

Keskusteluaiheita – Discussion papers

No. 1022

Olli Martikainen – Jussi Autere* – Markku Nurmela*

PERFORMANCE IMPROVEMENT IN PUBLIC ORGANIZATIONS

– How to leverage ICT investments**

** This paper is based on a Nordic research project funded by TietoEnator Oyj in 2005 – 2006. We wish to thank Ulla Lehtinemi, Ritva Elonen and Asko Torniainen from TietoEnator for participating in the project management group and organizing the Nordic interviews.

* Jussi Autere and Markku Nurmela are partners at Gearshift Group Oy.

MARTIKAINEN, Olli – AUTERE, Jussi – NURMELA, Markku, PERFORMANCE IMPROVEMENT IN PUBLIC ORGANIZATIONS, HOW TO LEVERAGE ICT INVESTMENTS, Helsinki: ETLA, Elinkeinoelämän Tutkimuslaitos, The Research Institute of the Finnish Economy, 2006, 38 p. (Keskusteluaiheita, Discussion Papers, ISSN 0781-6847; no. 1022).

ABSTRACT: The research analyses effective ways and means of improving the performance of public sector organizations. Etlatieto and TietoEnator have organized the study on the basis of interviews of key public sector managers in four Nordic countries. Special attention was paid to methods employing information and communications technologies (ICT). The first main result is contained in the conclusion, that performance objectives and methods of improving the public sector productivity are not similar to those in private industries. The justification for several public sector services and organizations comes from providing public goods like rule of law, collective security and social justice or putting limits to opportunistic behaviour. The second main result of the study lies in the assessment, that in public sector the services are often not codifiable. The user of the services assesses their quality based on the expectations and experiences. The third main result is that public sector organizations have underlying structures that make performance improvements more difficult than in private sector. In the private sector, all organizational levels usually get benefits from productivity improvements, but in the public sector incentive structures are not common to all actors. Based on the three basic results obtained the analysis suggests methods that can be used in pursuing higher performance in public sector.

Keywords: Government performance, ICT diffusion, performance improvement

JEL-codes: H11, O33, O38, L30

MARTIKAINEN, Olli – AUTERE, Jussi – NURMELA, Markku, PERFORMANCE IMPROVEMENT IN PUBLIC ORGANIZATIONS, HOW TO LEVERAGE ICT INVESTMENTS, Helsinki: ETLA, Elinkeinoelämän Tutkimuslaitos, The Research Institute of the Finnish Economy, 2006, 38 s. (Keskusteluaiheita, Discussion Papers ISSN, 0781-6847; no. 1022).

TIIVISTELMÄ: Etlatieto on tutkinut yhdessä TietoEnatorin kanssa mahdollisuuksia kehittää julkishallinnon tuottavuutta tietotekniikan avulla. Tämän työn osana järjestettiin neljässä pohjoismaassa haastattelututkimus. Tutkimuksen ensimmäinen havainto oli, että julkishallinnossa tulostavoitteet ja tuottavuuskäsitteet eroavat usein yksityisen sektorin vastaavista. Monet julkiset organisaatiot tuottavat kansalaisille julkishyödykkeitä, joita ovat esimerkiksi laillisuusperiaate ja yhteiskunnallinen oikeudenmukaisuus. Toinen havainto oli, että suurin osa julkishallinnon työntekijöistä työskentelee organisaatioissa, joiden palveluiden sisältöä on vaikea kodifioida eli kuvata määrämuotoisesti. Palvelujen käyttäjä, kansalainen, arvioi palvelujen laadun omasta, odotuksiin ja kokemuksiin pohjautuvasta näkökulmastaan. Tutkimuksen kolmas havainto oli, että julkisen sektorin organisaatioissa on rakenteita, joiden seurauksena toiminnan tehostaminen on vaikeampaa kuin yksityisellä sektorilla. Yksityisellä sektorilla kaikki organisaation tasot hyötyvät yleensä tuottavuuden kasvusta. Julkisella puolella hyvien tulosten tuottaminen ei aina lisää organisaation resursseja tai palkitse työntekijöitä. Näiden kolmen tutkimuksen päähavainnon perusteella esitetään keinoja julkisten organisaatioiden suorituskyvyn kehittämiseksi.

Avainsanat: Julkishallinnon tuottavuus, tietotekniikan käyttöönotto, toiminnan kehittäminen

JEL-koodit: H11, O33, O38, L30

1 Executive Summary

This report examines effective ways and means of improving the performance of public sector organizations. TietoEnator and Etlatieto have organized the study on the basis of source analysis and interviews of key public sector managers. The interviews were taken in four Nordic countries. Special attention was paid to methods employing information and communications technologies (ICT).

The first main result is contained in the conclusion, that performance objectives and methods for improving the public sector are not similar to those in private industries. Revenue growth and profitability motivate development in the private sector and the guiding criterion is productivity. In the public sector, the volume or value of outputs is seldom the main goal. The justification for public sector organizations comes from producing public goods (freely available for all citizens), like rule of law and social justice, limits to opportunistic behaviour or collective security. Public organizations may also serve to correct market failures and perform functions where markets do not produce socially optimal solutions. Typical examples are education and research.

The problem of legitimacy and equality as objectives is that they are difficult to measure. This problem can be dealt with in two ways: one is to identify more clearly boundaries of those organizations devoted to general issues like legality and equality, the other is to use more advanced output concept of quality as key driver in productivity.

The second main result of the study lies in the assessment, that in public sector services it is not the technical standards of the outputs that determine efficiency. The user of the services, the citizen, assesses their quality from the social vantage point of his expectations and experiences. The concept of perceived service quality deals with this matter.

The third main result of the study is the inference, that public sector organizations have underlying structures that make performance improvements more difficult than in private sector. In private sector, all organizational levels usually get benefits from productivity improvements, but in public sector incentive structures are not common.

Based on these three basic results obtained, the analysis suggests the following methods that can be used in pursuing higher performance in public sector:

- Setting relevant social objectives for service producers and defining measurable social indicators for service producers' performance;
- Segmenting the milieu of users of public services, based on perceived service quality;
- Segmenting the organization and service production according to codifiability;
- Improving the perceived service quality by innovative application of modern knowledge and ICT technologies combined with organizational changes;
- Creating incentives for public organizations to implement change.

2 Table of contents

2	Table of contents	2
3	Background	3
3.1	Overview	3
3.2	Research focus	3
3.3	The paradox of declining productivity	3
3.4	Public sector produces legitimacy	4
3.5	Public sector corrects market failures	5
4	Key terms.....	5
5	Present state analysis	6
5.1	"Horror story"	6
5.2	Productivity of public services is decreasing	8
5.3	Information society	9
6	Performance and productivity increase	10
6.1	Development based on quality improvements	10
6.2	Quality is in products, services and life	10
6.3	Quality in information society is not understood fully yet	12
6.4	Innovations and knowledge	13
7	How perceived service quality can be improved	13
7.1	Segmentation of the service demand	13
7.1.1	Legality and equality as framework for objectives	14
7.1.2	Profiling.....	14
7.1.3	Usage history data collection	14
7.2	Segmentation of the service supply	14
7.2.1	Personalization	14
7.2.2	Augmentation.....	14
7.2.3	Automation.....	15
7.2.4	Self service	15
7.2.5	Participation and collaboration.....	15
8	Unused potential of Information Technology.....	15
8.1	Productivity increases caused by ICT	15
8.2	"ICT as an option and hidden potential"	16
8.3	Huge potential in public sector	17
9	How innovations are put into practice	18
9.1	Overcoming institutional rigidities	18
9.2	Creating dynamic innovation systems	19
10	Framework of methods to improve performance	20
10.1	Segmentation of services	20
10.2	Changes in service production	21
10.3	Deployment of innovations.....	23
10.4	Successful IT-solutions in framework context.....	26
11	Findings from the Nordic study.....	28
11.1	Data collection	28
11.2	Summary of findings.....	29
11.2.1	General findings	29
11.2.2	A closer look at the findings	32
12	Recommendations	35
13	References	37

3 Background

3.1 Overview

This report analyzes opportunities for the public sector organizations to most efficiently improve their performance. Since the financing of the public sector cannot be increased significantly, while the demands of the public services seem to be growing, there is a clear-cut need to increase their efficiency and find methods and tools to do this without essentially decreasing the quality of services. TietoEnator and Etlatiето have carried out this study, based on source analysis and interviews of key managers. The interviews were conducted in four Nordic countries. Special attention was paid to methods employing information and communications technologies (ICT).

3.2 Research focus

The importance of public sector performance is increasing in the Nordic countries. The continuous growth of resources needed for public services is becoming a problem. Aging population poses an increasing demand for health care services. At the same time, the global competition makes it more difficult to maintain current taxation levels.

Even though ICT has created clear productivity increases in private sector, it has failed to produce significant improvements in public sector. In fact, the measured techno-economic productivity has decreased in public services in Finland.

The public organizations have actively invested in ICT solutions. So the problem is neither unwillingness to make changes and introduce innovations, nor lack of development strategy. The three main problems seem to be: 1) The productivity measures in public services do not mirror real performance needs; 2) The measures do not account sufficiently for the quality improvements in services; 3) The benefits in personnel savings cannot be utilized because of organizational rigidities.

A question still remains unanswered: what kind of methods and approaches produce performance improvements most efficiently. This study would propose some recommendations for solving the presented problems.

3.3 The paradox of declining productivity

The productivity in the public economic sector and healthcare has been decreasing. For instance, in Finland in 1980-2001, the public sector productivity calculated as *outputs* divided by personnel needed to produce them has actually declined. Currently the public sector has more employees than ever. The number of administrative employees has been rising, even though public sector in Finland has invested heavily in IT systems to automate processes.

If the developments in public services are examined in more detail and changes in service features are taken into account, the picture becomes more varied. For instance, in

personal tax return process, an immense improvement has taken place in Finland. In 1980, citizens had to collect invoices and other papers during the taxation year, and to fill a rather complex form next January. Then they would send the form plus the invoices to the IRS. Today, the majority of Finns get of a suggestion what would be their taxation for the previous year in May. They need only to correct possible mistakes. The savings of time, needed to comply with public service requirements, amount to thousands of man-years. Still, from technical viewpoint, productivity may have declined, since the number of tax returns and their attachments has declined.

Richard Walker (2004) has determined that the probability to obtain performance improvements by implementing process changes in public sector increases, if changes in services are done at the same time. It is then most probable that the quality and features of the service change synchronously with the new processes being introduced. Most often the result would be that some paperwork or services become obsolete or the need of them is significantly reduced. Thus, in classical productivity calculations, the change is easily negative. Also the new process may enable better service in difficult cases. For instance, the criminal police would adopt new methods that can solve cases previously left unsolved.

There is another feature of public organizations that resists performance improvements. Today in the private sector, change of processes leads to managerial profitability and incentive pressures to reduce the number of employees. If the number of employees declines and the amount of services remains the same, the productivity increases. In formal organizations the number of subordinates often defines management status and salary. In public sector it can be difficult to put out extra workers. Hence, the organization has a tendency to find new tasks, for instance development projects, for the personnel that becomes redundant in process streamlining. If there is no incentive structure, or even measures to assess the real value produced, the managers may not have enough motivation strive for real performance improvements.

Obviously, there are problems both in terms of definition and estimation. We need to know what the real value produced by public organizations is, and how to measure it. The first challenge is to find out, what is the specific value produced by the public sector, or in other terms, what are the quality measures of services in this industry.

3.4 Public sector produces legitimacy

The research tradition in the USA considers the main role of public administration as providing fair and legal infrastructure to society. The end-result is rule of law, justice or legitimacy. In contrast to Europe, in the USA the word justice does not necessarily include a connotation of economic equality, or not even of social justice. Thus the public sector organisations provide only rule of law infrastructure to the society. This means, for example, providing economic and political stability through legal norms, democratic elections, independent media, lawful limits to corruption and opportunism and security against the acts of criminals or foreign aggression.

Such a viewpoint that public sector produces legitimacy displays immediately one quality feature of services that has value in the public sector, but not necessarily in the private organizations providing services. It is the ability of citizens to enjoy transparency

and control on the services. For instance, in taxation, the citizens should be in a position to check easily if their taxation is conducted according to the regulations and that the organization conducting the taxation is using its resources for the public benefit. For instance, citizens do not necessarily like the idea that resources are being spent for traffic control on common taxpayers. Citizens would rather like to have criminality curbed, even if the amounts collected would not cover the real costs.

3.5 Public sector corrects market failures

The legalistic viewpoint on public sector role is shared by all the democratic societies. The public sector has also another role, which is more visible and pursued in Europe and especially in Scandinavia. This is the mission of a welfare state to correct the failures of market economy in providing equal social and economic opportunity for everybody. In contrast to private organizations, which follow the pure capitalistic logic of profit-seeking techno-economic systems, public sector corrects market failures by:

1. Creating positive externalities such as basic education, healthcare, social services and insurance and public research and development;
2. Limiting negative externalities such as pollution;
3. Preventing monopoly and cartel formation;
4. Enforcing intellectual property rights.

