

Information society needs of managers in a large governmental organisation

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ABSTRACT

Dealing effectively with information and communication technology in the information society is a complex task and the human dimension is often under-estimated. This paper tries to give a voice to some managers about their experiences with information, communication and technology in their working environment, which involves participating in a learning organisation, knowledge management and communities of practice, competency management, ICT-Security awareness management as well as and innovation and change management. Managers of a large governmental organisation in the Netherlands were polled in a questionnaire requesting their responses in using ICT as well as involvement in the above categories. The responses of 246 of them were analysed. It was found that they knew full well that their strongest need was for a conceptual understanding of the implications of ICT in their changed work environment. This need overarched the elementary end-user training needs of what buttons to press to achieve what end. The research findings emphasize that as education is increasingly need-driven instead of content-driven it is necessary to reconsider the curricula of higher educational institutes especially with regards to management training. Furthermore, this research highlights a need for on the job training and performance support for middle managers.

Keywords

ICT skills, Digital work environment, Information society, Learning organisation, E-leader

Introduction

The organisation, the technology, the employees as well as the information society each play an important role in dealing effectively with information and communication technology and they influence each other. Especially managers play an important role in firstly implementing new technologies in the working environment and secondly in motivating their staff to use the information, communication and the technology effectively. Yet managers often struggle to define their role in the new work situation. In this paper some answers are given to the question: What are the reported experiences of managers regarding information and communication technology in their working environment? Working from the perspective of a person who is responsible for facilitating learning in a large governmental organisation in Europe, we wanted to know two things. Firstly, what ICT skills do they already have that we may draw upon when creating a culture of learning in an organisation? Secondly what are the ICT skills required by middle managers?

Literature shows that managers play an essential role in managing information as well as implementing information and communication technology in organisations (Hargrove, 2001; Kluytmans, 2005; Boonstra, 2005). This is a complex process for which managers are often not sufficiently prepared (Beijen, Broos & Lucas, 2003). Hence it appears important to research the area of information and communication technology in the work environment further from the perspective of managers in order to identify needs for further development as well as for performance support in this regard. Yukl (2006) also calls for research in which more insight is obtained in how managers deal with information and communication technology in the working environment. Furthermore, Davenport & Prusak (1997) argue that in order to optimize any information system, it is important to investigate the human interactions with the system as well as their interpretation of the system in the context of their working environment. This leads us to the important question if managers are indeed ready and prepared to deal effectively with the adjusted ways of working required in the information society by using information and communication technology. Such information will be valuable when determining the ICT literacy requirements for management training, as well as determining the extent to which ICT would be a suitable conduit for management education.

Literature survey

Feather (2004, P. 209) states that *“the information society can perhaps best be understood as a society that has developed information technology and is learning to use it.”*

The technology in the information society has made the current level of globalization and the sharing of information possible through international networks and mobile technologies (Boonstra, 2005; Hargrove, 2001; Feather, 2004) and the amount of available information is increasing exponentially. Managers are confronted with the task of implementing changes and innovations as organisations continue to adjust to the requirements of the information society (Hargrove, 2001; Boonstra, 2005). Technology makes alternative ways of working possible and the requirements of the information society are such that implementing alternative ways of working are necessary to adjust to the changed requirements. Hargrove (2001) has noticed that managers could play a crucial role in this regard on three different levels: firstly in influencing the strategy of the organisation in this regard, secondly in implementing the new strategy and thirdly in influencing their subordinates in participating in the new ways of working and using ICT. However there are also authors that warn that the technology of the information society can never replace the social networks and resources that make learning and working possible (Brown & Duguid, 2000).

Our research identified the following components of adjusted ways of working and leading for managers in the information society (Broos, 2007):

- Participating in a learning organisation, knowledge management and communities of practice
- Competency management
- ICT-Security awareness management
- Innovation and change management

In the following section the literature pertaining to each of the components is discussed.

