SOCIETY 5.0

A New Challenge to Humankind's Future

Edited by

Doğa Başar Sarıipek
Pasquale Peluso

Okur Yazar Association Publications

Society 5.0: *A New Challenge to Humankind's Future*
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Contents

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Preface

This book is the outcome of the joint hard work of Italian and Turkish social scientists. We seek to examine how debates around Society 5.0 explain economic and social transformation. It is the product of the common curiosity to discover the most recent phase of societal development, namely *the Society 5.0*.

We would like to emphasise that this book is the product of multidisciplinary work covering the fields of law, technology, social policy, sociology and literature. The book has an introductory chapter and eight chapters. The volume editors Assoc. Prof. Doğa Başar Sarıipek and Assoc. Prof. Pasquale Peluso exposed the theoretical and contextual foundations of Society 5.0 in the introductory chapter. This chapter focuses on defining the historical background and key aspects of Society 5.0 to serve as a starting point for further analyses in following chapters.

The second chapter*, Social Dimensions of The Transformation Toward Society 5.0* by Prof. Dr. Abdulkadir Şenkal and Zahide Peker, addresses the concept from a social policy perspective. This chapter seeks to establish a connection between Society 5.0, working life and social protection.

The third chapter, *Man, Science and Politics in Utopian and Dystopian Literature: A Survey* by Assoc. Prof. Angelo Arciero, presents an utopian and dystopian view to the issue in question from the literature. This chapter traces a possible reconciliation of man with the natural, social and political environment through different literary works.

The fourth chapter, *Transformation of Public Labour Relations in The Process of Society 5.0* by Assoc. Prof. Gökçe Cerev and Emine Elif Ayhan, presents a unique and specific impacts of Society 5.0 on public labour relationships. This section stands out by focusing on the possible effects on a particular branch of the working life rather than the effects that can be attributed to the general working life.

The fifth chapter, *Developing Countries and International Waste Trafficking: The Challenge of Fair and Sustainable Waste Disposal in Society 5.0* by Assoc. Prof. Pasquale Peluso, focuses on waste disposal process, one of the most visible negative externalities of economic development from the perspective of Society 5.0. The chapter frames the discussion via popular examples and from a legal point of view. The chapter ends with the analysis of the concept of circular economy as a possible strategy to reduce the illegal waste disposal in the developing countries and to allow them follow a fair development process.

The sixth chapter, *Smart Contracts and Contracting's Position in The Italian Civil Law: Technology for The Benefit of The Individual Contracting Party in The Perspective of A Human-Centred Society* by Assoc. Prof. Marzia Rossi, addresses a very well-known issue in civil law with a completely new point of view by referencing core aspects of Society 5.0. To this end, the chapter enables to develop a unique insight to the issue.

The seventh chapter, *The Identification of Potential Criminals from Phrenology to Artificial Intelligence* by Assoc. Prof. Giovanna Palermo, presents the studies on bioanthropological investigations of the etiology of crime from phrenology to artificial intelligence. This chapter highlights the most recent studies in the field of neuroscience and then dwells on the today's role of artificial intelligence, a system typical of society 5.0, which is used both as a tool for crime and as a means of identifying potential criminals.

The eighth chapter, *Society 5.0 Vision in Contemporary Inequal World,* by Emine Elif Ayhan and Çağlar Akar, presents a renewed view to the oldest social policy problems, poverty and inequality, from the point of Society 5.0. After highlighting the core aspects of these two socioeconomic problems, the chapter seeks to present a critical insight to the issue.

The ninth chapter, *The Importance of Green Growth in the Society 5.0 Process* by Assist. Prof. Ali Kemal Nurdoğan and Ali Arıöz, focuses on the importance of environment-sensitive growth in times of Society 5.0. Attributing a central role to the green growth in the overall quality of life of

people, this chapter underlines the significance and the interconnectedness of poverty, inequality, technology and environment-friendly growth.

Although the book follows a sequential structure as having nine different chapters, each of the chapters is self-explanatory and can be read and evaluated separately. In this way, this book seeks to be a contribution to the thoroughly understanding of the concept of Society 5.0. Besides, by approaching such a new phenomenon from a variety of concepts, this book makes itself a starting point for those who wish to understand and evaluate what Society 5.0 is and how it takes place in different contexts.

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1 Understanding Society 5.0: A Human-Centred Society via Technology

Doğa Başar Sarıipek and Pasquale Peluso

Introduction

Society 5.0 is, in the simplest sense, integration of information technologies and human wellbeing. It was first introduced by Japanese government and has been the symbol of the most developed welfare societies, which are capable of using advanced information technologies efficiently in both resolving socioeconomic challenges and the provision of welfare to citizens. Therefore, it has become the name of a human-centred society approach.

Society 5.0 actually relies on a cycle between cyber space and physical space. The cycle starts with the collection of relevant data from the physical space and continues with analysing them to reach the most appropriate solutions for social problems. Computers and other information technology tools handle the entire data collection and analysing process. The next step is to implement the solutions in real life. After observing the outcomes, a new set of data is generated and this data is uploaded back into cyber space to start the cycle all over again. This is a learning-by-doing process. In other words, if any faults or problems are determined in outcomes, corrective actions and/or measures are planned for the next round of the cycle. In this sense, more efficient and contributory interventions to social life are guaranteed continuously. To this end, Society 5.0 may be considered as a new set of rules in order to realise an efficient needs-based social protection.

Society 5.0 will attract more attention in the years ahead undoubtedly. It is already idealised by virtually all societies because of its positive impacts on quality of life and overall wellbeing. As the physical and cyber spaces are integrated more successfully in social welfare provision fields, the spread of Society 5.0 to different societies, which have the necessary

substructure, will become even faster. With more developed public services, the social life in physical world will be more comfortable.

With the perspective mentioned above, this introductory chapter is an overview of the concept of Society 5.0 as well as an attempt to define the core aspects of it. The chapter starts with a historical look to the concept to reveal the solid ground that Society 5.0 is built. Then it clarifies the main goals of Society 5.0 and discusses the social transformation that it generates in nations.

Historical Background on Society 5.0

Considering the overall evolution of human history, we can define a number of important dates and/or events addressing clear development stages of societies. This evolution process starts with Society 1.0, which is the stage of hunting and gathering. The people of this stage had their daily lives under the rules of nature. Therefore, this was the stage of coexistence in harmony with the nature. As the second development stage, Society 2.0 is characterised with agriculture. People lived during this stage were more organised and planned then their earlier relatives in agricultural cultivation. In this sense, they took the first important step of nation building through transition to the settled life. Society 3.0 is identified with a very ground-breaking event of all human history; The Industrial Revolution. Thanks to the steam power, which is the symbol invention of this stage, mass production became possible for the first time in entire human history and industrialisation accelerated. The following development that marked the Society 4.0 was the power of "information". Society 4.0 or with other words the "information society", addresses the stage of hegemony of the information; the nations that not only the user, but also the creator of information stood out as the rule-makers in world economy politics.

Society 5.0 as the most recent development phase of humankind is believed to be first used in the 5th Science and Technology Basic Plan by the Japanese government in 2016.[1] Based on the previous information so-

[1] F. Wang, et. al., "Societies 5.0: A New Paradigm for Computational Social Systems Research", *IEEE Transactions on Computational Social Systems*, 2018, 5, No. 1. 10.1109/TCSS.2018.2797598; X. Wang, et. al., "ACP-Based Social Computing and Parallel İntelligence: Societies 5.0 and Beyond", *CAAI Transactions on Intelligence Technology*, 2016, 1(4), 377–393. Keidanren (Japan Business Federation), "Toward realization of the new economy and society. Reform of the economy and society by the deepening of Society 5.0", 2016; Y. Harayama, "Society 5.0: Aiming for a new human-centered society. Collaborative creation through global

ciety characteristics, Society 5.0 means a more integrated and systematic society order, which relies on the harmonious coexistence of technology and daily lives through a cyber-physical system.

