

**Economic Theory**

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**SOCIETY 4.0:  
GENERAL ECONOMIC IMPLICATIONS**

**Abstract**

The term «Society 4.0» is used to define a group of people in advanced economies who form a modern cultural society, which is heavily influenced by technological developments and digitalization and having a significant impact on most aspects of human life. The notion of Society 4.0 is closely related to and factually corresponds with the Fourth Industrial Revolution, which is also referred to as «Industry 4.0» and widely debated. Despite its topicality, this concept has not received as much publishing attention as anticipated. Surprisingly, the term «Society 5.0», which describes what the current society will gradually transform into in the near future, receives much more focus in this context. The aim of this article is to present the concept of Society 4.0 in its factual form and to identify its general exogenous and endogenous implications, in particular in the sphere of economics.

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**Problem Statement and Methodology**

The ongoing technical and technological revolution, occurring predominantly in developed economies, is producing a significant impact on various aspects of human life, resulting in major transformations across our modern society. This revolution is mainly characterised by robotics, advanced automation and digitalization, and is referred to as «Industry 4.0» from the perspective of the manufacturing sector. Transformations brought about by Industry 4.0 are continuously affecting both individuals and society as a whole. This ongoing impact is leading to a redefinition of the overall concept of society, as it transitions to its new form known as «Society 4.0».

Society 4.0 encompasses economic actors that consciously or unconsciously engage in daily active and passive interactions with technological stimuli originating from both internal and external environment. Through the society thus shaped, these technological stimuli induce changes in economic, social and environmental attitudes, as well as change the preferences and attitudes of these actors towards each other. The aim of this paper is to present the concept of Society 4.0 in its factual form and, against the background of the synthesis, to define the predominantly economic implications that arise from it. These implications can be distinguished into internal and external, and at the same time into explicit and implicit, i.e. impacts that are obvious and can be quantified relatively easily, and those that are hidden at first sight and that are very difficult or impossible to assess.

From a methodological standpoint, the text is based on a traditional search of relevant literature and other publicly available sources of information, unless otherwise noted as the authors' own professional experience. The goal is to elaborate on the topic of Society 4.0 with a focus on the content of this term itself and to present it in factual (economic) parameters that are understandable to a broad audience, not only professionals. To achieve this goal, we perform an analysis of available information and a synthesis of partial findings by using the deductive approach and visualization of selected findings. The concept and issues of Society 4.0 are often overshadowed by the more prominent topic of «Industry 4.0» and, more recently, by the emergence of the term «Society 5.0», which has theoretically overtaken the reality and formation of the contemporary society.

Due to a purely descriptive and overview nature of the text, the structure of this article deviates from a typical layout. In addition to the traditional Introduction and Conclusions sections, it contains two chapters: The first presents the concept of Society 4.0 as it is generally understood, while the second identifies which specific areas will be affected by the formation of Society 4.0 and in what ways. The discussion or critical debate on the topic is not relevant to the nature of the paper.

## **Research Results**

### **The Genesis of Society 4.0**

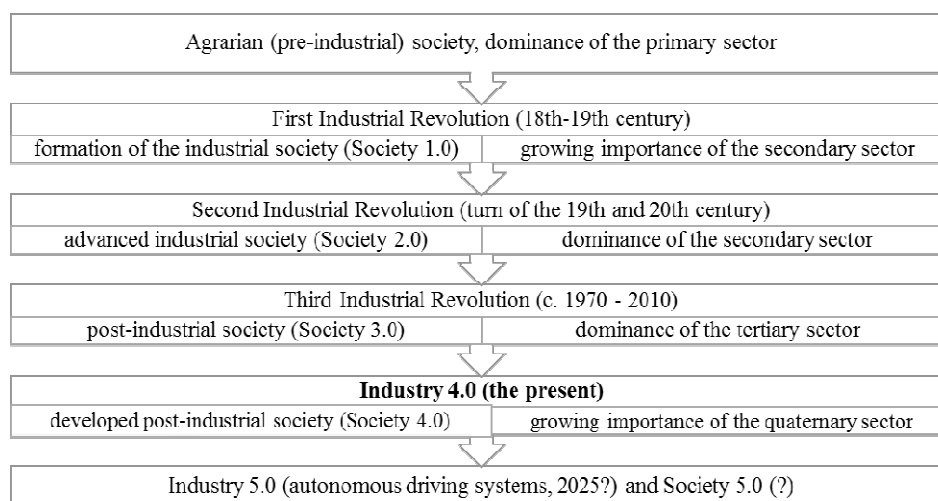
Society 4.0 represents a theoretical fourth stage in the institutional evolution of our society. The origins of society can be traced back to the agrarian society and an economic system based on the dominant role of the primary sector and craft production. It was only with the development of industrialisation in the 18<sup>th</sup> century that we began to speak of a society whose manifestations are linked to stages of the scientific and technological revolution (see Figure 1). The First Industrial Revolution started with the invention of the steam engine in 1765 and the gradual mechanisation of production. During this period, the initially agriculture-oriented society gradually transformed into the industrial society, which marked the first stage in the society's evolution known as «Society 1.0». It was characterized by the increasing importance of the secondary sector and growth in human labour productivity.