Participating in the learning organisation, knowledge management and communities of practice

Organisations need to become adaptive and flexible (Belasen, 2000) and it is important that they change into learning organisations, in order to keep up with continuing changes required in the information society (Wenger, 2000; Senge, 1990). A corporate curriculum has become very important in such organisations, according to Kessels & Keursten (2001) and working and learning come together in the work environment. Just-in-time learning and mobile technology could also play a role in the learning organisation (Hargrove, 2001; Traxler, 2005).

The importance of a positive attitude towards learning and life-long learning in the information society is generally accepted, but Hargrove (2001) takes this even further and claims that new ways of learning are required in the information society. He calls this learning process transformational learning in which learners fundamentally change in the way they think and behave in their working context. Other authors support this notion (Yukl, 2006; Zaccaro et al., 2006). Individuals can thus learn in an organisation, but the learning capacity of an organisation can also be increased by implementing a knowledge infrastructure and dealing with an integral and systematic approach in a network-organisation (Rampersad, 2002).

In this paper knowledge is seen as a higher level of complexity than information, in the sense that it contains not only facts and insight in those facts, but also experiences, attitudes and skills. In this light is important to recognize that people know more than they can tell (Polanyi, 1962). Knowledge management includes the systematic planning, storing, controlling, using and distribution of knowledge that is important for the organisation as well as for the individuals in it (Weggeman, 2000). According to Feather (2004) one of the key aspects of knowledge management in an organisation is to ensure that the informal information that underpins effective operation is included. It is therefore essential that the explicit knowledge of an organisation is evaluated continually and managers play a crucial role in this process (Belasen, 2000).

Davenport & Prusak (1997) found that political battles in organisations could also frustrate the sharing of information. They claim that organisations need to take those aspects into consideration when a strategy for using and sharing information and knowledge is developed. This notion is supported by Rosenberg (2006) who also explains the importance of the culture of a learning organisation supporting the development and distribution of

knowledge in the organisation. Trust between staff members as well as staff members and management is important in a spirit of open communication, commitment and willingness to work together for a common goal. In this light the following quote of Drucker in Davenport & Prusak (1997:28) appears to be important: *“We will have to learn, before understanding any task, to first ask the question, What information do I need, and in what form, and when?... The next question people have to learn to ask is, To whom do I owe which information and when and where.”*

Communities of practice are communities that support professional discussion and work by sharing knowledge and experiences, often called best practices. Such communities often have some kind of online presence and sociability and usability are often important determining factors (Preece et al., 2004). Wenger (2000) argues that the success of organisations is largely determined by the ability to create communities of learning and practice.

Competency management

According to Nobre (2002) there are three types of competencies that are important in organisations: core competencies within an organisation, competencies that the employees have and competencies that the customers as the ultimate decision makers have.

According to Kluytmans (2005) and Harrison & Kessels (2004) it appears to be beneficial for an organisation to create harmony in which the potential human resources are optimally available for the organisation and at the same time the employability of the employee is increased. One of the adjusted roles of the manager is the need to find a balance between the competencies required by the organisation with the development needs of the staff he/she is responsible for (Kessels, 1999). The managers could identify the gaps in the required competencies and the available competencies and adjust development and recruitment programmes accordingly. With rapidly changing organisations employees often do not work within the strict limits of their function descriptions any longer (role-orientated), but the demands of the work increasingly requires them to be flexible and task-oriented (Kluytmans, 2005).

Electronic means are available to help in this regard (Stoof, 2005). A competency profile could be made and managed for each employee and core competencies in the organisation could be digitally stored and managed.

