazon are good examples. It looked as if it was possible to make real money from providing free services by using new techniques for acquiring knowledge. The ability to search the internet was a key to success. So was monitoring of user and consumer behavior. The web became the new and most important source of knowledge and communication. This again changed the labor composition throughout knowledge intensive business sectors.

Companies developed from being based on a large number of workers with relatively lower levels of educational attainment and a few planners (managers) to a situation where more employees had higher levels of education and possessed college degrees. The demands on competence and the quest for innovation and creativity seemed to favor people with higher levels of educational attainment fundamentally changing the culture of companies. Engineers and scientists,

economists, psychologists and people with higher business degrees populated the successful companies of this “new economy”. It became natural not only for the research and development of the company to have close relations with universities and research institutions, but for the company in general. Many companies specialized in the essential roles of developing new knowledge and cutting edge technologies, such as when Sun Systems secured the development of the Java programming system.

Further, during the 1980s, a new conception of the State emerged. This is often associated with the emergence of the concept of New Public Management (Ferlie, Lynn, and Politt 2007). The State was characterized by many to have progressed into a large bureaucratic system. Now new demands emerged and the State had to adapt. Demands appeared for higher efficiency, a critical look at what was best done by the State – or by private business – and new roles in relation to securing the infrastructure and knowledge needed for sustaining a high level of economic, technological and scientific development. The State should not only administrate but create and facilitate. This put special demands on the universities and the research system that came into focus as a central provider of the necessary new knowledge and the basis for new innovations. The research system tended to blend with the innovation system, so that the aim was not only new basic knowledge, but new innovations that could form the basis for sustained economic development (Amidon 1997).

## 2. The business system

We have several types of business systems. A good example is the highly industrialized mass-production business system that emerged in the 20<sup>th</sup> century. This is based on large corporations having an advanced production capacity and a huge system for distribution. The auto industry and the pharmaceutical industry are typical industries in such a business system. They are based on a high level of technology and research and an efficient infrastructure in a highly complex society.

The industries are typically system-based, so the auto industry is dependent on the system of roads and the system of fuel supply, the pharmaceutical industry on a skilled distribution system – pharmacies – and a highly developed medical and health system. There is a tendency for the creation of larger and larger networks of actors in the system, so that financial institutions, production companies, marketing and communications merge in bigger and bigger corporations and networks of dependencies. The Japanese and the Ger-

man capitalist systems are good examples. But increasingly the tendency goes global. Multinational corporations emerge. We have seen examples in several areas such as General Motors, Ford, IBM, companies that have in the second half of the 20<sup>th</sup> century played central roles in several markets. We could say that in such a system we have a fairly clean distinction between markets and organizations. Companies are like large suspensions of the market organizations – and markets are increasingly global markets under less and less efficient State control – due to globalization. In many areas the interplay between government regulations, free markets, the labor market and the companies as central actors in the system has of course continued. This is referred to as the industrial society.

In a typical industrial economy with an industrial business system the form of capital that is important is financial capital. Labor is paid with financial capital, and so are investments in production facilities. As the qualifications of labor become more and more important, another form of capital becomes apparent: human capital. This reflects the increased importance in large parts of the labor market of more and more qualified employees. If capital is understood as a store of value that has the potential of producing more value, then human capital is a denotation of the potential for value-creation that is located in the knowledge and skills of the employees. In the “traditional” equation of value creation this was due to the merger of capital and labor in the production of goods that could be sold on a market. The creation of value was thus a result of interaction of a company – an organization – and a market ruled by supply and demand with demand coming from consumers that hold financial capital – typically acquired as salary for work, in return for their human capital.

When the central source of value is a structured creation and use of knowledge, new forms of business systems appear. Competition is supplemented with new forms of cooperation based on the fact that a lot of knowledge is common and publicly available. However, exchange and sharing of knowledge can not be isolated to companies as monadic organizations. Other relations also appear (e.g. relations based on trust). New forms of organization of the various industries appear to be more based on a sharp division of labor. Thus the large multidivisional corporation is no longer the most adequate form of organization. These new forms of organization are typically seen in areas such as the creative industries and the software industry. We could call such forms of business systems semi-markets, entities loosely coupled in the sense that we do not have a very sharp division of the tightly organized companies and totally differently

organized markets, which are actually not organizations at all. Examples are the relation between a large marketing and distribution company on the one hand and the large number of small suppliers on the other. Contemporary examples of this can be seen in the music industry, the computer-game industry and the software industry.

