

“Hospital management: using knowledge to strengthen hospital overall performance. Organization and management of nurses in Norwegian hospitals”

AUTHORS

Jon-Arild Johannessen
Tom Karp

ARTICLE INFO

Jon-Arild Johannessen and Tom Karp (2010). Hospital management: using knowledge to strengthen hospital overall performance. Organization and management of nurses in Norwegian hospitals. *Problems and Perspectives in Management*, 8(3)

RELEASED ON

Friday, 04 June 2010

JOURNAL

"Problems and Perspectives in Management"

FOUNDER

LLC “Consulting Publishing Company “Business Perspectives”



NUMBER OF REFERENCES

0



NUMBER OF FIGURES

0



NUMBER OF TABLES

0

© The author(s) 2026. This publication is an open access article.

Jon-Arild Johannessen (Norway), Tom Karp (Norway)

Hospital management: using knowledge to strengthen hospital overall performance. Organization and management of nurses in Norwegian hospitals

Abstract

Our purpose is for this article to be used by the management of hospitals in order to increase health workers' productivity. The more efficiently knowledge workers are utilized, the better the care that will be provided; this in turn leads to greater patient satisfaction and increases the motivation of personnel. We want to contribute to this positive spiral by means of this article, taking the perspective of knowledge productivity in our discussion whilst at the same time remembering that hospitals cover functions and services where knowledge and time efficiency are not the decisive factors. We, therefore, ask the following research question: How can the productivity of knowledge workers as nurses in Norwegian hospitals be increased in order to provide better care-taking and treatment to patients?

Keywords: hospitals, nurses productivity, knowledge worker productivity, management innovation.

JEL Classification: M20, M38.

Introduction. Theoretical background

Until recently, knowledge management has not been at the core of hospitals, and is relatively new to the healthcare sector in general, even though hospitals are both information and knowledge intensive. A third of the costs of a healthcare provider are spent on personal and professional communication (Desouza, 2005). A typical health care provider needs to know something about almost 10,000 different diseases and syndromes, 3,000 medications, 1,100 laboratory tests, and many of the 400,000 articles added each year to the biomedical literature (Davenport & Glaser, 2002). It is, therefore, a challenge for any practitioner to stay on top of even a fraction of all the new knowledge being generated in his or her field and still do his job. This is not a trivial problem. It is, quite literally, a matter of life and death. The Institute of Medicine's 1999 report suggests that more than a million injuries and as many as 98,000 deaths each year are attributable to medical errors. Some of these mistakes result from carelessness, but far more of them occur because health practitioners must track and utilize massive amounts of complex information.

Lack of knowledge utilization is a part of the problem. We will, therefore, focus our discussion on knowledge effectivity. This is qualitatively different from cost effectivity. Whereas cost effectivity is linked to scarcity of resources, knowledge effectivity is linked to a surplus of knowledge resources and creativity, often combined with poor organization in the sense of organizing personnel and/or processes and/or lack of sufficient managers. Questions relating to knowledge effectivity are, therefore, linked to organization and management, while cost effectivity is related to various considerations adopted from micro-economic theory. For our purposes, knowl-

edge management and its effectivity are understood as the process that creates or locates knowledge and manages the dissemination, use and share of knowledge within and between hospitals (Darroch, 2003).

Such knowledge effectivity is theoretically embedded in three sources:

1. Knowledge-based growth theory, focusing on the relationship between creativity, knowledge, innovation and increased productivity (see Romer, 1998).
2. Knowledge-based theory focusing on the relationship between intangible resources, in particular tacit knowledge, innovation, technology and performance (see Grant, 1996).
3. Systemic thinking, focusing, among other things, on context comprehension, relations, management, control and communication (Bunge, 1996, 1997, 1998, 1999).

1. The basis for the problem

Nurses constitute the largest group of knowledge workers in Norwegian hospitals, and we, therefore, chose to focus on them as a group for our discussion. Although there are relatively more nurses in Norway than in countries with similar conditions (ref) and they are mainly employed in the health sector, the advantage of sufficient nurses is off-set by extensive part-time work which reduces their availability (ref). Due to this, the nursing resources are regarded as a bottleneck at Norwegian hospitals. The simple supposition is that nurses would work longer hours if wages were increased and the problem would disappear. However, several surveys, both in Norway and internationally, indicate that income alone does not have the intended effect of motivating nurses to work more hours (Askildsen & Holmås, 2001; Phillips, 1995).