ICT-security awareness management

With improvements of ICT the global security environment has changed dramatically (English, 2005) and it has become necessary to deal with the risks in a fundamentally different and more effective way. It is not sufficient any longer to have security professionals in the organisation and technical solutions in place; Every employee needs to be aware of the ICT- security risks as well as the potential consequences of such security breaches (English, 2005; Siponen, 2001; Parker, 2001). Often not enough attention is given to this human aspect and as Siponen (2001:26) states: *“Nothing is done as long as nothing goes wrong.”* and yet the cost of doing nothing can be huge. Managers could play an essential role in making sure that every employee is aware of the ICT-security risks and thus improving the integrity, availability and exclusivity of information in the organisation. The manager needs to understand the importance of a high quality of information in terms of completeness and collective significance (English, 2005). Bonatti et al. (2006) argue that the most important cause of computer security violations on the Internet is the lack of technical knowledge of the users.

Innovation and change management

Based on research done by de Jong & den Hartog (2005) it could be argued that participation of employees in generating innovative ideas is essential and that strategic attention to innovation has a positive correlation with innovative behaviour of employees, thus emphasizing the role of the manager in this regard. Innovation is further enhanced if an organisation is able to attract talented and creative people of diverse backgrounds and able to create an open working climate (De Pree, 2006). A manager plays an important role in facilitating those aspects in the work environment.

In the dynamic environments of the information society it is important that managers coach their workers to see the importance of change so that they want to change themselves and want to make a positive contribution in the changes (Stoker, 2005). The importance of effective leadership and communication during continuing changes in organisations is recognized by a number of authors (Hargrove, 2001; Boonstra, 2005; Belasen, 2000; Stoker, 2005).

Research method

A conceptual framework for ICT and ICT-related competencies required by managers in the information society based on research by Broos (2007) was used to determine a topic list for the questionnaire as is illustrated in table 1. The questions in the questionnaire are based on this topic list. The number of questions for each aspect was mainly based on the number of topics identified for each theme. A pilot study was conducted by handing out questionnaires in various parts of the organisation to 15 members of the research population. The questionnaire was thereafter adjusted according to statistical findings and comments of the participants in the pilot.

Table 1 Topic list for questionnaire based on research of Broos (2007)

	Topics identified	
General ICT skills	Knowledge about functionalities and limitations of (generic) applications, hardware and networks. Mastery of applications. Conceptual insight in ICT in order to participate effectively in decision-making in this regard. Finding quality information when needed. Evaluating the relative importance of information and sources.	
Adjusted ways of working using ICT	Dimensions	Indicators
Learning organisation	Willingness to be involved	Recognizing a need for information. Identifying and understanding the organisational value. Addressing the information gap in organisations. Individual concern: individuals need to participate in storing and using the knowledge, sharing the knowledge, applying the knowledge and evaluating the knowledge. Managers play a special role in organizing and communicating the knowledge.
	Knowledge management	Ability of the individual to utilize opportunities. Practical accessibility of the information in the organisation. Existence of applicable information. Knowledge of internal and external sources of information.
	Communities of practice	The need for networking (sources and networks for expertise need to be identified both nationally and internationally). Participation in Communities of practice. Usability (Work experiences and lessons learnt).
	Attitude towards life long learning	Understanding that lifelong learning is essential. Learning how to learn.

Competency management	Focus on organisation	Insight in competencies required in the organisation. This includes requirement for functions, but also across functions.
	Focus on employees	Insight in competences and talents of employees/subordinates. Insight in learning and training needs of subordinates. Development plan for each subordinate. Encouraging employability of subordinates. Use of a competency library in order to match the needs of the organisation with development plans for subordinates.
ICT-security awareness	Ensuring security of information.	Holistic understanding of ICT security (exclusivity, integrity, and availability) risks in the organisation. Participation in improvement of the ICT-security situation.
	Encouraging information security awareness.	Encouraging ICT- security awareness amongst staff.
Change Management	Change exposure	Knowing the effect of change and ability to deal with change constructively. Dealing with resistance of subordinates against change. Inspiring and motivating staff regarding the vision.
	Communication and vision Effect of organisational culture. Autonomy Stimulation of innovative behaviour and work climate.	Communicating vision and changes required. Knowing the effect of the organisational culture during change. Allowing subordinates autonomy in dealing with tasks. Allowing subordinates to make mistakes. Encouraging subordinates to participate in generating new ideas. Being a role model by generating new ideas.
Innovation management		