Another important phenomenon that is linked to the emergence of knowledge industries is the increased importance of temporary alliances between partners. In a high-tech industrial business system we see a number of industries where project management emerges because the work is project based. Team-based projects are increasingly common in a number of industries, especially those working in areas such as research, the arts, design and consulting. When the project is not only a form of work that goes on inside a company, but involves people from various companies and with a variety of competencies, it may be organized through temporary alliances. A good example could be the film industry. Often, each film is produced in the context of an alliance formed specifically for producing that film. The same phenomenon can be observed in the area of research.

### 3. Forms of management

A major challenge to traditional thinking about management, emerging from the way knowledge intensive industries operate, is represented by the changing role of strategic management. If we look at a company in a production sector in a traditional industry, traditional management thinking has assumed that the sector is largely homogeneous, an assumption that goes all the way back to Marshall (1890). This point of departure was challenged by Porter (2004), whose analysis suggested that the main objective for a company in a given industry was to find the optimal position in that industry relative to some of the important variables that defined the industry and thus constituted its position-space. Thus, the main idea was that through relevant strategic thinking it would be possible to develop a strategy for your business and then derive directives for your executives to implement that strategy, and eventually in practice reach your strategic goals. The new forms of management, based on a central role for knowledge production and thus for knowledge management, are different from this conception of strategic management. Company strategies in knowledge intensive industries are much more dependent on the innovative capabilities of the company. It is not given that even if a strategic analysis points out a position and a set of goals, the company can actually get there, because this is not a matter

of applying familiar procedures and principles, but involves the creation of new knowledge or new innovations.

Knowledge management seeks to maximize the potential of the company to be able to meet challenges and be flexible enough to do relevant innovations. But it is the innovative capability that determines the trajectory of the company. Strategy tends to become emergent strategy. We might call this strategic innovation. We see the same tendency in the area of design. The designers do not just do what they are told, they become a central strategic resource and their capabilities determine the development of the company. If the designers work in a design company that works for another company which needs the design, we have an interesting relation. The partnership becomes strategic, but is still a company-client relationship, and the company "buying" designs finds itself in an interesting strategic dependency.

This clearly poses challenges for traditional business schools. Business schools to a large extent teach and train CEOs to create strategies and subsequently let the strategies filter down through the organization. In the knowledge economy it very often has to be the other way around. Researchers, innovators and designers take the lead and are in a sense in charge, and the strategies of the firm are adapted to what the innovative parts of the company develop. The knowledge creating capability is the central resource of the company, its intellectual capital. This change in the roles and the positioning in companies demands special emphasis on management of research, innovation and design. If these functions are not managed efficiently, the upper and traditionally strategy-forming part of the management has too little on which to base their management activities.

Research, innovation and design management can not be conducted the way traditional project management used to be. Project management in the traditional sense is based on the central idea of working toward specified goals. A goal is set, and it is the task of the project manager to reach that goal given certain resources (time, manpower etc.) so that certain functional requirements have been fulfilled. In the areas of research, innovation and design, it is impossible to provide specific descriptions of goals, because if that were possible, the project would more or less be accomplished. It is only possible to give fairly abstract specifications of goals. This means that planning a project in the sense of determining a trajectory from where the project is at a certain time through to the goal becomes impossible. Planning presupposes the existence of specific goals. So it is possible to use project management in constructing a building that has already been

designed by an architect, but it is impossible in the same way to plan the building design project. On the other hand, if you cannot come up with new knowledge based on research, innovation and design that actually secures the value creation of the company, then a company in such a field will have big problems staying in the market. We can see this in the music and the software industries. This is probably the most important change in the management situation when we think of the change from the traditional industrial production to production based on knowledge.

Therefore, when activities are run as projects and are based on temporary alliances, traditional project management must be supplemented with other forms of management. Research management is a good example, where the search for new knowledge creates a new situation and management therefore can not depend on traditional planning tools, but must rather be based of various forms of facilitation. Innovation is also different; not "just" research-driven. It will have to involve forms of creativity which demand teams and work forms where problem-solving is different; not necessarily based on logical reasoning. Interpretation, ambiguity, multiple sense-making, undetermined situations with insecurity, and lack of common goals characterize crucial periods in innovation projects (Easterby-Smith and Lyles 2003).