Considering the overall history of societies, one can clearly see that the sharpness between transitions weakens over time. In other words, Society 5.0 is basically an information society similar to Society 4.0; but draws apart from it with the promise of aiming a prosperous human-centred society with high level of well-being relying on the intensive use of advanced technology".[2]

Society 5.0 includes a clear cooperation and a merge between cyber- and physical-space in daily lives thanks to advanced ICT networks.[3] Cyber-space, in this sense, means a digital space in its core meaning. Computers collect real-world data and analyse them continuously to reach the most productive and effective solutions of daily life problems and adjust public social services accordingly. A larger part of the raw data is transferred to the process of creation of useful information and thereby, the overall well-being and quality of life of people increase.[4]

The Japanese Government calls this new society a "super smart cyber-physical society" and characterises it more "human-centred" than ever[5]. Even though it is an information society in its core meaning, this is the exact point that Society 5.0 differs from Society 4.0.

Core Logic behind Society 5.0

Society 5.0 may seem şğcomplicated to some, as it is a new social order based on the intensive use of advanced technology. However, the working principle of Society 5.0 is quite simple. The key words defining the core logic of Society 5.0 are *integration* and *merge*. The cyber-space and physical-space are well *merged* and the positive outcomes of this merge are *integrated* with daily lives of people in a way to increase overall quality of life as much as possible. In other words, the data occurred in physi-

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R&D open innovation for creating the future", *Hitachi Review*, 66/6 (2017): 8-13; Center for Research and Development Strategy, Japan Science and Technology Agency, Future Services & Societal Systems in Society 5.0, Tokyo: Japan, 2017.

[2] Harayama, "Society 5.0", p.10.

[3] Government of Japan, "The 5th Science and Technology Basic Plan". *Provisional Translation*, 2016, p.13

[4] K. Iwano, et. al., *Future Services & Societal Systems in Society* 5.0.,Tokyo: Center for Research and Development Strategy, Japan Science and Technology Agency, 2017, p.1.

[5] Harayama, "Society 5.0", p.8.

cal-space or the real world are collected and processed in cyber-space by computer networks and the emerging innovative technological outputs are transferred to the daily life through more comfortable and supportive public services.

Therefore, Society 5.0 represents a further developed stage of an information society and consists of three interconnected dimensions; data collection, processing and application of the results in real life. None of these dimensions is new by itself. However, the most visible innovation brought by Society 5.0 is that these dimensions are not operating within a limited scope and independent manner anymore. Instead, they are interconnected to each other and operate throughout the whole society under an integrated way. Thus, Society 5.0 is a big machine working at society level with the purpose of ensuring welfare and comfort for all. One can see the most obvious examples in the technologies of energy supply, medical treatment and care, education, mass travel schedules or even in air-conditioning technologies.

One should also consider that digitalization is only the means; human capital is still the key actor in terms of both directing and controlling the whole system and in terms of creating a society that gives the central priority to enabling higher quality of life for the entire public. In this sense, enabling happiness and comfort of the entire society is only possible through collecting varying and extensive real world data without giving a break even a moment. To that end, another core aspect of Society 5.0 emerges as *permanency*. The big machine must be aware of ever-increasing and -changing needs of the public and adjust itself accordingly. Therefore, Society 5.0 may also be considered as one of the most recent occurrence of a *needs-based social policy* approach.

To put more clearly, the fruitful partnership between cyber and physical space under Society 5.0 circumstances has a higher potential to "respond precisely to a wide variety of social needs". In this sense, Society 5.0 is definitely capable of building "a society in which all segments of population can access high-quality public services regardless of their age, gender, region, and language and, therefore, enjoy comfortable lives".[6]

Moreover, some authors have suggested a close interaction between Society 5.0 and Industry 4.0[7] with the claim that advanced technologies

[6] Government of Japan, *Outline of the Fifth Science and Technology Basic Plan. Provisional Translation*, 2016, p.1.

[7] C. M. Ferreira, and S. Serpa, "Society 5.0 and Social Development: Contributions to a Discussion", *Management and Organizational Studies*, 5 (2018); T. Salimova, et. al., "From

such as digitalisation, robot technologies, artificial intelligence etc. that have already transformed industries and businesses have also affected the society as well. In this sense, both paradigms rely on advanced technology. The only difference is that while Industry 4.0 employs advanced technology in business and production processes, Society 5.0 is the way to spread the positive outcomes of advanced technology to the all segments of the public. Besides, Society 5.0 may be considered as a paradigm to socialize and humanize the Industry 4.0 and advanced technology that embedded to it. In other words, Society 5.0 is the necessary missing piece to improve the quality of lives of people and benefit society as a whole by adding social initiatives to the commercial-only concerns of Industry 4.0.

Aims of Society 5.0

Society 5.0 presents a transformation in both production and welfare provision. To become a highly developed society in terms of socioeconomic values, sustainability of production itself does not seem the only motive anymore, but social concerns come forward as well. By integrating production and social concerns, Society 5.0 promises a good combination to catch a human-centred developing model. In short, the primal goal of Society 5.0 is to employ advanced technology in favour of public and create a balance between economic development goals and the effective resolution of societal challenges.

Because of the more profitable business models due to value-added production led by advanced Industry 4.0 technology, meeting basic and further needs of people are now easier than ever. In this sense, Society 5.0 represents not only a development in production, but also an effectivity in public service provision as well. An effective integration of cyber space and physical space (the real world) makes it easier for governments to gather immediate needs and information of people and let them adjust public services accordingly to resolve socioeconomic challenges more

industry 4.0 to Society 5.0: Challenges for Sustainable Competitiveness of Russian İndustry", *IOP Conference Series: Materials Science and Engineering*, 497/1 (2019); D. Gorecky et. al., "Human-Machine-Interaction in the Industry 4.0 Era", Paper presented at 2014 12th IEEE International Conference on Industrial Informatics (INDIN), Porto Alegre, Brazil, July 27–30; H. Lasi et. al., "Industry 4.0." *Business & Information Systems Engineering,* 6 (2014); J. Kang, "Change: From Industry 4.0 to Society 5.0—Taking the Comparison of Related Development Strategies Between Germany and Japan as an Example", Paper present at 2018 4th International Conference on Humanities and Social Science Research (ICHSSR 2018), Wuxi, China, April 25–27.

productively. This is not only good for the public, but also good for efficient use of limited resources.

Equal treatment and equality in opportunities for all are among other primal goals of Society 5.0.[8] By providing the necessary available environment for everyone to reveal their full capacity and potential, Society 5.0 employs advanced technologies to remove physical, bureaucratic, administrative and socioeconomic barriers in front of self-realization and all individuals, including the most disadvantaged ones such as the older adults, the disabled, children and women, can enjoy a safe and secure life with comfortable and healthy choices.[9] Therefore, in addition to generating a minimum threshold for basic needs of individuals, Society 5.0 technologies helps to enjoy a more meaningful and enjoyable life for all in a "sustainable, vibrant, liveable people-centric world"[10] as a result of a fruitful partnership between human and technology.

Society 5.0 is the system to harness the most available and desired outcome for all from a number of different systems by enabling a fruitful cooperation and collaboration among them.[11] To this end, Society 5.0 is the key requirement to reach a "super smart society" which includes a strengthened competitiveness due to a complete integration between IoT systems, artificial intelligence technologies, data collection systems and rightfully trained human resources.

Even though Society 5.0 approach has emerged as the new growth and development strategy of Japan recently, it has also found a large support from other countries since its basic aims and promises are all about rapid and permanent development. Put directly, economic and sociodemographic risks, such as rapid aging, declining birth rates, cultural/technological alienation between generations, migration flows and adaptation of migrants as well as urgent renewal needs in health care facilities and other basic social policy sectors, that almost all developed welfare societ-

[8] E. Bryndin, "System Synergetic Formation of Society 5.0 for Development of Vital Spaces on Basis of Ecological Economic and Social Programs", *Annals of Ecology and Environmental Science* 2018, p.12.