After 1870 followed a larger wave of manufacturing innovations, including electrification, use of (electric) engines and assembly lines, which fundamentally transformed economic sectors and industries. The secondary sector became

dominant, a higher degree of division of labour began to take hold, countries experienced economic growth, and the living standards improved significantly. The industrial society, which was the second stage in society's evolution known as «Society 2.0», is being deepened.

Figure 1

**Stages of the Scientific and Technological Revolution with reference to the process of society formation**



The Third Industrial Revolution, which started in the 1970s, was characterised by the automation of production processes and the development of information technology. The design or optimization of components, as well as their production technologies, were now achieved through the use of sophisticated and ever-improving simulation programs (see, for example, Čada 2018 or Čada 2021). The industrial society has transformed into the post-industrial society known as «Society 3.0» due to lifestyle changes that have led to substantial strengthening of economic activities in the tertiary sector, which now dominates most developed economies around the world (Fukuyama 2018; Gladden, 2019; Turečková, 2014).

Currently, the Fourth Industrial Revolution, which can be traced back to early 21<sup>st</sup> century, is underway. Its main feature is digitalization, which is profoundly impacting society as a whole (Vaňová, 2021). It is characterized by the application of

information and communication technologies to the production environment in the form of robotization, highest level of automation and digitalization. These elements are complemented by the Internet of Things, big data, virtual reality, additive printing, machine learning, and artificial intelligence (Vaňová, 2021). The interconnection of production-intelligent systems enables the emergence of smart enterprises, companies and, above all, factories (Schindlerová & Šajdlerová, 2021 or Schindlerová & Šajdlerová, 2019). In the context of the Fourth Industrial Revolution, the term «Industry 4.0» has emerged, marking a shift towards an increasingly more post-industrial or «technocratic» society. The structure of the economy has undergone changes, leading to the establishment of the fourth sector, also referred to as «the quaternary sector». This sector encompasses a range of services related to the creation and dissemination of knowledge and information, naturally spanning all areas of intellectual activity. Such an extended sectoral structure is a better reflection of the ongoing changes in the knowledge economy, where knowledge serves as a foundation for value added and where knowledge creation and utilization significantly contribute to the overall well-being of society. At this stage of the science and technology revolution, the quaternary sector is gradually strengthening. All the economic-socio-environmental transformations brought about by Industry 4.0 have led to changes in the behaviours, attitudes and self-perceptions of economic actors, thus shaping the Society 4.0. In this context, a deeper intertwining of the biological and technological aspects of life is anticipated to occur or is already taking place in most areas of human existence.

Society 4.0 is understood by some as a kind of an ecosystem of information, innovation and smart production that connects smart technologies with smart citizens and leads to a smarter society (Helbing, 2016). Mazali (2018) even uses the term «digital society» in this context. We understand Society 4.0 as a grouping of people (or economic actors) of technically advanced economies formed into a modern and cultural society, which are naturally subject to the significant influence of technology, automation and digitalization, and which are demonstrably transforming most areas of human life and the socio-economic system as a whole. Society 4.0 can be identified with the concept of «Smart Society». It should be noted that the addition of «4.0» to various sub-sectors, such as «Finance 4.0», «Management System 4.0», «Economy 4.0», «Construction 4.0», «Infrastructure 4.0», «Agriculture 4.0», «Medicine 4.0», and others, designates the intention to declare the adoption of the key features of the Industry 4.0 paradigm in the respective economic domains.

Although we are currently experiencing the ongoing Fourth Industrial Revolution, there is already discussion about the imminent emergence of «Industry 5.0». This concept suggests even greater and deeper automation, aiming to minimize human labour interaction as much as possible. The focus will be on utilizing an exclusively robotic workforce, with minimal interaction of employees, who will be employed in minimal numbers. This will be matched by companies' premises and their input requirements, as well as corporate policies of human re-

source management. The European Commission has introduced the concept of Industry 5.0 as an approach that provides a vision of an industry that looks beyond efficiency and productivity as the only goals and reinforces the role and contribution of industry to society. It puts worker well-being at the centre of the production process and uses new technologies to ensure prosperity beyond jobs and growth, while respecting the planet's limits to production (iDNES.cz, 2022).

