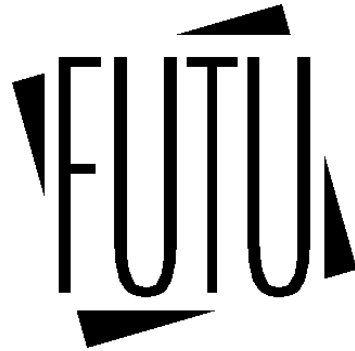


TURUN KAUPPAKORKEAKOULU
TULEVAISUUDEN TUTKIMUSKESKUS

TURKU SCHOOL OF ECONOMICS AND BUSINESS ADMINISTRATION
FINLAND FUTURES RESEARCH CENTRE



FUTU-publication 3/98

Pentti Malaska

**SOCIOCULTURAL TRANSIENTS OF WORK
IN THE LATE-INDUSTRIAL PERIOD¹**

**USA AND FINLAND
AS THE EMPIRICAL CASES**

1 Presented in the III International Kondratieff Conference in Kostroma, Russia, May 18-22, 1998.

The purpose of the research programme Citizenship and ecomodernization in the information society – the futures approach – is to study the social and ecological dimensions of emerging information society. Particularly we aim at assessing social impacts of new informational structures that are impinged on citizens. We also focus on analyzing the ways application of information technology influences on targets and realization of sustainable development. The study programme comprises of ten individual research project organized around above sketched themes.

Copyright © Pentti Malaska &
Finland Futures Research Centre

Pentti Malaska
Professor, D.Tech.
Finland Futures Research Centre
Turku School of Economics and
Business Administration

ISBN	951-738-921-3
UDK	338.12 (73) (480)
	338.45.01
	331.101
	331 (091)

TABLE OF CONTENTS

1. INTRODUCTION	5
2. THEORETICAL FRAMEWORK OF THE LONG-CYCLE STUDY	8
3. OVERALL EMPIRICAL VIEW OF THE TRANSIENT PERIODS OF THE MODERN ERA	10
4. INDUSTRIALIZATION	12
4.1. Industrial employment surpasses agriculture	12
4.2. Expansion of services	14
5. LATE-INDUSTRIAL TRANSIENT PERIOD	15
5.1. Intensive growth in industry	15
5.2. Differentiation of services in the late-industrial period	16
6. PROSPECTIVE ANALYSIS OF THE WORKFORCE IN THE LATE- INDUSTRIAL PERIOD	20
6.1. Swyt's model	20
6.2. Three-dimensional prospective analysis	21
6.3. Adaptability of employment	23
7. DISCUSSION	25
REFERENCES	28
APPENDICES	
Appendix 1 Stepwise discontinuity of societal development	32
Appendix 2 Maddison's three stages of development in 1820–1980.....	33
Appendix 3 Fluctuation of growth rate indicates transient in 1915–1945.....	34
Appendix 4 Fluctuation of growth rate indicates transient in Finland in 1915–1945	35
Appendix 5 Annual growth rates and projections for industrial countries.....	36

Appendix 6	Industrial employment overcomes agriculture.....	37
Appendix 7	Employment in primary production decreases also in numbers during the industrialization transient, in USA since 1900.....	38
Appendix 8	Employment in primary production starts to decrease in absolute numbers in Finland since 1920.....	39
Appendix 9	Services overrun goods production in employment	40
Appendix 10	Transition from goods production to services accelerated.....	41
Appendix 11	Employment in goods production in USA imitates the previous pattern in primary production	42
Appendix 12	Employment in industry decreases in absolute numbers during the late industrial transient, in UK since 1966.....	43
Appendix 13	Employment in USA in 1840-1990 and in Finland in 1900-1980	44
Appendix 14	Occupation profile of US Economy according to D. Swyt .	45
Appendix 15	Occupation profiles of USA and Finland in Swyt's 4-pole co-ordinates	46
Appendix 16	Occupation profile of US workforce from 1900 to 1980 and Swyt's projections to 2010	47
Appendix 17	Development of occupation profile in the leading industry in USA.....	48
Appendix 18	Observations and projections of occupation profile in 3-D co-ordinate system.....	49
Appendix 19	Development of occupation profile of USA workforce	50
Appendix 20	Development of occupation profile of Finland workforce ..	51
Appendix 21	Physical production workforce (PP) in relative and absolute terms in USA in 1900-1980	52
Appendix 22	Projection of occupation profiles in USA and Finland in 2017	53

1. INTRODUCTION

Hardly anything is as important to the unity and development of human communities as the concept of work and positive attitudes towards work as a means to acquire what is needed for a good life. The work of the society largely determines the kind of a society. The change of work also how the society will change. On the other hand, what is regarded as real work in a society at a given time depends on the dominating production system. In the agricultural society the real work was different from what is understood as work in the industrial society. In the future, the concept of work will have again new meanings, which will have as little in common with the content of work in the industrial society as the latter has with the work in the agricultural society.

Whereas the substance and content of work changes, the essential meaning of the concept of work for human life remains however unchanged. That is what I have called the essence of work. Already about aeons ago the forefathers of the human species invented that which still is the essence of work. Some of them made tools out of stone while others, for their turn, using those tools produced what was needed for survival and wellbeing. *The essence of work is in the making of good things reciprocally for other members of the community so that every member of the community has opportunities to take part in the reciprocity.* Without violating and fragmenting the community work cannot be defined in the modern way by which work would only be possible for some people but not for everybody. The mental, creative side of work and its social aspects belong also to the essence of work (Wilenius 1981).

Without working of everybody a community cannot reach adequate social coherence nor the material wealth and prosperity that are necessary for a good life. Prosperity results from real work in the real economy not from a negative sum gambling of circulating money in the symbol economy. The symbol economy with its money circulation serves as an invaluable instrument for directing and organizing the real work. But even though it is work that produces the material prosperity, it is not true, however, that more wealth could be gained only through more and harder work. On the contrary, wealth increases as we work less but smarter, better and more effectively. This is evidenced by the fact that the annual working hours in the industrialized countries have reduced by half during the last century, even though the material wealth has greatly increased during the same period. Thus the aim of increasing prosperity and welfare cannot be accomplished by increasing the volume of human work but by increasing the productivity of work. “Not working longer and harder but working smarter” as Peter Drucker (1991) expresses it. From that it follows that no solution for full employment can be found solely in the growth of production volume of tangible

goods as before. Constraints of the industrial economies hinder renewal of working life and production becoming more effective, and they may instead result in decreasing wealth and increasing unemployment.

