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PROFESSIONAL SKILLS IN THE ICT INDUSTRY

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Professional Skills in the ICT industry - Turbulent Times Resulting Contradictions and New Combinations

In the modern knowledge intensive economy human resources are the most critical factor behind the success of corporations. Information and communication technology (ICT) sector is one of the most knowledge intensive branches of the economy. The overall importance of ICT has also greatly increased, as it is nowadays widely integrated into almost all functions of the whole economy, business and society. As a result, it is highly important to foresee the skills needed from the ICT professionals in the future.

In this paper, the Finnish ICT sector's expectations from employees in the near future are examined and compared with the ones of other industries. Based on recent researches, the new skills requested by the ICT firms, besides the certain educational degree, are often qualities of personal nature. Factors like attitudes, the world-view, personal communication skills etc. are more important than before when firms are recruiting new staff. The new needs are reflecting the changes taking place inside the ICT industry, but also in the relationship between the ICT and other sectors. The mastery of ICT and its integration into thinking and business model has become necessity in sectors like banking. ICT has entered into the core of these businesses.

Keywords: Foresight, Employment, ICT industry, ICT skills.

1 INTRODUCTION

In the emerging digital economy, human resources are the critical factor behind success. Therefore, scarcity in skills or in skilled personnel can pose a serious threat to knowledge intensive branches, such as the Information and Communication Technology (ICT) sector. The quantity and quality of skills have been important issues especially in the high growth development phase, which the ICT sector in many countries has gone through. But quantitative skills shortage and qualitative skills gap could still threaten the further positive development of the ICT sector. In addition, when ICT is nowadays widely integrated throughout the functions of the whole economy and society, the possible skills related problems are to be taken seriously (Pohjola 2002, SRI Consulting 1997). When generalized to all end-users and the whole society, the qualitative skills gap could also block countries' path towards true information society (Gaia 2000 and Koski et al., 2001).

Changes taking place in the operational environment of the ICT firms influence the skill profiles they demand from their employees. By examining the evolution of the ICT sector and business clearer picture of the skills demanded in the future can be formed. Other branches beside ICT sector have needs of their own. Some examples of these needs are also included into this article.

2 BACKGROUND

2.1 Definition of ICT sector

The definition of the ICT sector, which is used in this article, follows the lines of the OECD definition (OECD 2000). Accordingly, the ICT sector consists of ICT manufacturing, ICT services, telecommunications and content production. In the field of content production, only the digital media is included to the ICT sector. Figure 1 below illustrates the definition of the ICT sector developed and used in the *ICT Skills 2010* project and it describes the products and services of each of these four sub-branches.