The synthesis of these surveys can be expressed in one sentence: If wages are increased, the ones who

are out want to get in, and vice versa. To be more specific, these surveys show that unemployed nurses would consider applying for work provided that wages were increased. Conversely, the ones who work full time or part time would consider a reduction in their working hours, gaining the advantages of shorter working hours but maintaining the same income. Fewer than 25,000 nurses, about half the nurses in Norway's health sector, work part time (Askildsen & Holmås, 2001). This is the basis for the problem. If income alone is not a deciding factor, what can then be done?

In this article we will argue in favor of the concept that the job of nurses, and other knowledge workers in Norwegian hospitals, must be organized and supervised in a fashion conducive to raising performance and job satisfaction. Then, among other things, nurses will be motivated to work more hours, i.e. extend their part-time hours. Organizing and managing the nursing staff in other ways would increase motivation and improve performance; more people would be employed, fewer people would resign, the quality of care would improve, patient satisfaction would increase, and priorities within the health sector would diversify, not rely solely on economic cost-benefit analyses. Such conclusions are supported, for example, by Herzberg's classical motivator and hygiene factor theory (1959, 1966). Herzberg claims that factors such as recognition, achievement, growth possibilities, advancement, responsibility and work itself are more frequently associated with favorable employment experiences than with unfavorable employment experiences.

2. What factors determine the performance of knowledge workers at a general level?

From the 1930s, industrial workers' productivity has increased by 3% per year, i.e. an increase by about 50 times (Drucker, 1999. 1999a). This is also the same time period in which analysis of tasks and

automation have been in focus; the epoch of Scientific Management. On the other hand, several studies indicate variations in terms of productivity increase on the administrative level in organizations as a result of, among other things, the introduction and use of ICT (ref). The danger in the knowledge society, as well as in the globalized market economy as such, is the absence of long-term thinking. It is the very long-term investments in research, infrastructure and information structure which are required at a time when short-term interests dominate thinking (Thurow, 1996, 1999). When knowledge workers increase in numbers we have to focus on their productivity or performance to sustain our present level of affluence. This is accomplished through long-term thinking, neither necessarily present in the global market economy, nor in the present management of Norwegian hospitals.

At the superior level, there are five characteristic features for the emergence of the knowledge society, as pointed out by several studies (e.g., Shapro & Varian, 1999; Thurow, 1999; Drucker, 1999; Catellis, 1997, 1998):

- ◆ competence becomes a very important factor for productivity;
- ◆ service sector occupations play a dominant role in employment;
- ◆ professions become a central part of the occupational structure;
- ◆ the performance of knowledge workers becomes critically important for increased production; and
- ◆ the focus is on knowledge, leading to an increased focus on the human factor.

Following the above, the three main factors becoming important for knowledge worker performance are: competence, organization and technology (ref). At the superior level, the following model shows the development of knowledge worker performance.