[9] Keidanren-Japan Business Federation, "Toward realization", p.10.

[10] A. Medina-Borja, "Smart Human-Centered Service Systems of the Future. In *Future Services & Societal Systems in Society 5.0*, edited by Kazuo Iwano, Yasunori Kimura, Yosuke Takashima, Satoru Bannai and Naohumi Yamada, Tokyo: Center for Research and Development Strategy, Japan Science and Technology Agency, 2017, p.235.

[11] H. Hayashi, et. al., "International standardization for smarter society in the field of measurement, control and automation." Proceedings of the 56th Annual Conference of the Society of Instrument and Control Engineers of Japan (SICE), 2017, p.264.

ies face today encourage them to take steps towards Society 5.0.

Another reason to capture Society 5.0 globally is that its basic presumptions are totally in conformity with United Nation's Sustainable Development Goals (SDGs). In other words, socioeconomic impacts of Society 5.0 serve well to the realisation of SDGs including ending poverty, empowerment of individuals, environment-sensitive growth etc.

In short, Society 5.0's final goal is to improve the overall quality of life in a society by reflecting all convenient technologies of Industry 4.0 to everyday life.[12] To that end, Society 5.0 brings a radical change in the meaning of society and the way that people live by creating new potentials to improve the overall level of wellbeing.

Social Transformation and Society 5.0

As put forward by Japanese government, Society 5.0 values brings a social transformation unavoidably. The most obvious fostering power of such a transformation is the endless search for more knowledge and more advanced technology. When this search creates a solid potential, it is inevitable to see some positive and facilitating reflections in all spheres of everyday life. The ultimate result is a more productive society that is formed by a combination of advanced technology-based economic growth performance and a healthy and long-living society.[13]

During this transformation process, societies replace their labour-intensive production structures with capital-intensive systems as the first and most direct change. As the use of capital and machines increase in production process, knowledge increasingly becomes the key element to create a solid level of benefit. This is another step to take in the transition to Society 5.0 circumstances. Therefore, a knowledge-intensive society fostered by ever-advancing information technologies is a central feature of Society 5.0.

With its life easing potential, Society 5.0 is the key tool to reach a more human-centred society. In such a society, it might be easier to overcome socioeconomic challenges because of balanced economic improvements and in this sense, all different segments of society can enjoy more comfortable and high quality lives. As seen clearly, Society 5.0 is the criti-

[12] Harayama, "Society 5.0", p.11.
[13] Government of Japan, "The 5th Science", p.11-12; Government of Japan, "Outline of the Fifth Science", p.1.

cal tool providing the link between economic growth, overcoming social challenges, and quality of life.

While discussing Society 5.0, it is not easy to distinguish it from Industry 4.0. Both systems rely on intensive use of advanced technology and an ever-increasing integration of cyber–physical spaces.[14] Therefore, the most striking feature of this social transformation is the combination of cyber, physical and social system.[15]

The idea of Society 5.0 was an anticipated stage of development even before it was introduced in Japan. Actually, the rapid progress of information technology in the field of industrial production was expected to get beyond Industry 4.0, and definitely have certain consequences and reflections on social system. The ever-increasing integration of cyber-physical systems and their first positive impacts on quality of lives of people was indicated as the most solid ground for this suggestion.[16]

Broadly speaking, each society has a ground to build Society 5.0 circumstances. Societies have their public service schemes including energy, housing, transport, sanitation, environment protection, clean water, healthcare, education, public security, and entertainment. Normally, these are the basic grounds of Society 5.0, but they may function separately and independently from each other. When these services are integrated through advanced information technology tools and result in an obvious increase in the level of wellbeing of people, this may generate the first sign of transition to Society 5.0.

However, a simple interconnectedness between services may not be sufficient to realize Society 5.0 circumstances. In addition to an interconnected public service scheme, the raw data and information gathered from the real world on a timely manner must be turned into useful knowledge. However, this requires a more complicated and advanced techno-

[14] H. Gill, "From Vision to Reality: Cyber-Physical Systems", In *HCSS National Workshop on New Research Directions for High Confidence Transportation CPS: Automotive, Aviation, and Rail*, 2008; Wang, et. al., "Cyber-Physical Systems", p.2

[15] Z. Liu, et. al. "Cyber-Physical-Social Systems for Command and Control", IEEE Intelligent Systems, 26 2011; Y. Ren, et. al. "Understanding the Predictability of User Demographics from Cyber-Physical-Social Behaviours in Indoor Retail Spaces", EPJ Data Science, 7 2018, p.1; R. Ganti, et. al., "Senseworld: Towards Cyber-Physical Social Networks", Paper presented at 7th International Conference on Information Processing in Sensor Networks, St. Louis, MO, USA, April 22–24; Washington: IEEE Computer Society, 2008.

[16] L. Monostori, "Cyber-Physical Production Systems: Roots, Expectations and R&D Challenges", Procedia CIRP, 2014, p.11; H. Zhuge, "Cyber Physical Society", in Paper presented at 2010 Sixth International Conference on Semantics, Knowledge and Grids, Washington: IEEE Computer Society, 2010, p.1.

logical process, which is completely different from the so-far-seen human–computer interactions. This is only possible when a society becomes experienced enough in using Industry 4.0 technologies. Even though the system seems to be left to the machines only, and the human element is located to the backstage, in fact, it is still the human power controlling and monitoring the whole process by accessing the whole amount of AI -derived knowledge. This is exactly what is meant when claiming that Society 5.0 is a human-centred system.

Conclusion

Society 5.0 represents the most developed social system of today in terms of employing information technologies intensively in determining and meeting the needs of people on a timely manner. Main principles of Society 5.0 are interconnected with essential aspects of Industry 4.0. The only difference between two paradigms is that Industry 4.0 is the name of the most recent technological advancements in production while Society 5.0 puts human satisfaction at the centre instead of production. Therefore, Society 5.0 is the name of employing information technologies increasingly in the improvement of overall quality of life and social comfort.

However, one should note that even though digital and information technologies are intensively employed in Society 5.0, the human factor still keeps its central and key role in the entire system since the ultimate goal is the happiness and comfort of entire public. Besides, Society 5.0 approach generates an efficient response to demographic and socioeconomic challenges that developed welfare countries face today, such as rapidly aging society, declining birth rates, migration flows and integration of migrants, social protection etc. In this sense, Society 5.0 contributes significantly to the stability and sustainability of welfare societies by integrating social, economic, and cultural benefits.

Considering all these essential features, Society 5.0 also means a social transformation as well. The main components of this transformation is integration, cooperation and interaction of human and technology. Therefore, it may be called the missing part in Industry 4.0; it enables to transfer the positive outcomes of advanced information technologies on society. To this end, it gives a hint about how future societies will be in terms of social protection and wellbeing.

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2 Social Dimensions of the Transformation toward Society 5.0

Abdulkadir Şenkal and Zahide Peker

Introduction

Society 5.0 can be described as a human-centred society where balances economic progress aligned with the solution of social problems by a well-functioning system that completely integrates physical space (real space) and cyberspace (virtual space). In this sense, it is an important progression that has economic and social dimensions. Especially, the social dimension of innovation has several aspects. In general, innovations reflect a social output and an output for society. These are also indications of social progress. Social changes generate new demands and expectations in terms of economic as well as cultural.

From the point of society 5.0 is creating a society where social challenges are concluded through integrating the innovations of industry 4.0 or, in other words, the fourth industrial revolution in industry and social life. These innovations might be listed, for instance, artificial intelligence (AI), share economy, Internet of Things (IoT), and big data. The concept came from the Council of Science, Technology, and Innovation in Japan and it approaches all respects of society, such as health, policy, economy, industry, mobility, and infrastructure.