In this study long-term changes of work in the industrial societies are illustrated with data from two countries, of a large world economy (USA) and of a small country (Finland, see Vartia et al. 1992)

As we learn to work “not longer and harder but smarter” we move from an extensive growth to intensive growth of the economy. Transients in data reflect the period of the intensive growth. They indicate qualitative changes of work content. In extensive growth, increase of the production commands more labour of the same quality, and more output will be gained out of more labour input. In intensive growth, the production will grow regardless of the simultaneous decrease in the amount of work; more outcome will be gained out of less but smarter work. Intensive growth indicates a period of transition of the economy, which can be seen in changes and instability in the economic activity. The dominant branch of production will become more effective through intensive growth, but at the same time it starts losing its relative importance as the sole engine of the economy and the ultimate source of the social “sense”. A new mode of production will be growing, that will cause new creation of jobs and sooner or later the new jobs will take the dominant position in the economy and in the social importance. This is how the industrial society grew out of the agricultural society and by analogy it can be concluded that this is how the interaction service society grows out of the industrial society. The transitional periods in-between the consecutive stages are of several decades of duration.

The intensive growth of agriculture was made possible by the emerging industrial work. Better tools, raw materials and possibilities of processing agricultural products, as well as the production and consumption infrastructure, education and other services provided by the society changed the work in agriculture both qualitatively and quantitatively. By analogy, in the present late-industrial time the attention has to be paid to non-industrial work, which offers new possibilities for improving industrial activity and for dematerializing goods production. New scientific knowledge is a kind of “fertiliser” for the industrial productivity, and information technology and new management forms make a new infrastructure available. Kind of work by which information can be effectively utilized is service production. The ongoing late-industrial transition means in the first place knowledge and service intensive change of the whole economy. The effectiveness of education, research and acquiring and managing new scientific knowledge and increasing productivity of services has become key issues. This is not the same thing as re-industrialization, which refers to the growth of industry by means of extensive growth. In the sphere of service production there will gradually arise new consumer needs and new production possibilities of satisfying these needs.

This study reveals a course of development and its rationale towards a knowledge and service intensive society in future. The empirical analyses on the long-term changes of the workforce in the industrialized countries - the USA and Finland in particular - is made firstly with sectorial data of employment. The late-industrial transient period means a transition between the industrial society and the post-industrial society. The late-industrial transient period brings forth changes of knowledge content and skill profiles of the workforce and employees, which are not reflected, in the sectorial statistics. Those changes will be analyzed in this study by using the occupational data of workforce. The author's previous writings on the subject are also listed on the references.

In a larger frame of reference the late-industrial transition hypothesis of this study can be seen as part of a longer cycle of development, about which some philosophers speak as the late-modern transition (v. Wright 1992, 1993, Malaska 1994, Tamminen 1994, Yakovets 1993). The earlier reference is then the time of the Enlightenment and the modern project.

2. THEORETICAL FRAMEWORK OF THE LONG-CYCLE STUDY

The theoretical framework applied rests on the idea of progress going from one stage of development to the next one through a transient period between them. The transient period is characterized by turbulent, fast changes, which are unpredictable and may appear even chaotic. The progress is a progress of going through the transients - facing the threats and risks and overcoming them, and making space and meeting for new opportunities.

A message of this study is that we are living in the middle of transient period in-between two consecutive stages of development, in a period where the prevailing industrial society is losing its dominance to a new type of society called post-industrial. The transient period we are experiencing can be regarded as a threat if environmental and social problems of humankind are not coped with by adequate measures, but it may also be seen as a time full of new emerging options of progress for all.

It has been left with rather little attention among the futurologists, whether a great social change will in general proceed discontinuously or through a long transient period where the previous stage is losing ground and a new one unfolding only gradually. The present transients are regarded as being able to lead away from the industrial era to something where industry shall no longer be the determining and dominant branch of society. In the stepwise thinking the permanent characteristics of a new stage establish themselves at once, whereas according to the transient thinking the shift takes time and the transient period does not reflect characteristics of the coming era. For example, if we would already live in the post-industrial society, the material production would be unproblematic. On the other hand, there are strong claims for re-industrializing the economy or strengthening the dominance of the industrial rationale in the society. According to the transient thinking both of these views are erroneous interpretations of the development.

The differences of thinking are illustrated in the appendix 1. The picture illustrates the different patterns of development, of stepwise or through a transient period. The present transient period may well be called an information society because of the essential new role of information and information technology to the production and consummation of material goods and services. However putting the development into a larger frame it is more relevant to call this period in-between a late-industrial period.

The term refers both to the fact that this time is a latest part of the industrial society stage ending and giving space to something new.

The material production at present is moving from extensive growth to intensive growth in the use of natural resources and work. Previously “more was produced out of more”; but now “more is produced out of less”, and production is better, faster, and more reliable and cheap. Further, new information will be turned into new skills and know-how and different needs than now are going to become primary in the future (Drucker 1986).

In the use of scientific knowledge we are going from the knowledge of macrosciences (physics, mechanics, chemistry, biology, physiology, sociology etc.) and the technology based on them to knowledge and technology of microsciences (microphysics, micromechanics, microchemistry, microbiology, microphysiology) and ‘nanosciences’ (nanotechnics) and further. Technology based on one discipline will be replaced by intelligent hybrid technology based on knowledge several branches of science. This change - the revolution of scientific knowledge - can already be seen in research and product development, and later in all life.

What the futurologists say about transition? Great advancement of technology towards conscious technology is to be expected in the future based on new scientific knowledge. Conscious technology will surpass greatly what we understand now by information technology (Glenn 1989). Yoneji Masuda (1980) dates the beginning of the new stage, which he calls information society around the middle of the next century. Daniel Bell, who created the term post-industrial society, regarded it as having already begun in the USA in the beginning of the 1970’s. He describes the post-industrial society mainly as a discontinuous step from the industrial society to the post-industrial without any time period of transition (Bell 1974). According to Herman Kahn and the Club of Rome authors of the *Limits to Growth* the post-industrial stage is characterised with zero-growth of the tangible production, and will be reached within approximately a century. Before that stage the growth is, however, intense, but with diminishing rate (Kahn et al 1967, 1976, Meadows et al. 1972, FICOR 1997). Alvin Toffler’s wave metaphor (1981, 1990) and John Naisbitt’s (1982, 1984, 1990) megatrends describe the ongoing great change of the industrial era. Among other ideas of long-term development are Kondratieff’s long cycles (Kondratieff 1993), Yakovets’s cycles of civilizations (Yakovets 1993) and Leach’s episodes (Leach - Wagstaff 1986) and Kusnetz’s epochs (Maddison 1982)

3. OVERALL EMPIRICAL VIEW OF THE PERIODS OF THE MODERN ERA

Angus Maddison has in his work *Phases of Capitalist Development* (1982) proposed a developmental analysis for the market economy countries, which well suites as a referential background of this study. Maddison ends up with dividing a period of 160 years to four different phases, which he names in the following way: (1) The Liberal Phase 1820 - 1913, (2) The Begger-Your-Neighbourg Phase 1913 - 1950, (3) The Golden Age 1950 - 1973 and (4) The Phase of Blurred Objectives from 1973 on. The picture shows the three Maddison's phases of development in some countries (appendix 2).