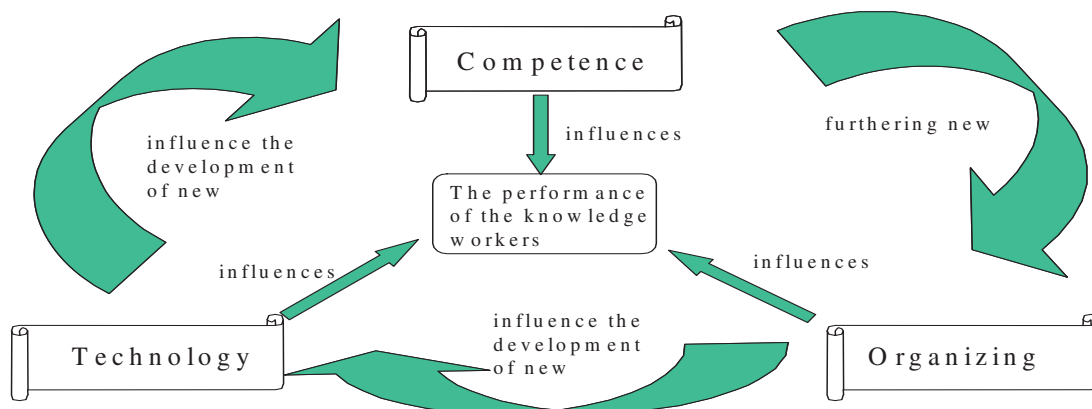


Fig. 1. The performance of knowledge workers at the superior level

Factors impacting the dynamics of knowledge production are innovation processes, technology, and network resources. At the individual level – curiosity, creativity, competence and relationship building. Balancing empirical and theoretical knowledge will assist in the development of an integrated system of the processes and activities performed in the health sector. For the individual hospital, the application of scientific knowledge will be determined by the knowledge available within the hospital or the environment of the hospital. For society, on the other hand, the development of knowledge is based on both an enlightenment ideal, and the belief that scientific knowledge is essential for the development of social systems.

Knowledge acquisition in familiar educational systems is based on the belief that this process will enable children to achieve positions in society. Knowledge development is then perpetuated by both a supply and demand side, in addition to strong expectations due to the production and application of knowledge. Expectations are important for all knowledge workers, whether their focus is on core or support activities in the enterprise, or whether they are closely or loosely attached to the core processes of the enterprise.

The value of knowledge, and particularly competence, is to what extent it is relevant in practical terms. In other words, individuals will not specialize in order to become more productive but will become more productive as a result of specialization. This is also applicable to nurses. With the exception of pure chance, specialization is a prerequisite for innovation. One of the reasons that nurses in hospitals specialize, and should continue to specialize, is to increase productivity and the degree of innovation; this enables them to perform the job they are given in a more knowledge-effective way, thus providing better care for the individual patient and benefiting the society as a whole.

3. The organization of knowledge workers in hospitals

Knowledge workers in hospitals can be categorized into five knowledge systems (analogy with Beer, 1979, 1981, 1985).

Knowledge system 1: People in possession of the relevant core competence; those nurses who have competence in the main processes and main activities for which the hospital is designed. This competence is interwoven to the hospital's intended core competence.

Knowledge system 2: It is also necessary to have coordination competence; the competence to ensure

that conflicts do not develop in, or between, the core processes of a hospital. Workers with coordination competence should resolve or contain conflicts in or between individual core processes. This competence is in the central commando axis in a hospital. The coordination competence system can be understood as an internal surveillance and filtering mechanism, facilitating effective utilization of core competences. Core competence and coordination competence systems are, as presented here, mutually dependent. The difference is their link to the hospital's core processes – tight versus loose link.

Knowledge system 3: The third type of competence is what we refer to here as management and administrative competence. It is linked to both the support activities and core processes. This type of competence is linked to the activities of management and administration of the hospital which, not being directly linked to what the hospital is designed to do, are referred to as support activities.

Knowledge system 4: The fourth type of competence is future competence for hospitals. This system performs an important function for development and change. Another important function for this competence is to monitor and assess changes, not only actively shaping the future of the hospital itself, but also thinking strategically and developing various scenarios enabling the hospital to respond to changes in the outside world. There are strong arguments that members of the hospital management staff should not be actively involved in the exercise of strategic competence because of the different modes of thinking; knowledge 3 thinking is more analytical and oriented towards detail, while knowledge 4 competence requires more creative thinking oriented to context comprehension.

Knowledge system 5: We will refer to this fifth type of competence in hospitals as decision competence. The function of this type of competence is, among other things, to create identity – to draw attention to the unique features of the hospital in relation to other hospitals. This type of competence is oriented to the organization as a whole as well as to how well it is doing compared to other similar hospitals. The hospital board could be an example of this type of competence. Knowledge system 5 can, hence, be seen as consisting of representatives from the patients, knowledge workers (nurses, doctors and other health workers) and authorities at all levels of the hospital. In this way not only demand, represented by the patients, and the supply side, represented by the knowledge workers, but also distribution considerations, represented by the authorities, are taken care of. Representation of patients through patient organizations is based on the

idea that attitudes, values, perceived security, desires and expectations do not necessarily follow classical representation channels in a representative democracy.