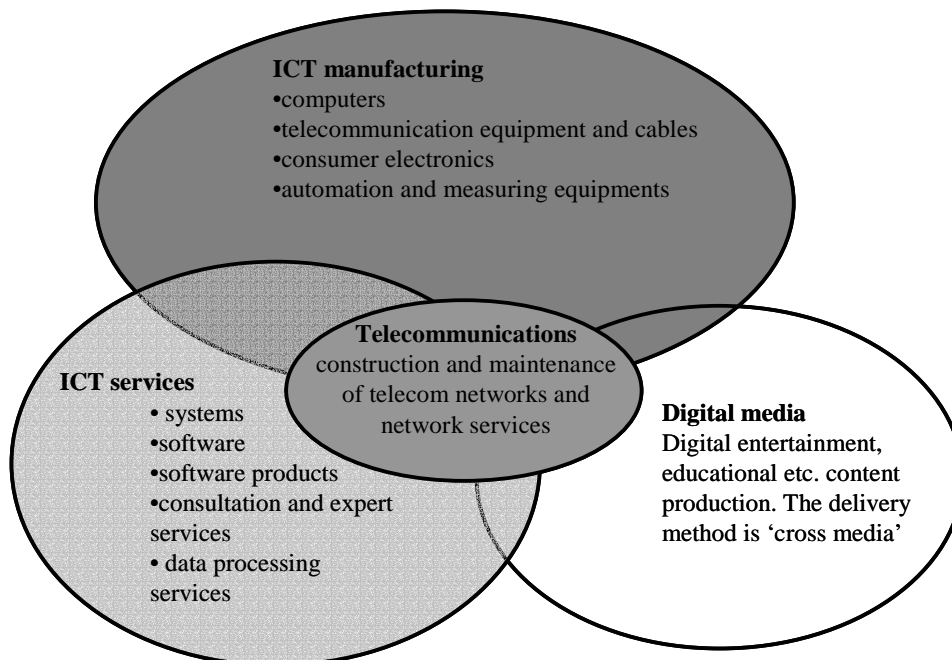


Figure 1. The definition of the ICT sector from the consumer's point of view (Meristö et.al. 2002).

2.2 Methodology

This article is based on ICT sector related industry foresight and other projects conducted in Finland in the years 2000-2002. In these projects quantitative forecast methods and the more qualitative methods of for example future studies were used in the industry foresight context. The results of these projects are in this article combined, compared and upgraded with newer material. The main focus is in ICT skills. What are the futures qualitative and quantitative skills needed in the Finnish ICT sector and other branches? Changes in the needs of the ICT firms are examined for example by identifying change factors affecting the operational environment of the ICT sector. The significance of ICT and skills related to it has increased strongly. ICT has become a new core competency in many sectors of the economy. This raises the question: What kind of skills and employees do these other sectors demand? Have they some special needs? Also the relationship between the ICT and these other sectors is examined. These key questions are examined by the help of data collected in the ICT firm survey conducted in year 2001.

One of the most important sources of knowledge is the background interviews conducted mainly in the year 2001. These interviews were part of the *ICT Skills 2010* project initiated by the organizations in the Finnish ICT sector and also financed by them together with the European Social Fund. The 20 persons interviewed were selected so that the most important viewpoints, i.e. markets, technology and society, would be taken into account. Interviewees included top executives of the ICT firms, academics, civil servants and other experts, who have an insight into the ICT sector. Also representatives of other sectors of the economy were included into the interviewees. The main function of the interviews was to identify and clarify the most important issues that should be addressed in the project.

The ICT company survey conducted among the Finnish ICT firms in the year 2001 is another of the central sources of information in the article. The survey was also part of the *ICT Skills 2010* project. Survey questionnaire was sent to 450 ICT firms and 114 firms replied. Respondent were members of the top management of the firms.

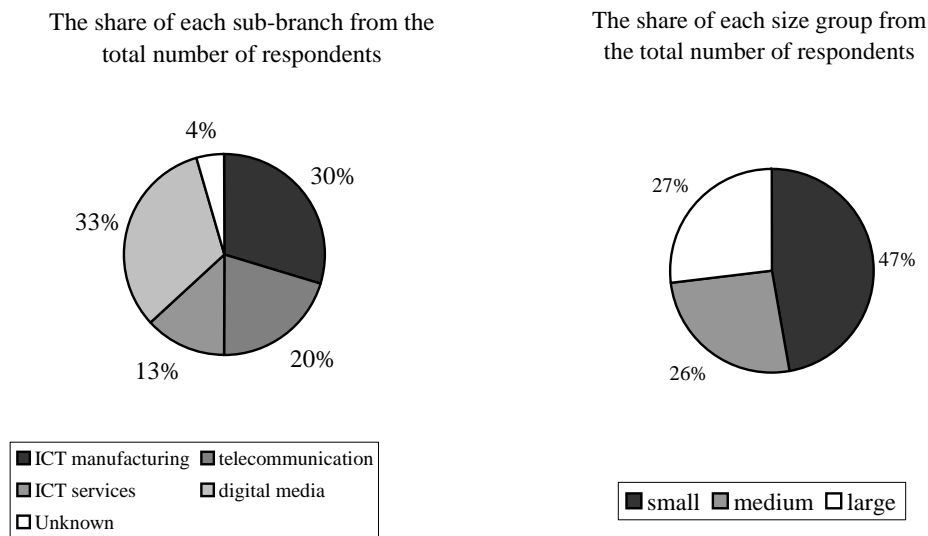


Figure 2. The distribution of survey respondents across sub-branches and size. The firms are here divided into smalls, medium sized and large following loosely the European Commission's definition of SMEs (The Commission of the European Communities, 1996 and 2001).