Maddison's second and fourth phases are transient periods in the sense of this study. Here these periods are called (see appendix 1) the industrialization transients and the late-industrial transients.

An observation of a transient period of the industrial era can also be obtained by examining the fluctuations of economic growth in the OECD-countries (appendix 3). The growth rate has varied considerably in 1870-1990. It is possible to distinguish three different periods, which were recognized by Maddison as well. The first of them extended from the end of the last century to the first decade of this century. At that time the average annual growth was approximately 2 %, the fluctuations of growth rate were moderate and there were no severe recessions. It was still a time of agricultural societies, except for England and Holland. Agriculture was the dominant branch of economy both as an employer and as a generator of purchasing power. The real work was something done in the fields, farms and forests. This epoch was time of stationary development compared to what was to follow.

The next time period to the 30's and 40's was different. It was time of great and unpredictable fluctuations, and recurrent periods of recession were frequent. During the periods of recession the economy declined, enterprises went bankrupt and many people lost their jobs, wealth and property. Fluctuations also manifested themselves as the "crazy years", during which growth suddenly accelerated and went out of control. The fluctuations were not predictable; instead, the course of the economy changed rapidly and unexpectedly, which is one of the characteristics of a transient period. No real production can profitably keep up with too rapid changes in purchasing power. The real economy of goods production is essentially slow, which can mean several years in building production capacity. And even though it is possible to overload the existent capacity by different working arrangements, that does not necessary mean

profitable business. The average growth rate remained low and it fell from the mean value of the previous period to a value of 0.5 %/a. The first decades of this century were time of the industrialization or late-agricultural transients. During that time the industrial society evolved from the agricultural society, and in the course of next decades, industry became not only the dominant branch of production but also the basis of the overall social rationale.

After the Second World War a new period of more stabile development, i.e. the real age of the industrial society, began. Fluctuations calmed down and recessions disappeared totally. The average growth rate, which had been rising since the mid-30's, continued to rise during the whole period. The ever-intensifying growth in the purchasing power brought stability to the economy and also to the social development on the whole. The ideas of societies of mass consummation and material abundance were evolving together with welfare state programmes, which were believed to be permanent future states of the society. The fluctuations of growth were small compared to the transient period, and in addition, they were more easily predictable and easier to affect with the measures of the economic policy.

The fluctuations in the small economy of Finland have been similar to those in the industrial countries in general. The period of strong fluctuations extended from the 1920's until the 1940's. After that period more stabile growth followed until the 1970's (appendix 4).

From the 1970's on, the change towards new transient situation has been evident again. In the present study this is called the late-industrial transient period. The signs of it are the falling trend in the growth rate, strengthening fluctuations in the growth rate and unpredictability (appendix 5). Recessions, unpredictable "crazy years" of growth, and political instabilities in different countries are part of these fluctuations.

The new transient period - the late-industrial one we are living through - can be expected to gain similar characteristics to those in the beginning of this century. The wide and unpredictable fluctuations form a different kind of prerequisites for decision making than the prevailed state of stabile growth. The period of transition brings new risks in the decision-making, but it can be seen also offering new possibilities. The late-industrial transients of the industrial societies will extend to the next century.

4. INDUSTRIALIZATION

In the last century, primary production was the dominant sector of production in nearly all countries, as measured by workforce or value and volume of production. By the 19th century, England took first, along with the industrial revolution, the leading economic position, which then in the 1880's shifted to the USA. The value of the industrial production in England surpassed the value of the agricultural production in 1821 (Maddison 1982). The peak of the industrial production in England was reached 130 years later, when its proportion of the national product was 43 %. In the USA the industrialization took place with a time lag of around 50 years to England. The value of the industrial production in the USA surpassed the agriculture in the beginning of the 1870's. After it Germany, Sweden and France followed suit with a further lag of 10 years each (Martel 1988). In Finland the comparable dominance of the industrial value over agriculture was not reached until the 1930's (Hjerppe 1989, Tiainen 1993), and in employment figures only after 1960.

4.1. Industrial employment surpasses agriculture

In 1870 as much as half of the US labour force was in agriculture (appendix 6). The proportion, however, decreased continually and in 1990 it was only 3 % of the labour force. In 1910 the employment in industry surpassed that of agriculture. The value of the agricultural production, on the other hand, has been increasing all the time, and in the end of the 1980's its real value was 2.5 -fold compared to the situation in the beginning of the century (Swyt 1988). When we examine the changes in the number of persons employed in agriculture along with the proportion of agricultural labour force, we will get a boomerang type figure and find an essential turning point (appendix 7). Until the 1910's the number of persons employed by agriculture increased (indicating an extensive growth period), although its proportion in the total labour force decreased. In relation to the labour used, agriculture was at that time in extensive growth: more production was gained by more input of labour. In the turn of the 20th century the production continued to grow, although the input remained the same, and during the next decades the production increased, even though the labour force employed decreased. Since then the relative proportion and the number of people working in agriculture decreased at the same time, but the agricultural production continued to increase (intensive growth period). Since the beginning of the 20th century, agriculture

moved from the extensive growth pattern to intensive growth: more was produced with less labour. That means entering the industrialization transient period leading to the society of industrial dominance.

A similar course of development of employment happened in each OECD country and in Finland. It happened with different time lags, as can be seen from appendix 6 and appendix 8. The proportion of agriculture in the total labour force has continually decreased, while the proportion of industry increased from the beginning of this century until the 1960's and 1970's.

The period of industrialization transient in Finland begins in the 1920's (appendix 8). At that time agriculture is in the beginning of its intensive growth. It does not employ more labour force, even though the production grows. The II world war brought back some of the previous dominance of agriculture. From the year 1960 on, however, the absolute number of people in agriculture started to decrease as well. In Finland the joint existence of industry and agriculture as equally important branches of the economy continued for longer than in the leading countries.

The fast industrialization and the stabile extensive growth of industry began right after the war. The proportion of industry in the employment surpassed agriculture in the 1960's; its proportion of the national product had already in the 1930's reached the same level with agriculture (Hjerppe 1989).