Decision competence is designed to, among other things, ensure that a minimum of conflicts develop between personnel with management and administration competence on the one hand, and creative future competence on the other. These two competence systems often engage in conflicts due, among other things, to their differences in relation to work fields: here and now versus the future. Without the

indirect intervention of those with decision competence in conflicts between knowledge systems 3 and 4, the majority of resources will be allocated to the daily management and administration competence system, due to its dominant role in fire extinguishing. However, it is possible to reduce the number of fires by means of systematic and deliberate emphasis on future competence.

Following the above five knowledge systems represented by the knowledge workers in hospitals, we will propose the following normative model for organizing these knowledge workers.

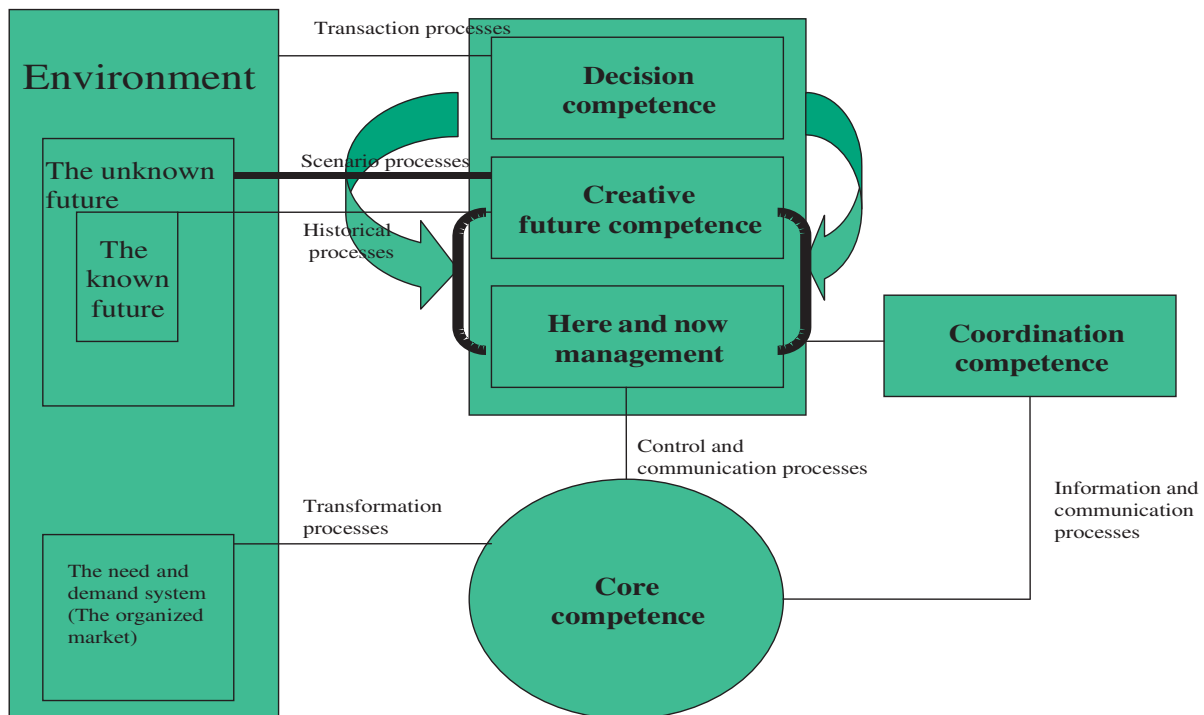


Fig. 2. Organization of knowledge workers in hospitals: a normative knowledge cluster model

The model is intended to answer our initial question: How can the productivity of knowledge workers in Norwegian hospitals be increased? We should point out that the model is highly simplified for pedagogical reasons. Firstly, there is usually more than one core competence in a knowledge system. Secondly, there should be five knowledge systems in every core competence at any established level of a hospital. This means that the model is holographic and recursive at all levels.

4. The importance of the knowledge system 5 in relation to priorities in the health sector

The challenges facing Norwegian health system in general and hospitals in particular are related to priorities in the health sector. It is the organization and coordination of decision systems that determine the priorities in the health sector.