In contrast to Industry 4.0, its successor concept shifts the focus of research and innovation in services towards the sustainability and resilience of the industry (Thilagavathi et al., 2022; MacGregor Pelikánová et al., 2021). Machine learning and artificial intelligence linked to the Internet of Things will create the Internet of Everything (IoET) that will underpin the entire manufacturing process. The production output will be mass-produced, while at the same time possessing the capability to respond flexibly to individual and customer-specific requirements. The fundamental change in principle lies in shifting the development focus away from technical aspects and constant profit growth. Instead, the emphasis will be placed on people and their quality of life. Society 5.0 is then a successor-formed, human-centred society that balances economic and technological progress with solving social and environmental problems through a system that deeply integrates cyberspace and real-physical space (Fukuyama, 2018; Harayama, 2017; Zakri, 2018; Vaňová, 2021). An alternative term used to refer to Society 5.0 is «Super Smart Society» (Ferreira et al., 2022). It is not uncommon to put it in the context of Industry 4.0 (Salimova et al., 2020; Potocan et al., 2021), which effectively leads to Society 4.0 being virtually «skipped» from researchers' focus.

### **Selected Economic Implications of the Formation of Society 4.0**

Society 4.0 will manifest itself in the economic sphere through significant transformations of the labour market and employment, including the use of human labour, control and competence requirements, seamless integration of workers into the company's infrastructure, training and worker mobility, while also emphasizing ethical aspects and shared values (MacGregor Pelikánová et al., 2021). In the context of employment within Society 4.0, there is ongoing discussion regarding a significant shift towards individualisation, whereby working conditions will be tailored to align with the lifestyle of each worker. This means that employers will strive to implement flexible systems of working hours and remuneration for the work done, whenever feasible (European Commission, Directorate-General for Research and Innovation, 2013). Moreover, it is anticipated that workers will naturally adopt a proactive approach (Castells, 1997) and, thanks to the automation of production processes and remote management, they will generally not be forced to have a permanent workplace (Huws, 2016).

Another significantly affected area of Society 4.0, apart from households (individuals), are companies and their potential and actual possibilities of using and adapting technological changes and impulses that come from Industry 4.0 (see above) and that are reflected in all roles and processes of the company (company as a producer, seller, hirer of production factors, customer/supplier, investor, etc.). Such firms and production enterprises will integrate, create or mediate technological and social innovations, which can be seen as an opportunity to create a new work culture that is maximally oriented towards the interests of workers (Mazali, 2018) and the individual requirements of customers. The transformations are also expected to involve deeper engagement between employees and the company and, from an efficiency perspective, there will be pressure for system compatibility and connectivity and communication within the supplier-customer relationships (MacGregor Pelikánová & Hála, 2021). Companies will declare their contribution to social and environmental responsibility (MacGregor Pelikánová & Rubáček, 2022). Saving time and money, increasing flexibility in decision-making and implementation, including streamlining communication and innovation processes, all appear to be key for companies.

The state also has an essential role to play in contributing to the development of Society 4.0, especially regarding the introduction of regulatory, security and legislative measures related to adoption or financing of technological innovations within the public sector, as well as ensuring the provision of public goods and services. This involves, in particular, removing the unnecessary bureaucratic barriers and establishing a transparent legal environment (MacGregor Pelikánová and Rubáček, 2022) in the long term. In the context of Society 4.0 and public administration, there are discussions surrounding computerisation, open data interconnectivity and digital communication, civic participation, and the concept of smart governance as such (Vitálišová et al., 2023). In line with the principles of Society 4.0, the public sector must initiate the necessary changes in education, healthcare, transport, and other public domains, while also reassessing the design of economic policy, the tax system (including the potential taxation of robots), the social security system, and other pertinent areas.

The economic transformations that can be identified in connection with the formation of Society 4.0 are logically linked to Industry 4.0. In each case, the affected economic actors are households, firms and the state, which are both the agents of change and the beneficiaries of it. The impacts on these subjects can be internal (endogenous) and external (exogenous), and at the same time they will be readily apparent, known and quantifiable (implicit) or partially or completely latent and unidentifiable (exogenous). The transformation of society will undoubtedly find their reflection in the economic sphere, just as the economic sphere will also influence society itself. In other words, the initial impulse generated by Industry 4.0 will accelerate the interaction between Society 4.0 and the economic system, deepening their mutual transformation.