#### 4. The creation of value

In the knowledge economy financial capital is still an important element, but the challenge is how to transform human capital, social capital and intellectual capital into financial capital. In the knowledge economy it is this interplay between different forms of capital and how successful the company is able to manage this interplay that will decide if the firm will survive and develop. This again has to do with the existence and interplay of different forms of knowledge being at the centre of the creation of value in the company. Human, social, and intellectual capital should be value creating for the company. These forms of capital are usually not traded directly in the market, although human capital can be available through the labor market. But there are various market phenomena that will affect these forms of capital. Companies can compete for labor through a wide variety of means, and they can also accumulate intellectual capital in many ways. The location and character of a company's position in various networks can be of vital importance for its ability to secure knowledge, and thus social capital can be of high strategic importance in relation to value creation. A firm can contribute to the development of its intellectual capital stock by hiring people with key

knowledge. However, it is still the internal process of expanding the firm's stock of intellectual capital and securing its transformation into financial capital through the production system and the market that is the key feature for making profits.

In the knowledge economy, human, social and intellectual capital becomes much more important and the transformation of these into financial capital becomes vital to the firm. We see many examples of this, not only in knowledge intensive production like software and business services, but also in traditional manufacturing like the production of oil rigs and in tourism. These sectors are transformed by the globalizing factors mentioned earlier. Thus, the role of knowledge in such sectors is changing, new forms of adaptation to market needs have to be implemented, and an ongoing change from piecemeal adaptation to conscious innovation can be observed. The important lesson here is that knowledge management principles are important also in traditional manufacturing and other kinds of services where production demands specific types of educated manpower.

#### 5. Knowledge and learning

In the knowledge economy, it is important to note that two simultaneous tasks are required to run a successful knowledge based company:

- conduct the task efficiently
- learn from ongoing processes

When conducting their tasks, like producing software, companies have to be able to manage a complex set of procedures that involve highly abstract knowledge and highly educated, often research-based people. These procedures have to be managed efficiently otherwise a company will go out of business. If a company is able to increase its efficiency through learning from ongoing processes, it will be in a better position. Actually the company that is best able to learn from ongoing processes will profit most on the assumption that companies have access to the same specific knowledge.

The notion of being able to conduct a task efficiently has been the focus of much research since the emergence of management as a specific field of research. Efficiency was originally at the center of Frederick Taylor's "scientific management". The new feature brought into the analysis by the knowledge economy is the emphasis on the learning process. What is essential is to do a job and learn from it more efficiently than your competitor.

Learning is an essential way of appropriating knowledge. A recent study suggests that biotech firms in Germany are more willing to share knowledge than one would have expected (Haeussler 2006). The reason for this disposition is that what they can gain from sharing is more important than what they can achieve by just protecting knowledge, for example through patents. This supports the thesis formulated above that you have to consciously learn from such processes such as product development, and integrate this learning process into the organization of the firm and thus stimulate further development. Otherwise the company may run into problems of survival. We might say that both the ability to create new knowledge as well as the ability to learn – in the sense of acquiring new knowledge – are essential to companies that want to stay competitive.

The knowledge can have several forms. One type is the scientific-engineering type, which is used in programming new software, developing new materials etc., and another is the knowledge that is present in the organization about how to do tasks, how to coordinate them, how to communicate; in short, how to perform. The first type is propositional explicit knowledge, the second is often tacit and present in the form of procedural knowledge that has an organizational character.

For some firms, for example in the medical or textile and clothing sectors, the development of new products and business services linked to the production stays in high cost countries, typically in northern Europe, while the actual production is moved to medium and low cost countries. This is an important aspect of the globalization process. In other sectors, for example oil rig production, knowledge development and learning takes place inside the company located in high cost companies in northern Europe. If you are clever enough to develop knowledge efficiently, competitiveness can result. Indeed, in a related article in this special issue, Westernen (2008) notes that this can result in competitiveness even when wage rates are 50 percent higher. In general we can also find several examples of successful knowledge and learning development within traditional manufacturing firms that scale down the effects of globalization and thus enable industries to stay competitive under conditions that, from a superficial point of view, would make survival impossible. This has meant that globalization and the entry of new low cost countries in a number of industries have not had the detrimental effects that might have been expected.