Thus, the task of a public sector is to act as an infrastructure and insurance company, but with policies, which in open market system could not be profitable. Hence, it is the task of the public sector to correct the effects of short-sighted profit seeking market economy, which would be harmful for the society in long term. These market failure corrections include for instance cash benefit schemes for families with small children, for otherwise the birth rates would be too low to support sustainability of the society; and support for early stage R&D, because otherwise companies would not get sufficient expected return on R&D investments.

The public sector's role in correcting market failures is especially important in the socio-economic context. Because the results of actions in gaining long term benefits at the cost of short term profits are often only increasing probabilities of certain outcomes, the performance measures should include a method to estimate the value or quality of these kinds of outcomes. This may need approaches resembling the real option theory.

4 Key terms

Externalities	Externalities arise whenever the production or consumption activities of some party directly affect the production or consumption activities of the others through channels other than market prices.
ICT	Information and Communications Technology.
Innovation	Innovation is the introduction of new ideas, goods, services, and practices, which are intended to be useful. An essential

element for innovation is its application in a commercially successful way.

Market failure	Case when free unregulated market does not achieve an efficient allocation of resources.
Performance	The results of activities of an organization or investment over a given period of time. In this study we use this term as a covering concept that tells how efficient, effective, and productive in its tasks an organization is.
Productivity	The amount of output per unit of input (labor, equipment, and capital). There are many different ways of measuring productivity. For example, in a factory productivity might be measured <i>by</i> the number of hours it takes to produce a good, while in the service sector productivity might be measured based on the revenue generated by an employee divided by his/her salary. In public sector, productivity is currently measured as in a factory.
Quality	A measure of fitness for use. The totality of features and characteristics of the product, process or service that bear on its ability to satisfy stated or implied needs (ISO 8402).
Social benefit	The sum of gains of some activity or project to whomsoever they accrue.
Social cost	The sum of money, which is just adequate when paid as compensation to restore their original utility levels to all who lose as a result the production of the output.
Social welfare	The utility of people considered as an aggregate.

5 Present state analysis

5.1 "Horror story"

Despite of all the savings initiatives in the public sector, the real development in Finland since mid 1990s has been a constant increase in size and cost of the public sector. As Pentti Vartia (2005) has pointed out, the real financial resources of public sector in Finland are now bigger than ever before. Social services, education system and health care each employ currently more people than ever before. Even the number of administrative employees is on the highest level ever. In addition, the salaries in real terms in public sector also the highest.

Different initiatives to increase productivity, to develop information society and to apply ICT have not succeeded in changing the tendency of the public sector to grow. An

important question is why the initiatives to develop processes and to reduce costs have not brought visible results. Instead, the public sector employees work more than ever:

Today we work in our government office surely more than people in industrial management. Many people in our office are too overloaded.

One has to search for the answer in the realm of the methods and the approaches used, as well as in the sphere of incentives.

The real incentive structure of the public sector often prizes the risk minimization. “If you do nothing, you will make no mistakes.” Also, many of the organizations have a traditional role of stability factors in society. If the objectives and tasks of the organizations are not explicitly defined and segmented, the situation easily leads to a single rationale of changes – survival of the institution.

Unfortunately the risk minimization cannot break the out-of-date practices. Risk-averse methods concentrate on making current process more efficient or less costly, because change in service features and process structures pose high risks. New services might not meet the requirements presented in the legislation and new processes may not work. New services and processes demand also significant investments in development before they start to produce results:

When I visited my health center two years ago, I received my medication in 5 – 10 minutes with some kind words and a smile. This year to get the same service took four visits and several queueing sessions of 15-30 minutes each, and the personnel seemed to be under more pressure than before.

The most risk-averse methods to achieve higher productivity are the reduction of the price of inputs and the increase of outputs from the existing production machinery and employees. The extreme case is that the quality of machinery, employees or production inputs is not improved at all while higher output is demanded on them. This means that either the quality of output is reduced, or machinery or employees have to work harder and may soon become worn out. Such methods could be justified in case of organizations whose employees are not yet working in full capacity. But it is also easy to point out organizations where employees are already working overtime to meet the productivity demands with current processes and tools.

There have been concrete case examples in history where these kinds of productivity improvements lead to in the long term. In the Stalin era Soviet Union, the output norms were regularly increased, but employees and factories were not given new machinery or resources to do their work more efficiently. In the 1930s the propaganda and tough management made employees work harder, but in the 1940s limits were reached. Because the system did not allow lower performance, the only choice for organizations was to start forging the statistics, bribing and sending to Gulag those who compared papers and real outputs. This led to a system where no one could rely on receiving goods or services from any outside organization and large integrated factories produced everything they needed themselves.

Unfortunately, we can see similarities to the Soviet system today. Different organizations *claim* publicly how hard they work and how little financial resources they get. Still, national level statistics show that the increasing of costs and personnel continues.

5.2 Productivity of public services is decreasing

Productivity in Finland has been increasing very rapidly since the 1980s. The increase from 1980 to 2001 was over 75 % in the economy as a whole, i.e., 2.5 times more than in the OECD area on average. The growth in the services sector was 60 %, i.e., two times more than the average in the industrial countries. Despite this rapid increase, the productivity level of the Finnish services sector has not yet reached that of the leading developed countries. The productivity increases have been fast in sectors facing global competition but slow or nonexistent in closed sectors. Hence, in some industries such as telecommunications and transportation, the current productivity level is very high by international standards. Productivity differences across the service industries have increased since the early 1990s. Services are now about 70 % of the national economy. In the research by Mankinen, Rouvinen and Ylä-Anttila (2002) it has been found that the total factor productivity of public services has been decreasing while for the others it has been increasing; see Figure below. Better approaches to measure and develop performance and productivity in the public sector are needed.

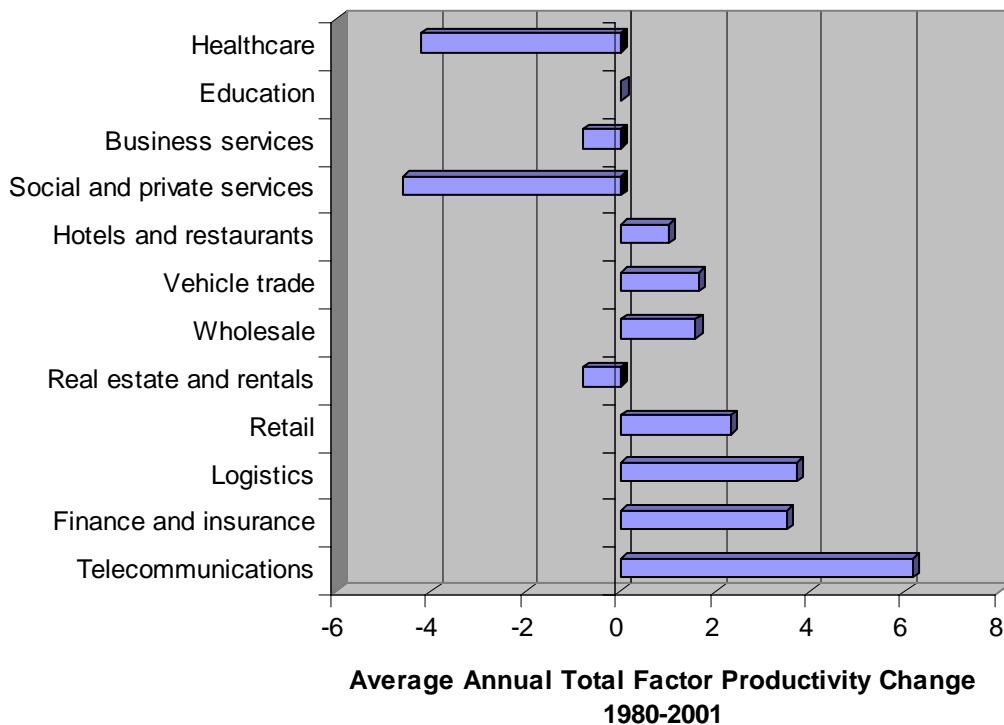


Figure 1: Productivity growth of services (ETLA 2002)

5.3 Information society

Currently, the development towards the Information Society is seen as an opportunity to reach higher performance in the public sector. But the tendency of risk minimization may make these possibilities a mirage. The Information Society (Johoka Shakai in Japanese) as a concept was first brought up in Japan in Tadao Umesao's article that described society's evolution through the development of information industries. The author of the article originally explored the cultures of monkey communities. The article caused debate in Japan in 1964, but already in 1967 Japan's Ministry of Trade and Industry (MITI) took the theme as one of its strategic areas. The notion of Information Society spread to the West in 1970's, but already in 1969 Peter F. Drucker has used the terms "Knowledge Society" and "Knowledge Industries" in his book "The Age of Discontinuity" (1969).

The term Post-Industrial Society was developed by an American sociologist Daniel Bell (1973). According to Bell, the Post-Industrial Society explains the future development of Western countries, where economy and occupation structures take new forms. The production of goods is more and more substituted by services (Service Society), technologies are based on new sciences and the society changes from one producing goods into a one based on information and knowledge.

Jürgen Habermas (1987) in turn speaks about the lack of perspective that is an implication of a deep change. According to Habermas, the question is about the implosion of work: automation replaces manual work and the changing of work processes alters the very nature of labour. The product of labour is no longer the result of the worker's immediate skill and activity. Professions tend to disappear.

Peter F. Drucker continues with the analysis of the post-capitalist society described by naming it "The Next Society" (2002). Instead of capital, natural resources and workforce, knowledge becomes the most important factor of production. Value from knowledge is produced in three ways: improving processes and services, development of new products and services and innovation. Knowledge carries out itself through action and it is measured by results. The goal of management is to allocate knowledge in a productive way, *to apply knowledge to knowledge*. That approach differs from earlier management, which focused on allocating capital in the most productive way.

Drucker's logic can be used to interpret many of today's phenomena. First, the theory of information and knowledge as economical resources is very incomplete. This theory, when teamed up with technological transition, would be most useful in developing better methods to produce information and increase productivity. Second, if creating new knowledge and innovations are crucial forms of production tomorrow, today we are at the handicraft stage in this area. Good methods, tools and automated "industrial refining" of information and knowledge are missing or not applied. The situation is as it was in England at the beginning of Industrialization: underpaid and overworked employees try to achieve production goals by doing manual work in factories without adequate tools of mass production. No wonder if people burn out early before retirement age in this kind of environment. It is no surprise that burnout problems are well visible in public organizations, because public sector organizations typically handle and process information.

The automated “refining” or value adding of information and knowledge as required by the “Information Society’s Industrialization” should be developed in two stages: first the automated collection and use of information should be realized, and after that the automatic producing of algorithms and procedures or in other words “codes producing codes” or “knowledge producing knowledge” should follow. In fact the vision of learning machines and programs is not new. It appeared already in the visions of Alan Turing in the 1940’s. The gradual shift from manual refining of information and knowledge to real automation means that organizations have to be ready to invest in innovation and accept changes in organizational structures and positions.

6 Performance and productivity increase

6.1 *Development based on quality improvements*

In economic development, the main consideration is the value of production, which is the volume of production multiplied by the price of products or services. The volume of production has two features: it is measured in terms of quantity and quality. In modern growth theory by Paul M. Romer (1986) the volume of production, or the deflated value added, is the result of invested capital, utilized labour and available new knowledge called also as stock of ideas. So, if one wants to increase the volume of production, one has to increase the quantity or quality of the factors of production, that is: capital, labour and knowledge. In other words, productivity increases can be based either on substitution of factors (increasing factor productivity), such as automation and investing in machines instead of using labour, or by quality increases in capital investments, labour and knowledge which are measured in total factor productivity (TFP).

It is well known in economic history, that until 1990’s the increase of productivity was based on investments, which substituted labour by machines. This means the so-called capital intensity growth in production. However, in 1990’s the increase of total factor productivity has been the major driver of growth, and this development is expected to continue in the future. So, in future productivity development it will be the *quality improvements* that matter.

6.2 *Quality is in products, services and life*

Quality is present in total factor productivity in three ways:

1. Quality of products, services and production (directly perceived by customers)
2. Quality of capital investment based factors (machines, software, buildings)
3. Quality of labour (experience, education, specialization)

The first factor includes also new products or services and their better characteristics. The second and third factors are indirect in the sense, that the quality improvements of machines or software are created by their producers as well as the quality improvement of labour is achieved through education, experience and learning. These indirect factors have a delayed effect. The labour quality increases take effect only when old labour is substituted by new labour for an approximate period of 10 years. The quality increase

based on new investments behaves similarly; new machines and software replace old ones in large quantities in 5 – 10 year intervals.