Moreover, Society 5.0 includes countless opportunities and challenges of the 21st century. In as much as this concept, problems such as poverty, unemployment, migration, and climate change should be solved with joint efforts. However, the solution to these issues and Sustainable Development Goals (SDGs) like education or poverty reduction require an international effort. Lessons that have been understood from the COVID-19 Pandemic might have a notable effect on overcoming crises and universal challenges. Technological developments and tendencies through digital

transition should tackle these global issues. The convergence of physical space and cyberspace might give countenance to global partnership forms. People, things, and systems are interconnected in cyberspace. Outcomes received by AI might overstep the limit of human capabilities and feedback to the physical space.

Transition from Industry 4.0 to Society 5.0: Fundamental Paradigms

Society 5.0 is a unique human-centred social vision that is initiated by Japan on the 5th stage. It is an original concept that is raised in the Fifth Science and Technology Basic Plan (2016-2020), as a form of actuating and directing the activities in the fields of science, technology, and innovation (STI) to reach a sustainable, prosperous, and inclusive future. In other saying, Society 5.0 aims to revolutionise the habits and habitats of the community alongside revolutionising the industry. Society 5.0 is a unique human-centred social vision that is initiated by Japan on the 5th stage. It is an original concept that is raised in the Fifth Science and Technology Basic Plan of Japan (2016-2020), as a form of actuating and directing the activities in the fields of science, technology, and innovation (STI) to reach a sustainable, prosperous, and inclusive future. In other saying, Society 5.0 aims to revolutionise the habits and habitats of the community alongside revolutionising the industry.[1] From this point of view, Society 5.0 represents nationwide and, the primary efforts of Japan are directed towards integrating social and ecological requirements and skills of the innovation economy, which are generating wealth and employment. The profit motive does not forsake the Japanese business engagements as it is an indivisible part of Society 5.0.[2] In this respect, society 5.0, which was built on Industry 4.0, is not limited to Japan alone even though it is the development strategy of the Japanese, and this approach is expected to help contend with the social problems in the world.[3]

Society 5.0 pursues to solve a series of modern social problems by way of incorporating ground-breaking innovations such as robotics, artificial intelligence (AI), Internet of Things (IoT), and big data into all industries

[1] A. Deguchi et al., "What Is Society 5.0?", in *Society 5.0*, ed. Hitachi-UTokyo Laboratory (U-Tokyo Lab.), Singapore: Springer Press, 2020, p.1-23.
[2] C. Holroyd, "Technological innovation and building a 'super smart' society: Japan's vision of society 5.0", *Journal of Asian Public Policy*, (April 2020), p.1-15, https://doi.org/10.1080/17516234.2020.1749340.
[3] N. Akın, et. al., "Akademik Yayınlar Işığında Toplum 5.0 Kavramına İlişkin Bir Değerlendirme", *Atatürk Üniversitesi İktisadi ve İdari Bilimler Dergisi 35*/2 (2021), p.580.

and social activities. Technology is used to achieve a human-centred society where all members of the community can lead active and enjoyable lives instead of a future controlled and scrutinised by artificial intelligence and robots. Within the scope of ever-growing digital connectivity and the expanding usage of AI technologies, several actions have been initiated by the Japanese government and private sector under this flagship concept.

The replacement of Industry 4.0 by Society 5.0 was one of the major themes of the 2019 G20 summit, which was held in Osaka. This is because society 5.0 takes a different approach than Industry 4.0, focusing on persons and society. In this sense, Industry 4.0 is referred to as "information society," whereas Society 5.0 is referred to as "super smart society". Tateo Arimoto, Director of the Japanese National Institute for Graduate Policy Studies (GRIPS) Science, Technology, and Innovation Policy Programme, stated that "Industry 4.0 has emerged from the industrial revolution and therefore it focuses on industrial activities. But the focus of Society 5.0 is the well-being and happiness of the individual."[4]

The notion of Society 5.0 consists of the aspect that technology should be recognized as an aid, not a threat, as Prime Minister of Japan Shinzo Abe stated at the 2019 CeBIT expo. A study was conducted by the Japanese Federation of Economic Organizations Keidanren, which aims for the public to clarify that the economic and societal reformations are expected to advance in the consideration of Society 5.0's philosophy. The ideology of Society 5.0 in Japan may be stated to include several innovations in the following topics:

- Generating solutions to the aging population in the world
- Ensuring the virtual and the real worlds work hand in hand
- Taking advantage of the IoT via regarding the concerns of society
- Developing solutions to natural disasters and environmental pollution

There are several obstacles to fulfilling these social transformations and objectives. The Japan Economic Organization, Keidanren, has identified five key issues in order to overcome to enhance Society 5.0:

- Restrictions in the legal system
- Scientific distinctions in the digitalisation of things

[4] "Society 5.0 – Transformation in Human Resources and Technology", Peoplefocus, accessed November 2021, https://peoplefocushr.com/en/society-5-0-transformation-in-human-resources-and-technology/.

- Deficiency of qualified employees
- Socio-political biases
- Social resistances

Finding skilled and qualified employees and ensuring their loyalty, finding training and career development opportunities, and the coaching ability of executives to their employees have become one of the priority issues among enterprises in this process. In order to develop new skills which will sustain social revolution, new departments are found in universities to support the progress in technology and new positions are formed within the corporations that will benefit from this fore-mentioned transformation process.

Human Resources (HR) Departments that have started to taking advantage of the artificial intelligence practises came our lives by Industry 4.0 ought to include Society 5.0 into their actions during this term. The existence and availability of talent, career planning, talent management, comprehensiveness, and diversity should be the most significant issues to consider after joining the company.

Towards a Human-Centred Society

At a time when digital innovation is changing the world, Society 5.0 represents the conception of a unique human-centred society that combines the physical world with the virtual world.[5]This digital innovation aims to support and even fulfil what humans have done so far using artificial intelligence (AI), robotics, the Internet of Things (IoT) and big data analytics. Interaction between humans and machines is inevitable in the societies of the future. Society 5.0 aims to make life easier for everyone by incorporating advanced technologies into different sectors and social activities. Through the process clarified above, society 5.0 will become an individual-oriented society. The overarching strategy of the Japanese government in 2017 defines a people-centred society as one that is *"able to harmonise economic progress with solving social problems to enable all residents to lead high-quality lives of well-being and vitality"*. The lead contributors of the previously mentioned strategy comprehended how challenging it can be to redress the equilibrium among dealing with social problems, eco-

[5] R. D Piacentini, M. Vega, and A. S. Mujumdar, "Beyond Industrial Revolution 4.0: How Industrial Revolution 5.0 is Related to Drying Technology", *Drying Technology: An International Journal, 39* (2021), p.439.

nomic development, and the quality of life. Thus, Society 5.0 has been suggested in such a sense as to endeavour this success.[6]

Society 5.0 can be named as a super-intelligent society that aims to acquire social goals, prosperity, and social well-being by leveraging innovation and artificial intelligence technologies. To achieve such a goal, the Japanese government has recently launched a particular program based upon providing incentives for supporting the transition procedure. Overall, society 5.0 represents a sustainable system that includes a transition process.[7]

The necessity of solving social problems without desisting from the condition of life is compelling because of its requirement to harmony between what is best for society and what is best for the people. If we pursue economic growth with a single thought, we can become a world of mass production and mass consumption that damages the earth in the process. Nonetheless, as humanity, if we renounce our wishes and minimise our consumption, life would become dull and uncomfortable. On the other hand, if everyone lived such simple lives, the economy would be obstructed. Society 5.0 can be seen as an attempt to overcome this ostensibly formidable quandary.[8]

Can we compromise or find an acceptable equilibrium between the interests of society and the interests of the people within it? This challenge is essentially linked to the question of what we mean by "high-quality lives of well-being and vitality." There are various definitions and measurements of well-being. In most time, well-being cannot be measured, such as warmth. It is difficult to throw light on the clarification of it, but for now, humanities and social science researchers are exploring the environment of matter and considering how we can best approach the root. [9]