Knowledge system 5 at all recursive levels in hospitals, and in the health sector as a larger system,

could be seen as the source of treatment priorities. We, therefore, propose a political and strategic move towards a bottom-up model for health priorities, based on competences at the intersection between economic (costs), political (distribution), social (social effects), and cultural (ethical values) factors. System 5 can also be regarded as a conflict solution forum, where professional logic can confront economic management logic and allocation logic represented by the political system, in addition to user logic represented by patient interest organizations (Melander, 1997, p. 113).

The complexity of the problem of determining priorities does not mean that simple solutions oversimplify; a reduction of complexity, external or internal, by means of models ensuring sufficient variation, should be strived for. It is this sufficient variation itself we see as our crucial point, as it transfers the priority debate to knowledge system 5 in hospitals, and in the wider health sector, entailing

that context proximity is great, as well as production proximity. This level is characterized by context comprehension as well as representation by the supply, the demand and the distribution sides.

Today, health priorities are, like political agendas, subject to top-down priorities, where hospital owners supply the framework conditions for priorities (Norheim & Bringedal, 2000, pp. 89-114). In other places in society it would be unthinkable for an owner to be in charge of both supply and demand as the state is in the health sector as an owner and framework provider. International and national laws prohibit this type of development in the business environment. In the Norwegian hospital sector this mixture of interests seems to continue unimpeded. Who the owner is means less to the patient who falls victim to priorities – often short-term political ones. In relation to health politics this is an important perspective, as social, physical and mental consequences can be so grave.

By transferring priority decisions to knowledge system 5 at all recursive levels, context proximity will exist, and we would have observed all the main criteria forming the basis for priority selections in terms of:

- ◆ medical considerations;
- ◆ ethical considerations;
- ◆ scientific basis for treatment; and
- ◆ cost efficiency in production.

Professional information must, of course, be available to knowledge system 5 workers as nurses at all levels, in the same way as it is available to other decision makers today. When personnel in knowledge system 5 are authorized to set priorities within only one field of responsibility, the principles forming the basis for priorities by the authorities will be integrated and treated in the same process and, unlike today, they will be evaluated as single principles by various boards and committees.

A side effect, not to be underestimated by transferring priority issues to knowledge system 5, is that we will come to grips with principal-agent thinking, where the one discharging duties (doctor or nurse) has more knowledge than the authorities responsible for the operations, i.e. the supply side dominates the demand side. In the long run, no system's interests will be well served by this kind of imbalance. When knowledge system 5 takes over responsibility for setting priorities, in accordance with a bottom-up model, competition between the various departments within a hospital and between the single hospitals will increase. However, increased competition will entail larger differences to begin with, as priorities will not be based on a standard. These differ-

ences can then be evaluated in terms of their effect on health improvement, treatment, care-giving, life quality and quality-adjusted life expectancy. The competition between the various knowledge systems, both internally within the hospital and between hospitals, will lead to wider access to information, thereby toning down some of the negative aspects of the principal-agent model.

Health economists seem to assume that the best solution in the long run is to base priorities in the Norwegian health system on elaborating unpopular decisions (Norheim & Bringedal, 2001, p. 106). In debates about priorities it is precisely factors (power struggles, political agendas, and so forth) that are not objective which generate debate and influence priorities in Norwegian hospitals. It is, hence, not the uncertainty of priorities that is problematic, but their ambiguity. The uncertainty can be reduced by means of information, while ambiguity must be reduced by means of communication.

A developed knowledge system 5, in which the context and practice are well understood, is best suited to clarifying ambiguity and uncertainty through information and communication. Also, priorities should not be based solely on information differences but on ethical considerations linked to the values and norms of the individual. Priorities are based on ideological concepts, which do not necessarily have to be linked to information differences. Priorities are also linked to social relationships. While information is a necessity in priority debates, reducing ambiguity is crucial to the outcome of priorities and the reduction in ambiguity is not achieved through increased information but by increased communication. Interaction between personnel within the knowledge 5 system, and between hospitals, can result in positive knowledge effects, a form of knowledge cluster effect, in terms of priorities. The point is to reduce ambiguity in priorities by increasing interaction and reducing complexity, which is achieved by means of sufficient variation.