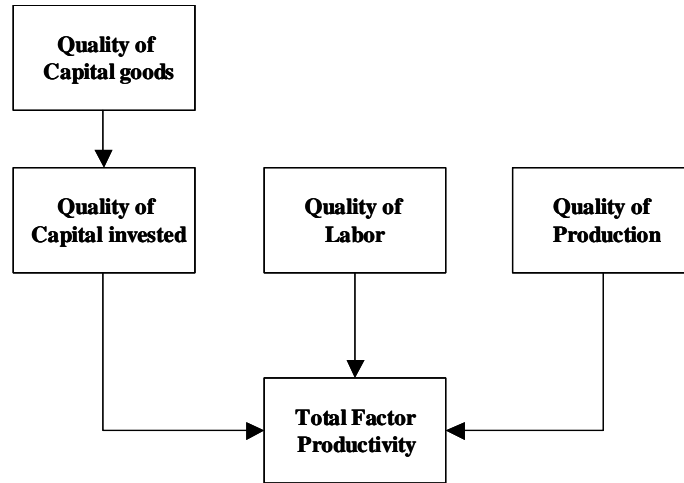


Figure 2: Drivers of total factor productivity growth

Quality is, however, present not only in industrial contexts but also in society and environment. We can talk about the *quality of life*, which can be considered in various social and national dimensions (Nestor Terleckyj 1970):

- Freedom and justice
- Health and safety
- Education and skills
- Work and income
- Human habitat and environment
- Arts and leisure
- Economic base.

Social goals are often the prerogative of public services and they can be defined at global, national or individual levels. There is a relatively wide consensus on them internationally. The services dealing with social issues are guided by principles of law and equality.

The rise in the standard of living can be estimated by the quality change in products and services provided to consumers. Gordon and Griliches (2001) have calculated an average annual quality increase for goods and services in 1967 – 1996. It has been 0.6 %.

It is difficult to compare the importance of different qualities, for example consumer electronics improvements against curbing crime or pollution. On the personal level preferences on quality may differ largely. This leads to the segmentation of users' body and correspondingly to the differentiation of products and services. However, we can say that the quality of life is in any case a combined result of the techno-economic quality provided by products and services and the perception of psycho-socio-economic quality experienced in work, society, environment and family. In other words, for each product or service:

$$\text{Total Quality index} = \text{Perceived Quality index} * \text{Production Quality index}$$

In public services, the perceived service quality depends on the difference between service expectations and service perceptions. It depends also on the experience, education and motivation of the service providing people as well as on the organization, location and availability of the services. The technical, or service production quality is determined by the service's capacity to meet the user's needs, as well by the service standards and performance of the service provider. Hence, while technical quality and productivity increase in service production by consolidating service units, cutting cost and using cheaper less educated labour, it may decrease perceived service quality. The quality of the service personnel is important, too, since its degradation easily lowers the quality of provided service. There are special cases where cutting of the service costs will prove expensive in the last analysis. For instance, preventive and supportive services at school and in social sector enable children at risk to continue the normal development in their age group. Cutting these services results in drop-outs, requiring more expensive interferences later. Similarly, cutting the costs in higher education services may increase the number of educated students, but at the same time it will decrease the professional quality of employees in industry and administration. This in turn may decrease the overall productivity of the organizations. In other words, the short-term technical performance may increase to the detriment of total quality. The trend becomes visible over a 10-year period. Hence, the long term *outcome of services* should be considered in connection with the short term output, and one can propose the quality measure to be:

$$\text{Service Quality} = \text{Long Term Outcome index} * \text{Total Quality index}$$

In Finland, the productivity statistics have not so far addressed the changes in service quality, not to mention the perceived service quality or service outcome indicators. Thus they don't at the moment reflect the long-term achievements and potential problems in the society.

6.3 Quality in information society is not understood fully yet

The worst phenomenon generated by Information Society today is the *digital divide*. It is a product of the special features of information and knowledge. Information and knowledge are expensive to produce, but cheap and fast to copy and distribute in digital form and in large quantities. The transfer cost of digital messages is low and they have no geographical boundaries. The result is information overflow, polarization of information to gatekeepers and lowering of communication thresholds. All this creates fragmentation of time, work, free time and social contacts. So, the quality we perceive may become lower than the quality that is pursued in services. The result is non-concurrence between *Perceived Service Quality (PQ)* that we experience, and the technical *Service Quality (SQ)*. In everyday environment we may be moving from high PQ, low SQ systems to low PQ, high SQ environments. One can easily find everyday examples. One could have high PQ, low SQ during a nice meeting with friends, and low PQ, high SQ after a prison sentence.

We could think of this phenomenon as a product of management and structures inherited from pre-information society signalled by lack of innovations to level up with the

automation of information and knowledge creation and “refinement”. This reflects a Tayloristic approach to a completely different environment. What we need is a global understanding of the basic issue: how to increase productivity and quality in information society, while avoiding degradation of the perceived quality and long term outcomes.

6.4 *Innovations and knowledge*

We need innovations and new knowledge for management, production and applications. When studying innovations we go back to the ideas of Joseph Schumpeter (1911): Innovations are new ways of utilizing resources. These include new products or services, new types of activities or organization models and new or changing needs of users. In this setting innovations are also interactive learning processes between participating actors. They require that different institutions participate in the national innovation system.

Social innovations relate to a large set of changes and activities in society. They can be improvements in social institutions involving reforms in organizations, services, incentives, related norms and laws or corresponding regulation. They can also introduce new management of production and labour, new methods of interaction, communication, coordination or agreement. It is also obvious that social innovations inevitably depend on the general state of economy and technology. So thorough understanding of the implications of technological progress and Information Society is needed.

7 How perceived service quality can be improved

As presented in the previous chapter, our society is moving steadily towards higher service quality for everyone. But the perceived quality of public services has not been increasing so steadily. The expectation levels from popular public services intended to correct market failures, like kindergartens or health care, have been rising. Citizens take higher and higher levels of welfare services as their due right. Thus the disparity between technical service quality and perceived service quality has been rising. Methods to address this problem are needed.

7.1 *Segmentation of the service demand*

An average measure of maximum perceived service quality is hard to formulate. If everyone gets the same public service, costs and prices are easily inflating and become a norm. Instead, segmenting of the services better suit user needs.

Market segmentation basically means dividing a market into smaller subgroups. It is based on the practical observation that the total market is usually made up of submarkets (called segments), which are homogeneous with respect to their specific parameters. Because of their internal similarity, the segments are likely to behave similarly when interacting with certain services. Another reason, why segmentation improves

perceived service quality is that it can reduce the inflation of costs of basic services to the minimum level.

7.1.1 Legality and equality as framework for objectives

Speaking about public organizations we can use the performance objectives presented in the Background chapter as a framework. Thus we distinguish the legitimacy producing objective and the equality production objective. A matrix of these two dimensions to characterize organizations will be used as the basis for the segmentation framework.

7.1.2 Profiling

User profiling means the basic parameter collection for service segmentation. User profile can be based on the preferences of the user or on user information about demographic (age, gender, occupation), geographic (location, area type), psychographic (personal values and life style) and behavioural parameters. The profiling can also depend on the channel the user approaches the service. In multi-channel services the personalization of the service is based on the channel used.

7.1.3 Usage history data collection

The user preferences on services and the typical scenarios of use can be identified also by collecting history data of service usage. This data can be used for demand segmentation.

7.2 Segmentation of the service supply

Provided the user base has been segmented, the service production can be optimised based on the existing segments. Information technology provides abundant means for the service segmentation such as *personalization* of services, *digital interaction* during service use including augmentation, automation, self-service and collaboration, *multichannel access* to services and *standardization* of certain transactions. These principles can be applied both in communication and information processing.

7.2.1 Personalization

Personalization means differentiation of services based on certain parameters, which relate to the user or to the user segment. Personalization requires that the user can be identified and has a profile or history data, which can help modify the service according to user needs. Personalization may require service handling by human interaction, self-service, and service automation. Customisation is a special case of personalization controlled by the customer, but it does not stress real-time service behaviour as part of the user profile.

7.2.2 Augmentation

Augmentation of a service means that the information system supports the service by proposing alternatives, giving help and answering questions. The user is also helped to

communicate with other services or persons if co-operation is needed, either in real time or by E-mail. In augmentation the software acts as a consultant.

7.2.3 Automation

Automation of service means that certain tasks of the organization are assigned to the information system. For instance, in communication the call centers can automate the service selection by using voice response units and in the information processing certain social benefits and taxation data can be calculated directly from the existing income and demographic data of the citizen. Automation is often associated with industry consolidation and layoffs of personnel and the term may evoke negative opinions. Hence, the participation of personnel in developing services is most important.

7.2.4 Self service

If relevant service data is available in the information systems, part of the service can be delegated to the service user himself, and the service becomes a so-called self-service. The self-service can be augmented with different kinds of supporting services and guidance and integrated with communication and collaboration functions, if needed.

7.2.5 Participation and collaboration

In service development the key idea is to let workers apply their knowledge productively and create more knowledge. The goal is by augmenting and refining knowledge to achieve higher perceived service quality. Productivity increase from applying knowledge in services may lead to exceptionally cost-effective ways of production. In practice, the participation of service providing people in service development and knowledge augmentation has led to innovations resulting in better quality and automation of specific functions with minimal amount of human intervention. Modern ICT tools and environments enable collaborative work of user and service provider in the process of development.

But even most modern collaboration tools do not create improved utilization of resources, if the objective setting system and management do not guide the service producers in this direction. If they lack performance indicators that help to evaluate importance of different user groups and their needs, resources could be easily spent in ways that do not improve the perceived quality level of the product.

8 Unused potential of Information Technology

8.1 *Productivity increases caused by ICT*

The productivity increase results from ICT in the society are of rather recent origin. Mika Maliranta and Petri Rouvinen from ETLA (2003) show that the widespread use of ICT is indeed a quite recent tendency. Contrary to what was believed in the midst of the

“new economy” boom, the increasing use of ICT is primarily a corporate event, i.e., overall restructuring has had a rather marginal impact on the aggregate ICT intensity. Case data nevertheless suggests that experimentation and selection are quite intense among young ICT intensive firms. The excess productivity of ICT-equipped labour ranges from eight to eighteen per cent. The effect is manifold in younger firms and in ICT-providing branches. The findings with respect to firm age are consistent with the need of ICT-complementing organizational changes. The findings on ICT-providing branches are not determined by communications equipment industry but rather by ICT services. Overall, the ICT-induced excess productivity seems to be somewhat higher in services than in manufacturing. Manufacturing firms benefit in particular from ICT-induced efficiency in internal whereas service firms benefit from efficiency in external communication. There is weak evidence for the complementarity of ICT and education.

In their further research Maliranta and Rouvinen (2004) study productivity effects of portability as well as wired and wireless connectivity using Finnish ICT firm-level data. It was found that a computer of only processing and storage capabilities boosted labour productivity by 9% (corresponding to 5% output elasticity), portability by 32%, wired connectivity by 14%, and wireless connectivity by 6%. These findings are in line with previous source data, and comparisons to ICT costs suggest that firms equate marginal costs and returns. While increasing ICT employment can no longer be a major source of productivity growth in developed economies, the studied new characteristics can.

Corresponding studies in public organizations and practices in applying ICT would be welcome.

8.2 "ICT as an option and hidden potential"

Service, in its extensive definition, is such immaterial performance that is transferred from the producer to the customer during the event of the service. It has traditionally been typical to services that they cannot be stored or sold onwards to a third party, because the production and the consumption take place at the same time. Programs and digital networks alter the concept of service: service can be turned into a program and used either locally or through a network. So, services change to what is more like a product or an automated process. In a way, “the boundaries between services and products become obscure”. A product may include its program, contents and service elements. Today about 70% of national economic activity in Nordic countries is already related to services.

The splitting of products into elements and components makes it possible to outsource part of manufacturing. Components and service elements, especially through ICT, liberate also development and production activities from being tied up to a certain place. So, the traditional cost and value chains begin to disassemble into networks. Large manufacturers prefer *to* integrate their distribution chains and subcontractors straight into their enterprise resource management systems. It can be said that through value networks “the boundaries of firms overlap”.

If some modules or elements in the production of a service or a product get standardized in such a manner that they fit into several parallel products or services, the part in question may become independent. During adequate demand, such an independent part can

turn into a global standard or even a field of business. Good examples of this are the standardization of Internet-technologies and the IT and telecommunications companies utilizing them. This kind of change is called *horizontal development*.

According to Clayton Christensen (2004) global fields of businesses may commoditize and become global horizontals. The companies involved in the commoditization and striving to maintain their profitability must make a move to a more profitable part of the value chain, possibly downstream. Christensen calls this as decommoditization. These new areas can in turn transform into global verticals.