Intensive growth in agriculture coincided with the transient period of industrialization during which the agricultural society gradually turned into the industrial society. The change took place in several decades; the beginning or ending of the transition cannot be defined exactly (Maddison 1982). The industrialisation transition took place in the USA in the first decades of this century. It meant extensive growth of the industry and the real breakthrough of the industrial era. During the following decades the industry reached its position as the dominant form of the economic. It gave rationale of a new kind to the whole society, an industrial society's rationale. As the proportion of labour employed in the agriculture decreased, the proportion of the industry increased. It is interesting to observe that the proportion of industrial employment reaches its highest peak, about 40 % of the total employment and not more, in one country after the other. In the USA this happened in 1970's and in Finland only a few years later, but in some other countries already in the 1960's (Leach 1986).

The intensive growth in agriculture could not have been evolved without contributions of industry - in other words contributions coming outside the agriculture - or without the services of the public sector in the form of education, road network and other infrastructure. All these contributions were first justified most strongly with the rationality of agriculture, but later on they created foundations for the emerging industry. This view can be considered to be analogical with that of the present late-industrial transient period: now it is industry whose development depends essentially

on the new kind of contributions from outside industry from sciences and new information infrastructure.

In the present society the industrial mode of production is the most important branch of economy and the driver of the course of development - a kind of a social sense, as agriculture had been before. Industry has never been, however, and will never become the largest branch of economy when measured with the supply of jobs. The industrial era is characterized also by expanding service sector.

4.2. Expansion of services

When in the 1910's industry passes agriculture as the largest employment sector in the USA, the proportion of both of them is third of the total labour force, but so is the proportion of services. The two main productive fields of activity in the industrial era are services and manufacturing (appendix 9).

The services surpassed manufacturing as a source of employment already in the beginning of the 30's in the USA; in Finland the same situation was 40 years later, in the 70's. Finland remained manufacturing-oriented for much longer than USA, but on the other hand, the rate of growth of the service sector employment has then been faster. This observation also holds true for the industrialized countries in general; different countries have reached the 50 % / 50 % intersection of the proportion of labour force in manufacturing vs. services at different time points, but the later it has happened, the faster has the rate of change been at that point (appendix 10). This may show a global learning taking in place.

5. LATE-INDUSTRIAL TRANSIENT PERIOD

According to the theoretical framework adopted, it can be expected that the manufacturing as a whole will share the destiny of the agriculture, in other words it will move from extensive growth to intensive growth. In the use of labour it would mean a fall in number of the employed people, while production would still be increasing. Appendix 11 repeats the previously presented development of employment in the US primary production, and in addition it shows the labour force in the whole good production (primary and industrial). In the USA the total labour force has increased during the last few decades much faster than in Europe (Walsh 1994), and in goods production as well. Since the productivity in the USA has, on the other hand, grown more slowly than before (Chyert - Mowery 1989), it will mean that the economic growth in the USA has had an employing impact. It has followed from this, however, that the USA has lost some of its competitiveness to Japan, where the growth of productivity in industry has been faster (Hori 1993). Now the US manufacturing industry is faced with a challenge of better productivity, which will mean expected decrease in the growth rate of employment. More will be produced with less labour input. The greatest challenge during the late-industrial transient period is to improve productivity of the services in any industry and consumption. This is a common challenge for all the industrialized countries (Ginzberg - Vojta 1981, Drucker 1991, Hori 1993, Machlup 1962).

5.1. Intensive growth in industry

The extensive growth in industrial societies continues until the mid-1960's or the 1970's. In England the figures of employment show that in the 1960's industry turned to intensive growth in the use of labour (appendix 12), and that same happened in other countries a little later. The proportion of labour force in industry decreased also in the USA in the 1980's (Martel 1988). Thus industrial employment seems to follow the same boomerang course of development as in agriculture. From the 1970's onwards the industrial era is in a late-industrial transition. During this period the structure of production in the societies still continues to change away from industry dominance, by means of information and growth of service production. The industrial society will change first into information intensive one, and then the development leads to totally new kinds of production and consummation of novel-services (Khan et al 1976).

The macroeconomic observations of the growth of the service sector can further be supplemented with microeconomic observations. In order from to gain macroeconomic benefits manufacturing production more and more effective service functions are needed to contribute to it. Even in goods production the economic value is created more and more with services. The proportion of manufacturing costs of the retail price of a television set is about 20 %, the corresponding figure for cars being less than 30 % (Norman 1992). The rest is value added by services, created in the product development, marketing, distribution etc. In addition to that, the production itself includes many service-like tasks within manufacturing business. Improving the productivity of services and the effective use of them are key issues of the period of transition. Therefore service functions should be studied in a new differentiated manner and not as a statistical sector of economy.

Late-industrial transient period is characterized by increasing share of knowledge - and service - intensive work.

5.2. Differentiation of services in the late-industrial period

When services are studied according to the sectional statistics, essential changes will be hidden from observation. From the point of view of the late-industrial transient it is interesting how the proportion and number of people doing services are changing as a whole in the economy regardless of the sector grouping. There are workers within every sector of economy who are engaged in physical production, others who work in physical services such as cleaning and maintenance, and others who are doing jobs requiring higher education, such as technical or other high-level professional services, and still others who work in administration, sales and management. The expansion of services inside the sectors and businesses and differentiation of services into physical services and services requiring higher education is a key phenomenon in understanding the late-industrial transition. The previously shown service sector employment figures do not offer a sufficient prospective view. Dennis A. Swyt has proposed an analysis, which is applied in this study in which the occupational structure is taken as a new starting point of examination. (Swyt 1988).

Swyt bases his analysis on a typology of occupations formed on the employment statistic of the USA. The detailed information about his typology and the statistics is given elsewhere (Swyt 1993). He divides occupations into four categories, which he calls Physical Production, Physical Service, Managerial-Administrative and Technical-Professional.

This analysis of the U.S. manufacturing workforce is based on a new typology of occupations, one constructed by grouping standard labour classifications into four major categories or types, defined and illustrated below. These four types involve no subjective reallocation of activities associated with standard occupational classifications into more than one type.

- * The first type of occupation is called 'physical-production' and consists of a standard broad group, which in turn consists of four standard classes: labourer, operative, precision-production, and craft.
- * The second type of occupation is called 'physical-service' and consists of a standard board group consisting of a single class, service occupations, which includes, for example, hospital orderlies, parking-lot attendants, custodians, security guards, and fast-food workers.
- * The third type of occupation is called 'managerial-administrative' and consists not of a single broad group but three occupational classes: managerial-and-administrative, clerical, and sales.
- * The fourth type of occupation is called 'technical-professional' and consists of a standard broad group consisting of two standard classes, technical and professional occupations, which include, for example, engineers, doctors, scientists, financial analysts, nurses, accountants, and paraprofessionals of all types.