A questionnaire was circulated amongst managers in a large non-profit organisation in the Netherlands (Broos, 2007). The first section of the questionnaire contained questions about the use of applications and general use of ICT in the work environment based on the topics mentioned in table 1. The use of ICT in the workplace contained a number of open questions about specific applications in the work environment. Furthermore a list of applications was stated in the questionnaire. The respondents could select one option on a 4-point scale for each application, where option one represents 'do not use', option two represents 'not so important', option three represents 'important' and option four represents 'very important'. In order to obtain insight in whether the applications are used and their relative importance in the digital work environment the four options provided sufficient information.

The second section of the questionnaire contained statements about new ways of working in the information society as they were identified in the literature. The respondents could evaluate the statements on a 5-point Likert scale where option one represents 'does not apply at all' and option five represents 'applies entirely'. The purpose of the second section of the questionnaire was to provide some insight in the commitment, knowledge and behaviour regarding the adjusted ways of working required in the information society by means of a self-evaluation and therefore a standard 5-point Likert scale with five ordered responses appeared appropriate for this section. The items included in the questionnaire for the new ways of working are listed below.

Creating and participating in a learning organisation

- I do communicate electronically with other professionals about my work.
- In my function it is important to continue to learn all the time.
- I have the opportunity to learn via the Internet during working hours.
- I obtain ideas from the work of others that I find on the Internet to improve my own work.
- I participate in keeping the information on the Intranet of the organisation up to date.

- I obtain ideas from the work of others that I find on the Intranet of the organisation to improve my own work.
- It is important to store the knowledge of my section electronically.
- I have the opportunity to learn via the Intranet of the organisation during working hours.
- I share my work-related knowledge with others electronically using a share.
- I spend time to organize electronically the working knowledge of the unit that I am responsible for.
- I think of ways to improve the sharing of information electronically.
- I spend time to improve the sharing of organisational knowledge electronically.
- I benefit from colleagues who share their experiences/lessons learnt with me.
- I share the mistakes that I made and what I learnt from it with my colleagues.
- I play an important role in managing the knowledge of the organisation electronically.
- I reflect on how information can be managed more effectively.
- I play an important role in organizing the flow of information in my unit.
- It is important for my organisation unit to share working knowledge and information with international partners.
- I implement new ways of working with information in the organisation.
- I reflect about the integrity of the information that I am responsible for.
- I allow my subordinates to learn via the Internet during working hours.
- I encourage my subordinates to share their working knowledge with others electronically.
- I discuss the advantages of sharing working knowledge electronically with my subordinates.

Competency management

- I use my computer to obtain insight in the competencies needed in the organisation.
- I use my computer to store relevant information about the potential of my subordinates.
- I recognize development needs of my subordinates.
- I facilitate the development needs of my subordinates.

ICT-security awareness

- I reflect on the security of information in the organisation.
- I know what the security risks of the Internet are.
- I reflect about the integrity of the information that I am responsible for.
- I encourage ICT-security awareness amongst my subordinates.

Change and innovation management

- I know how to manage change effectively.
- I know how I can accompany changes in the organisation effectively.
- Communication is important during a change in the organisation.
- I know how I can deal with the resistance my subordinates have against changes in the organisation.
- I consider renewal projects as a challenge.
- I have enough autonomy to work in the way I find best.
- Support in developing new ideas is always found in the organisation.
- I use creative ideas to improve the working method.
- I encourage my subordinates to participate in the thinking process about improving the working processes.
- I allow my subordinates to work in the way they find best.
- I allow my subordinates to make mistakes.