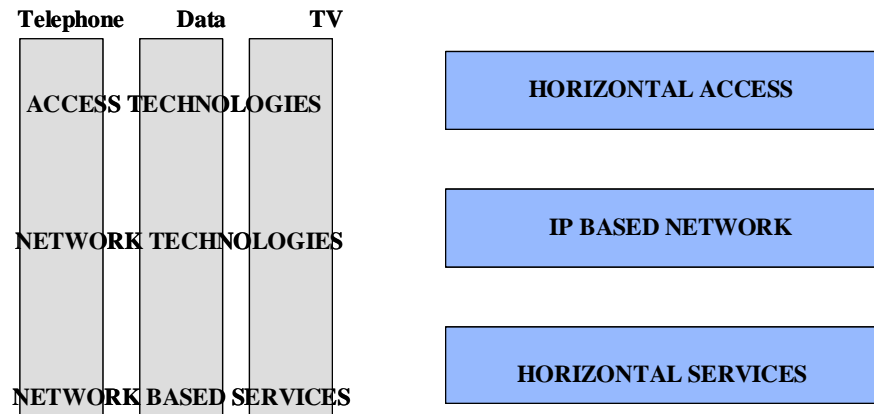


Figure 3: The horizontal development in communications industries

As with the main value chain of organization, which can undergo horizontal development, a similar phenomenon is also visible in supporting value chains. In supporting value chains the horizontal development is called the birth of *Knowledge Intensive Services*, also known as Knowledge Intensive Service Activities (KISA) or Knowledge Intensive Businesses (KIBS). These have been the fastest growing services of recent years in the western countries. The standardization of product and service characteristics, components and design methods enable the marketing of related services and *ensure* them even broader clientele. At the same time when global corporations focus on their most important value-enhancing functions, they outsource other functions. So the globalisation and the consolidation of industries facilitate the growth of Knowledge Intensive Services.

8.3 Huge potential in public sector

In discussing the future of the Nordic welfare state one main question has emerged: how to organize and fund public services in the years to follow. The aging of population, increasing costs of health and social services, new educational demands, industrial competition due to globalisation pose challenges. Proposed solutions include increase of funding for research and development (R&D) in technology, introduction of ICT on a mass scale, more social innovations and improvement of network forms of co-operation.

In a recent study of ETLA by Olavi Rantala (2004) the productivity growth based on increasing quality of processing, labour, software and equipment in different industries has been analysed (see Figure below). In financial services the quality increase has been

largely achieved thanks to software improvement. In other industries the potential software - based productivity growth benefits are still at an opening stage of realization.

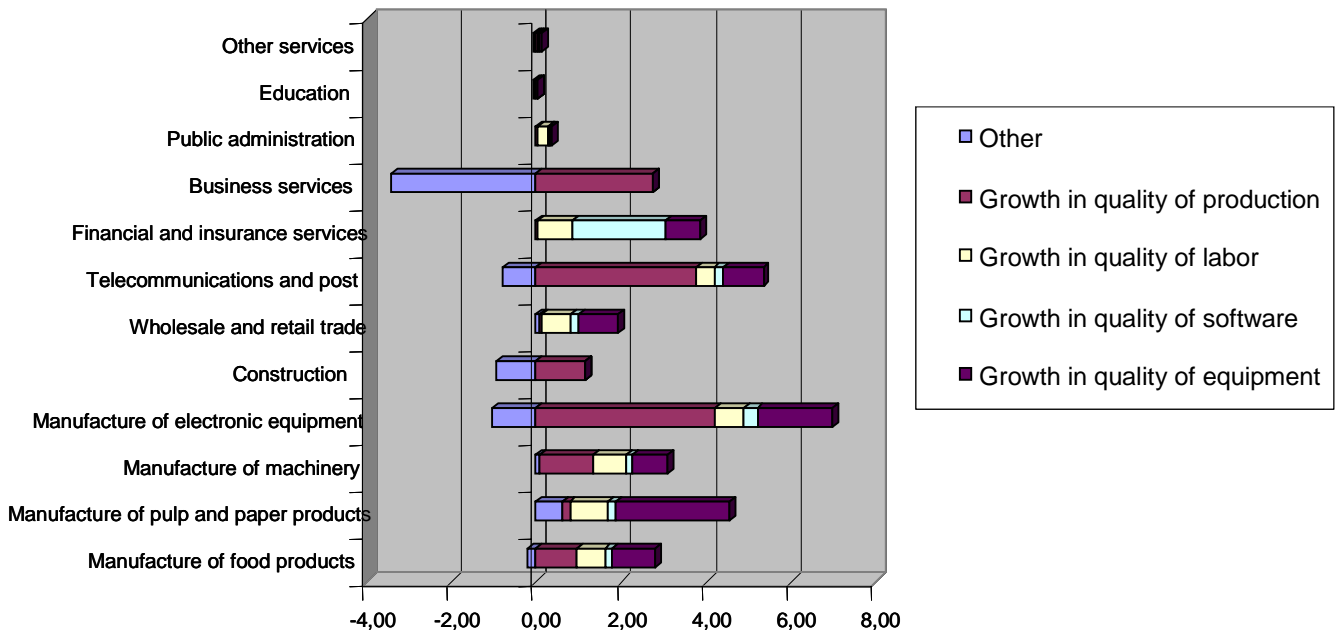


Figure 4: Productivity increases based on growth in quality

9 How innovations are put into practice

9.1 Overcoming institutional rigidities

If a change in service or process is not based on just harder work, a new idea and solution has to be developed. An invention or idea implemented into a practical solution is called innovation. Thus, the studies on how to improve performance are essentially studies on how to implement ideas to become innovations, and how these innovations are diffused. The following discussion focuses on innovations and their practical application. Today there is plenty of innovations available based on ICT that can be applied and modified to public sector.

The development of innovations and their diffusion into wide scale use is a systemic phenomenon. New products, services or solutions may replace the existing ones. In this process, new major players are apt to appear both in the economic and political space.. That is why incumbent organizations often keep to existing models and try to avoid change. The shift from technology phase to innovation diffusion phase depends on several factors: players in the field, market demand and competition, availability of resources. One important limiting factor has been identified to be the institutional rigidities which may include:

- Slow development of relevant legislation
- Market organization failures or missing competition
- Supply failures in technology, services or other resources

- Lack of incentives and/or institutional powers to apply the innovation
- Extensive taxes on existing products and services.

One should note that the first two rigidities are features, traditionally expected from public organizations. One can explain that. If legislation would change by fiat of administrators or after each election, it would be difficult to define common concepts what is legitimate. So certain slowness of the legislative system is justified. Also many public organizations exist just because they correct market failures in areas where pure market organizations may produce unwanted results sooner or later.

In her study on techno-economic paradigm shifts Carlota Perez (2002) stresses the importance of economic recessions, which could break up institutional rigidities and speed up the adoption of innovative solutions.

9.2 Creating dynamic innovation systems

Innovation systems have been for a long time an important research topic in evolutionary economics. Bo Carlsson and Gunnar Eliasson (2001) present a model for competence block and experimental economy explaining the commercialization of innovations in firms. Franco Malerba (2004) has developed a theory of Sectoral Innovation Systems, which can be applied in market and non-market relationships and can be used for policy implications based on different system failures. Let us consider here the model of *Dynamic Innovation Systems* by Bo Carlsson and Staffan Jakobsson (2004). It postulates that system evolution and performance with respect to innovation and its large scale deployment depend on six functional requirements: (1) creating a knowledge base; (2) creating incentives; (3) promoting entrepreneurial experiments; (4) creating markets or appropriate market conditions; 5) creating resources; and (6) promoting positive externalities, or free utilities. The model is based on recent studies on innovation systems and entrepreneurship. Let us consider these requirements in detail.

(1) Creating a knowledge base

Knowledge on the innovation and how to apply it can be gathered and distributed in several ways. A natural but slow way is to include it in general higher education. This kind of approach however would work only with a delay of 5 – 10 years. The explanation is simple: the new educated generation must enter the organizations. It would be much faster is to educate the personnel of existing organizations. But this requires also flexibility in management and suitable project structures to deploy the newly learned techniques. A third way is to create partnerships, so called knowledge alliances with service or consultancy firms, which provide knowledge intensive services.

(2) Creating incentives

There are many cases in public sector where the innovation was deployed only after the personnel was motivated to find ways to apply it and change corresponding work structures. This is a challenge to the management: how to motivate experienced and highly skilled personnel to take actively part in a change process. In fact the changes should originate from the personnel, not from the management. Incentives in this respect are major research topics.

(3) Promoting entrepreneurial experiments

It is not possible to decide on new working models or other changes in organization without knowing the range of possible solutions and their outcomes. Hence, entrepreneurship, which is a must in industry, is also an important element in the development of public services. However, public entrepreneurship has special features that may coincide or differ from the private one.

(4) Creating markets or appropriate market conditions

In public sector, one way of development has been to create virtual markets or to out-source part of the activities to private markets. Market is considered as an optimal environment to increase productivity and to make supply meet demand. Experiences on successful cases and reasons of failures should be examined and made available.

(5) Creating resources

No project or process is possible without adequate resources. From research and development literature it is well known that R&D activities are possible only in profitable businesses. It is also well known in economics that monopolies are better suited to fulfill social than private needs, which is the opposite case compared to “pure” competition markets.

(6) Promoting positive externalities, or ‘free utilities’

In innovation systems there may be some missing parts and market failures that prevent the diffusion of innovations. This may especially be the case with knowledge or information intensive components. Public funding is hence needed to overcome these failures. For example, it can ensure free education and standard software platforms and promote dissemination of best practical models that can be applied in new environments.

10 Framework of methods to improve performance

The ideas presented in previous chapters are synthesized in this chapter as a framework of potential methods to improve performance in a public organizational context. The aim is to shed light on methods and approaches that produce performance improvements most efficiently, and their impact on perceived service quality. Basically, the chapter contains a description of the stumbling blocks that prevent public organizations from innovating as compared to an innovation system that works perfectly. Then we present suggestions how to lessen the effect of these obstacles.

10.1 Segmentation of services

As we said already in the Background chapter, the public sector is not a homogenous entity. That is why we must first of all build a framework of different types of public organizations. The framework is based on varied performance objectives presented in the Background chapter. Thus we distinguish the legitimacy producing objective and equality producing objective. A matrix containing these two dimensions to characterize organizations is used as the basis for the framework. The matrix is presented in the

following figure. It also presents typical objectives of organizations falling in each of the four corners of the matrix.

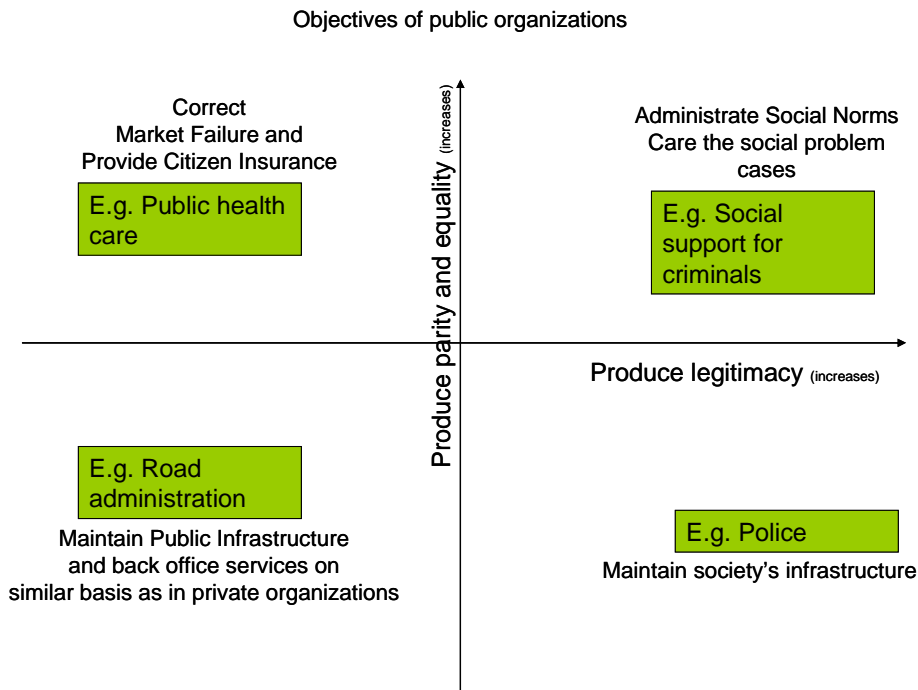


Figure 5: Segmentation of the services of public organizations

An example of an organization in the lower left corner is road administration in modern societies. The objective is to organize road building and maintenance in a most efficient way by ensuring that public money allocated for the purpose result in good roads. In the upper left corner falls the public health care. It has to provide medical care which lacks economic return. An example of lower right corner organization is police precinct whose only role is to protect society against violations, but does not have to solve the social or welfare problems that lead to them. An example of upper right corner organization is psychiatric and social care for children. They must at one and the same time prevent the individual from causing harm to others and provide him such care that enables him to develop as a normal citizen, enjoying full civil rights.

10.2 Changes in service production

The following figure shows how dimensions of decision process automation and level of knowledge codification relate to legality and welfare state dimensions. The more a process has to deal with justice and social issues, the more difficult it is to automate decisions. Of course, even in making justified decisions, technical management can be automated. But the actual decision could not. When market failures have to be corrected, the task situation gets more complex. It becomes more difficult to sum up and codify all the aspects. Workers have to rely on their intuition and “tacit” knowledge. The difficulties in codifying knowledge and automating decision making represent an outstanding bound hindering innovation.