The total sum of employees in the firms that responded was 141 600 persons, which included also personnel stationed abroad. It can be estimated, that the survey formed a quite representative sample of the Finnish ICT firms. The survey produced valuable data for the further analysis of the ICT sector. The main topic areas of the survey were:

- the general future prospects of the ICT companies (globally, regionally and locally)
- the major change forces in the future
- the quantity of skills needed in the ICT sector in the future (number of employees in years 2005 and 2010)
- the quality of skills needed in the ICT sector in the future
- the future business areas relevant to the ICT companies

Some of the questions concerned the environment where ICT companies operate and some were more ICT sector or sub-branch specific. In addition, some questions dealt strictly with the situation and outlooks of the individual company in question. Consequently, the survey data could be used to examine the ICT sector as a whole and also the differences between four sub-branches of the ICT sector, i.e. ICT manufacturing, ICT services, telecommunications and digital media. The questionnaire was designed so that the data it produces would enable also more advanced analysis.

3 CHANGE FACTORS

From the basis of expert interviews the most important change factors the ICT sector is confronted with were identified. These included for example:

- technological convergence
- changes in the value chains, development towards value networks
- increase in networking
- other factors like the relationship between ICT sector and other sectors of the economy, the increased weight of the consumer markets (B-to-C) etc.

The interviews reinforced the significance of earlier identified trends familiar from literature (McKinsey 2001, Pajja [ed.] 2001, Koski et al. 2001, OECD 2000), but along them also some new ones surfaced.

The results of the ICT firm survey were similar to those of expert interviews' results. Technological convergence, increase in networking and increase in outsourcing were mentioned as factors, which will have a great significance to the developments of the ICT sector in the future. Also rapid technological development, shortening of product cycles and rise of new business models were identified as significant factors.

4 FUTURE PROSPECTS OF THE ICT SECTOR

Survey results show that the Finnish ICT companies look at future with confidence. The majority (60%) of the companies, who answered to the survey, saw the future of the sector in Finland and globally been characterized by slow positive development (figures 3 and 4).

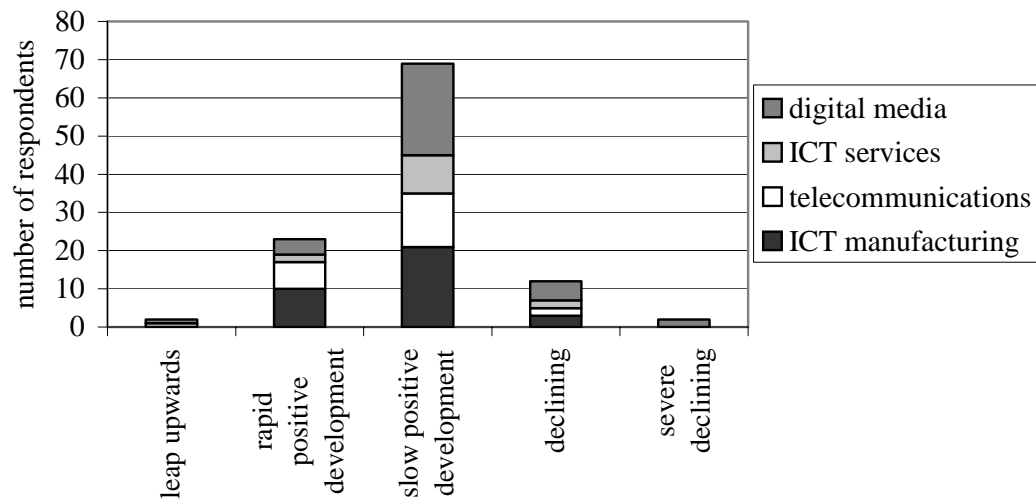


Figure 3. The ICT firms' views of the ICT sector's future prospects in Finland.