The people-centred approach locates basic human needs and interests at the core of the production process, proceeding from a technology-oriented strategy to a fully individual-centred and community-centred way. Employers eventually will be obliged to generate new aspects as a value shift from seeing employees, namely "costs" to "investments". People and communities benefit from technology, which means that manufacturing

[6] Deguchi et al., "What Is Society 5.0?", p.1-23.
[7] M. Del Giudice et al., "Toward the human – Centered approach. A revised model of individual acceptance of AI", *Human Resource Management Review,* 100856, (September 2021), https://doi.org/10.1016/j.hrmr.2021.100856.
[8] Deguchi et al., "What Is Society 5.0?", p.1-23.
[9] Deguchi et al., "What Is Society 5.0?", p.1-23.

technology may be adapted to the needs and diversity of employees. Employees' physical and mental health, as well as their well-being, must be prioritized in a safe and inclusive work environment. Throughout the establishment phase of such a work environment, new "non-traditional" ways will eventually prosper to protect the workers' fundamental rights, especially autonomy, human dignity, and privacy. All employees, especially industrial workers, must continue to up-skill and re-skill for having better career opportunities and work-life balance.[10]

Understanding Society 5.0: Combining The Digital and Real Worlds to Resolve Social Problems

We might have heard a lot about the fourth industrial revolution, but Society 5.0 is what we should genuinely talk about. It suggests smart education and health, smart cities, and even smart governments. Together, they can establish the foundation for a safer, more inclusive, more productive, and environmentally friendly society. The remarkable thing here is that the model places individuals in its centre. Society 5.0 is technology-oriented, people-focused, and it contains a wide range of 'smart' functions. In addition, it represents a fully-networked, intelligent, human-centric and sustainable society.

Generally, an industrial revolution is guided by transformative technological advancements that lead to fundamental changes in the way the industry works. These changes have economic and societal conclusions, some of which are intentional and desirable; others are unintended and undesirable. Industry 5.0 is value-driven, while Industry 4.0 is technology-driven, like other predecessors. The former requires the latter to remind us of basic societal needs, values, and responsibilities as ultimate goals; and the latter requires the first one for technological challenges and solutions.[11]

Platforms, services, and digital infrastructure are all part of the basis. These are based on cutting-edge technologies, including artificial intelligence (AI), robotics, the Internet of Things (IoT), and blockchain, as well as augmented and virtual reality (VR) and robotic process automation (RPA). These technologies have now matured to the point where they can cause

[10] M. Breque, L. De Nul and A. Petridis, "*Industry 5.0: Towards A Sustainable, Human-Centric and Resilient European Industry*," (Luxembourg: Publications Office of the European Union, 2021).
[11] X. Xu et al., "Industry 4.0 and Industry 5.0—Inception, Conception and Perception", *Journal of Manufacturing Systems,* 61 (October 2021), p.535.

enormous social and economic disruptions.[12] However, individuals have benefited from the increased use of smart technologies as Society 5.0 progresses. Artificial intelligence and digitalisation are re-adjusting or expanding the scope of individual activities in the workplace. Many traditional professions are disappearing in the manufacturing sector, which is dominated by machines, automation, and robots, and thus necessitating the need for training and retraining of individual.[13]

Core Values of Industry 5.0

Society 5.0 is centred around three complementary core values as a trivet. These are anthropocentrism, sustainability, and flexibility (Fig.1). The industry should be sustainable in attempt to respect planetary limitations. The new form of society should lead actions from the sustainability framework. From this view, it needs to form circular processes that recycle and reuse natural resources, reduce waste and its environmental impact, and conclusively guide to a circular economy with better resource efficiency.[14]

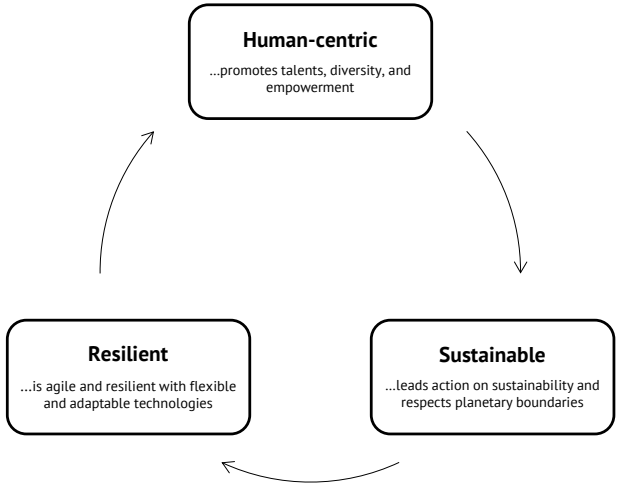

Figure 1. Core Values of Industry 5.0

[12] T. B. Sheridan, "Human–robot Interaction: Status and Challenges", *Human Factors* 58/4 (2016), p.525-532.
[13] K. Grunwitz, "The future is Society 5.0," *Computer Fraud & Security*, 8 (2019), p.20.
[14] Breque, De Nul and Petridis, "Industry 5.0".

Flexibility addresses the need for developing a higher degree of endurance in industrial production, better equipping itself against disruptions, and ensuring that it can provide and support critical infrastructure. The future industry needs to be adequately flexible to direct itself quickly through geopolitical changes, natural emergencies, and times of crisis.

In the case of Society 5.0, one of the main challenges is how to stabilise ideally the needs of the community with the needs of the individual. No progress can be made until this issue is resolved. The actors who are participating in policy and technology ought to perform cooperatively (or in other words, mutually) with one another so that everyone comprehends how each policy proposal or technological progress adopts and contributes to Society 5.0. Otherwise, these actors would uncoordinatedly follow their technologies or policies without understanding how they are placed in the big picture of things.[15]

The Social Dimensions of Society 5.0: A Social Revolution

Every innovation generates a social dimension with regard to engaging the participants and communities in the process of its creation.[16] Since the dawn of fourth industrial revolution, it has been clearly seen in all manufacturing sectors where digitalisation, automation, and other information technologies have increased productivity and transformed factories. Nonetheless, despite the rapid advancement of these technologies, there are some concerns about the potential negative social effects.

In the ongoing scenario where the world is facing expanding challenges on a global scope, such as natural disasters, an aging population, resource deficits, increasing economic inequality, and ultimately the ongoing global epidemic, it is crucial to take full advantage of digital technologies efficiently. In this regard, it is important to solve the problems in a way that will benefit the greater good. As a result, integrating technology into society will be much more crucial in the future.[17] In addition, the policies necessary to optimise society (to look for a way to resolve social problems) must be attached to the required technologies for delivering high-quality social services (that enable people to lead happy, active and comfortable lives). Besides, the policies to optimise society must be linked

[15] Deguchi et al., "What Is Society 5.0?", p.1-23.
[16] M. S. Kruk, "Social dimensions of innovation", *World Scientific News* 72, (2017), p.58.
[17] S. Bartoloni et al., "Towards designing society 5.0 solutions: The new Quintuple Helix-Design Thinking approach to technology," *Technovation*, (November 2021): 102413.

to providing high-quality social services. In other words, looking for a way to resolve social problems helps to enable people to lead happy, active, and comfortable lives.[18]

What can be called as a social revolution? It is defined as sudden shifts in the structure and nature of society, such as developments in philosophy, culture, and technology. The latest revolution, in other words, "Society 5.0," unites people's creativity with digital technologies to drive towards sustainable development. The concept is an attempt to bring human concerns to figure out how to think about technologically advanced environments. Japan makes the most of Society 5.0's opportunities to solve social problems with technology. For example, they're aiming to create a "super-intelligent society" to improve healthcare, mobility, and infrastructure for its citizens. This will be done through the adaptation of new technologies, such as AI, robotics, big data, and drones. Automation practices are replacing human roles and increasing inequality, and the unequal distribution of wealth are factors that raise questions about the impact of digital technology on society. But in an era where things, people, and devices are interconnected, a new social revolution could enable these technologies to meet the needs of people and the environment. Various examples may be mentioned, such as reducing carbon emissions with driverless vehicles, deploying robots to care for the elderly, and deploying sensors to alert people to patients when their needs arise. In a newer practice, artificial intelligence (AI) is also used to set a person's route for a city break. In this sense, AI technology will consider a person's preferences and forecast the weather before planning a trip to their choice of destination.