The questionnaire was sent to 700 randomly selected managers in the organisation. The managers have received a higher education, work at least one year in the organisation and are working in a variety of function areas ranging from governance, human resource management, administration and logistics, information and communication systems, planning and control, education and training to technical design and maintenance. 246 respondents returned

the questionnaire. This constitutes 35% of the sample. Relevant demographic variables of the respondents such as gender and position in the organisation compared sufficiently to the demographic variables of the target population in the organisation. The responses to the questionnaire were analyzed using the statistical package SPSS version 13. The respondents were given the opportunity to write comments on the questionnaire, which gave a further voice to the managers. Some of those comments are used to illustrate the experiences from an insider's point of view. The comments were analyzed in a qualitative way by identifying predominant topics in the opinions of the respondents. Thereafter the comments related to each topic were compared to each other to obtain insight in the relative importance of the opinions about each topic. The identified topics were then compared and linked to the items identified for this research based on the literature review. The comments are used to enrich the discussion of the findings.

Finally factor analysis was used to further investigate if the separate components that are found in the literature review are also observed as separate components based on the analysis of the results of the questionnaire.

Findings

Managers spend on average 20.9 hours per week on the PC at work. Two of those hours are spent on the Internet and 3.8 of those hours on the Intranet of the organisation. Working at home during working hours is not yet common practice in this organisation with a mean of 1.1 hours per week (s.d. 3.8) but most managers indicated that the hours worked at home were productive.

In general the managers indicated that they were more productive as a result of the information and communication technology in their work environment, however 31% of the managers indicated that they lose production time because they are not familiar with the software applications in their work environment.

One respondent wrote on the questionnaire: *"I observe a mixture of loose applications and an abundance of digitalization, but only poor automatization. The consequence is that it costs time instead of saves time"*.

Managers are fairly confident in using ICT in their work environment, however

- 27% indicated that they are not able to use all the software applications that they needed in their work.
- 32% indicated problems managing e-mail effectively.
- 30% indicated problems managing information effectively. One respondent wrote in this regard on the questionnaire: *"Information can easily be stored, but finding it afterwards is difficult"*.
- 48% needed help from others in dealing with ICT in their work environment.

The following quote illustrates the frustration that some of the managers have regarding their lack of knowledge about ICT: *"I have an ultra modern computer system with many recent applications, but I only use it as a typing and e-mail machine, since I have no insight in how to use the applications. I use pen, paper and the knowledge of my colleagues to do my work. I fall back on stone age technology since I am not familiar with the system."*

Managers did not experience regular info-stress, however

- 65% of the managers experience some stress as a result of using ICT (e.g. software, printers and availability of the network) in their work.
- 22% of the managers experience stress as a result of using ICT in their work because they do not have enough knowledge about it.
- 48% of the managers experience some stress as a result of the amount of information that they have to work through on a daily basis.

The next section discusses the importance that managers allocated to some of the applications in their work environment. Microsoft Word and Email were excluded from the list as these technologies can be regarded as ubiquitous. The rated applications are ordered according to perceived importance in table 2.

Table 2 Response about importance of software applications in the working situation

Software application	Mean (Scale 1-4)	S.D.	95% Confidence Interval for Mean	
			Lower bound	Upper bound

Intranet	3.20	0.70	3.11	3.29
MS Excel	3.01	0.77	2.92	3.11
MS PowerPoint	2.91	0.73	2.82	3.01
Electronic calendar	2.78	1.10	2.64	2.91
Internet	2.62	0.95	2.50	2.74
Information management system	2.29	1.09	2.16	2.43
MS Access	2.18	0.96	2.05	2.30
Project planning system	1.81	0.98	1.69	1.94
Competency management system	1.55	0.86	1.44	1.66
Tool to organize thoughts	1.52	0.87	1.41	1.63
Video conferencing	1.21	0.50	1.15	1.27
On-line discussion	1.21	0.52	1.14	1.27

Delving deeper into the data we can consider the extent to which managers find the applications important, use it, and ignore it.