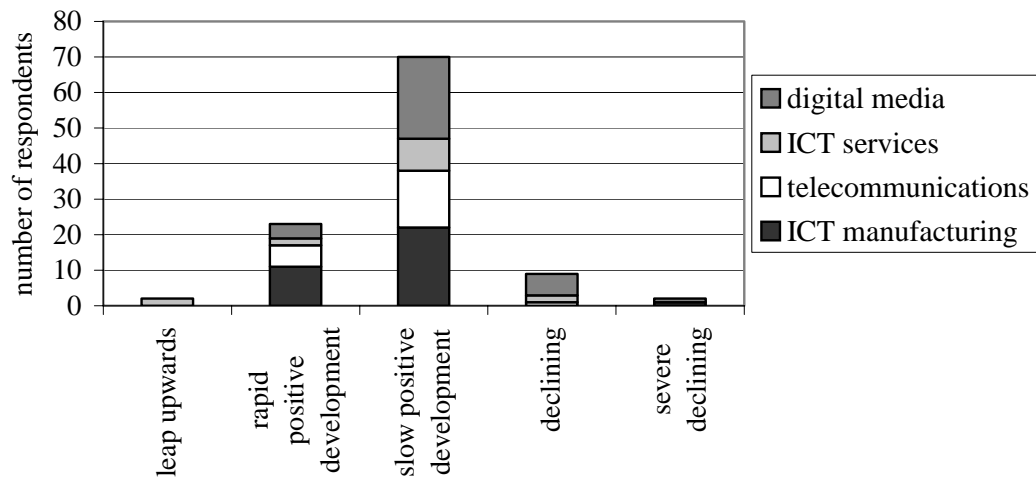


Figure 4. The ICT firms' views of the ICT sector's global future prospects.

The most important business areas, which could be the “spearheads” of the Finnish ICT industry were examined by factor analysis. As a result following areas stood out:

- Wireless communications, mobility, internet and e & m-commerce
- E-health and e-learning
- Microelectronics and mechanics and digital communications

As threats that could jeopardize the positive development following factors were identified:

- Concentration of the public subsidies, oversized expectations, over marketing, the skills gap of the end users
- Quantitative skill shortage
- Societal factors like inflexibility of the labor markets, high taxation etc.
- Product and service related problems: High prices, incomplete products launched too early into the markets, product usability etc.
- Security risks
- Rapid technological changes and educational standards
- Outdated attitudes

The survey data was utilized to produce a quantitative forecast concerning the number of employees in the Finnish ICT sector to year 2010. This was done by generalizing the survey respondents' estimates and the trend that formed into the whole ICT sector. The workforce statistics of that time were used as a starting point and they were extrapolated into the future (Statistics Finland, 2001). Forecast attained this way can be called the "Business as usual" –scenario, because it illustrates the future where workforce needs follow faithfully the present estimations of the companies.