The basis for this construct of four occupational types is empirical, theoretical and conceptual:

- * Empirically, as this paper will show, the workforce as a whole shows highly ordered behaviour in terms of specific relations among these particular four types.
- * Theoretically, this fourcomponent workforce results from a mapping into the subject domain of this paper of a general systems theoretic model under development by the author. The general model includes as dual dichotomies four components linked fourwise in a system in which each component has a position specific but general paradigmatic meaning.
- * Both the empirical results of paper's analysis and the theoretic construct behind it support the conceptual interpretation of the types as corresponding to physical-production, physical-service, mental-production, mental-service, where production is here defined as a substance-transforming activity and service is here defined as ephemeral action-on-demand.

The US statistics make it possible to examine the changes in labour force according to Swyt's typology of occupations, beginning from the year 1900 until the year 1980 at intervals of 10 years.

In this study Swyt's method is modified and developed further, and a prospective analysis of the USA and Finnish labour force is made. For Finland rather few data values exist, which naturally means great uncertainty in the results, and the results can only be regarded explorative. The comparisons between the two sets of data will, however, bring out important points of consideration and discussion regarding the late-industrial transition.

In his study "The Workforce of US manufacturing in the Post-Industrial Era" (1988) Dennis A. Swyt analyzed the occupational structure of the US economy and its different branches as well as changes in it during this century. Swyt's analysis brings out the expansion of the service industry, typical of the industrialized societies, as well

as the ongoing qualitative and quantitative differentiation of services. Occupational structure means the proportion of different occupational groups in the total employed workforce. The total workforce in the USA and in Finland during this century is shown in appendix 13.

Swyt divides the occupations listed by the US Bureau of Census into four different categories. One of them is the category of physical production occupations, which is abbreviated as PP (Physical Production) and the three others are categories of employers working more or less in the service - like occupations. The first of them is the category of the so called physical services (Physical Service, PS), the second is the category of technical and other professions requiring higher education (Technical-Professional, TP) and the third is the category of managerial, sales and administrative services (Managerial-Administration, MA). The latter occupational group can be regarded as being based more on human relations and interactive skills and the former group to technical and intellectual proficiency and expertise. Swyt's description of the categories is given below; labour statistics of the USA give data from the years 1900 - 1985.

For Finland the comparable grouping of data into Swyt's categories was made for which the years 1975, 1980 and 1985 were available.

The occupational structure is expected to illustrate roughly the requirements by the economy for skills, knowledge and know how of the workforce. The changes in the occupational structure indicate the pressures for new know-how and skills, which for its turn is important to know for education, for example. On the basis of these changes it is possible to obtain more accurate information of late-industrial transition than by examining the workforce of the sectors.

The late-industrial transition is changing knowledge and skill of the occupations themselves, and these do not come out in the occupational group data, which only number the persons in each group. One feature concerning all occupations, is overall increase of knowledge intensity and the need for interactive skills.

Swyt's statistical data has been derived from the US labour statistics. The proportion of physical labour in the total workforce has fallen steadily, while the proportions of services have accordingly increased. An especially strong growth has occurred in the proportion of sales and services requiring human relation skills, corresponding broadly to the category of managerial-administration occupations. Occupations directed to things rather than people have increased more slowly. The proportions of technical-professional occupations and of physical services have increased at the same rate. The physical production in the USA lost its dominant position to services in the 1950's and later in the 1980's to managerial-administration occupations. Swyt's occupational grouping brings out the internal differentiation of tasks and services within economy, and it can shed new light on the change of work and workforce compared to sectorial approach (appendix 14).

The faster growth of the proportion of managerial-administrative occupations compared to technical-professional occupations is contrary to common beliefs and expectations. Both the futurologists and the economists have kept stressing the dominance of the high-level technical know-how. Swyt's analysis from the USA shows that this had not come true by the 1980's; instead, the proportion of tasks requiring human interaction skills had grown faster than the proportion of thing-oriented tasks. This is what can be expected to happen in the late-industrial transient period towards the post-industrial society of intangible needs as will be explained in the second part of the study.

The situation in Finland in the beginning of the 1980's is different from that in the USA. The realized "know-how profile" in Finland is almost a mirror image of that of the USA between TP and MA occupations, and it corresponds better to prevalent general beliefs and expectations. In Finland the proportion of people working in technical-professional occupations is larger and the proportion of people working in occupations requiring human relations skills is smaller compared with the USA.

6. PROSPECTIVE ANALYSIS OF THE WORKFORCE IN THE LATE-INDUSTRIAL PERIOD

6.1. Swyt's model

The basic variables (x,y) in Swyt's model are the pairwise differences of the proportions of occupational groups (PP, TP, MA, PS) as follows

$$\begin{aligned} x &= MA - PS \\ (1) \quad y &= PP - TP \\ &\text{and} \\ PP+PT+MA+PS &= 1 \end{aligned}$$

In this way the two basic variables can be derived from the four occupational group variables. These two basic variables can then be represented in a system of coordinates. According to the definition, the sum of the four occupational group variables will always be 1 (or 100 %), so there are three independent variables.

It follows from these conditions that it is possible to form the Swyt's diamond figure i.e. a square lying on its apex, on which all the possible (x, y) values are placed (appendix 15). In the apex of the figure the work force consists of only one occupational group. In the upper apex this occupational group is PP / blue-collar occupations, in the right apex MA / white-collar occupations, in the lower apex PT / No Uniform occupations and in the left apex the group of PS / Tan Collar occupations. On the sides of the diamond the occupation profile is formed by groups in the apexes directly in relation to their side proportions. On each side the matching is unequivocal to both directions: each occupation profile (PP, TP, MA, PS) corresponds to one and only one (x, y) value and vice versa. Inside the diamond the inverse representation is not unequivocal; instead there are several possible occupation profiles corresponding to each point in the diamond.

There are triangles distinguishable around the corners of the diamond figure. Inside these triangles the occupational group represented in the apex is the largest group in the occupation profile, and its proportion over 50 % of the total workforce. Thus these vertical triangles can be called by Swyt's terms blue-collar, white-collar, No uniform and Tan Collar zones.

The representation of the workforce data of the US economy in Swyt's system of coordinates, from the beginning of this century with intervals of ten years until the year 1980, is presented in appendix 16. The observations display, as Swyt notes, great temporal ordination and coherence of direction. From the mid-50's onwards the proportion of service - like occupations in the occupation profile grows larger than the proportion of physical labour.

In appendix 16 Swyt has determined a straight line going through the observational data as accurately as possible, and projects by means of it the occupation profile for the future. Swyt's results can, however, be criticized due to a defect in his prospective method, which will be discussed later in more detail.

Swyt's analysis is especially interesting because he shows that the temporal order observable in appendix 16 can be explained by the advance of the cutting edge industries (appendix 17). When arranged according to the occupation profile, the leading branches of industry will be placed in the same order as the whole economy in its course of development in appendix 16. This order well brings out the growth of the service type occupations and the increasing information intensity in industry.

