

The New Economy

New challenges for the statistical system

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Introduction

The term "new economy" has been used extensively in recent years to describe the workings of the US economy and in particular the part of its economy that is linked to Information and Communication Technologies (ICT). The new economy is however not well defined and there is also a doubt that a new economy exists at all.

To understand the technological, economic and social phenomena that are the roots of the pre-occupation with the notion "the New Economy" one has to realise that most technological development is incremental and each incremental advance has a marginal effect. Occasionally, however, there are major innovations which have a more profound impact on society and the economy. The steam engine and electricity were of that nature. Information technology seems to be emerging similarly. Such major innovations typically require a long series of incremental advances, together with often profound organisational and even societal changes, to render their full benefit. In that sense technological change is also a process of social change: it requires that the new technology be fully integrated into the society. [1]

It seems thus a bit beside the point to ask if there is a new economy or not. The new economy evolves within a services society. The service society can be seen from three different aspects: a society where the main part of production as well as consumption is made up of services; a society where the majority work in the services sector; and a society where the dynamic force in the development is created in the production of services. The first two aspects are familiar and in the statistical mainstream. The third is not well covered by the current statistics and represents what is behind the expression the new economy.

In this paper the new economy is discussed from the business statistics perspective.

The third industrial revolution

The first industrial revolution took place around 1800 with the steam-engines and the factory system. At the end of the 19th century the second industrial revolution came with the internal combustion engine and electricity. We now experience the third industrial revolution with microelectronics and information technology as the centre. All these revolutions are characterised by basic innovations being diffused within the production system together with new principles for organisation of enterprises and new knowledge requirements.

The developing new infrastructure impacts on the entire society. In the middle of the 19th century building of railways became an important element in an accelerated growth and expansion of the world economy. In the middle of the 20th century a similar development of the infrastructure, with electrification, motoring and aviation took place. Also the electronic revolution leads towards the creation of a new infrastructure, with the Internet in focus.

The processes of change around the infrastructure differ from those focusing on basic innovations. Enlargement of the infrastructure is not so much about creation of new needs for competence as about transfer of possibilities and making more people participate. This covers a substantial part of the readiness and intensity steps of the hierarchy in figure 2.

When the infrastructure has been developed the pressure for change and renewal moves to a large extent from technology to society, and the societal changes become far-reaching. This phase corresponds to the impact and outcome steps in figure 2.

The Internet is still in a very early stage. The technology is known, but represents still to large extent an unknown body in the society. It takes time to develop new systems and a new infrastructure, in particular as political solutions, both on the national and the international arena, are needed [2].

What does the New Economy imply?

The essential in the new economy is a structural shift from the industrial economy towards an economy characterised by information, intangibles and services and a parallel change towards new work organisations and institutional forms. This latter type of change is not very visible in the statistics, but is nevertheless of the utmost importance for the understanding of the development of the economy and society.

Some frequent key words for the New Economy are: The Information Society; The Digital Economy; The Knowledge based Society; and The Networked Economy. They address a specific aspect of the new economy, but no one captures the full spectrum of the New Economy. The term Service Society is more adequate as it encompasses most aspects – technological, economic and social – of the new, emerging economy.

The use of information and knowledge as basis for industrial activities and production becomes increasingly dominant at the expense of the use of energy and manufacturing equipment. A consequence is that the focus of the economy moves from processing material input into material output towards creation, trading and distribution of knowledge, intellectual property and intangibles. This is an important area for new indicators.

The new economy is basically about co-ordination, innovation, selection and learning. Bringing the knowledge-based economy into focus highlights that understanding what to do has become more important and more resource demanding than actually doing it. Information and knowledge capital and input and quality of output are the core in the new economy. A mirror of this is the interest and growing markets for knowledge management, collaborative software and software for managing relations.

The advancement of IT and know-how stimulates the economy to reorganise in more efficient ways. Outsourcing as well as other changes in inter-enterprise relationships are examples of this. The symbiosis between changing production and business processes and information and communication technologies (ICT) is the driving force towards the new economy.

The rapidly developing Information and Knowledge-based Society makes the prevalent theories and statistics loose in reliability and validity. New and revised theories, concepts and measurements are needed. Theoretical development lays the ground for improved measurements and improved measurements and statistics promote development of theory.

Services

The key to understanding the new economy is services and measurement of services. The modern industrial enterprise is largely a producer of services integrated or embedded in the product. A large part of this service production

concerns the use of information in some form. The new developments in the ICT lead i.a. to increased possibilities to commercialise earlier ancillary services.