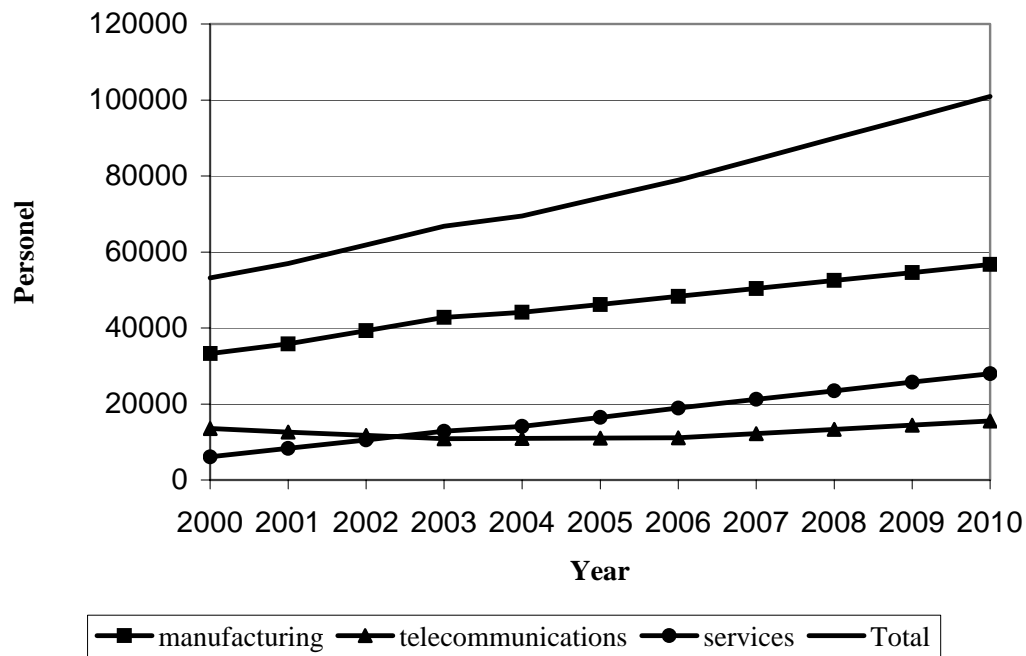


Figure 5. The number of employees in the Finnish ICT sector in 2001-2010 in the Business as Usual –scenario (employment figures for starting point of the forecast were adapted from the Statistics Finland 2001) (Meristö et. al. 2002).

5 ICT SKILLS

The survey included questions where the respondents could indicate which were the most important skills and characteristics, which they valued when recruiting new staff. The list of skills was based on the results of the interviews and background research. The results of the survey show that new skills that the ICT firms need and want besides the certain educational degree were often personal qualities by nature.

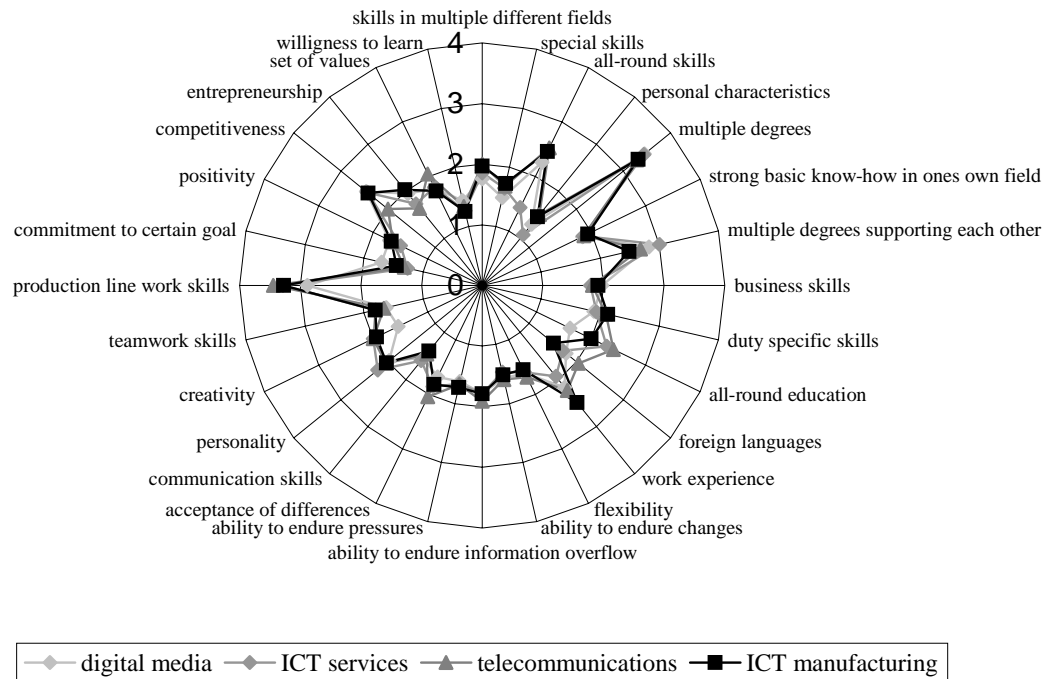


Figure 6. The desirability of certain skills in the ICT sector. Mean values for each sub-branch are illustrated; the more desirable the skill is the more closer to 1 the value is (on a scale from 1 to 4, where 1=important, 2=quite important, 3=not so important and 4=not at all important skills or characteristics).