In this extraordinary face of society, social problems are resolved by fully integrating digitalised technology into the real world. Robots are taking care of the elderly, using body sensors to indicate if additional human assistance is needed. Artificial intelligence (AI) will shift through an individual's online history and health records to examine their health. Carbon emissions are reduced by self-driving vehicles that take the shortest route to home

Working Life and Social Protection: A New Paradigm

Industry 5.0 is known as recognising the industry's capacity to be a flexible provider of welfare, achieving societal goals beyond employment and

[18] Deguchi et al., "What Is Society 5.0?", p.1-23.

growth, by ensuring that production respects the limits of our world and placing the well-being of the industrial worker at the focus of the production system.[19] The introduction of Society 5.0 is ground on the observations or expectations that Industry 4.0 slightly focuses on the crucial principles of social justice and sustainability, whereas redundantly on digitalisation and artificial intelligence-driven technologies to increase effectiveness, efficiency, productivity, and flexibility of production process. Thus, the industry 5.0 concept provides a distinctive focus and perspective and emphasises the importance of research and innovation to reenforce the industry in its long-term service to humanity within the confines of the planet.[20] In fact, there has been some discussion about the "Age of Augmentation" where people and machines integrate and function in a synergy that brought to this official introduction of Industry 5.0.[21]

While self-employment is nothing unusual (and self-employment is still the dominant form of work in emerging economies), enabling its digitalisation is reframing the phenomenon. While technologies are replacing some jobs, they are also creating new jobs and forms to generate revenue in industries most of us cannot even dream of doing imagine. One-third of the new jobs created in the US over the past 25 years were non-existent or almost non-existent types in areas such as IT development, hardware manufacturing, application creation, and IT systems management. The exact impact of new technologies on employment can be highly positive. A 2011 study by McKinsey's Paris office found that the internet had destroyed 500,000 jobs in France in the previous 15 years - but also it created 1.2 million new jobs, for a network of 700,000 additional jobs, or 2.4 jobs in return for every job that had come to an end. [22]

Despite the recent increased attention to the social impact of their technologies, the academic literature presents some shortcomings that may lead practitioners and scholars to develop a new paradigm called Society 5.0, where people are at the centre of innovation, thereby benefiting from the impact and consequences of technology. [23] Introduced in January

[19] X. Xu, et. al., "Industry 4.0 and Industry 5.0—Inception, Conception and Perception", *Journal of Manufacturing Systems*, 61 (2021).
[20] Breque, De Nul and Petridis, "Industry 5.0".
[21] X. Xu et al., "Industry 4.0 and Industry 5.0", p.535.
[22] "Technology, jobs, and the future of work," McKinsey, last modified 24, May, 2017, accessed November 2021, https://www.mckinsey.com/featured-insights/employment-and-growth/technology-jobs-and-the-future-of-work.
[23] de S.Jabbour et al., "When Titans Meet–Can İndustry 4.0 Revolutionise The Environmentally-Sustainable Manufacturing Wave? The Role of Critical Success Factors." *Technological*

2016 as a growth strategy for Japan, Society 5.0 has the aim of creating a people-centred society where economic growth and technological development are accessible to all. Industry 4.0 is a society in which technologies are actively used in people's daily lives, industry, healthcare, and other fields of activity, not only to pursue development and technological progress but also to obtain the well-being of each individual. Both economic and social progress cannot be even a matter of discussion unless proper policy measures are chosen in order to close such social protection deficits for employees in the "new" forms of employment. In this era of a transformational shift in the world of work brought about by technological innovations, social, demographic, environmental and climate changes, and globalisation as well as constant inequalities. Social protection systems must secure that people may take advantage of new opportunities throughout their lives, especially during life and career transformations, while living under an adequate protection.[24]

Social protection systems will be oblige to adapt to changing situations and needs as the business world changes by global tendencies, like flexibility, digitalisation, automation, and globalisation. [25] Digital technologies are incorporating the employment creation of new jobs and income-generating opportunities for social groups that are frequently disadvantaged in the labour market, such as women, youth, the elderly, the disabled, the ex-convict, and those who living in secluded areas. While some alternative forms of employment offer many employees lower barriers to access, opportunities to acquire skills, and better balance between work and family life, other employees find themselves in an undesirable, precarious position because of the unpredictability of their work. Such precarious forms of employment are characterised by non-traditional work patterns, temporary forms of contracts, irregular working hours, and alternative places of work. [26]

The gaps in social security coverage for employees in alternative forms of employment pose a dual challenge for the future of work. On the one

Forecasting and Social Change 132, (2018), p.18-25.

[24] Christina Behrendt, Quynh Anh Nguyen, and Uma Rani, "Social protection systems and the future of work: Ensuring social security for digital platform workers." *International Social Security Review* 72, no. 3 (2019), p.25

[25] Behrendt, Nguyen, and Rani, "Social protection systems", p.25.

[26] United Nations, "Digitally enabled new forms of work and policy implications for labour regulation frameworks and social protection systems" accessed November, 2021, https://www.un.org/development/desa/dspd/2021/09/digitally-enabled-new-forms-of-work-and-policy-implications-for-labour-regulation-frameworks-and-social-protection-systems/.

hand, vulnerability leaves workers susceptible to the uncertainties of the labour market, erodes their dignity and rights, increases inequality and poverty, and threatens the implicit social contract of modern societies. On the other hand, gaps in civil protection coverage for employees in certain contractual arrangements can alter employment and recruitment decisions, undermine investment in education and qualification, and undermine fair competition for businesses.[27] Therefore, while developing and promoting new digital technologies, it is necessary to apply new human-centred approaches and methods as well as design community 5.0-featured jobs.[28]

Social policy is a significant mechanism to focus on the demands presented by the rise of non-standard employment, including new digitally enabled forms of employment. Countries are implementing policy preventions to promote the protection of non-standard employees. For example, some OECD countries, such as France and Germany, aim to offer "individual activity reports" of benefits that are not particularly transitable from one job to another but can also be used flexibly by employees corresponding to their needs.

Many countries are taking steps to extend existing social security coverage to protect non-standard employees. France, for example, needs policies to cover accident insurance costs for the self-employed ones. Many Latin American countries are expanding social security for self-employed individuals. Indonesia and Malaysia have offered some benefits that work-related injuries and deaths to the workers on some work platforms. A territory court in China has passed a verdict that a delivery worker who works at one of the platform companies must pay injury compensation. Ireland has expanded sickness benefits to all workers in response to the Covid-19 Pandemic. The USA and Finland have granted unemployment benefits to uninsured, self-employed people. All of these actions to improve social protection coverage are welcome developments, but they have often been gradually, and those included in Covid-19 response programs will be withdrawn unless they become constant components of national social protection systems. Solutions are also required for pos-

[27] OECD, *The future of work: OECD Employment Outlook 2019*, (Paris, Organisation for Economic Co-operation and Development, 2019).
[28] K. A. Bzhwen, O. Broberg, and C. S. da Conceicao. "Current research and future perspectives on human factors and ergonomics in Industry 4.0", *Computers & Industrial Engineering,* 137, (2019), p.106004.

sible challenges, such as defining who pays employer contributions for employees in alternative forms of work, specially platform workers.[29]

Conclusion

We are on the edge of a technological revolution that will fundamentally transform the way we live, work, and relate to one another as humanity. This change will be unlike anything humanity has experienced before in scope, scale, and complexity. The objective of Society 5.0 is to realise a society where people enjoy. Economic growth and technological progress exist for this purpose, not for the well-being of a select few. According to this understanding announced by the Japanese government, activities have started in various academic circles and industries. Although Society 5.0 originated in Japan, its purpose is to provide frameworks not just for the well-being of one country but for the challenges faced by all countries around the world. What has been developed here will unquestionably contribute to solving social problems.