6.2. Three-dimensional prospective analysis

Equations above give an unequivocal representation from the (MA, PS, PP, TP) occupation profile on to (x, y) coordinates.

From the direction of (x, y) onto (MA, PS, PP, TP) the mapping is not unequivocal, in other words the proportions of people working in different occupational groups cannot be calculated on the basis of the (x, y) coordinates alone.

In the equation group there are 3 equations and 6 variables. When variables x and y, and one occupational variable is chosen as a free variable, the three remaining ones can be solved. Physical production (PP) is a good choice for the free variable, because it is known to reduce monotonically. The inverse transformation from space (PP, x, y) to triad (MA, PS, TP) will produce equation (2).

$$\begin{aligned}
 & \text{PP, x, y given} \\
 & \text{and then} \\
 (2) \quad & \text{TP} = \text{PP} - y \\
 & \text{MA} = \frac{1}{2} (1 + x + y) - \text{PP} \\
 & \text{PS} = \frac{1}{2} (1 - x + y) - \text{PP}
 \end{aligned}$$

By using the inverse transformation (2) it is easy to confirm the results for the apexes, triangles and sides of the diamond presented above.

Appendix 18 shows Swyt's observations together with observations from Finland as well as projection points in a three-dimensional system of coordinates of (2). Swyt's

diamond figure is the horizon level of this three-dimensional system of coordinates, for which $PP = 0$.

With the three-dimensional system of this study it is possible to project the development of the occupational profile from the data set up to the horizon of future ($PP = 0$).

In the USA the occupational structure has already since the 1940's left the "hegemony" of physical production ($PP \geq 50\%$) behind and become more and more service-driven. Finland has followed the same pattern, but did not pass the limit mentioned above until the 1970's. The growth rate in Finland in the turn of the 1980's was, however, much faster than in the USA.

The observations on Finland are situated at a different point in the coordinate system than the observations on the USA. In order to find out what it means, the annual occupation profiles projections are calculated. The results are presented in appendix 19 and 20. They illustrate the proportions of the workforce for each four occupational group in different years until 2030.

In Finland the proportion of physical production around the year 1980 corresponds to the situation of employment in the USA in the 1950's. The occupational structures of these two countries were dissimilar in other respects, too. A striking and remarkable difference is that while the proportion of technical-professional (TP) occupations in the US occupation profile is only about third of the proportion of managerial-administration (MA) occupations, in Finland the relation is much larger. In Finland the proportion of technical occupations is considerably larger than that of the managerial-administration occupations. And this difference will grow all the time until the horizon of future. The difference in the occupation profiles of Finland and the leading industrialized country, the USA, gives cause for questions and discussion about the diversity of development and requisite know-how and skills in the late-industrial transient period.

It has to be kept in mind, however, that there are inaccuracies in the analysis, due to inaccurate groupings, changes in statistical material and measurements. The small amount of observational data from Finland is also a great factor of uncertainty from the point of view of the analysis, but how great it is, will not become clear before more observations are available.

Reduction in the proportion of physical production (PP group) is typical of the changes in the occupation profiles of the industrialized countries. It resembles the former reduction of the proportion of workforce in agriculture or manufacturing in all industrialized countries. In many countries the number of people employed in the manufacturing has started to fall and not only the proportion, while the production volume is still growing. In the USA this kind of a turn was not, however, observable yet in the beginning of the 1980's. It would be more interesting to find out the boomerang point in which a decrease in the amount of PP-work is going to occur (appendix 21). Changes in the PP-workforce can be regarded as a more valid indicator

of the late-industrial era than the workforce in manufacturing industry. There are jobs of service nature constantly departing from the manufacturing. Carrying out these jobs will create new companies and these companies will become agencies of the service sector in statistics. At the same time manufacturing and its expansion employs relatively less physical production workers. This is likely to have already happened in the USA, as can be seen from appendix 21: the relative proportion of PP occupations has constantly fallen, but the number of employees has grown. The kind of a turn into intensive growth as has happened in agriculture, is only about to begin. The total employment in the USA has increased especially strongly since the 1970's, a lot more strongly than for example in Europe (Walsh 1994). At the same time, however, there has been a downward trend in the growth of productivity in the USA (Cyert - Mowery 1989) and the USA has been left behind Japan in many fields of manufacturing industry; there are potential productivity reserves in the US economy (Hori 1993), and when they will be brought into use, it may mean decrease in the amount of PP-workforce. For Finland there is inadequate data for observing this point of transition as yet.

6.3. Adaptability of employment

During the period of transition, the changing-over from extensive growth to intensive growth in the use of PP-workforce comes along with the growth of productivity both in physical production and in service job. In that situation it is interesting to ask how quickly the structural change of the economy can adapt the vacant workforce to new tasks in the economy and what has been the proportion of different occupational groups in this adaptation.

In the USA the proportion of physical workforce has decreased during the last decades by 6 %-units in ten years. Correspondingly, this decrease shows itself in the growth of the proportions of service occupations. The largest proportion of growth, over 60 %, is covered by managerial-administration (MA) work, including sales, marketing and clerical work. Thus the proportions of technical-professional work and physical services together cover less than 40 %. The proportion of technical occupations and other TP-group occupations in the adaptation is less than 20 % and in future still less. There is still an extensive growth of the service jobs going on in the US economy, but now it is directed towards services requiring human relation's skills. As the occupational structure is changing, the relative importance of services requiring technical skill is smaller than before albeit they are needed more in amount.

In Finland the proportion of physical production in the employed workforce has decreased between 1975 and 1985 by approximately 10 %-units. In other respects, however, the situation is quite opposite to that in the USA. Of the growth of employment in the service sector the technical occupations (TP) cover nearly 60 % and

managerial-administration occupations around 30 %. The physical production is left with less than 10 %. The difference to the USA is great: there the increase in physical services was able to cover over 20 %. A more striking difference, however, can be found in the technical occupations and managerial-administration occupations. This difference reflects the larger dominance of engineering and production orientation in the Finnish economy compared to the USA, and on the other hand, the stronger dominance of managing and marketing in the US economy.

7. DISCUSSION

In this study it has been shown how the social development can be understood as alternation of stable and transient periods. The transient periods are not necessarily shorter or less important than the stable periods, even though the latter tends to dominate the ideas and the expectations on the development. In periods of transition the environment becomes rapidly changing, unpredictable and determined by many new and strange factors. Making wise decisions in transient periods call for different practices than in a period of a stable growth.

