ADAPTING THE SYSTEM OF CONTINUING VOCATIONAL EDUCATION FOR THE 3RD INDUSTRIAL REVOLUTION – EXPERIENCES FROM THE SWEDISH PILOT PROJECT WITH AVE[1]

Mats Lindell
Luleå University of Technology

Index words: Advanced vocational education, Continuing vocational training, Information- and communication technology, labour market transformation.

Abstract: This paper analyses problems associated with adapting the system of continuing vocational education (CVT) to the rapidly changing Swedish labour market. The key question asked in the paper is how CVT is going to adapt to a labour market characterised by a growing IT-economy. The paper also presents empirical data from the pilot project in Sweden called *Advanced Vocational Education.* AVE is a new form of post-secondary education designed to meet changing technology and skill requirements. The paper concludes that AVE is a step in the right direction in decreasing the gap between demand and supply.

INTRODUCTION

The Swedish system of Continuing Vocational Training (CVT) has over the last five years been subject to a debate regarding its future content and performance. The reason behind the debate is the primarily problem of how to adapt to the rapidly changing labour market. Fierce international competition, flexible work organisations, together with a general trend of downsizing and outsourcing during the 1990s, helped to create a need for new skills and competencies.

One of the single most important factors behind the transformation of the labour market, is the fast and almost overwhelming evolution of information- and communication technology (ICT). The development, that started in the late seventies, and intensified during the eighties and nineties, to a large extent contributed to, a decrease in some sectors of the economy and growth in the sector of information services. The foundation for the evolution, besides an increasing openness to worldwide technological and economical shift, has been major national investment programs that support research & development and the necessary high technological infrastructure.

The purpose of this paper is that through compilation of available statistics indicators on macro- and sector level from the period of 1990 forward analyse one of the large problems facing the system of CVT and its adapting to the rapid changing labour market. The development of ICT in Sweden also gives the appropriate background when presenting results from the pilot Project with Advanced Vocational Education (AVE). The theoretical framework for the analysis is the economic-historical model that explains the process of labour market transformation in transitions between industrial revolutions.

[1] The author wishes to thank Professor Jan Johansson, Research engineer Jonathan D. Stubbs and Doctoral student Marita Olsson at the Department of Human Work Sciences, Luleå Universtity of Technology for valuable comments on earlier drafts.

LABOUR MARKET TRANSFORMATION IN A THEORETICAL AND EMPIRICAL CONTEXT

According to the economic-historical model of explanation, the process of labour market transformation can be seen as a phase in the transition between two industrial revolutions (Magnusson, 2000). Every revolution has a fixed time length as its existence depends on certain characteristics of industrial production. These generally are performance, planning of work organisation in combination with social and economic conditions in society. The first industrial revolution occurred in Sweden with the introduction of mechanised industry in the middle of 18th century. The second revolution occurred after the Second World War, in the 1940s. In the second industrial revolution the main characteristic was massproduction with Tayloristic methods of work organisation. The transition to the third industrial revolution that we are in now in has it origins, according to the model of explanation, in mid 1970s. This model emphasises long-term changes as influencers. Those changes were; (1) Increasing international economic competition; (2) Changing preferences in the population away from streamlined mass-produced items to designed products reflecting different lifestyles and (3) Innovations and expansion of microelectronics.

Signifying the transition between the second and third industrial revolution is the setback experienced by established sectors of the labour market in terms of employment and economic strength. Competing with the old is a growing service sector with a high dependence on ICT. In Sweden, this development is been very visible where the numbers of employed in the sector of Agriculture, forestry and fishing during the period 1987-1999 have decreased from 4,0 percent to 2,5 percent[2] (Statistics, 2000b). In economic terms the percentage of GDP changed from 2,34 percent in 1980 to 2.09 percent in 1998. The same development followed in the sector of construction with a drop of 1,16 percent in level of employment. In terms of GDP, the sector of construction fell from 6,74 percent in 1980 to 5,00 in 1998 (Statistics, 2000a).

In terms of expansion is the sector of information services provides a remarkable example. The expansion has its roots in heavy investment programs financed by the government starting in the late seventies. For example, the state owned phone company, Telia, invested during the period 1992-1994 4,5 billion US $ in upgrading its networks and telecommunications systems (Statistics, 1993). In 1993 total expenditures on research & development amounted to 7.4 billion US $, which was equivalent to 3,3 percent of Sweden's GDP (Statistics, 1996). From the late nineties, the expansion has continued at a relentless pace. In 1998 total capital investment of ICT in Sweden amounted to six percent of GDP (ISA, 2000).

One of the most significant examples of the dividends that these investments programs have subsequently returned has been in the expansion of ICT. The ICT sector is defined as the sphere consisting of companies within the electronics industry and IT-related enterprises including mobile communication services (Statistics, 1996). A compilation with key figures relating to the expansion of the ICT sector under the 1990s is shown in table 1.

[2] In comparison, the equivalent level of employment was in 1970 5,7 percent.