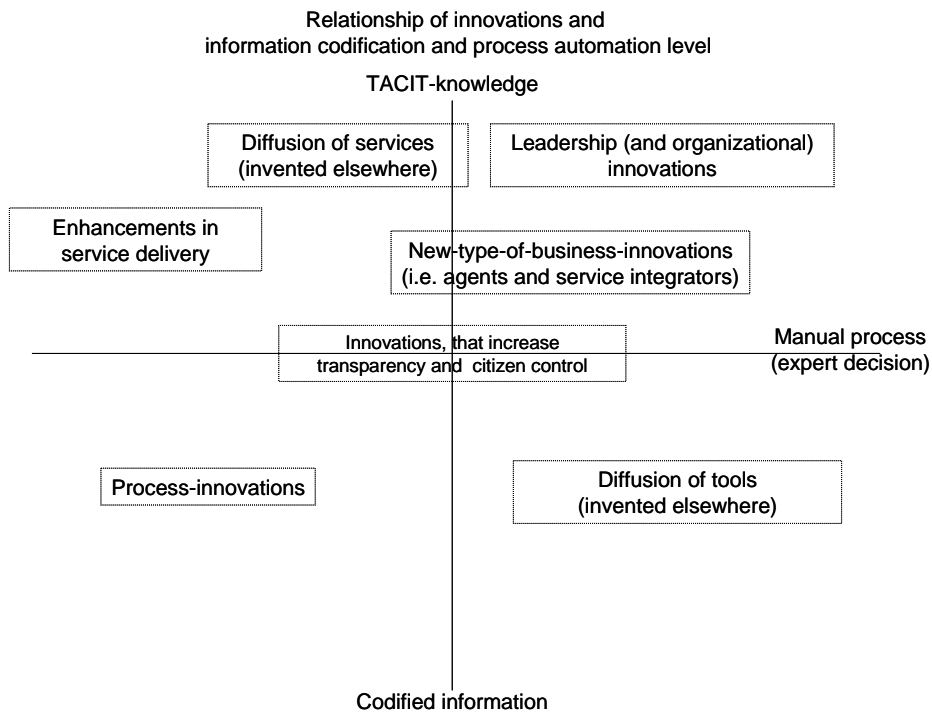


Figure 6: Relationship between segments and automation based innovations

The figure above illustrates also types of innovations that are natural in organizations in different positions of the framework, due to the bounding conditions. The lower left corner is the domain of ordinary process innovations and traditional automation. The upper left corner is a domain of new services discovered elsewhere using new ways of delivery. Unfortunately this often leads to escalation of costs, especially if new services are deployed without sufficient cost management. The lower right corner is the domain of new tools put into use. As the basic task of the organization remains intact, the tools are usually used by the same number of employees to reach better decisions without any productivity improvement. The upper right corner consists of organizations where automation is not a solution and where an IT system can neither enable self-service nor process codified information. In this kind of setting, productivity is improved, if the number of employees is reduced without reducing the responsibility area. But the essential function of these organizations is to produce good decisions, not plenty of decisions. In this case productivity improvement might actually make the organization perform worse. One innovation type covers all the parts of the framework. This is the innovation specific for the public sector. The increase of transparency and control as innovation seldom produces measurable productivity improvements, but the perceived quality of services of the organizations can improve highly.

Besides the direct limitations for innovation, the public sector specialties also hinder the work of an innovation system in general. The following figure shows what parts are problematic in each of the corners.

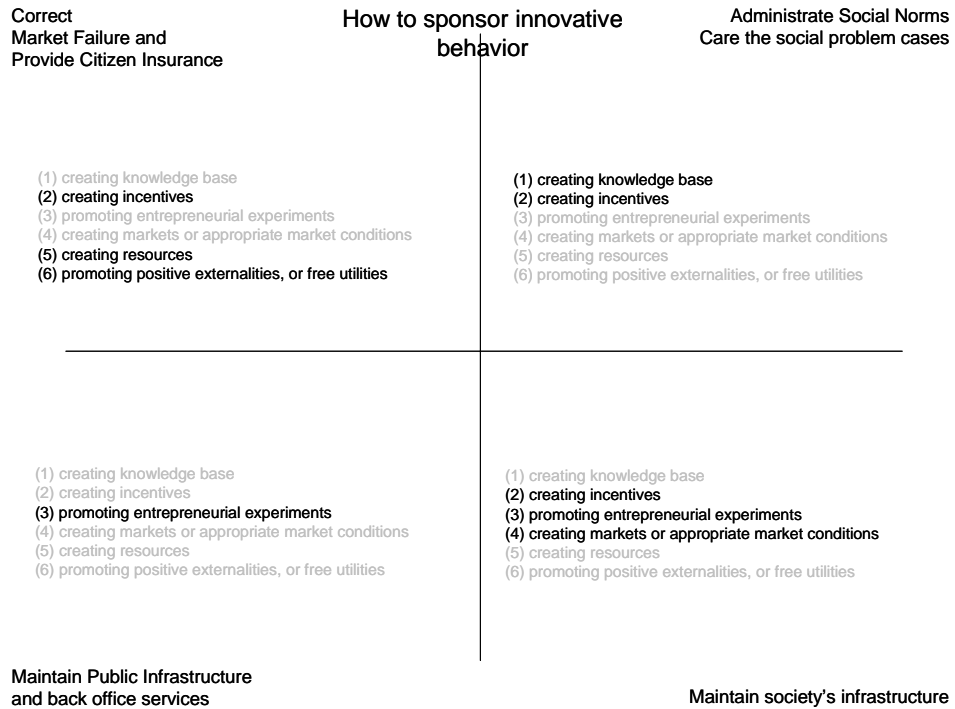


Figure 7: The problematic areas for functioning innovation system in public sector

The least problematic is the lower left corner, where only the incentive structure of public organizations may be vulnerable. In the upper left corner it is often difficult to create resources as they are bound to budgets and previous services. It is also difficult to expand services outside the area of the organization. In the whole right half of the matrix incentives are always a problem, even though the rigidities due to history are overcome. A functioning incentive system demands that improvements are measurable and exact measuring will always pose a problem. In the lower right corner one problem is the possibility of experiments as such. No one wants, for instance, police to experiment on public safety. Also creating markets or virtual markets may not be possible if the organizations provide parity or legality. In the upper right corner, creating knowledge base is difficult, as it is difficult there to codify knowledge.

10.3 Deployment of innovations

Introducing innovations in public organizations demands that institutional rigidities should be overcome in the first place and the necessary parts of dynamic innovations systems are included. The most self evident method in this area is separating the parts of the organizations producing such services whose features (quality) can be defined. If the features can be codified, then it is possible also to outsource their production. Thus the producing can be done also in private sector. The area can be opened to competition and measures common in private industries can be utilized.

The applications of this method may be larger than it is currently assumed. Many public organizations whose task is to correct market failures, do so by taking full responsibility of producing the whole service set. This is especially common in health care. In the future, the roles of producing services and correcting market failures can be separated. For instance, public health care organizations can concentrate on buying service sets from

private services producers. The move to supplier-buyer relationship would enable larger economies of scale. Mergers between organizations from different countries also may become feasible.

The separation of organizational parts does not have to be necessarily based on supplier-buyer relationship. It can also be done by dividing the users that do not need correction of market failures or special treatments from citizens that need to be served on non-commercial basis. Different service types can also be used for the separation. For instance, Finnish Police gained good experience from a pilot project, which divided criminal investigation cases into different complexity groups and a specialized team was assigned to each of the groups. Thus the team specializing in smaller crimes could process them systematically aside from complex cases demanding mind share. Complex case group did not have to give left hand to number of simultaneous small cases. Also the performance objectives could be made simpler. This kind of segmentation also includes possibilities to develop horizontal common tools and services instead of tailored vertical systems. As the task set of individual parts of the organizations becomes simpler and better defined, and the number of guidance points for the organization is reduced. Thus the need of systems to guide and control the work diminishes. The focus *on* ICT and other tools increases in each organizational part.

No matter how actively the codification, outsourcing and segmentation are pursued, there remain tasks for public organizations that are complex and whose result is either increased justice or increased equality. Then the key is to define the legality and equality objectives of the organizations clearly and to minimize the number of employees that have overlapping objective sets. These employees should not have objectives that are based on production quantities at all.

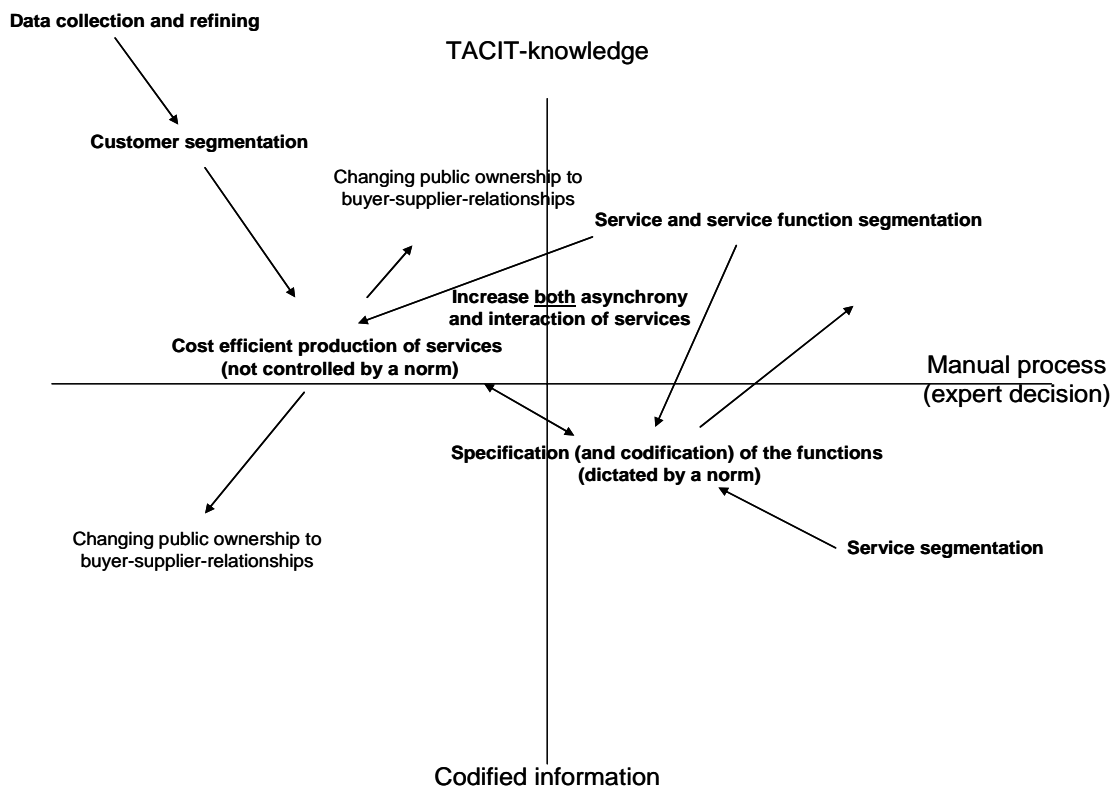


Figure 8: Innovation types in services

One important inference from the previous chapters is that in the public sector perceived service quality often matters more than technical service quality. So methods that help to improve the perceived service quality are especially important. One successful way in private industries in modern times has been to increase the self-service, for instance on the Web. If an individual feels that she or he understands the problem situation, quite often the need to explain the situation to someone and to spend time on personal interaction is just a waste of time. Another method is to give citizens better information on their service status. This is an old experience of travel industries: passengers feel much less frustrated in case of train or flight delays, if they are constantly informed about what is happening. A third way is to integrate data from different organizations. Most citizens do not have knowledge of public service organization's responsibilities or processing logic, and they do not want to know about them. Thus it makes sense to offer public services to different citizen segments through the same user or service interfaces. And last but not least, public organizations should always remember that customer's time matters also. If a change reduces the effort of public employees, but increases the effort of citizens, e.g. filling new forms, the change is not usually appreciated.

As discussed in previous chapters, not only the methods to change processes and services, but also the motivation of managers needs to be addressed for an innovation system to function properly. This means incentive structures that encourage risk taking, and leave part of the benefits of increased performance or achieved cost savings to people responsible for implementing changes. One incentive mechanism that supports the innovation system is to give more responsibilities and rewards to those managers and organizations that succeed in risk taking. Thus the experience of successful change projects proliferates and an attractive model to follow is set.

The last potential method to encourage innovation diffusion is directly related to the quality aspect of productivity improvement. If an innovation makes it possible to provide larger scope of service features in the same organization, the innovation is specifically fit for organizations producing welfare services. Usually new services demand new resources. In the area where the focus is on producing legality, the innovations that improve decision making are of special interest. The situation is illustrated in the following figure.