The present period of transition, called the late-industrial transient period, has been under special attention of this study. Its beginning can be observed from growth of service sector jobs and reduction in the manufacturing workforce. These features of development have been visible for long in the developed industrialized countries. The late-industrial period of transition does not come out clearly if the workforce is analyzed only according to sectorial data. An analysis based on occupational groups can shed new light on the period of transition. The essential point for the late-industrial period of transition is when the number of physical workforce starts to decrease, as measured by the number of workers. Such turn to intensive growth for the part of the workforce was not yet discovered by this analysis either in the USA or in Finland. There is, however, reason to believe that this kind of a turn in the development of the US economy can happen, along with the accelerated growth of productivity.

Another interesting and important feature of the late-industrial transition regarding the workforce, is how fast the growth of the service jobs will proceed and how fast it is possible for the new service jobs to balance the decrease in the physical labour in economy. In Finland this rate has been such that in ten years about 10 % of the structural change in workforce has been compensated by the growth of workforce in the service type of occupations, while in the USA the corresponding rate of adaptation has been smaller by nearly half. Relatively taken the Finnish economy has been faced with a stronger transition than the USA since the turn of the 1980's.

For Finland's part, the adaptation has led to stressing the importance of occupations and jobs requiring technical education, knowledge and skill; and accordingly, the proportion of technical professionals in the total workforce has grown large. Managerial-administration occupations and jobs requiring for example sales and marketing skills have been smaller both in proportion and importance. The proportion and importance of physical services have not been large either.

The situation in the USA is almost a mirror image of that in Finland: the proportion and importance of occupations related to managing, administration, sales and

marketing have been dominant, twice as large as in Finland, and the proportion of occupations requiring technical know-how, respectively smaller, i.e. three quarters of their proportion in Finland (appendix 22).

These differences are already present at the starting point defined by data, and they are strengthened further in the projection. The stronger dominance of engineers and likewise production orientation in Finland can be explained by the past one-sidedness of the Finnish economy and its strong orientation towards manufacturing production ever since the world war. The most important task of the economy was to get production. Sales and marketing were not needed in foreign trade, at least in the trade with the Soviet Union; it was possible to handle the Soviet trade in negotiations by a few people. Questions regarding the choice of materials, product design, financing and risk management were decided in the same negotiations. In addition to that, there was producer's market prevailing in the home market demand until the 1980's. Finland has succeeded well by simply assuring its production capacity for the volume of orders at a given time, and the dominance of technical skills in the educated workforce or the production-orientation of the economy have not come out as problems. It is not until recently that some attitudes have started to change into a more critical direction.

In his paper Jyrki Haikonen (1993) brings out suspicions that the role of technology is overemphasised and the citizens being estranged from technology. He talks about the reluctance and inability of the developers of technology to take social factors into account. Although Finland is a country of high-level technical infrastructure, something essential is missing. This something is reflected in the results of the analysis as a quantitative difference between the occupation profiles and know-how profiles in the USA and in Finland. Finland is going to continue full ahead to the direction that may not any longer guarantee success in the changing world of the late-industrial era.

The expansion of services in any branches is progressing quickly, but it is the growth of information intensity and differentiation of services within each branch that are going to rise to key issues. Finland is traditionally production-oriented industrialized country, in which human relation's skills are left with little attention as factors of success. The fact that people practising different occupations do not have much of these skills and that the skills of people in managerial positions are also rather poor, is likely to be the reason for underrating these skills and underestimating them in relation to factual knowledge. The Future Barometer forecasts (Mannermaa - Mäkelä 1994), among other things, that the importance of the human relation's skills will grow, as well as the importance of information intensive service skills. The results of the Future Barometer support and enrich the observations of this analysis.

It has been said that in the future every business will be a service business. Some of them may have some goods or systems as a spin-off, but the most profitable value added will be achieved by services. At the moment manufacturing "employs" services by subcontracting or hiring. In the future it will be the other way round: services will employ the manufacturing industry with its orders. Therefore service skills, the right

differentiation of services and the productivity of differentiated services will be keys for success (Drucker 1991). Any economy will therefore face a structural change of the expanding service jobs and tasks. This is what late-industrial transition demands. The occupation profile will not remain unchanged; every occupation will have to become more information intensive and service-oriented. Appendices 19 and 20 show the required profile of know-how in future occupations for each individual and the changes of a personal profile.

REFERENCES

- Bell, Daniel (1974) *The Coming of the Post-Industrial Society*. Heinemann. London.
- Cyert, Richard M. - Mowery, David C. (1989) *Technology, Employment and U.S. Competitiveness*. Scientific American. May 1989.
- Drucker, Peter (1986) *Dramatic Shifts in the Global Economy*. Foreign Affairs. Spring 1986.
- Drucker, Peter F. (1991) *The New Productivity Challenge*. Harvard Business Review. November-December 1991.
- FICOR (1997) *On the Way to Sustainable Development*. The Finnish Association of the Club of Rome. Helsinki.
- Ginzberg, Eli - Vojta Georg J. (1981) *The Service Sector of the U.S. Economy*. Scientific American. March 1981, Vol. 244, No 3, pp. 32 -38.
- Glenn Jerome C. (1989) *Future Mind: Artificial Intelligence*. Acropolis book. Washington.
- Haikonen, Jyrki (1994) *Suomi informaation valtatielle*. (Finland onto the information highway. In Finnish). Helsingin Sanomat. 23.1.1994.
- Hjerppe, Riitta (1989) *The Finnish Economy 1860-1985. Growth and Structural Change*. Bank of Finland. Government Printing Centre. Helsinki.
- Hori, Shintaro (1993) *Fixing Japan's White-Collar Economy*. A Personal View. Harvard Business Review. November - December 1993, pp. 157 - 173.
- Kahn, Herman - Wiener, Anthony (1967) *The Year 2000*. The Framework for Speculation on the Next Thirty-Three Years. New York.
- Kahn, Herman - Brown, William - Martel, Leon (1976) *The Next 200 Years*. New York.