Table 1. Key figures on electronics industry and IT-related Enterprises. Year 1993-1997.

Branch	Electronics industry		IT-related enterprises	
Year	1993	1997	1993	1997
Companies	800	1 291	8 100	10 928
Employed	46 000	55 360	77 300	126 151
Turnover	57	136	86	237
Investment	2,3	*	4	17

Source: (NUTEK 2000; NUTEK 1996)* Missing data.

Altogether the ICT sector produced in 1993 goods and services to a value equivalent to 3,6 percent of the GDP (NUTEK, 2000). The expenditure for research & development for the year 1993 1.3 billion US $ for the electronics industry and 0,4 billion US $ for ICT-related enterprises. In 1997 the cost for R&D had expanded to 1.7 billion US $ for electronics industry and 0,5 billion US $ for ICT-related enterprises. Altogether the expenditures within the sector amounted to 16 percent of the total R&D in Sweden (NUTEK, 2000).

On a individual level, these national investment programs has resulted in that about 70 percent of the Swedish population having a computer in their homes today (Rembe, 2000). About seven percent of the Swedish working population are today working in telecommuting occupations with the help of ICT (NUTEK, 1998). In the end of 1999 about 56 percent of the Swedish population, which is about five million people, owned a cellular phone (ISA, 2000).

THE SWEDISH SYSTEM OF CONTINUING VOCATIONAL TRAINING

Over the years Sweden has developed a diversified system for provision of continuing vocational education and training (CVT), which includes sectors with a strong working life orientation. As a system, CVT is affected by changing supply-demand patterns that characterise the training market. According to a common definition (CEDEFOP, 1999) the CVT system until 1996 consisted of:

- Labour market training
- Vocational training within the framework of municipal adult education
- In-company training or staff training
- Short technical programmes at university level

The different components of CVT were, however, very slow responding to the fast development in working life as, for example, technical evolution that called for changes. A report commissioned by the Ministry of Education and Science (SOU, 1995) concluded that there was a need for a drastic improvement with regard to a higher degree of flexibility and swiftness by which CVT answers demands for skilled labour into relevant education programmes upon short notice. The report also concluded, which later European studies has confirmed (CEDEFOP, 2000), that it is not just a matter of increasing the technical skills. On the contrary, development of and flexible work organisations, globalisation and ICT, call for new and different methods for learning a vocation as well as the importance of personal skills. For example, the ability to work and communicate in a team, the ability to think in the abstract, and adaptability to work on a variety of projects at the same time.

ADVANCED VOCATIONAL EDUCATION

To respond to the new demands, in 1996 the Swedish government launched the pilot Project called Advanced Vocational Education (AVE). With AVE, which is a new component of CVT, one-third of course time is devoted to advanced application of theoretical knowledge at a workplace. The intention was that the courses should not be organised along traditional lines, but rather revolve around active workplace-based learning and problem solving in an overall educational context. The length of AVE course programmes ranged from 40 points up to 120 points, where one point is equivalent to one week of fulltime study. Courses were build around close co-operation between enterprise and various course providers such as upper secondary schools, municipal adult education, higher education, and commercial training companies.

During the period from August 1996 to September 1999, the pilot Project with AVE was evaluated. This evaluation which covered about 12 000 students in 200 different programmes was performed by a research group from Luleå University of Technology (SOU, 1999).

The programmes were divided into 12 different branches. The largest branches, with respect to the number of course programmes, were Manufacturing, Business, Tourism and ICT which together enrolled 72 % of the students.

Since AVE was (and still is) open to those coming directly from upper secondary school and those already gainfully employed wishing to develop their skills within a defined area, there was a slight difference in age between students attending AVE and students attending university studies. In AVE, the majority of students (52 %) were between 16 and 24 years old. For students attending university studies, the equivalent number was 48 %. In comparison with regard to sex the differences were similar. In AVE, 53 % of the students was men and 47 % women. For university, the numbers were in fiscal year 1997/98 58 % men and 42 % women.

ICT-PROGRAMMES WITHIN AVE

During the evaluation period, the ICT-sector was the largest of all with 46 different course programmes enrolling almost one-fourth (24 %) of the total student body. Depending on various definitions of IT-branches, approximately between 5 and 7 percent of the working population are employed within that sector, the volume of ICT-programmes at first glance seemed over-enrolled in relation to other sectors. The reason behind expansion was not due so much to the student interesting enrolling the programmes, as much directives by the government giving ICT-programmes high priority.

On an analytical level, the programmes were clustered into four different categories depending on the aim and scope. One category consisting of 16 course programmes was traditional and established systems- and software course programmes. Goals of those programmes were to meet demand for semiskilled workers. A second category was programmes educating for the new area of multimedia and Virtual-reality technology. The 14 course programmes trained the students in a broad introduction to and necessary skills for a future vocation as a Web-designer, producer of interactive CD-ROM, or DVD publications. A third category constituted of 10 course programmes training the students in computer knowledge on a very basic level. The courses were specialised into different sectors and trained students for well-established occupations (e.g., data-entry).