In the introduction was said that the Service Society could be seen from three different aspects: production of services; employment in the services sector; and services as the dynamic force in the economic development.

The classification of economic activity goes by institutional or legal criteria, so services linked to manufacturing are classified as manufacturing goods production, if the services are produced in-house in the manufacturing enterprise, or as services production if the services are bought in the market. This means that official statistics do not give an accurate view of the value or volume of services production. Not only production for the market but also in-house production should be measured.

The other side of this coin is that employment in the service sector is a measure, that does not produce a comprehensive view of the employment in services activities, because it disregards the services employment in other sectors.

Services – the dynamic force in economic development

The allocation of certain critical production activities to what is statistically called manufacturing or market services production depends on how the organisational technology of the enterprise develops. This emphasises the need for developing the description of the organisation of economic activities and production processes in the knowledge-based and networked economy.

A study of the distribution of wage and salary costs on different functions in Swedish manufacturing enterprises showed that the *costs for direct production* including internal transports and inventories were *one fourth to one third* of the total internal labour costs. The rest was made up by service production, mostly information processing in some form. In addition services corresponding to approx. 20 percent of the sum total of the internal labour costs were purchased in the market [3].

These results are no surprise as manufacturing industries were early adopters of ICT for rationalisation and automation. The study is from 1986 but the use of information and knowledge as production factors has presumably become even more accentuated.

The New Economy – a combination of services and the Information Society.

The essential elements of the information society are:

- Digitalisation and intensive use of ICT;
- Codification of knowledge;
- Transformation of information into commodities; and
- New ways of organising work and production.

This implies that a large and growing part of information and services are available on-line. A widely distributed access to the networks, the intra- and Internet, and of skills to live and work in the Information Society is the basis for the new economy. Organisational, managerial and business innovations are at the centre of the development.

Combining the results of the study of internal labour costs in manufacturing industries mentioned above and the characteristics of the information society leads to the conclusion that a key element in the performance of the economic system is its capacity to distribute knowledge effectively and efficiently. This will in part depend on the openness of the system and the degree to which the information is codified. The new economy should be seen as the combination of services and ICT.

Statistics for the New Economy

Statistics are an important tool underpinning the formulation, implementation and enforcement of Community and EU policies. The relevance and usefulness of statistics depend on the underlying methods and concepts. These are based on the prevalent economic, social and cultural theories and models.

A balance between developing new indicators for the new economy and re-sifting old statistics has to be found. The challenge is to identify the new elements in the economy. One crucial aspect of the developments in the economy is that much of it is cross-sectional – the structure and borders of the existing system for classification of economic activities become less and less adequate.

From this point of view the focus of interest should be changes in the ways industries work and how the entire value chain is transforming. New business models are generated, new ways to create wealth are invented. In the new economy the important question is what the actors – businesses, people, politicians – actually do – and how these activities trickle upwards to result in macro-economic outcomes. The new economy is a bottom-up approach.

The current economic statistics are based on concepts, definitions, theories with the roots in the agricultural and industrial society and economy. To be able to accommodate the new economy in the statistical system research and

development are needed. Figure 1. is a general outline of the main elements in the required RTD.

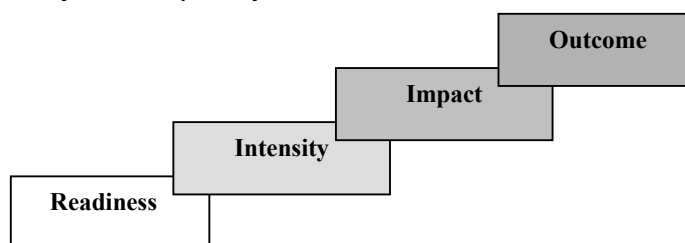
Figure 1. RTD for statistics for the New Economy.

<u>Objectives</u>	<u>Areas for RTD</u>
Framework for measuring the New Economy	Socio-economic research; Scope and delineation;
Classification systems	<ul style="list-style-type: none"> - Concepts and definitions; - Develop appropriate statistical measures; - Develop new classification systems or revise existing systems; - Basis for new or amended international statistical standards
Data collected and classified	<ul style="list-style-type: none"> - Identify and fill gaps in the measurement of concepts; - Statistical methods and systems; - Identification of target groups and populations; - Collection of data
Statistics and indicators	<ul style="list-style-type: none"> - Data processing, editing etc.
Policy formulation, monitoring, evaluation and assessment	<ul style="list-style-type: none"> - Descriptive and analytical models

Indicators for the New Economy – a hierarchy of complexity.