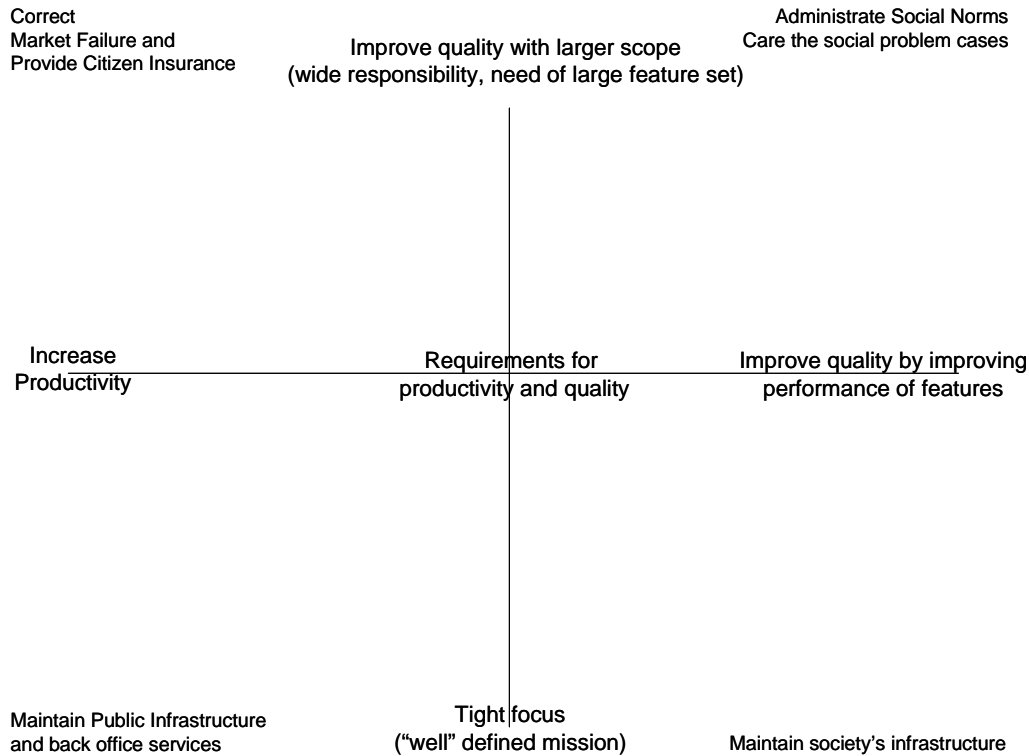


Figure 9: Analysis of relevant actions

10.4 Successful IT-solutions in framework context

Based on the above discussion, a couple of practical recommendations on information systems related to the given framework of methods can be presented.

In the lower left corner of the framework matrix, the main problem for public organizations compared to private organizations has often been that the methodologies and practices needed in other corners of the matrix prevent the management and personnel of the organizations from adapting to the private sector ways of working. In general, in this corner IT systems used also in private industries should be used. If this is not possible, organizational and management tools need to be utilized to isolate the actual service producing parts from the public administration framework. In more concrete terms, if these organizations cannot use standard accounting or ERP software, they must be reorganized and managed in such a way that they can. The tools to make it possible to use standardized IT solutions may include:

- Building a supplier-buyer relationship
- Building the organization in a way that the service organizations have direct interfaces and feedback from their real customers and the incentive structure of the organization is based on their customers' perception of the service quality
- Dividing the organization into units that have more freedom in guiding and budgeting their activities

In the lower right corner of the matrix, the general approach to IT systems is also the same: structure the organization in a way that solutions developed for private organizations would be usable on a large scale. The tools to achieve this are also mainly the

same as in the lower left corner, but need to be used more intensively. Often they cannot be applied to the whole organization. But it is exactly for that purpose that the services of the organization need to be segmented, and each segment needs its own objective setting. The objective setting and especially codification of the objectives to measurable terms is often a very extensive task. As these organizations usually are one of a kind in each country like police or army, they have been using tailored IT systems in the past and will need IT systems dedicated to their special needs also in the future. Hence transnational co-operation to develop common systems for organizations in different countries is a possibility to use IT more efficiently. The resources allocated to these kinds of organizations are often constant, no matter how efficiently they operate. Thus IT systems that aim at more efficient production do not improve productivity in these kinds of organizations, because the necessary resources are allocated elsewhere. So IT (or manual) systems that measure as transparently as possible how well the organization achieves its essential goals in producing perceived service quality are crucial. This might include different kind of simulators and testing systems that tell how well the army trains its soldiers to fight or how well the police succeeds in catching criminals that jeopardize citizens' security.

The upper left corner is the domain of different IT systems that make it possible to segment the customers and provide multiple channels for serving different types of customers in a different way. This kind of IT systems include mechanisms that collect customer demographic and other data and automatically define to which group the customer belongs. It contains also systems which help customers select a certain segment of services. They are crucial in achieving perceived service quality. The service producing personnel needs systems that collect crucial information about customers so that they can quickly decide whether a customer needs special treatment or screening, or the case can be assigned to a standard automated or cost-efficient process. The systems that can perform these kinds of actions may resemble private sector CRM systems. But in many cases they must be tailored or complemented. In summary, this segment needs the following types of IT systems:

- Public sector CRM
- Automated customer segmentation and customer prioritization
- Automated systems to process majority of customer cases
- Automated self-service or a self-service to get time slot for a professional providing the service (e.g. Dentists)
- Systems integrating information about the citizens from multiple sources
- Multi-channel services provisioning
- Systems that citizens can use to track the status of their own service cases

The upper right corner of the matrix mainly contains organizations that are focused on decision-making and hence systems that support decision-making are crucial. They include:

- Workflow control and document management systems
- Systems that collect information related to an individual case from different sources behind an unified user interface
- Systems that make it easy to collect and analyze information from society outside the organization's area
- Collaboration and teamwork systems
- Automated customer segmentation and customer prioritization

11 Findings from the Nordic study

The findings from the Nordic study present opportunities for the public sector organizations to most efficiently improve their performance. Since the financing of the public sector cannot be increased significantly, while the demands of the public services seem to be growing, there is a clear-cut need to increase their efficiency and find methods and tools to do this without essentially decreasing the quality of services. TietoEnator and Etlatiето have carried out this study, based on source analysis and interviews of key managers. The interviews were conducted in four Nordic countries. Special attention was paid to methods employing information and communications technologies (ICT).

11.1 Data collection

A Pan-Nordic interview research was conducted to empirically test ideas presented in a previous conceptual analysis. The goal was to gain more understanding on the segmentation of service demand, service supply and the corresponding distribution of available resources and development activities. The interviewees were the highest level general and IT management of Nordic public sector organizations. There were totally 73 interviewees, of which 46 were Finnish 16 Swedish, 6 Norwegian and 5 Danish. The Finnish interviewees managed the majority of workforce and IT budgets of the Finnish central government except health care. The Nordic interviewees were selected to pair the Finnish interviewees. Of the interviewees, 32 were from general management and 41 from IT management. Of the Finnish interviewees, 4 were from municipalities.

The interviews were conducted by TietoEnator's account management organization.

In the interviews the topics were grouped in the following four areas:

1. Organizational profile:

- Organizational roles and responsibilities
- Types of services and customers
- Incentive mechanisms and possibilities
- Service quality issues
- Competition

2. Role of IT in the organization:

- Importance of IT based changes for the organization (past/coming 2 years)
- How organization performance and IT performance are measured
- Information of successful IT projects

3. Importance of innovations and process and IT solution-based changes:

- How often does the organization use innovation, IT solutions and process changes to improve it's behaviour
- The importance (cost efficiency, benefits to the society) of different methods
- Innovations that have been successfully deployed

Note: IT solutions deployment is one subset of available innovations. Other types of innovations are e.g., new services, adaptation of new services or new machinery. The objective of the survey was to collect information about how to improve the performance of the organizations.

4. Managing the change:

- Which are the primary methods to manage changes
- How easy/how difficult they are to apply
- What is the role of IT in change management

This research has not considered subjective questions related to the experiences of people, either customers or employees in service providers. However, it is clear that these questions are essential when procedures to improve the performance and quality of services are planned.

11.2 Summary of findings

11.2.1 General findings

The analysis of the questions describing the profile and nature of the interviewed organization revealed that majority of the questions could be reduced around four latent variables. The new variables, factors, emerging from the data reduction analysis were:

- F1: Management by Objectives (MBO), which contrasts with the management by organizational role in public sector. Its components included aspects of
 - Organization's approach on rewarding performance
 - Organization's allowance of experiments
- F2: Processes codified (contrast uncoded or tacit), including aspects of
 - How much organization has automated routines and processes
 - How much organization has been able to control processes and data
- F3: Services codified (contrast uncoded or tacit)
 - How well the organization has been able to codify information needed in services providing
 - How well the organization has defined the expected outcomes
- F4: Value and role in society, which contrasts with market based value in society
 - How much the common values of the society guide the behavior of the organization
 - How limited the operational freedom of the organization is due to role expectations

Factors F1 (MBO) and F4 (Value and role in society of organization) are related in an interesting way: If the organization is driven by costs and market needs and position gained by performance (contrast: driven by value and role in society), then the management perhaps should reflect this property by being of MBO type (contrast: being of the type Management by organizational role). This means that the organizations should be discovered mainly in the quadrants 1 or 3 (Figure 1) and there should be strong cor-

relation between these two factors. The findings, however, support this reasoning only partially. There is no statistically significant correlation between the factors. As can be seen from Figure 10, in many organizations there seems to be a contradiction between public position and management, which is a basis for further study. The situation might be a result from existing outside pressures to implement management by objectives practices also to organizations where those practices do not fit without reorganization and defining new performance measures.

The interview data was not large enough to make comparisons between organizations in different Nordic countries. However, the average position of all interviewees based on their opinions of each country could be depicted in the figure. This gives basis for thought but should be used with care because of the small statistics.

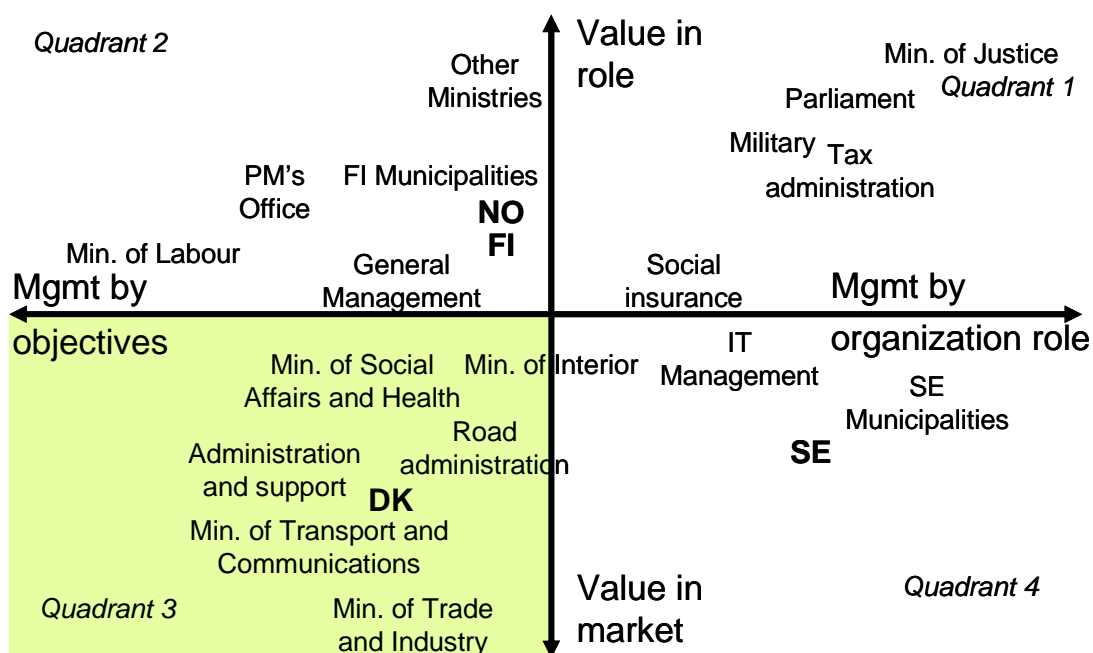


Figure 10: The positioning of the interviewed organizations with respect to the factors: organizational role and management

Another comparison can be made with respect to factors F2 (processes codified) and F3 (services codified). Service codification means that the content of the service is defined, maybe standardized, and the levels of sufficient quality are specified for the service. Process codification means that processes are so explicitly defined that they can be partly automated, and standardized methods and tools can be used to control them. A very common approach to improve productivity by using ICT enabled changes is to codify the services and processes of the organization. Often this is also considered as digitalization, which, however, refers to a larger context. In Figure 2 the straightforward ICT productivity increases can be obtained in quadrant 1, whereas in the other quadrants codification or more segmented and professional approaches are needed.