The results of interviews and the survey both indicated that skill profile of an employee have to desirably include strong proficiency in the area of ICT, but also right attitudes. 'Production line' type of working skills is not desired. Neither multiple degrees or work experience are valued. The four sub-branches of the ICT sector seemed to appreciate same kind of skills, no significant differences were found.

The desired skills profiles reflect the changes taking place in the ICT sectors' operational environment. Maybe things like entrepreneurship and communication skills are emphasised just because the ICT firms are operating in more and more networked world and the focus of the business is shifting towards consumer markets.

The issues that ICT employers expect from the employees were also investigated on a continuing education survey that focused on professional upgrading programmes in ICT (Leppimäki et al 2001). According to the respondents, good skills in ICT are the most important thing. Efficiency and ability to cope with changes were ranked as secondly and thirdly significant expectations. These findings are somewhat similar with the results discussed above.

6 ICT SKILLS IN OTHER SECTORS

In addition to the ICT sector, banking, chemical & pharmaceutical and metal sectors were also included in the study. Their opinions on the ICT skills needed in the future were investigated by the means of separate surveys. Especially in banking the development and increasing use of ICT has had

an enormous effect. Also ordinary consumers have faced the changes in their normal life. In Finland, the Internet is already secondly most common way to pay bills. (Suomen Pankkiyhdistys 2002).

The sum of pure ICT professionals in the responding banks was around 400, and the banks estimated to need 1-7 % more of them in the near future. Planning, development, and maintenance are tasks for which the new employees are needed. Special skills and strong basic skills are demanded from the potential employees. It is important, that the ICT workers can cope with stress and pressure, too. However, it was not regarded as a remarkable advantage if the worker has been studying several subjects. The theoretical assumption that the use of ICT has an optimum level above which the increasing of ICT doesn't mean any advantage was presented to the survey respondents. They were then asked to evaluate their own level of ICT usage in this theoretical framework. In this survey, bank sector defined that it now has reached already 75 % of the potential optimum.

The opinions of chemical industry were investigated by a survey, too. It was forecasted by the chemical & pharmaceutical firms that the amount of ICT employees would increase annually with 3 % on average in 2001-2003, 9 % in 2004-2006, and 3 % in 2007-2010. The firms assumed that they would need new employees to application consultants, ADP planners, PC advisors. Some of the respondents told that they would not recruit any new ICT workers in the near future. Certain companies even estimated that the amount of their ICT employees would strongly decrease. Respondents thought that nearly all skills listed in the questionnaire are important for ICT workers. This could happen due to out-sourcing of ICT operations and maintenance. Studies in several subject and willingness to compete were regarded as less important characteristics. The responding firms thought that their current level in the use of ICT is about 50-75 % of the optimum.