A structure for analysing what statistics and indicators are useful for underpinning identification, formulation, monitoring and assessing policies for the new economy is described in the following. Figure 2 illustrates the hierarchy of complexity connected with indicators for the new economy – starting from basic facts to more intricate indicators for capturing the emerging phenomena developing from the new economy. The steps also illustrate the different domains the indicators should bring light to.

Figure 2. Hierarchy of Complexity



The *Readiness indicators* indicate the *potential* for use of ICT and describe variables such as ICT infrastructure, access to and availability of Internet, e-mail, PCs and IT-skills.

The *Intensity indicators* indicate the *actual use and applications* of ICT and describe variables such as ICT investments, the extent of use of Internet, e-mail, PCs, e-commerce, for what purpose they are used by different user groups – people and households, businesses and government.

These two families of indicators represent the basic indicators for the Information Society and provide the main basis for eEurope benchmarking and analysis of the digital divide. They relate mainly to the infrastructure and the transfer of possibilities and participation of the people.

The following two families of indicators relate to economic and social changes.

The *Impact indicators* relate mainly to the micro level, enterprises and governments, but also to the industry level. They describe new ways of organising work, referring to the relations between individuals as well as between individuals and the enterprise; of organising production, which refers i.a. to inter-enterprise relations such as outsourcing, joint ventures, licensing etc; knowledge supply/human investment/human resources; mobility; innovation/R&D and spin-offs.

The *Outcome indicators* relate mainly to the macro or societal level. They describe economic growth, productivity and competitiveness; employment and the labour market; social inclusion and participation. It is on this level the issues about sustainable economic development can be approached.

The emphasis in this paper is on the impact indicators and to less degree on the outcome indicators.

Strategic areas for development

From this aspect four closely related areas stand out as priority for RTD. They are measurement of Business processes, Knowledge capital, Classifications and Information and other intangible assets.

Business processes

Economic statistics are mainly concerned with the *inputs* and *outputs* of the production unit. From the new economy perspective we are also interested in the *throughputs* – the processes linking input to output.

New information and communication technologies influence how businesses and people interact and change the organisation of production. Globalisation, deliveries of systems rather than individual products, virtual enterprises, re-localisation, outsourcing are some of the phenomena reshaping the economy. The relationships between producer and customer change and the border becomes increasingly blurred. The significance of including small and medium-sized enterprises in the measurements increases.

Principal sources of competitive advantage are intangible – such as skills and education, intellectual property rights, research, brand names, distribution structures, organisation, management and enterprise re-engineering. Enterprises are embedded in networks transforming through value-chain re-engineering, new intermediaries and creation of new types of partnerships. E-commerce is a central phenomenon in this respect.

A taxonomy for actors in the new economy and their interaction should be developed as well as statistical concepts for the enterprises' internal processes. Statistical and accounting practices should be brought closer together.

For describing new ways of organising work it is necessary to link data on the enterprise/establishment to data on employees. This might be done using administrative registers or something similar to the Canadian Workplace employee survey (WES), i.e. a panel approach.

Measurements of in-house production, in order to get a better grip on the total volume and value of different "economic activities" would greatly improve our basis for analysis of the economy and should be developed.

Supply of knowledge and know-how

The supply of knowledge and skills is crucial for the competitiveness of the enterprise. Old competence is competed away through organisational innovation and increased competition.

New superior knowledge makes existing knowledge, vested in teams of people, economically less valuable, without lowering their physical capacity to put what they know into production. Human knowledge as such does not depreciate and can to some extent be transferred to others through education and training. On the whole however competence will constantly be competed away through creation of new superior knowledge. Hence, any firm has to devote resources to upgrade its competence.

This indicates the importance of developing concepts and measurements related to competence and skills, not only for formal education and training, but also for experience, personal capability and performance, mobility of high-skilled professionals. This includes measurement of available skills, skills mismatch and skill gaps.

Also measurement of tools for managing knowledge and know-how – such as knowledge management, collaborative software and software for managing relations should be studied.

Classifications

No common framework exists for measuring and describing the new economy. The existing frameworks, as for example the System of National Accounts, is not fully adequate. This is partly due to insufficient detail, both in the data that go into the national account and the underlying statistics.