The conclusion is that successful knowledge management within firms can change globalization trends. Production is, in some cases, moved to medium or low

cost countries. In other cases, it stays in high cost countries. This is determined by new knowledge and competence strategies being developed and implemented. However, the general trend is that companies in high cost countries have to rely more on making profits from knowledge and learning, regardless of the country in which the actual production takes place.

Another important part of this knowledge and learning process is that companies have to be successful in several areas at the same time; individual learning, knowledge development and organizational learning. The key feature here is that the company must efficiently transform human, social and intellectual capital into financial capital. This means that the firm has to develop its innovative capabilities as well as be good at transforming tacit knowledge within the company into explicit knowledge, and must also have some procedures and capabilities securing the transformation of explicit knowledge into profits or shareholder value. The latter is however similar to the kind of business processes that have always been central to science and technology based companies (Easterby-Smith and Lyles 2003).

## 6. Management and authority

Authority is essential both in management of traditional manufacturing firms and in production based on highly skilled labor. In the earlier industrial systems authority was often executed as in the military system with rank playing a central role. Authority flowed downwards, and certain persons were in authority due to their mastery of all steps and \*all facets of the production processes. In the knowledge economy, management authority can not be based on this type of authority because the company will not survive if people working for you must be less knowledgeable than the persons managing them.

Management may have specific forms of specialist knowledge, but in general it does not possess the knowledge of the employees. If the boss knows more about the software product being developed and the programming problems involved than his employees, for example in a software company, the company will definitely have problems, since this means that the people working on the projects are not competent. So in the knowledge economy you have what can be referred to as an inversion of authority. The management has to trust the competence of the employees. The management also has to rely on other processes of selection of staff than through conducting the selection process themselves. This can be compared to a dean in a research based university; he or she needs peers to evaluate candidates for research positions since he or

she cannot possibly be a competent judge in all the areas of expertise and knowledge involved in the research at the university.

This may not be easy to implement in the organization because you have to train people to have authority without being able to base that on relevant experience. Sometimes this creates a situation where the employees have the attitude that if management just stays away from managing and leave it to the competent employees themselves, everything will work out much better. But that will typically create problems of a different sort, because management must play a central role in transforming of the different kinds of competences into financial capital. The company is not just a knowledge organization; it is also a company that must secure an income to make it sustainable. In the knowledge economy the key personnel must both learn how to be managed and how to manage their own activities, such as being a participant in a project or being a project manager. This represents a radical change in many companies because management and authority are still often considered to be based on a hierarchy (Drucker 1993).

## 7. The new economy

The more you enter into the knowledge economy the more the embedded nature of the market economy becomes clear. The discussion about whether the market creates social structures or whether the social structures are preconditions for the existence of market structures tends to favor the view that the market is embedded. This also has to do with the hypothesis that in a knowledge economy you cannot have an individualistic view of entrepreneurship or creativity, nor can you actually have solely individual competencies. The alternative is a systemic view of business organizations. One can say that the lonely entrepreneur is a thing of the past. The fundamental dependence on knowledge implies a more radical sociality and social coherence than used to be the case. This is also why regional local value creation as a manifestation of social capital has to work together with business management to secure value creation both at the social and company levels. In a way, business is becoming a part of civil society and not just floating islands in a market. This also gives management a central role in creating links and networks to the surrounding regional structures, thus being able to know how the competences of the work force actually are developed and can be used and in a certain sense exploited in the company – but to the benefit of all.

We often see that the learning abilities of the work force are not only created by the company but are also

dependent on conditions outside the company. This again points to the increasing role of social capital, which is not the same process we see in many regions where there is a development from an industrial to a service economy. The point here relates to how the regional surroundings play a role in developing the social capital and the learning environment within which the processes inside the companies create a positive environment for business development. Some regions are in the process of closing down traditional manufacturing industries, and at the same time, expanding shopping malls and fast food chains. This is an example of development from a manufacturing to a service economy. But whether this will develop the social capital or increase the embedded nature of economic activities in a way that favors the competitive situation of developing a region has not yet been studied in detail. One problem has to do with measurement. How we can measure changes in occupation and industrial structure of output is one thing, but to say something about the social capital of a region and the implication of this for its competitive situation is a more difficult and complex issue. Thus, we need to understand both the structure of the regional capital available – the competencies and the relations and interactions of its workforce and its organizations and companies as well as its public sector – and the capabilities present in the companies seen as economic agents that are central to the value creation in a society (Stehr 2002).

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