A fourth category constituted of six programmes of a very advanced kind. The programmes trained for very specialised kinds of skills. For example, designing safety systems monitoring computer traffic on the Internet. Other course programmes within this category was advanced courses in Computer Aided Design and Computer Aided Engineering.

DEMAND FOR AVE-STUDENTS GRADUATED FROM ICT-PROGRAMMES

From a survey carried out six months after students graduated it appears that AVE has been favourable in terms of employment after course completion.

Table 2. Occupation six months after graduation.

Occupation	**Employed**		**Continuing to universities**	
Sector	**NR.**	**%**	**NR.**	**%**
Construction	28	80	4	11
Business	173	78	22	10
ICT	**142**	**78**	**12**	**7**
Agric./forestry	50	71	1	1
Food industry	8	44	0	0
Environment	28	58	14	29
Transportation	50	77	2	3
Manufacturing	177	76	12	5
Wood industry	19	56	2	6
Tourism	121	84	9	6
Care	25	66	1	3
Misc.	24	71	3	9
Total	845	75	82	7

Source: (SOU, 1999)

Table 2 show that of the former AVE students, an overall average of 75 % have been employed. Of the students that graduated from course programmes within the ICT-sector, approximately 78 % of the students were employed. Furthermore, 4 % of the students reported that they had started their own company, which gives a "success rate" of 82 %. The survey also conveyed that 13 % were unemployed and that 7 % continued to further studies at the university level.

CONCLUDING COMMENTS

AVE is an important contribution for the CVT system. The research results implicate that AVE in its first years has had a favourable outcome with regard to employment rate. One important explanation behind this is the active workplace learning instead for traditional classroom learning and close co-operation with industry designing the courses. For the students this means that they, at an early phase of their education, get the chance to meet potential employers. This is otherwise a common problem. The employers, on their hand, gives through interaction with AVE administrators, the opportunity to receive the kind of workforce, with regard to skills, that are demanded for.

There are, however, some problems with AVE, in terms of ICT courses, today. The relatively low skill level offered in AVE courses might be explained by the fact that there is no basic ICT

education at the high school level in Sweden. This means that ICT education can only begin after a student has completed their basic high school curriculum. This is not an ideal state since AVE is supposed to be more advanced vocational education that can supply industry and commerce with workers having a relatively broad array of ICT skills and qualifications. There is a risk, that the students after leaving an AVE course must learn additional skills on the job as their qualifications do not precisely match with the skill requirements of industry. In the growing economy of today industry is willing to overlook skill deficits as long as the former students grasp basic skills and concepts. At this time industry is willing to do some training of new employees. Should the economy slow down it may well be that graduating students will find that their array of skills will not be viewed as adequate by potential employers. It is important to acknowledge that there are some specialised and advanced course programmes that already meet the criteria of flexibility and high skill level, but in regard to the fast economic and technological development described earlier, those few are only the beginning.

REFERENCES

CEDEFOP, K. A. 1999 'Vocational education and training in Sweden', Thessaloniki: CEDEFOP.

CEDEFOP, M. G. e. a. 2000 'The impact of information and communication technologies on vocational competences and training. Case studies in Italy, France and Spain', Thessaloniki: CEDEFOP.

ISA 2000 'Information society showcase', Stocholm: Invest in Sweden Agency (ISA).

Magnusson, L. 2000 *An economic history of Sweden*, First Edition, London: Routledge LTD.

NUTEK 1998 'Telecommuting vocations. Development in figures', Stockholm: Swedish National Board for Industrial and Technical Development (NUTEK).

NUTEK 2000 'The electronics industry and IT-related service companies in Sweden 1999', Stockholm: Swedish National Board for Industrial and Technical Development (NUTEK).

NUTEK, S. 1996 'The electronics industry and ICT-related enterprises in Sweden 1996', Örebro: Swedish National Board for Industrial and Technical Development (NUTEK) & Statistics Sweden (SCB).

Rembe, A. 2000 'Invest in Sweden. Report 2000', Stockholm: Invest in Sweden Agency.

SOU 1995 'Vocational colleges. Advanced vocational education', Stockholm: Ministry of Education and Science. Swedish Official Report series (SOU)

SOU 1999 'Evaluation of Advanced Vocational Education', Stockholm: Ministry of Education and Science. Swedish Official Report series (SOU)

Statistics 1993 'Data about Information technology in Sweden 1993', Örebro: Statistics Sweden.

Statistics 1996 'Data about Information Technology in Sweden 1996', Örebro: Statistics Sweden.

Statistics 2000a 'Gross Domestic Product (GDP) by industry and time (SNI 92)', Vol. 2000: Statistics Sweden (SCB).

Statistics 2000b 'Labour Force Surveys (LFS). Employed by industry (SNI 92)', Vol. 2000: Statistics Sweden (SCB).