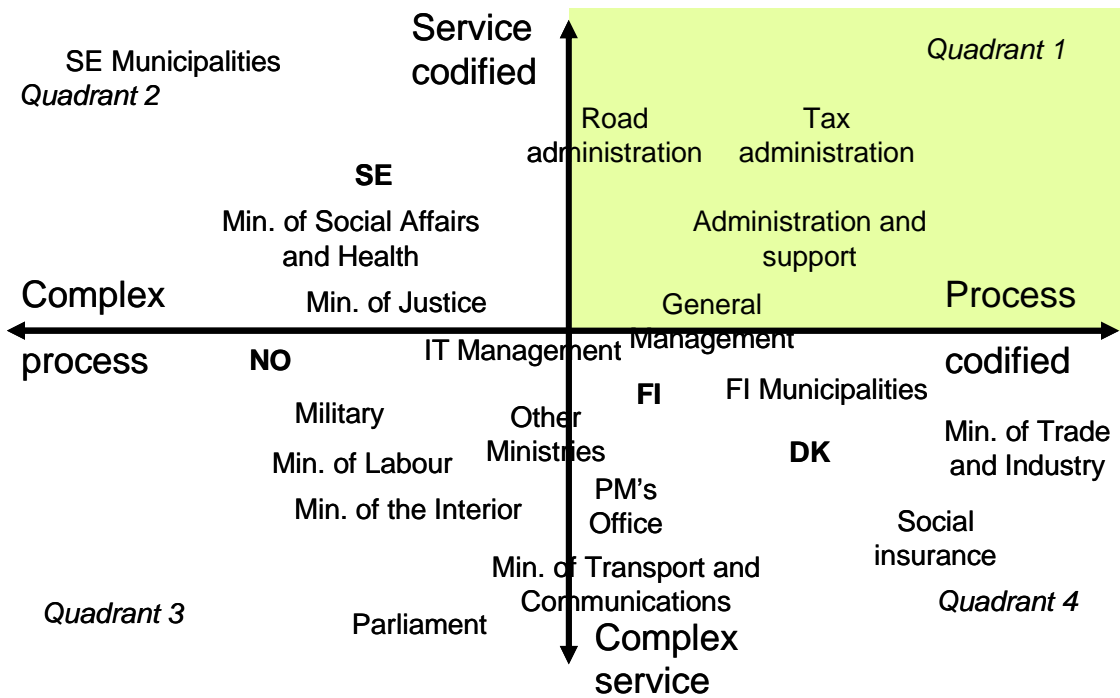


Figure 11: The positioning of the interviewed organizations with respect to the factors: codification of service and codification of process

If we calculate approximate numbers of the public sector employees in the corresponding quadrants of Figures 10 and 11, we obtain the following distribution of personnel in Finland.

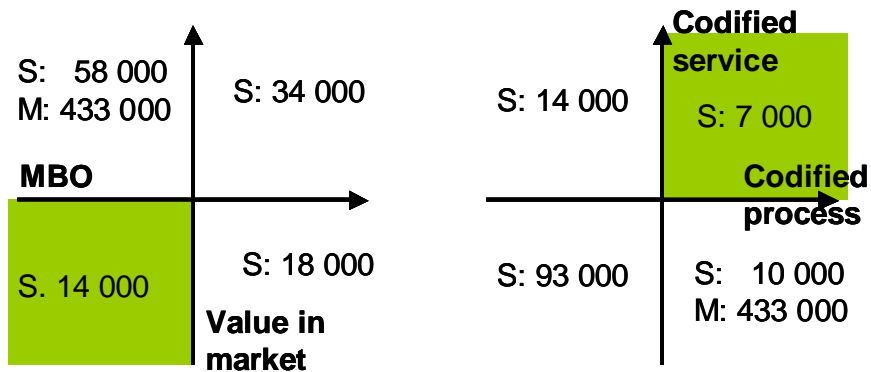


Figure 12: Amount of personnel in different quadrants (S = state, M = municipalities)

In Figure 12 the quadrants corresponding to relatively straightforward ICT based performance improvements are colored in green. As we see, the great majority of personnel is in other than green areas. This implies that more refined approaches for ICT based improvements are needed. Too extensive conclusions based on the data should still be avoided, as only four of the interviewees were from municipalities, which represent the majority of the public workforce in Finland. More interviewees and analysis are needed to understand the situation fully in municipalities.

The finding is also supported by the following two additional findings. Firstly, the majority of the public personnel are in quadrants, where the organization has value in role, but the management is based on management by objectives. Secondly, most public personnel are in quadrants where the service is considered as complex. As a result there are efforts to codify management objectives and at the same time there are complexities in the services. The current Finnish discussion on the feasibility of quality management systems in rating university organizations is an extreme example of the problems. Some of the most renowned scientists have produced only a handful of articles during their careers and they have been initially heavily criticized by the peers. Short termed management by objectives might have led to underrating these geniuses.

Even though the majority of the employees in these unbalanced sectors are from municipalities, where the number of interviewees is limited, there is a clear implication also from other sources that municipalities are under a pressure to conduct performance based management and to improve process efficiency. This is done obviously without sufficient services codification and with organizations having strong pressures to fulfill their inherited role in the society. Consequently, it might be useful to segment the activities in the organizations into codifiable and non-codifiable parts (including services and processes) and then apply corresponding managerial structures in these parts, see Figure 13.

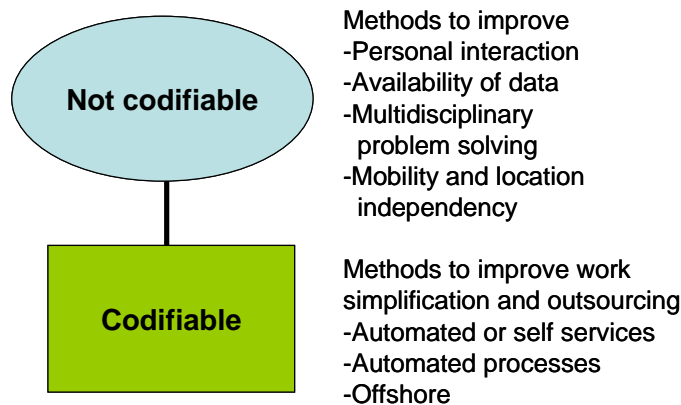


Figure 13: Codifiable and noncodifiable parts of organization

Besides the methods presented in Figure 13 to improve performance, structural changes, changes in legislation, management innovations and active promoting of innovation diffusion could also be mentioned as methods for improving the not codifiable parts of the organization. For codifiable parts, outsourcing, centralization and buyer-supplier models may be other available methods.

11.2.2 A closer look at the findings

The Nordic interview data has been statistically analyzed by using regression analysis, where the organizational factors identified in the previous chapter have been used as independent variables and other questions as dependent variables. In Figure 5 the different performance measures used to guide the organization have been the dependent variables related to the independent organizational factors F1 (Management by objectives), F2 (Process codified), F3 (Service codified) and F4 (Value and role in society). The green color means a positive statistically significant relationship and the red one negative.

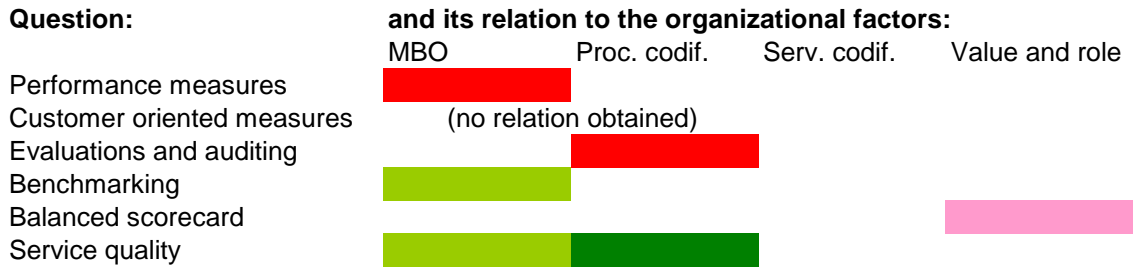


Figure 14: Performance measures

Figure 14 reveals some interesting relationships. The organizations that follow MBO practices use less direct cost or output related performance measures than the less MBO oriented ones. They rely more on benchmarking. This might mean that organizations using objectives as a guiding practice have noticed that the measures used in public sector have to be wider than narrow cost or output-oriented ones. Organizations with codified processes use less evaluations than others. This is quite natural, because with the process codification performance or customer based measures become more easily available. Organizations with codified processes or MBO practices measure service quality. This is also natural, since either it is easy for them to measure the quality (processes codified) or they have a need to measure it (MBO).

An interesting finding in these interview results is that there is no indication of statistically significant relationship between any of the independent factors and customer oriented measures (Fig. 14). This does not mean that organizations do not use customer oriented measures. On an average, customer oriented measures account for 28% of the total measures per organization. But there is no relationship between any of the detected characteristics of organizations and customer oriented measures. Further modeling tells that customer oriented measures are used by such organizations that have organized their customer satisfaction surveys well. Hence, customer oriented measures are used when the data for them is easily available.

From a theoretical perspective, the perceived service quality and the benefits obtained in society should be the starting points when services are analyzed and measured. However, these measures are not trivial, and more work is needed to develop and deploy these kinds of measurement approaches.

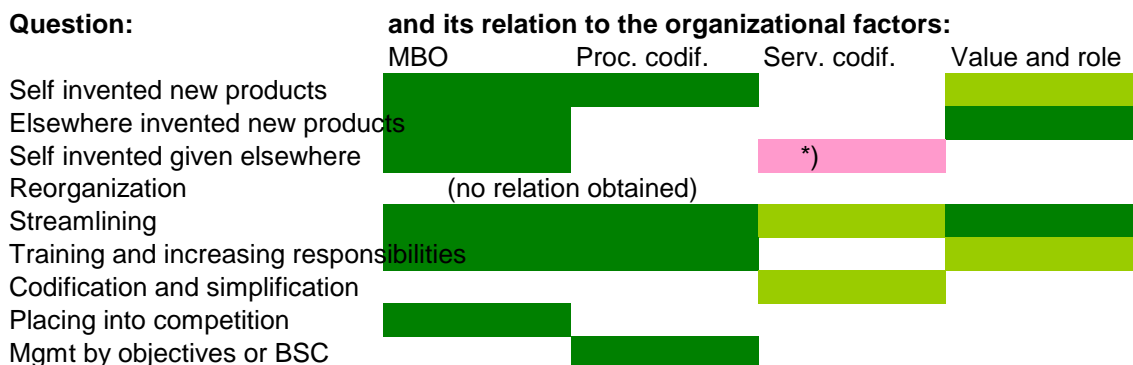


Figure 15: Innovations applied or planned. (*) is positive w.r.t. complex service.) According to Figure 15 reorganization, self-invented new products, streamlining, training and giving new responsibilities have been and will be the most popular innovation

types together with balanced scorecard (BSC) and MBO. Codification and simplification and giving own products to others are the least popular, together with placing organizations under competition. Obviously, organizations tend to do things that are rather easy to accomplish (reorganization), are interesting (developing own products), or bring immediate cost savings (streamlining). Attempts with other innovation types which require systematic long term work, such as codification, are not so popular.

The popularity of giving own innovations to other organizations or transferring them from other organizations to one's own is lower than inventing new services oneself. This implies that innovation diffusion mechanisms are not functioning efficiently in public sector. Another finding is that reorganization does not seem to be related to any of the organizational characteristics. According to the findings in OECD research (2003), the productivity improvements created by ICT deployment correlate to the related organizational changes and digital communication. These changes are most important in the diffusion phase of ICT innovations. Reorganizations seem to be popular in public sector. Only one of the organizations studied had not conducted reorganization in 2004-2005. The next Figure 16 illustrates more, how popular different methods to adapt innovations have been and are expected to be. Inefficient innovation diffusion and the missing relationship between reorganizations and organizational characteristics signal that the reorganizations may not always be optimal in creating productivity improvements.

	Has happened 2004-2005			Will happen 2006-2007		
	Not once	1-2 times	More often	<10% probability	10-50% probability	>50% probability
Self invented new products	6 %	38 %	57 %	10 %	25 %	65 %
Elsewhere invented new products	10 %	58 %	32 %	10 %	38 %	52 %
Self invented given elsewhere	18 %	56 %	26 %	19 %	38 %	43 %
Reorganization	3 %	62 %	35 %	3 %	41 %	56 %
Streamlining	7 %	65 %	28 %	3 %	39 %	58 %
Training and increasing responsibilities	17 %	35 %	49 %	13 %	26 %	61 %
Codification and simplification	43 %	38 %	19 %	31 %	39 %	31 %
Placing under competition	54 %	35 %	12 %	39 %	31 %	30 %
MBO or Balanced Scorecard	8 %	35 %	56 %	10 %	22 %	68 %

Figure 16: Innovations applied or will be applied

From Figure 17 we can draw several conclusions. Self services, automation of customer work and automation of processes are seen as important IT based changes in organizations with high MBO and process codification ratings, as can be expected. Organizations with codified services prefer self services and customer work automation solutions. Organizations with less codified (more complex) services prefer to use decision support systems and common data warehouses to help experts to make judgements. Organizations with high organizational role ratings prefer self services and automation of processes to automation of customer work. Interestingly organizations with high MBO and process codification ratings do not usually apply Web and mobile channels, time and location independency and new IT standards such as XML and SOAP. We should understand this result better. Are new standards not yet ready to be applied in operative

improvements or are the mainstream information systems fixed to old types of interfaces, or are there some other reasons.