The boundaries between sectors and between goods and services change continuously and typical activities are no longer characterised by uniformity but rather by inter-linkages with other activities.

The present classifications of economic activities, ISIC rev.3 and NACE rev.1, are based on a material production and take little account of services or immaterial products of the new economy. They build on likeness in production and output. New innovative ways of constructing the classifications are called for, for example classifications built on distribution, markets or purpose.

It is no longer sufficient to describe the economic processes in terms of units performing primary and secondary activities. In the new economy with emerging new ways of organising activities and a variety of inter-linkages between these activities, the IT of an enterprise or an economy is reflected in its organisational structure. This emphasises the need for adequate descriptions of how the economic activities, production processes and the value-chain are organised in the knowledge-based and networked economy.

New ways of organising production, selling systems rather than individual products and the offering of packages of goods and services are some of the reasons why the product dimension will gain in importance relative to the industry dimension. The elements in the value chain have to be described and defined in product terms. The definitions of the results from the activities in the new economy – the information and services products – have to be developed.

Improved descriptions and definitions of products and specially service outputs are crucial for understanding business processes, changes in the business structure etc. and how productivity and economic growth are affected.

Information and other intangible capital

Conceptualisation and measurement of intangible assets or capital are crucial issues for development of adequate statistics on the new economy.

The skills embodied in the staff is the most strategic and valuable asset for many businesses in the new economy. As high-skilled professionals are rather mobile, this influences the behaviour of the business and how it is valued, for example by the market capitalisation.

Information can be used by many at the same time in different places independently of each other. Information is not consumed by usage. Its depreciation depends on other factors, like actuality. How to measure and evaluate information and the information capital becomes a major issue.

A number of other intangible assets, notably software, entertainment and artistic originals, patents, licences and goodwill, pose important valuation and measurement problems.

Productivity and economic growth

The basic elements of economic growth are increased productivity and renewal of the economy. As renewal represent time-consuming investments for the future the concepts growth and productivity are problematic to use as measures of success during periods of rapid technological change. Social processes and time-consuming incremental advances seem often to be overlooked in discussions of economic development.

The increased heterogeneity of input and output quality makes it more difficult to measure input and output. The two intangibles knowledge capital and quality of output could be argued to be the core in the modern economy. On the input side the knowledge capital is not measured very well and on the output side we lack statistical techniques to measure volume of quality produced [4].

The discussion if there is a new economy or not have largely centred on the issue of the impact of IT investment on productivity. The evidence so far has not been conclusive. However, the connection between IT and other factors, like human capital organisational innovation etc. has largely been disregarded in the assessment of the possible productivity-enhancing effects of IT [5, 6].

The new communication possibilities, that ICT offer, have consequences beyond lower transaction costs. They lead to expansion along new paths and thus to new and different transaction costs – new knowledge and competencies have to be co-ordinated, new markets emerge and more consumers have to be reached. Knowledge and competence constitute a more long term investment and inert component than material investments in the development of the society [7].

The development of productivity and economic growth on the macro level is the end result of what happens on the enterprise – micro – level and the industry level. To explain macroeconomic growth one has to understand how changes in the organisation of communication and information transfer in the economy generate measured productivity at the macro level. A theory, aiming

to explain the macroeconomic development, has to be organisation- or micro-based and thus build on firm level data and improved classifications and measurements of business processes, knowledge and know-how and of information and other intangible capital [8].

In this spirit, OECD has launched a project on ICT and business performance based on firm-level data, recognising that such data enable a deepening of analysis of firm performance and its drivers, such as technology, human capital, organisational change, innovation, competition [9].

The concept of productivity is closely related to ideas of capacity and marginal cost. Information production and distribution is often characterised by a high initial cost or investment and close to no capacity restraints and an almost negligible marginal cost. Information can be sold/licensed and used over a long period of time. The concept and measurement of productivity becomes difficult and should be looked into in the context of the new economy.

How much of the economy do we measure?

A consequence of the changes brought about by the evolution of the new economy is the blurring borders between working life and life outside work, between employee and self-employed as well as between producer and consumer.

Time use is the key to an appropriate statistical description and measurement of this integrated development of the economic, social and personal spheres. Change in time use patterns is part of the essence of socio-economic development [10].

The measured economy is represented by paid and taxed hours of work. Unpaid hours of work and "black" work represent an equal or even larger part of the total economy.

The implication is that if only a small part of the unpaid hours could be transferred to the paid and taxed labour, it would have significant impacts on employment and the economy.