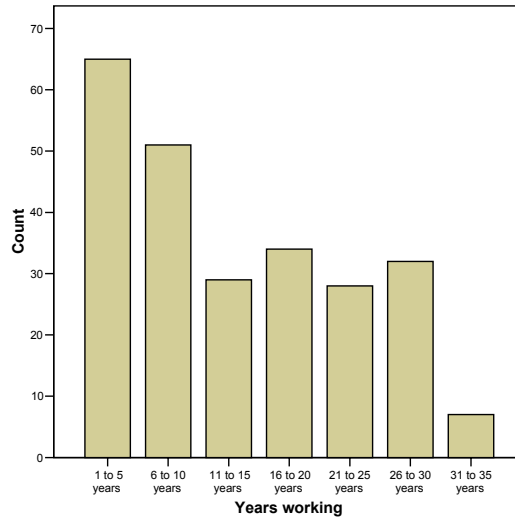
- Intranet: 86.9% find it important, 11.4% use it but do not find it important and 1.6% do not use it.
- MS Excel: 76.8% find it important, 20.3% use it but do not find it important and 2.8% do not use it.
- MS PowerPoint: 76.4% find it important, 19.9% use it but do not find it important and 3.7% do not use it.
- Electronic calendar: 67% find it important, 11.4 % use it but do not find it important and 20.8% do not use it.
- Internet: 60.4% find it important, 24.1% use it but do not find it important and 15.5% do not use it.
- Information Management System: 48.8% find it important, 17.4% use it but do not find it important and 33.3% do not use it.
- MS Access: 36% find it important, 35.3% use it but do not find it important and 28.7 do not use it.
- Project Planning system: 27.4% find it important, 20,3% use it but do not find it important and 52.3% do not use it.
- Competency Management system: 18.1% find it important, 15.2% use it but do not find it important and 66.7% do not use it.
- Tools to organize thoughts: 17% find it important, 13.7% use it but do not find it important and 69.3% do not use it.
- Video conferencing: 10.2% find it important, 4.1% use it but do not find it important and 84.5% do not use it.
- On-line discussion: 5.3% find it important, 10.2% use it but do not find it important and 84.5% do not use it.

The qualitative data showed that some managers simply did not know what certain applications could do for them: “There are applications that I use now and find very important. I would have liked to know about those applications at an earlier stage. An example is mind mapping. This is an important tool to organize thoughts. It is most likely important to all managers.”

In graph 1 is illustrated the number of years the respondents work as managers in the organisation. In this research no significant differences were found related to the number of years that managers were managing in the organisation in relation to the lack of knowledge.

This means that younger managers did not experience fewer problems using ICT in their work environment compared to older managers. This research result could be important since it is often expected that younger people will be able to deal with ICT in the work environment based on their experience in private use of the computer or what they have learnt in school. This research does not support such notion and therefore a re-evaluation of the curriculum of higher education in order to include more ICT related topics appears necessary. Especially in the light of higher education becoming increasingly needs-driven instead of content-driven (Plomp, 2006).

A number of managers indicated on the questionnaire that it was important to have a conceptual insight in the generic functionalities of the applications or in the context of exchanging data between applications. They wanted to understand the underlying principles of the applications, what the possibilities are of the applications and how applications can import and export data. Furthermore they wanted to know what the reasons are that there are sometimes limitations in doing so.



Graph 1 The number of years that respondents are managers in the organisation

Some respondents wrote on the questionnaire that it is important to learn how to communicate appropriately using digital media, implying that this was not always the case in the organisation.

Table 3 shows how the aspects under consideration in this article applied to the respondents. The findings will be discussed in the following paragraph.