- Kondratieff, N.D. (1993) *Izbrannije Sotsinenija* (Collected Works). Moskova.
- Leach, Donald - Wagstaff, Howard (1986) *Future Employment and Technological Change*. Kogan Page. London.
- Machlup, Fritz (1962) *The Production and Distribution of Knowledge in the United States*. Princeton University Press. Princeton N.J.
- Maddison, Angus (1982, 1986) *Phases of Capitalist Development*. Oxford University Press. Oxford.
- Malaska, Pentti (1983) *Tulevaisuuspoliittinen hahmotelma*. (A proposal of an interaction society for the Future. In Finnish). Pellervon taloudellisen tutkimuslaitoksen julkaisu 4/1983, 2-12.
- Malaska, Pentti (1987) *Disemployment and Intensive Growth*. Future of work. Edited by Kari Eklund. Niva 1987.
- Malaska, Pentti (1989) *A Conceptual Framework for the Self-Reliant Transformation in Africa*. Africa Beyond Famine. A report to the Club of Rome. Ed. by Aklilu Lemma and Pentti Malaska. Tycooly Publishing. Midsomer Norton.
- Malaska Pentti (1991a) *Economic and Social Evolution: The Transformational Dynamic Approaching*. The New Evolutionary Paradigm. Edited by Ervin Laszlo. London, Gordon Breach.
- Malaska, Pentti (1991b) *Nature-Oriented Technology*. In the WFSF World Conference Proceedings. Budapest.
- Malaska, Pentti (1993) *Ongelmina lama, räme ja murros*. (Depression, collapse and transition of the society. In Finnish). Turun Sanomat, 8.2.1993.
- Malaska, Pentti (1994) *Progress, Nature, Technology*. Futures, Vol. 26 No 5, pp. 529-542.
- Mannermaa, Mika - Mäkelä, Keijo (1994) *Tulevaisuusbarometri 1993*. (A Futures Barometer. In Finnish). Opetusministeriön suunnittelusihteeristön keskustelumuiistioita, 21. Helsinki.
- Martel, Leon (1988) *Mastering Change*. Graftin Books. London

- Masuda, Yoneji (1981) *The Information Society as Post-Industrial Society*. World Future Society. Bethesda, USA
- Meadows D.H. - Meadows D.L. - Randers J. (1972) *The Limits to Growth*. A report to the Club of Rome. Universe book. N.Y.
- Ministry of Finance (1993) *Economic Survey 1993 Finland*. Helsinki.
- Naisbitt, John (1982) *Ten New Directions Transforming Our Lives*. New York.
- Naisbitt, John (1984) *Megatrends: Ten New Directions Transforming Our Lives*. Warner Books. New York.
- Naisbitt, John - Aburdene, Patricia (1990) *Megatrends 2000. Ten New Directions for the 1990s*. New York.
- Normann, Richard (1992) *New Business Logics*. Seminar Lecture. Finland Futures Research Centre. 14.10.1992.
- OECD (1986) *Labour Force Statistics*. Department of Economics and Statistics. Paris.
- OECD (1992) *Historical Statistics*. Paris
- OECD (1993) *Main Economic Indicators*. Paris.
- Swyt, Dennis A. (1988) *The Workforce of U.S. Manufacturing in the Post-Industrial Era*. *Technological Forecasting and Social Change* 34, pp. 231-251.
- Swyt, Dennis A. (1993) *Matrix Mapping Correlations between My Four Occupational Groupings and Those Defined by U.S. Census Bureau*. Unpublished Paper. 4.6.1993.
- Tamminen, Tapio (1994) *Edistyksen myytti*. (The Myth of Progress. In Finnish) Suomen Antropologinen Seura.
- Tiainen, Pekka (1993) *Taloudellisen kasvun tekijät Suomessa*. (Economic Growth in Finland. In Finnish). *Kansantaloudellisia tutkimuksia XXXVII*.
- Toffler, Alvin (1981) *The Third Wave*. Bantam Books. Toronto.
- Toffler, Alvin (1990) *The Big Turn*. (Suuri Käännö. Finnish edition). Otava. Keuruu.

U.S. Bureau of Census (1976) *Historical Statistics of the United States, Colonial Times to 1970: bicentennial edition*. Bureau of the Commerce. Washington D.C. Oct. 1976. Series D 152-166 (for the Period 1820-1940).

U.S. Bureau of Labor Statistics (1981) *Employment and Earnings*. January 1981.

U.S. Bureau of Labor Statistics (1985) *Monthly Labor Review*. Nov. 1985. (for the Period 1950-1995).

Vartia, Pertti - Ylä-Anttila, Pekka (1992) *Kansantalous 2017*. (Finland Economy. In Finnish). Elinkeinoelämän tutkimuslaitos - ETLA. Suomen Itsenäisyyden juhlarahasto - SITRA. Helsinki.

Walsh, James (1994) *Will the Jobs Ever Come Back?* Time International. Feb. 7, 1994, No 6, pp. 25 - 30.

Wilenius, Reijo (1981) *Ihminen ja työ: Esitutkimus*. (Man and Work. In Finnish). Gummerus. Jyväskylä.

Wright, Georg Henrik von (1992) *Minervan Pöllö*. (Minerva's Owl. In Finnish). Otava. Keuruu.

Wright, Georg Henrik von (1993) *Myten om Framsteget: Tankar 1987-1992 med en Intellectuell Självbiografi*. (Myth of progress. In Swedish). Söderström. Helsingfors.

Yakovets, Yu. V. (1993) *At the Sources of a New Civilization*. International Kondratieff Foundation. Moscow.

ABSTRACT

The changes of societies and their global co-operation at present have many layers with their pertinent aspects to be observed and understood. Conventional real economy business cycling is mixed with sudden and short-term tremors of the monetary and financial part of the economy, i.e. of the symbol economy. And in addition to these changes there is a more fundamental long-term transformation taking place at the same time and mixing with the whole of the change pattern. One of the most crucial aspects of this societal transformation is the transformation of work. This paper describes and analyses the change of work, employment and dominating mode of rationale from the agricultural societies to the present industrial societies, and beyond the present situation. The present situation is called a late-industrial transient period, and it is regarded as a transient phase of development between the prevailing but diminishing industrial society and a coming service economy. The empirical data of the sectorial analysis of OECD countries is presented, and the occupational data of USA and Finland is used with the Swyt's model in order to make comparisons and projections to the future.

PREVIOUS PUBLICATIONS:

2/98 Malaska, Pentti (1998) *Prospektiivinen analyysimetodi Suomen trendiskenaarioiden laatimiseksi.*

1/98 Keskinen, Auli (1998) *Participatory Democracy and Civil Society – Transforming Societal Decision Making in the Information Age.*

7/97 Becker, Theodore & Slaton, Christa Daryl (1997) *Transforming Modern Representative Democracy via Advanced Telecommunications.*

6/97 Masini, Eleonora Barbieri (1997) *Futures Studies and the Trends towards Unity and Diversity.*

5/97 Kaivo-oja, Jokinen & Malaska (1997) *Kestävän kehityksen tietoyhteiskunta: teoreettisia ja käsitteellisiä näkökulmia.*

4/97 Kamppinen, Matti (1997) *Teknologian riskit ja tulevaisuus.*

3/97 Mettler, Peter H. (1997) *Sustainable Technology – Sustainability of What?*

2/97 Kamppinen, Matti (1997) *Cultural Models of Risk – The Multiple Meanings of Living in the World of Dangerous Possibilities.*

1/97 Malaska, Pentti (1997) *Sustainable Development as Post-Modern Culture.*