It is among the possibilities to create a super-intelligent society by utilising the potential of artificial intelligence to create an innovation-paced world where innovation and artificial intelligence are consciously used to solve major social and environmental problems like poverty, epidemics, climate crisis, etc.

This model, which consists of innovations and inspirations, recommends that policymakers invest in education to create new competencies relevant to the world of the future. In particular, the demand for comprehensive and competent social protection systems remains valid as always. Moreover, many social protection systems are not even fully provided to manage the challenges of digitalisation and automation.

It seems crucial to understand how advanced technologies can benefit society in a global-level scenario that has been recently characterised by diverse challenges. Critical researches are pointed to the technologically neutral adoption of digital technologies and Society 5.0 in a neoliberal political economy. But beyond that, Society 5.0 has the potential to underline a digitally driven transformation of social institutions.

[29] United Nations, "Digitally enabled".

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3 Man, Science and Politics in Utopian and Dystopian Literature: A Survey

Angelo Arciero

Introduction

The concept of Society 5.0 is based on the need to re-establish a new centrality of man within the framework of a science, which is harmoniously applied to the economy and population and capable of improving the quality of life. If examined from a political perspective, it constitutes one of the most recent responses to a series of cultural and social contradictions. These have grown during the nineteenth century and developed to their full extent during the twentieth century, reverberating their effects also in the new millennium. In the final analysis, as Umberto Galimberti has pointed out,

> in the age of technology, nonsense does not originate from an antagonistic force to man, but from human products themselves, which have gained a life of their own and have subordinated human life to it; so, if for the singers of 'universal pain' as Schopenhauer puts it, life and the world are meaningless because a force prevents man from realising, for the men of the technical age, life and the world are meaningless because, in a universe of means, technology does not propose any.[1]

It is no coincidence that at the beginning of the twentieth century, in the United States, the most scientifically advanced Western society, the New Humanism – a movement represented by scholars such as Paul Elmer More, Irving Babbitt and Norman Foerster – contrasted the scientific instances of relativism, naturalism and humanitarianism with the principles of a classical culture based on the freedom of the individual and the moral value of his activities.[2] In

[1] U. Galimberti, *Psiche e techne: L'uomo nell'età della tecnica*, Milano: Feltrinelli, 1999, p.689. On the philosophical and political implications of science and technology, see also, among others, Jean-Yves Goffi, *La philosophie de la technique*, Paris: PUF, 1988; Michela Nacci, *Pensare la tecnica*, Roma: Laterza, 2000; Ead. *Tecnica e cultura della crisi (1914-1939)*, Torino: Loescher, 1982.

[2] On the theoretical contribution of the New Humanism see, among others: J. David Hoeveler, *The*

particular, Irving Babbitt hoped for the return to a humanism "not only positive and critical, but what will be found to come to the same thing, individualistic",[3] that neutralized pressures of material progress and the cultural and political drifts of American democracy. The diagnosis of the state of crisis of Western society formulated by Irving Babbit is obviously only the ideal premise of a composite, prolonged and inexhaustible theoretical debate on the relations between science and politics. However, this can be analysed by adopting a circumscribed interpretative perspective, precisely for the purpose of a "political" framing of the questions raised by Society 5.0.

In 1958, dwelling on the uncertain destiny of mankind and questioning about its future condition, Hannah Arendt pointed out in *The Human Condition*, that the conquest of space, experienced as a "liberation" from the constraints of the earth, actually foretells a new and unknown era, which is characterized by the idea of a future man "possessed by a rebellion against human existence as it has been given". As she stated afterwards:

> Such feelings have been commonplace for some time. They show that men everywhere are by no means slow to catch up and adjust to scientific discoveries and technical developments, but that, on the contrary, they have outsped them by decades. Here, as in other respects, science has realized and affirmed what men anticipated in dreams that were neither wild nor idle. What is new is only that one of this country's most respectable newspapers finally brought to its front page what up to then had been buried in the highly non-respectable literature of science fiction (to which, unfortunately, nobody yet has paid the attention it deserves as a vehicle of mass sentiments and mass desires).[4]

Limiting the field of enquiry even further by starting from the end of the 19th century onwards, there was a progressive diffusion of futuristic literature which anticipated the future "as a non-fabulous but likely development of the present, independently of the hope or the will to reach it".[5] On the one hand, it polarized the tensions between man, science and nature in a dystopian key, highlighting their possible cultural, social and political consequences. On the other, instead, it preserved the possibilities of a utopian alternative centred on a conscious, albeit precarious, centrality of man ensured by a more balanced

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New Humanism: A Critique of Modern America, 1900-1940, Charlottesville, U.P. of Virginia, 1977; Paul V. Murphy, *The New Era: American Thought and Culture in the 1920s*, Lanham: Rowman & Littlefield Publishers, 2012.

[3] I. Babbitt, *Democracy and Leadership*, Boston and New York: Hougton Mifflin Co., 1924, p.38.

[4] H. Arendt, *The Human Condition*, Chicago and London: Chicago U.P, 1998, p.1-2.

[5] R. Runcini, *Illusione e paura nel mondo borghese da Dickens a Orwell*, Bari: Laterza, 1968, p.232.

relationship with science.[6] The result is a diagram of utopian and dystopian hypotheses which, according to Aaron F. Rosenfeld, can be traced back to four categories ("utopian humanism, utopian anti-humanism, dystopian humanism, and dystopian anti-humanism"). While at the same time outlining different questions, all of them are subject to reciprocal contamination: "Though these categories partially overlap in practice, they imply distinct outlooks: are our best selves are to be uncovered or created? Will they be found by looking to the past or the future? Does the human condition give cause for hope or no hope?"[7]

The 'dystopian' subjugation of human nature

By alternating utopian and dystopian works in his production, often objects of mutual contamination, Wells offers a direct interpretation of the ambivalent perception of science in the transitional period between modernity and contemporaneity. His faith in progress, in which instances of technocratic and social-Darwinist background converge, translates in fact into a representation of the future focused not only on political, social and cultural transformations induced by technological development, but also on the biological transformations of the human species. Thus, the vision of a perfect society directed by enlightened elites, to which mankind adapts thanks to the perfection of science, as expressed in *A Modern Utopia* (1900), coexists and overlaps with more disturbing scenarios, such as the one described in *The Time Machine* (1895). Here, man's original condition is irreparably altered on a biological level. This leaves room for the dichotomy between a race of almost ethereal beings without an intellectual conscience (the Eloi) and the other (the Morlocks) regressed to a brutal and animalistic state, imposing itself at the same time as "the logical

[6] Among the many studies devoted to the development of utopia and dystopia in the second half of the twentieth century, see: Keith M. Booker, *The Dystopian Impulse in Modern Literature. Fiction as Social Criticism*, London: Greenwood Press, 1994; Gregory Claeys, ed., *The Cambridge Companion to Utopian Literature*, Cambridge, Cambridge U.P., 2010; Gregory Claeys, *Dystopia: A Natural History. A Study of Modern Despotism, Its Antecedents, and Its Literary Diffractions*, Oxford, Oxford U.P. 2018; Douwe Fokkema, *Perfect Worlds: Utopian Fiction in China and the West*, Amsterdam: Amsterdam U.P., 2012; Adam Stock, *Modern Dystopian Fiction and Political Thought: Narratives of World Politics,* New York: Routledge, 2020. On the relationship between utopia, dystopia and science fiction, see, among the others: Raffaela Baccolini and Tom Moylan., eds, *Dark Horizons: Science Fiction and the Dystopian Imagination,* New York: Routledge, 2013; Tom Moylan, *Scraps of the Untainted Sky: Science Fiction, Utopia, Dystopia,* Oxford: Westview Press, 2000; Id., *Demand the Impossible: Science Fiction and the Utopian Imagination*, ed. by R. Baccolini, Bern: Peter Lang, 2014; Patrick Parrinder, *Learning From Other Worlds: Estrangement, Cognition, and the Politics of Science Fiction and Utopia,* Durham: Duke U.P., 2001; Id., *Utopian Literature and Science: From the Scientific Revolution to Brave New World and Beyond,* Basingstoke: Palgrave Macmillan, 2015.