The increasing "connectedness" of households, as shown by readiness and intensity indicators, changes the interaction between the household sector and the business and government sector. An example is "Internet banking", where the "customer" produces the service – transfer between accounts, paying bills etc. – and the bank provides access to the information system for updating data bases.

Much of new services and new modes of providing a service will be dependent on investments, expenditure and work in the household sector.

A conclusion is that measuring the use of time should be a central issue in the new economy and time use surveys emerge as an instrument for developing

a major or perhaps even the main economic indicator of the new economy as well as for social inclusion and participation.

Conclusions

The new economy poses new and exciting challenges for the statistical community. But not only for statisticians – the challenges address very much economists, sociologists, computer scientists, information scientists etc. The new economy is a true multi-disciplinary and cross-disciplinary phenomenon. To describe the new economy many aspects of the society – economic, social, cultural etc. – have to be covered, which means that the development of a few new statistical surveys is far from sufficient.

The resources in the (new) economy devoted to economic information processing are far too big to be statistically ignored. Knowledge-based information processing dominates or controls the entire physical production grid of the national economy and define the national competitive capacity.

Three aspects of economic measurement are of particular concern:

- The content of economic activities will not be properly specified, unless statistical assessments accommodate that knowledge-based information processing is the dominant economic activity.
- Changing IT is a major source for improvements in the micro-economic performance. The IT of an enterprise or the entire economy is embodied in its organisation. Our capacity to observe and measure organisational change depends on the taxonomies or classifications of our measurement systems.
- A proper account of the nature of production should distinguish between inputs and outputs in information terms.

Within this general framework important areas for RTD and measurement are indicated by the following examples

- Definition and measurement of services output;
- Measurement of outsourcing and other inter-enterprise relationships and their effects on employment and competitiveness;
- Measurement and valuation of information and other intangible assets;
- Measurement and analysis of new business modes and SMEs;
- Measurement of provision and supply of knowledge, competence and human capital;
- Description and analysis of the blurring borders between goods and services, between sectors, between employers and employees and the impact on our classification systems;
- Measurement and analysis of the location of production and consumption;
- Measurement and analysis of the effects of combinations of ICT investment and other factors, such as human capital and managerial or organisational innovations, on productivity;

The resource implications of the needs for RTD and new data collection are almost overwhelming. This puts great emphasis on our ability to come up with well justified priorities, efficient statistical systems and new data collection methods, making maximum use – to the extent integrity and confidentiality considerations allow – of the inherent possibilities of the ICT based information systems.

The European Research Area and the 6th Framework Programme offer new possibilities for joint and concerted efforts to meet the statistical challenges of the new economy. The results from research concerning indicators for the new economy and statistical methods produced under the 5th and earlier framework programmes should more intensively be exploited and implemented.

Notes

1. OECD 1991

2. Schön

3. Eliasson et al. The distribution of wage and labour costs over different functions in Swedish manufacturing enterprises with more than 200 employees was studied. The labour costs were distributed as follows:

• Creation of knowledge (innovation)	10 %
• Co-ordination (marketing, distribution, administration etc.)	30 %
• Internal knowledge transfer (education, training)	3 %
• Production scheduling	20-25 %
• Control, supervision	8 %
• Direct production	20-25 %
• Internal transport, inventories	3-8 %
• External purchases of services	22 %

(The external purchases of services amounted to 22 % of the sum total of the internal costs).

4. Eliasson et al.

5. Triplett mentions a study by the McKinsey Global Institute of which industries that accounted for the net U.S. acceleration in productivity after 1995 showed that six large industries (wholesale trade, retail trade, computer manufacturing, semiconductor manufacturing, securities brokerage services and communications) accounted for most of the labour productivity acceleration. It was concluded that the constellation of IT, managerial innovation and intensely competitive structures caused productivity changes in these six industries and not the effects of IT investment alone.

6. Gunnarsson et al. consider that ICT may affect productivity growth both through human capital interactions and possible externalities in the use of IT. The connection between IT and human capital has largely been disregarded in the assessment of the possible productivity-enhancing effects of IT. Their principal conclusion is that human capital is the key to the IT productivity paradox. They mention a study by Bresnahan, Brynjolfsson and Hitt, that found high levels of productivity in firms that are either high on both IT and human capital or low in both of these dimensions. Relatively lower levels of productivity are found in firms that are high in one of the two dimensions and low in the other [8].

7. Schön

8. Eliasson et al.

9. OECD 2002

10. Gershuny

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