Table 3 The results of commitment, knowledge and behaviour to alternative ways of working for managers in the information society

Component	Central tendency	95% confidence interval for mean		Cronbach's alpha*
		Lower bound	Upper bound	
Creating and participating in a learning organisation	Applies partly	2.8	2.9	0.9
Competency management	Applies mainly	3.7	3.9	0.7
ICT-security awareness	Applies mainly	3.5	3.7	0.8
Change and innovation management	Applies mainly	3.7	3.8	0.8

*Where scores of items are totalled to obtain a single score for a component, a Cronbach's alpha was determined to ensure that the questions that contribute to those dimensions are acceptably homogeneous

Discussion of commitment, knowledge and behaviour to alternative ways of working for managers

When the items related to the component 'Participating in the learning organisation, knowledge management and communities of learning' are combined in a scale, the managers score lower than expected, with a central tendency of 'applies partly'. From the comments written on the questionnaires leadership emerged as an important factor, as this quotation typifies: "Leadership is the most important task of a manager; Working with people instead of hiding behind a computer."

In connection with the learning organization three respondents wrote on the questionnaire that a cultural change was required in the organization in order to improve the sharing of knowledge and information, since in their opinion some managers might either not want to admit having made a mistake in order to avoid risking their careers or not want to share information and expertise from a viewpoint of power. A number of respondents indicated the importance of having a sound insight in the knowledge of the organisation, especially in the light of many re-organisations occurring simultaneously in their organisation.

One respondent indicated that managers needed to play a role preventing uncontrolled increase in information, stating “*least is best*”. Respondents emphasized the importance of critically managing the knowledge of the organisation, evaluating the knowledge that is shared, keeping it up to date and removing outdated knowledge and information from a common database. A substantial amount of time is lost because managers cannot find relevant information when they need it. 38% of the managers waste time looking for information on the Internet and 67% of the managers waste time trying to find information on the Intranet of the organisation.

48% of the managers indicated that they experience difficulty evaluating the credibility of the information they find on the Internet.

Some managers indicated that using ICT in the work environment changes the culture of the organisation, which is shown by the following quote: “*ICT is a good tool for the organisation, but at the same time a burden. ICT communication goes at the cost of interpersonal communication and personal interactions. The culture of the organisation is changing.*” One respondent stated that it is also important to have communities of practice in a wider context across the borders of a particular function area to share information and knowledge in order to improve integral management in the organisation.

Creating new rules in relation to ICT-security awareness is seen as one way to improve the security situation, but as one manager indicated: “*To prohibit does not contribute to a culture of involvement. A better way is to work towards a culture of security in which the employees become ‘security-minded’.*” A number of respondents indicated that facilities needed to be created in order to make working possible in a secure environment without complicating the work.

General agreement exists amongst managers in this organisation about the continuing adjustments required in order to keep up with the changes regarding dealing effectively with information, communication and the technology.

Results of the factor analysis regarding alternative ways of working using ICT

Finally factor analysis is used to further investigate if the separate components that are found in the literature review can also be observed in the results of the questionnaire. Based on the results it could be determined if subcomponents need to be included and or certain components need to be grouped together. Factor analysis sorts the variables in homogeneous components based on the correlations they have with each other. Each component can thus explain a section of the variance of the results.

Six principal components are found with an initial Eigenvalue > 1 and a Cronbach’s alpha ≥ 7 , explaining a total of 53% variance. Varimax-rotation is used to reorganize the information in a more effective way so that it is easier to interpret the components (ten Berge & Siero, 1997). The results of the factor analysis are summarized in table 4.

Table 4 Reliability and explained variance of the scales to measure alternative ways of working

Alternative ways of working	Explained variance %	Number of items	Cronbach’s alpha
Participating in the learning organisation and knowledge management in general	16	10	0,9
Innovation and change management	10	5	0.8
Knowledge management in own unit, including communication about it	8	6	0.8
Participating in communities of practice	7	3	0.7
ICT-security awareness	6	3	0.7
Competency management	6	3	0.7

From the table it appears as if participating in a learning organisation, knowledge management in own unit as well as participating in communities of practice could be seen as different components and hence it would be better to deal with them separately in further research. Innovation and change management, ICT-security awareness as well as competency management are identified as components.