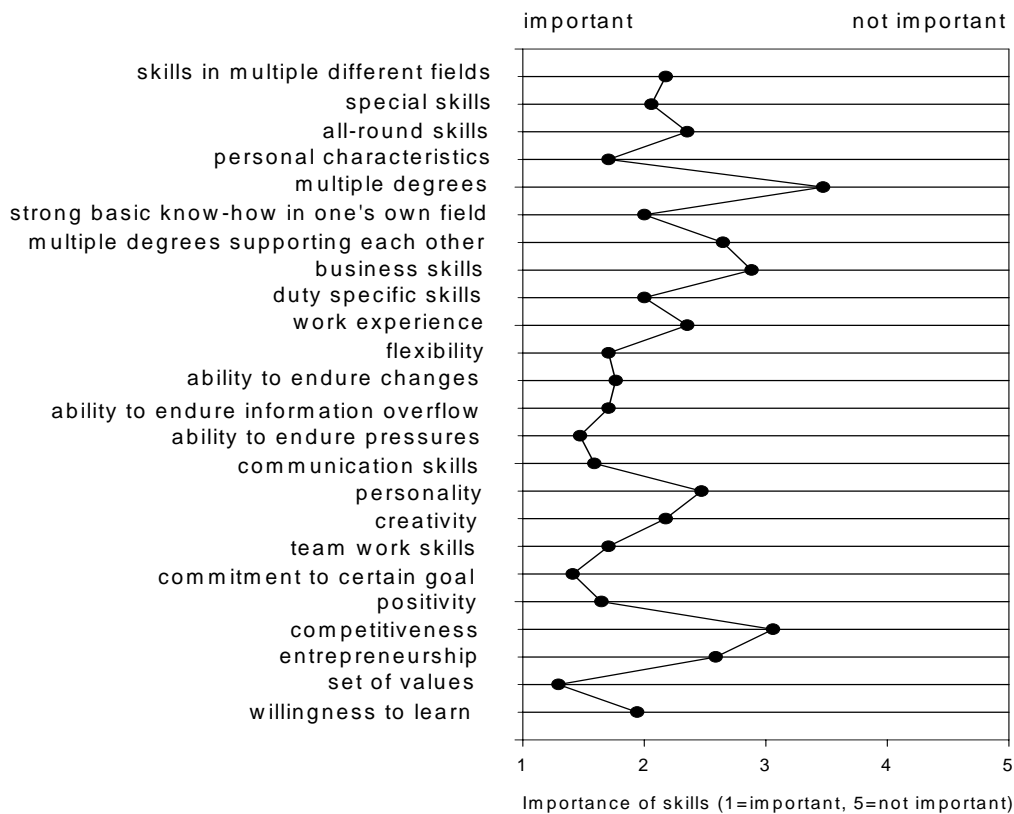


Figure 7. The desirability of certain skills in the chemical & pharmaceutical sector, summed up from survey responses of 21 Finnish chemical & pharmaceutical companies (scale from 1 to 5, where 1=important and 5=not important) (Meristö et.al. 2002).

Generally speaking, it seems that almost every sector would like their ICT professionals to have some basic knowledge and skills related to that specific industry and business.

Quickly thinking, ICT would also have a very positive effect on self-employment, as it gives through teleworking new possibilities to run small enterprises like web site design, IT consulting, freelance journalism and programming. However, Uusitalo (2001) found in his study that entrepreneurship is often a personal trait that cannot be changed for example by means of education. Therefore, the role of ICT for self-employment can be impugned because ICT cannot change the basic nature of people. In other words, if someone is not a “homo entrepreneurs” he will not become it with the help of ICT.

An important question that should be properly investigated is the effect of ICT on the development of employment. In the Netherlands, ICT had a positive effect on the employment in 2000-2001 (FENIT & Vereniging ICT Nederland 2001). On the other hand, ICT can also diminish the amount of employers required because it increases the labor productivity.

7 CONCLUSION

ICT is nowadays more and more integrated into other sectors of economy. It has become part of their business. Consequently ICT professionals have to have more versatile skills profiles. ICT sector needs multitasking professionals in the near future. They have to master ICT broadly, but they also have to have some narrower fields' expertise of their own. In addition it is desirable that they have good business skills. Besides right education new ICT professionals have to have right attitude and willingness to learn new things.

In other branches than ICT these issues are emphasised. ICT professionals have to be able to understand business perspective and they have to be able explain technical terms to non technical people and change their technical vocabulary to suit listeners' background.

When planning ICT education and training, these results should be remembered. Because changes in the education systems are slow, firms may find reasonable to arrange their own courses and education to their employees. The possibility for needs-tailored education inside firms and companies could be utilised more effectively than now. Co-operation between educational institutions and employers should be encouraged because it is everyone's interest that students become well educated and find job.

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