5. The knowledge management of nurses in hospitals

Several recent studies on knowledge management applied to nurses have emphasized the knowledge infrastructure, the importance of technology and culture (Ghosh & Scott, 2007, 2009), the importance of measuring and reporting knowledge (Lytras & de Pablos, 2009), and the importance of having knowledge strategies (Russ & Jones, 2005). We will, however, argue the importance of the individual nurse, and a framework to support the individual providing the necessary strategic context for performance. We will, therefore, propose the following

management framework designed to improve the organization and performance of nurses in Norwegian hospitals (see Drucker, 1999, 1999a).

1. We must ask questions on what the individual hospital is designed to do. It is in this context that the question about the knowledge cluster model for hospitals (Figure 2) is applied. Each of the knowledge systems is staffed by nurses with specific primary tasks. The focus is on core competence for the hospital as a whole, but the focus on the primary task for the individual knowledge system (1 to 5) is even more important.

2. A result-oriented culture must be developed whilst not compromising the treatment and care-giving functions of a hospital. The question is: How precise is the insight of the individual knowledge worker as to what results are expected of him or her within a specific period of time? What social mechanisms are built in to ensure that negative result deviation has consequences?

3. A culture of knowledge sharing must also be developed. Whilst there is a growing use of ICT in hospitals, knowledge sharing continues to rely on human interactions. An inability to share knowledge in hospitals creates ‘islands’ of care. Such knowledge sharing is pending motivation. The question is: What incentive systems are needed to improve knowledge sharing among nurses in hospitals?

4. The focus must be maintained on continuous innovation of management and organizational processes. The question here is: To what extent are innovation

processes in the hospital emphasized? Innovation here means processes, services and products, as well as organizational changes and market changes.

5. Motivation for each individual and the entire team must be integrated into the design of the reward systems, ensuring that sharing of knowledge is rewarded. The motivation of the knowledge workers can be expressed as a link between impersonal development opportunities, a considerable degree of autonomy in the execution of work, and a reward system relative to results. The question is: To what extent, and in what way, is knowledge sharing rewarded in cultures where political agendas often dominate?

6. The responsibility for productivity rests on the individual knowledge worker; a large degree of autonomy in relation to tasks must be incorporated in the execution of work. The question here is: What degree of autonomy has the individual knowledge worker in relation to planning work within the framework of the primary tasks of the enterprise? How is the quality of the tasks executed being measured? These two questions are linked to the degree of self-organization of the hospital.

7. Continuous competence development is a decisive precondition. The question here is: To what extent is the continual development of competence within the hospital being emphasized whilst at the same time not compromising care-giving aspects, considering internally and externally generated competence?

These factors can be presented in model form, as shown in Figure 3.

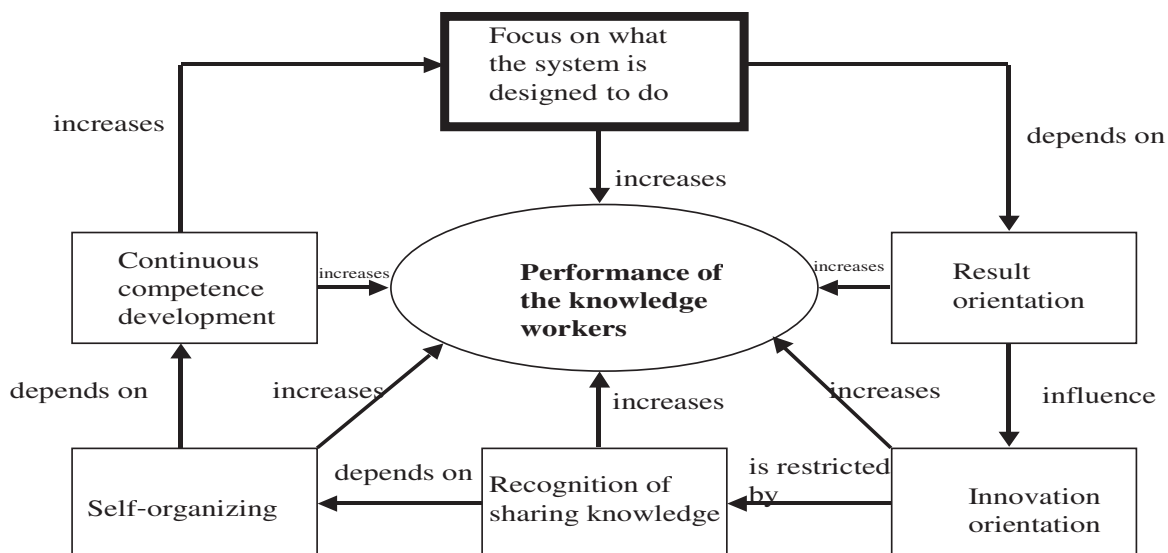


Fig. 3. Performance of knowledge workers

For a nurse, reflecting on what should be done is a vital part of his/her tasks. Result orientation is the most important factor in improving the performance of knowledge workers. The question is what can be expected as a result of the main processes