Conclusions and recommendations

Although the results of this research can not be generalized it could provide a basis from which further research amongst managers in organisations could be conducted. Many of the results might be of a general nature and emphasize the importance of employers being aware of the influence of implementing and applying ICT in their organisations.

In conclusion we try to answer the two sub-questions, regarding existing and required skills, as stated in the introduction to this article.

What skills do they have already?

Managers use the company Intranet, MS Excel, MS PowerPoint, the electronic calendars and the Internet regularly in their work environment and find those applications important. Based on the comments written on the questionnaires it would be fair to suggest that, although they use these applications and find their use important, they often use those applications probably rather superficial. Nevertheless it can be safely assumed that expecting managers to communicate using MS PowerPoint and MS Excel, and expecting them to find information on the Internet and Intranet effectively, would be academically feasible.

More significantly, however, the feedback from the questionnaires indicates that the most important ICT-related competency that the managers seem to possess, is the desire to learn more, as well as the desire to participate in a learning organisation. It is our contention that this attitudinal quality actually outweighs the actual physical knowledge of how to manipulate a given interface or application. The most important item of knowledge that the managers already have, is the knowledge of their own shortcomings in terms of acquiring information from the Internet and from the corporate Intranet, shortcomings in processing that information adequately using existing software such as spreadsheets and databases; and finally they know they need to improve their ICT communication skills.

What ICT skills do the managers require?

From this research can be concluded that using software effectively in the context of the work situation is very important in order to function effectively. This is in accordance with the research results from den Boer & Hövels (2002). This research shows that although a number of managers appear to be ready to deal effectively with the information and communication technology as well as the adjusted ways of working and leading, a substantial number of managers experience problems because they do not have enough knowledge about software applications, hardware and networks and experience problems in using the applications effectively in their work environment. What seems to emerge here however, is that the managers need to know more than just which buttons to push. They call for training that will lead to a conceptual understanding of ICT and its possibilities.

Managers spend a considerable amount of the work time using the PC. They play an important role in implementing ICT in the work environment and in motivating and coaching their staff in the adjusted ways of working. Our research indicates the importance of including effective use of ICT as well as dealing effectively with the adjusted ways of working in the corporate curriculum and perhaps also in higher education. In this regard it is remarkable that managers on average assign a relatively low score to the scale for 'creating and participating in a learning organisation' with the central tendency being 'applies partly'. In the light of the important role of the manager in facilitating the alternative ways of working, this appears to indicate a need for further training or performance support. According to Rowlands (2003) information policy ought to be seen as a verb and not a noun, arguing that including such issues in a corporate curriculum is a continuous process and can never be a finished product. Harrison & Kessels (2004) argue that effective knowledge management will not happen automatically, but that HRD programmes should deal with those aspects. The results of this research support this notion.

It has also become clear that communication using technology is not per definition the same as communication through natural language (Hart-Davidson, 2001). A number of participants indicated that they are often not sure how to communicate using ICT. They indicated that they found it difficult to represent data effectively using the

technology. Once again there is a need for training, not so much in using ICT, but in understanding and working in an environment that is constantly affected by the ever-changing nature of ICT.

An important change encompasses the attitude to the ownership of information. This research found that some managers regard their experiences, knowledge and even information as their property and as such provide them with a sense of power. This provides some support for the ideas of Rosenberg (2006) and research findings of Davenport & Prusak (1997) about the importance of creating a culture conducive to sharing information and knowledge. This research shows some support for the notion of Brown & Duguid (2000) not to underestimate the need for social networks and resources as well as the need for personal contact in order to make learning and working possible.

The most important skill required by the managers, therefore, is the skill of surviving in an information-driven work environment. ICT literacy is a subset of the greater skill of acquiring, processing and communicating knowledge.

These findings could motivate a re-evaluation of curricula of higher educational institutes in order to prepare future managers and professionals to deal effectively with information, communication and ICT in their working practices.

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