Question:	and its relation to the organizational factors:			
	MBO	Proc. codif.	Serv. codif.	Value and role
Self service	+F cost	-H c +H b +F b	+H b +F c&b	+F c&b
Reduc. time and location dependen	-H b -F c	-H b	-H c +F b	
Web and mobile channels	-H b	-H b		
Common data warehouses	+H c +F c	+H c	-H c -F c	
Automation of customer work	-F c	+H c&b +F c	+H c	-H c -F c
Automation of 3rd party work	+F b			
IT standards (XML, SOAP,..)	-H b	-H c&b -F c	+H c&b -F c	
Automation of processes				
Decision support systems			*)	

Figure 17: Importance of IT based changes.

Here *) has positive relationship w.r.t. complex service.

The following abbreviations are used:

H =	2004-2005
F =	2006-2007
c =	cost efficiency
b =	benefits to society

It was also found that organizations do not usually pay personal bonuses. A high number of organizations does not get benefits from good performance. Management by objectives does not work well, if management does not get benefits as a result of achieving objectives. Further, one of the conditions for an innovative environment is the existence of rewards for innovators.

12 Recommendations

Based on these findings, the following recommendations may be the most important in creating a globally leading public sector that improves national competitiveness:

- Currently, management measurements, methods and rewards do not reflect the different needs of organizations with different characteristics. Instead of applying similar management practices for organizations in all the quadrants of the matrices presented, approaches should be adapted;
- To maximize the percentage of organizations where straightforward management by objectives and productivity based measures apply, a government-wide reorganization initiative should be started to segment the organizations and service production according to codifiability: 1) Separating the non-codifiable parts from the codifiable parts (e.g. buyer-supplier relationship), 2) Codifying services more, or 3) Codifying processes more;
- The incentive mechanisms and management practices should be changed towards supporting innovation diffusion instead of each organization trying to invent improvements as an isolated island. It is especially important to nurture

these spillover effects in municipalities and regional government.

There are multiple other recommendations that result from the analysis of the interviews. Those who have the biggest impact are:

- Setting relevant social objectives and defining measurable social indicators for the performance of service producers. It seems to be that such measures are used mostly on reactive basis currently. In other words, it is suggested that customer orientation and customer feedback should be increased in public organizations;
- Improving the perceived service quality by innovative combinations of modern knowledge and ICT technologies and using organizational changes to support these activities, not as a method to achieve improvements, per se;
- Creating incentives for public organizations to implement change, especially by quality of work experiences and personal positive incentives;
- Conducting similar study with local municipalities. The current study indicates that the mismatch between organization profile and management methods that affects the largest number of employees might be there.

Some recommendations might be implemented fast, but they might not have been considered by the organizations so far:

- Analyzing the codification level of services and processes to detect whether the organization can already improve its performance through automation or self-service;
- Segmenting the milieu of users of public services, based on perceived service quality. It seems to be that currently the perceived quality is used when a producer has managed to codify processes, not services, as one would expect.

Other recommendations are:

- A research project to create research-based recommendation guidelines on how to change public sector organizations to become more supportive environments for innovation diffusion and spillover effects;
- The number of interviewees from Nordic countries other than Finland was too low to draw any strong conclusions about the differences between these countries. A more detailed study with larger sample is needed in other Nordic countries.

13 References

- Bell, D.: *The Coming of the Post Industrial Society: A Venture in Social Forecasting*, Heinemann, 1973.
- Carlsson, B. and Eliasson, G.: *Industrial Dynamics and Endogenous Growth*, DRUID Summer Conference 2002 on Industrial Dynamics of the New and Old Economy, Copenhagen, June 6-8, 2002, paper 2001, 1 – 25
- Carlsson, B. and Jakobsson, S.: *Dynamics of Innovation Systems – Policy-Making in a Complex and Non-deterministic World*, International workshop on Functions of Innovation Systems, Utrecht, 22-23.6.2004,
- Christensen, C. M.: *The Law of Conservation of Attractive Profits – Companies outsourcing activities that are not today's core competencies may well miss the boat*, Harvard Business Review, February 2004, 17-18.
- Drucker, P. F.: *The Age of Discontinuity, Guidelines to our Changing Society*, Heinemann 1969.
- Drucker, P. F.: *Managing in the Next Society*, Butterworth Heinemann, 2002
- Gordon, R., J. and Griliches, Z.: *Quality Change and New Products*, *American Economic Review*, v. 87, iss. 2, 1977.
- Habermas, J.: *Järki ja kommunikaatio: Tekstejä 1981-1985*, Gaudeamus, 1987.
- Malerba, F.: *Public Policy and the Development and Growth of Sectoral Systems of Innovation*, Globelics Conference, Beijing 16.-20.10.2004.
- Maliranta, M. and Rouvinen, P.: *ICT in Finnish business*, ETLA DP No. 852, 2003, 42 pp.
- Maliranta, M. and Rouvinen, P.: *Informational mobility and productivity – Finnish evidence*, ETLA, The Research Institute of the Finnish Economy, Helsinki, ETLA DP No. 919, 2004, 14 pp.
- Mankinen, R, Rouvinen, P. and Ylä-Anttila, P.: *Palveluiden tuottavuus - kilpailu ja teknologia muuttavat rakenteita*, ETLA DP No. 829, 2002, 49 pp.
- OECD: *ICT and Economic Growth*, 2003.
- Perez, C.: *Technological revolutions and financial capital, The Dynamics of Bubbles and Golden Ages*, Edward Elgar, Cheltenham, UK, 2002
- Rantala, O.: *Toimialojen t&k-panostusten ja tuottavuuden ennustejärjestelmä - julkisen t&k-rahoituksen vaikuttavuus ja tuottavuuden pitkän ajan kasvu*, ETLA DP 948, 2004, 54 pp.

Romer, P.: *Increasing Returns and Long-Run Growth*, Journal of Political Economy 94, 1986, 1002-1037.

Schumpeter, J. A.: *The Theory of Economic Development*, New York, Oxford University, 1911.

Terleckyj, N. E.: Measuring progress towards social goals: Some possibilities at national and local levels, *Management Science*, Vol. I6, No. 12, 1970.

Walker, R. M.: *Innovation and Organisational Performance: Evidence and a Research Agenda*. AIM Working Paper Series: 002-June-2004.

ELINKEINOELÄMÄN TUTKIMUSLAITOS (ETLA)
THE RESEARCH INSTITUTE OF THE FINNISH ECONOMY
LÖNNROTINKATU 4 B, FIN-00120 HELSINKI

Puh./Tel. (09) 609 900
Int. 358-9-609 900
<http://www.etla.fi>

Telefax (09) 601753
Int. 358-9-601 753

KESKUSTELUAIHEITA - DISCUSSION PAPERS ISSN 0781-6847

Julkaisut ovat saatavissa elektronisessa muodossa internet-osoitteessa:
<http://www.etla.fi/finnish/research/publications/searchengine>

- No 988 RAINE HERMANS – MARTTI KULVIK, Initiatives on a Sustainable Development Strategy for Finnish Biotechnology. 22.06.2005. 25 p.
- No 989 MIKA WIDGRÉN, Revealed Comparative Advantage in the Internal Market. 01.08.2005. 20 p.
- No 990 ARI HYYTINEN – MIKA PAJARINEN, Yrittäjäksi ryhtyminen ja yrittäjyysasenteet Suomessa: Havaintoja kyselytutkimuksista. 10.08.2005. 19 s.
- No 991 CHRISTOPHER PALMBERG – MIKA PAJARINEN, Alliance Capitalism and the Internationalisation of Finnish Firms. 01.11.2005. 39 p.
- No 992 ELIAS OIKARINEN, Is Housing Overvalued in the Helsinki Metropolitan Area? 29.09.2005. 33 p.
- No 993 MIKA MALIRANTA – PEKKA ILMAKUNNAS, Decomposing Productivity and Wage Effects of Intra-Establishment Labor Restructuring. 02.11.2005. 26 p.
- No 994 VILLE KAITILA – MAARIT LINDSTRÖM – EWA BALCEROWICZ, Puolan liiketoimintaympäristö ja suomalaisten yritysten kokemukset. 10.11.2005. 72 s.
- No 995 SERGEY SUTYRIN – VLADIMIR SHEROV, Russian Regions and Their Foreign Trade. 25.11.2005. 26 p.
- No 996 HANNU PIEKKOLA, Public Funding of R&D and Growth: Firm-Level Evidence from Finland. 20.12.2005. 30 p.
- No 997 AIJA LEIPONEN, Clubs and Standards: The Role of Industry Consortia in Standardization of Wireless Telecommunications. 08.12.2005. 44 p.
- No 998 EWA BALCEROWICZ, Poland's Enterprise Environment – A Polish View. 10.01.2006. 19 p.
- No 999 STEFAN NAPEL – MIKA WIDGRÉN, The European Commission – Appointment, Preferences, and Institutional Relations. 17.01.2006. 20 p.
- No 1000 JUKKA LASSILA – TARMO VALKONEN, The Finnish Pension Reform of 2005. 20.01.2006. 20 p.
- No 1001 OLLI-PEKKA OKSANEN, Are Foreign Investments Replacing Domestic Investments? – Evidence from Finnish Manufacturing. 19.01.2006. 59 p.
- No 1002 ARTO SEPPÄ, Open Source in Finnish Software Companies. 25.01.2006. 36 p.
- No 1003 TERTTU LUUKKONEN, Venture Capital Industry in Finland – Country Report for the Venture Fun Project. 27.02.2006. 48 p.

- No 1004 ELIAS OIKARINEN, Price Linkages Between Stock, Bond and Housing Markets – Evidence from Finnish Data. 15.02.2006. 36 p.
- No 1005 JUHA ALHO – NIKU MÄÄTTÄNEN, Aggregate Mortality Risk and The Insurance Value of Annuities. 21.02.2006. 15 p.
- No 1006 MORRIS TEUBAL – TERTTU LUUKKONEN, Venture Capital Industries and Policies: Some Cross-country Comparisons. 28.02.2006. 23 p.
- No 1007 MIKA PAJARINEN – PEKKA YLÄ-ANTTILA, Omistajuus ja yritysten menestyminen: Analyysia suomalaisella aineistolla. 01.03.2006. 42 s.
- No 1008 KARI E.O. ALHO, Labour Market Institutions and the Effectiveness of Tax and Benefit Policies in Enhancing Employment: A General Equilibrium Analysis. 29.03.2006. 43 p.
- No 1010 FRANCESCO DAVERI – MIKA MALIRANTA, Age, Technology and Labour Costs. 24.03.2006. 48 p.
- No 1011 MARKKU KOTILAINEN, Economic Shocks, Progressiveness of Taxation, and Indexation of Taxes and Public Expenditure in EMU. 03.04.2006. 29 p.
- No 1012 HELI KOSKI – TOBIAS KRETSCHMER, Innovation and Dominant Design in Mobile Telephony. 03.04.2006. 31 p.
- No 1013 HANNU HERNESNIEMI – MARTTI KULVIK, Helsingin seudun klusterit sekä erikoistuminen bioteknologiaan ja logistiikkaan. 11.04.2006. 44 s.
- No 1014 LAURA VALKONEN, Deregulation as a Means to Increase Competition and Productivity. Some Finnish experiences. 25.04.2006. 84 p.
- No 1015 VILLE KAITILA, Productivity, Hours Worked, and Tax/Benefit Systems in Europe and Beyond. 27.04.2006. 34 p.
- No 1016 OLAVI RANTALA, Sosiaalietuuksien rahoituksen hinta- ja hyvinvointivaikutukset kotitaloussektorissa. 05.05.2006. 21 s.
- No 1017 MAARIT LINDSTRÖM – MIKA PAJARINEN, The Use of Design in Finnish Manufacturing Firms. 05.05.2006. 26 p.
- No 1018 NIKU MÄÄTTÄNEN, Vapaaehtoiset eläkevakuutukset, verotus ja eläkkeelle siirtyminen. 05.05.2006. 25 s.
- No 1019 ESA VIITAMO – HANNU HERNESNIEMI, Ympäristöliiketoiminnan määrittely ja tilastollinen seuranta – Ympäristöalalle lisää kilpailukykyä. 15.05.2006. 58 s.
- No 1020 CHRISTOPHER PALMBERG – TUOMO NIKULAINEN, Industrial Renewal and Growth Through Nanotechnology? – An overview with focus on Finland. 17.05.2006. 45 p.
- No 1021 ESA VIITAMO, Markkinoiden toimivuuden arvioiminen – Suuntaviivoja vertailevalle kilpailututkimukselle.
- No 1022 OLLI MARTIKAINEN – JUSSI AUTERE – MARKKU NURMELA, Performance Improvement in Public Organizations – How to leverage ICT Investments. 30.05.2006. 38 p.

Elinkeinoelämän Tutkimuslaitoksen julkaisemat "Keskusteluaiheet" ovat raportteja alustavista tutkimustuloksista ja väliraportteja tekeillä olevista tutkimuksista. Tässä sarjassa julkaistuja monisteita on mahdollista ostaa Taloustieto Oy:stä kopiointi- ja toimituskuluja vastaavaan hintaan.

Papers in this series are reports on preliminary research results and on studies in progress. They are sold by Taloustieto Oy for a nominal fee covering copying and postage costs.