and main activities that constitute the performance of the core processes. Result orientation is also linked to the transfer of activities to other persons or systems that are in a better position to carry them out.

Asking questions in relation to the model and acting on the basis of the answers can potentially increase nurses' productivity in hospitals. A larger empirical study from the USA showed nurses' productivity increases significantly, supporting the argument about the importance of knowledge efficiency (ref). Also, patient satisfaction similarly increased significantly, and the number of nurses quitting their jobs fell.

Core competence and core activities should, furthermore, be oriented around quality measures. Maintaining the focus on core processes, core activities and the inherent core competence will direct the attention to what the hospital is designed to do, thereby improve the performance of the knowledge workers. This is supported by work by Gowen, Stock & McFadden (2008).

Focusing on core competence, core specialization, and work specialization will increase the degree of management innovation in a hospital. New ways of organizing and managing staff (see Figures 2 and 3) will put the hospital in a position to reduce costs, increase productivity, and use nurses in processes closer to the core processes and the primary tasks of the hospital's various knowledge systems. It is the motivation of the individual that is in focus for knowledge workers, not a rule-oriented reward system. The motivation of knowledge workers is, to a major extent, determined by personal opportunities for development, their degree of autonomy in the execution of their work, and the extent to which the reward is linked to the results achieved. This has been displayed in Figure 3.

Conclusion: Why are hospitals so difficult to manage?

The transition from an industrial society to a knowledge society is characterized by a cultural lag, during which the thought models from the industrial society still dominate, and become a basis for tensions and conflicts at many levels. This conflict is particularly evident between nurses closely linked to primary activities and the management system itself of hospitals (Kaarbøe & Østergren, 2001, p. 214) because they are linked to various mental models. One is from the industrial society, where management and control were the deciding factors for the

level of performance, and the other was from the self-organizational principle, in which there is little room for bureaucratic management structures.

Conflicts along these lines might entail unstable systems, liable to experience large oscillations, with internal conflicts, power struggles, relationship fatigue, and opportunistic behavior that complicate management and control. The insight gained through practical experience is not fed back from the front line to the control level, since this experience is, to a major extent, based on tacit knowledge and by definition cannot be transferred to others via explicit procedures and rules. Directives from the management system are, therefore, not congruent with the collective intellectual capital of the front-line staff, who gradually tend to overlook the directives until budgets tell the full story. Hospitals are, therefore, difficult to manage because the management rudder is disconnected and has no impact on the frontline activities. Such management systems must necessarily lead to variances between budgets and activities, with the corresponding effects on cost structure and motivation in hospitals.

Ambiguous directives from the authorities have reinforced this poorly designed management model in Norwegian hospitals. This has led, according to some research, not only to the middle management staff in hospitals making decisions and managing, but also to continuous power battles (Norheim & Bringedal, 2001) in which the total perspective for the health sector in general, and the individual hospital in particular, is lost. Another consequence of this management model is that doctors and nurses who are middle managers in Norwegian hospitals spend a lot of their time at work making decisions, ranging from diagnostic methods to appropriate treatment levels and purchasing procedures.

In brief, one can say that when the financing system is dissociated from the activity system, the management processes such as decision-making are unclear. Norwegian hospitals are, hence, difficult to manage because the distinction has not been made between cost effectivity and knowledge effectivity. In this article we have proposed one way to better cater for what we claim is improved knowledge effectivity in Norwegian hospitals.