Figure 2

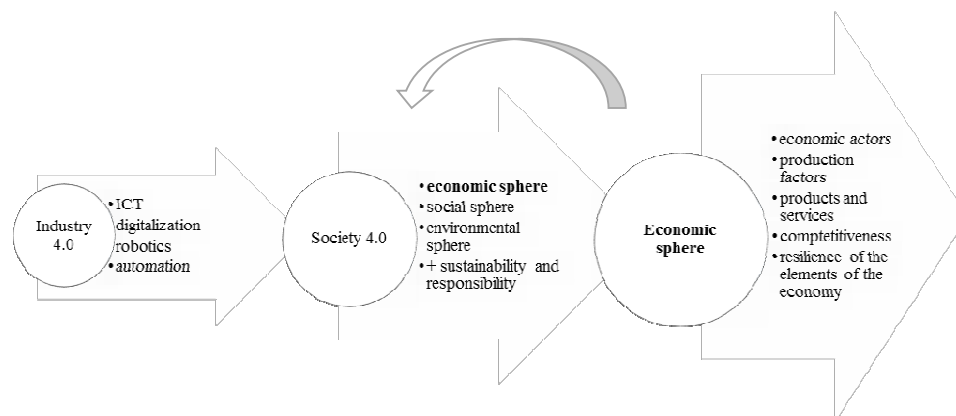
**Economic aspects of Society 4.0**

Figure 2 illustrates the economic aspects of Society 4.0. Alongside the previously mentioned economic actors, these aspects encompass the acquisition and use of production factors with requirements to their quality and quantity, as well as the nature of the products and services offered and demanded with requirements to their specifications and volumes. This will change not only the market for production factors, but also reshape the market for final output. Furthermore, Society 4.0 will have implications for corporate and regional competitiveness, which will arise as a consequence and a requirement of the broader transformations occurring throughout the entire society. As a last point, it is worth mentioning the general intention to strengthen the resilience of (not only) the economic system against destabilizing threats and potentially undesirable impacts.

At the same time, it can be assumed that economies that have progressed in terms of industrial development towards Society 4.0 will be more competitive (Staničková and Melecký, 2014). We have to remember that this is a demonstrable evolution of the industrial sector and that this involves increased investment in innovation, technological units, the assumption of more patents, etc. This is then reflected in the fact that, with a certain time lag, trends are being transferred from Industry 4.0 to Society 4.0. It cannot be the other way around because there must be a prerequisite for the implementation of smart solutions from one sector to another and then within the company. In terms of competitiveness, it can be stated that the spillover process begins at the level of an individual company, then extends to companies within the same industry, and later spreads to other industries. These processes continue to be adopted until they are established



within the entire industry through natural development. Thus, these developments are initially concentrated at the corporate level, then spread to the regional level, and finally extend to the national level. This then determines the possibility of further direction – in the case of «Company 5.0», for example, the impacts on competitiveness cannot be explicitly defined, as autonomous processes will result in lower labour requirements, different qualifications of workers and thus demands on the education system. It may therefore happen that what has previously contributed to the growth of competitiveness could become an internal barrier in the future. Considering that Industry 5.0 is projected to be dated from 2025, the start of this evolution cannot be precisely defined for Society 5.0.

The last comment pertains to resilience. Resilience of the economic system refers to the overall ability of economic actors to adapt to and cope with various threats, risks and challenges, which may include climate change, natural disasters, disease pandemics, energy crises, wars, political turbulence, social conflicts, and other adversities. The aim of «being resilient» is to quickly and effectively address these unexpected events in a mitigating manner. In other words, it is about continuously shaping a sustainable and reliable economic environment, which minimizes the occurrence of turbulent and undesirable manifestations. This is achieved through strong institutions, good planning and management, and mutually constructive cooperation among economic actors (loosely referenced by Papa, 2015; Vitálišová et al., 2023; Vale, 2014).

## Conclusions

The aim of this article was to present the concept of Society 4.0 in its factual form and to define in general terms the mainly economic implications that arise from it. It was not easy to find relevant information directly on the topic of Society 4.0 in the course of our enquiry into available literature and sources, which was quite surprising. In contrast, Industry 4.0 or Society 5.0 is a topic, which is widely discussed across the general and professional public. A possible contribution of this paper lies therefore in providing a general presentation of the Society 4.0 phenomenon and a fragmented description of the economic implications that are expected or already being realised from the emerging Society 4.0. As we are also talking about an open and interconnected social system, the economic attributes mentioned above have implications in the social and environmental spheres and vice versa. At the same time, it should be noted that many of the above-mentioned changes that are anticipated to be reflected and substantively covered by Society 4.0 will be effectively irrelevant in the end. This is logical because society as such is by no means static and does not evolve according to the expected scenarios that may characterise the ex-ante formulated Society 4.0. In the end, even Society 4.0 may not establish itself in the structure of the economic-social system in the long

term and will be replaced by Society 5.0 very soon, because changes will be more dynamic than we can currently suspect.

To summarise the essential characteristics that characterise Society 4.0, it is a grouping of entities that is significantly influenced in all areas by the ever-increasing digitalization, automation and robotization, which, against the backdrop of developments in technological innovation, allows for a greater degree of autonomy, encourages individualisation and facilitates communication. The simplification of physical work processes makes it possible to develop creativity, competence and intellectual work. Our needs and expectations are changing, transforming the nature of the economic goods we demand and the way we live. However, this is a perfectly natural evolutionary process to which we have given a specific name.

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