References

1. Askildsen, J.E. & Holmås, T.E. (2001). Arbeidsmarkedet for helsepersonell i Norge: Hvor blir det av sykepleierne? I Askildsen, J.A. & Haug, K. Helse, Økonomi og politikk, Cappelen Akademiske Forlag (sidene: 63-85).
2. Beer, S. (1979). "The Heart of Enterprise", John Wiley, New York.
3. Beer, S. (1981). "Brain of the Firm", Herder and Herder, New York.
4. Beer, S. (1985). "Diagnosing the System for Organizations", John Wiley & Son, New York.
5. Bunge, M. (1998). Social Science under Debate. Toronto: University of Toronto Press.
6. Bunge, M. (1996). Finding Philosophy in Social Science. New Haven CT: Yale University Press.
7. Bunge, M. (1997). Mechanism and explanation. *Philosophy of the Social Sciences* 27: 410-465.

8. Bunge, M. (1999). *The Sociology-Philosophy Connection*. New Brunswick NJ: Transaction Publishers.
9. Castells, M. (1997). *The information age: Economy, society and culture, Vol II: The power of identity*.
10. Castells, M. (1998). *The information age: Economy, society and culture, Vol. III*, Blackwell, New York.
11. Darroch, J. (2003). Developing a measure of knowledge management behaviors and practices. *Journal of Knowledge Management*, 7, 41-54.
12. Davenport, T.H. & Glaser, J. (2002). Just-in-Time Delivery Comes to Knowledge Management. *Harvard Business Review*, Jul 2002, Vol. 80, Issue 7.
13. Desouza, K.C. (2005). *Knowledge management in hospitals*. In Wickramasinghe, N., Gupta, J.N.D. and Sharma, S.K. (eds.): *Creating Knowledge-Based Healthcare Organisations*, Idea group Publishing, pp. 14-28.
14. Drucker, P.F. (1999). Knowledge worker productivity: The biggest challenge, *California management Review*, 41, 2: 79-94.
15. Drucker, P.F. (1999a). *Agement challenges for the 21 st century*, Butterworth Heineman, London.
16. Drummond, M. & Stoddart, G. (1997). *Methods for the economic evaluation of health care programmes*, Oxford University Press, Oxford.
17. Ghosh, B. & Scott, J.E. (2009). Managing clinical knowledge among hospital nurses. *International Journal of Technology Management*, Vol. 47, Nos. 1/2/3. 57-74.
18. Gowen, C.R., Stock, G.N. & McFadden, K.L. (2008). Simultaneous implementation of Six Sigma and knowledge management in hospitals. *International Journal of Production Research*, Vol 46, No. 23, 6781-6795.
19. Grant, R.M. (1996). Prospering in dynamically competitive environments: Organizational capability as knowledge integration, *Organizational Science*, 7, 4: 375-387.
20. Herzberg, F. (1966). *Work and the Nature of Man*. World Publishing Company, Cleveland.
21. Herzberg, F.B., Mausner, B., & Snyderman, B. (1959). *The motivation to work*. New York: John Wiley and Sons, Inc.
22. Lytras, M.D. & de Pablos, P.O. (2009). Managing, measuring and reporting knowledge-based resources in hospitals. *International Journal of Technology Management*, Vol. 47, Nos. 1/2/3. 96-113.
23. Miller, J.G. (1978). *Living Systems*, McGraw Hill, New York.
24. Norheim, O.F. & Bringedal, B. (2001). Hvordan bør vi prioritere helsetjenesten? (s. 89-114) I Askildsen, J.A. & Haug, K. (red.). *Helse, Økonomi og politikk: Utfordringer for det norske helsevesen*, Cappelen Akademisk Forlag, Oslo.
25. Phillips, V.L. (1995). Nurses labor supply: Participation hours of work, and discontinuities in the supply function, *Journal of Health Economics*, 14: 567-582.
26. Romer, P. (1988). Its all in Your head, *Outlook*, 1: 9-12.
27. Russ, M. & Jones, J.K. (2005). A typology of knowledge management strategies for hospital preparedness: what lessons can be learned? *International Journal for Emergency Management*, Vol. 2, No. 4, 319-342.
28. Shapero, C. & Varian, H.R. (1999). *Information rules: A strategic guide to the network economy*, Harvard Business School press, Boston, Mass.
29. Thurow, L.C. (1999). *Creating wealth*, Nicholas Breeley publishing, London.
30. Thurow, L.C. (1996). *The future of capitalism*, Nicholas Breeley publishing, London.