[7] A. S. Rosenfeld, *Character and Dystopia. The Last Men,* London: Routledge, 2021, p.87-88.

culmination of the contemporary reality of the exploitation in the industrial society of the 1890's".[8]

Still at the beginning of the 20th century, in the short story *The Machine Stops* (1909), explicitly conceived as "a reaction to one of the earlier heavens of H.G. Wells",[9] E.M. Forster unequivocally highlights the potential negative effects of mechanical progress. Anticipating Baudrillard's considerations on the transformation of man into "a switching centre for all the networks of influence",[10] he represents a future in which an exasperated and invasive mechanisation has completely weakened the normal physical and intellectual faculties of individuals by subjecting them to an obsessive media communication that compromises their relational abilities and their very nature:

> Of course she knew all about the communication-system. There was nothing mysterious in it. She would summon a car and it would fly with her down the tunnel until it reached the lift that communicated with the air-ship station: the system had been in use for many, many years, long before the universal establishment of the Machine. And of course she had studied the civilization that had immediately preceded her own - the civilization that had mistaken the functions of the system, and had used it for bringing people to things, instead of for bringing things to people. Those funny old days, when men went for change of air instead of changing the air in their rooms! And yet-she was frightened of the tunnel: she had not seen it since her last child was born.[11]

The unknowns opened up by the advent and spread of mechanised society were framed by E.M. Forster in the perspective of a crisis of western civilisation, which had now dissolved all its ties with natural reality and with its own historical origins: "It really is a new civilisation. I have been born at the end of the age of peace and can't expect to feel anything but despair. Science, instead of freeing man - the Greeks nearly freed him by right feeling - is enslaving him to machines. Nationality will go, but the brotherhood of man will not

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[8] R. D. Bhelkar, *Science Fiction: Fantasy and Reality,* New Delhy: Atlantic Publishers, 2009, p.24-25. Among the main and most recent studies devoted to H.G. Wells and in particular to the scientific implications of his non-fiction and literary reflections, see among others: Justin E.A. Busch, *The Utopian Vision of H.G. Wells,* Jefferson: McFarland, 2009; Simon J. James, *Maps of Utopia. H.G. Wells, Modernity and the End of Culture*, Oxford: Oxford U.P., 2011; Steven McLean, *The Early Fiction of H.G. Wells: Fantasies of Science*, Basingstoke: Palgrave Macmillan, 2009; Patrick Parrinder, *Shadows of the future: H.G. Wells, Science Fiction and Prophecy,* Liverpool: Liverpool U.P., 1995.

[9] E. M. Forster, *Introduction*, in *Collected Short Stories of E.M. Forster*, London: Sidgwick and Jackson, 1947, p.vii.

[10] J. Baudrillard, "The Ecstasy of Communication". In *The Anti–Aesthetic: Essay on Postmodern Culture*, edited by Hal Foster, Port Townsend Wash: Bay Press, 1983, p.130.

[11] Forster, *The Machine Stops,* 1909, in *Collected Short Stories*, p.122.

come".[12] Those have been interpreted by Wells as the effects of the tensions triggered by the end of the "Age of Democratic Ascent" and materialized in the contrast between egalitarian aspirations and a competitive logic of capitalism on which nationalistic ferments and the specialized pressures of science were grafted.[13]

The critical reflections on the futuristic framework that took place from the beginning of the 20th century were not limited in any case to outlining political scenarios marked by the crisis of a democratic system in continuous transformation (and increasingly exposed to the risk of authoritarian drift that prefigured the genesis of the totalitarian regimes of the 1930s). In fact, they are characterized by composite ideological instances, precisely because of their distinct acknowledgement of the implications triggered by technological progress and of their consequences on the cultural and social level. Furthermore, they also contribute to bringing to the fore the broader and more settled evolutionary (or involutionary) dynamics of industrial civilisation and the concomitant and opposing feelings of fear and hope aroused by the drastic social and political changes it produced.

In particular, Zamiatin's *We* (1922), unanimously considered the progenitor of the dystopian genre, proposes a model of a negative society, as exemplified by its title, that goes beyond the immediate objective of criticising the totalitarian course of the Soviet revolution. The more directly political intent is in fact associated with the description of a homogeneous social body enslaved to an ideology which, by elevating mathematical science to the dominant criterion of human relations, is ultimately animated by a latent death drive and a paroxysmal entropic vocation consequent to the realisation of a last revolution. The annulment of the unpredictability of natural phenomena (achieved thanks to the control of atmospheric factors and environmental isolation), the subordination of human and social relations to rigid mathematical criteria that empty them of any emotional and passionate component, and the depo-

[12] Quoted in Philip Nicholas Furbank *E.M. Forster. A Life*, vol. 1, *The Growth of the Novelist (1879-1914)*, London: Secker and Warburg, 1977, p.162. As Mordecai Roshwald states: "Wells and Forster, though contemporaries, are worlds apart in their writing. Wells is essentially a believer in science, even if he warns against some of its potential excesses. He is fundamentally a rationalist who, even it at one time despairing of human progress and salvation, cannot imagine them as resulting from any other source than reason, knowledge, science. Forster is a lyrical writer, looking for the elusive poetic strings in the human soul. He does not tread along the solid roads of reason, but seeks the mysterious realms of beauty and sentiment. It is virtually impossible to visualize him as an enthusiast of science". Mordecai Roshwald, *Dreams and Nightmares: Science and Technology in Myth and Fiction,* Jefferson: McFarland, 2008, p.146.

[13] H. George Wells, *Democracy under Revision*, London: Hogarth Press, 1927, p.43.

tentiation of the relational value of writing contribute to the construction of a transparent society whose counterpart is that of a complete alienation, both physical and mental, of the citizens of the Single State. The initial psychic dissociation felt by the protagonist of the novel, D-503, and determined by the persistence of individualistic components, is thus transformed into an open dissent towards the dominant system entrusted to the disturbing rediscovery of eros. But despite that, it is inevitably destined to give rise to a real psychosomatic pathology which, bringing to the forefront the bio-political dynamics of totalitarianism and their scientific implications, culminates in his sense of radical "non-belonging" to a world and in the questioning of reality itself:

> Morning. Through the ceiling the sky is, as usual, firm, round, red-cheeked. I think I should have been less surprised had I found above some extraordinary quadrangular sun – or people clad in many-colored dresses made of the skins of animals, or opaque walls of stone. Then the world, ottr world, does exist still? Or is it only inertia? Is the generator already switched out, while the armature is still roaring and revolving; two more revolutions, or three, and at the fourth it will die away?[14]

Adhering to the devices codified by *We*, and developing them from different ideological angles, the dystopias of the 1930s and 1940s take on significantly the relations between politics and science as one of the keys to interpret both. This gives access not only to the understanding of the authoritarian logic of totalitarian regimes, but is even capable of involving the broader questions relating to the dynamics of mass society and the dissolution of the very concept of human individuality. Furthermore, it also calls forth further examination. Firstly, Foucault's investigations on the microphysics of power and the analyses dedicated by Barthes to the diffusion of a "depoliticised word". Secondly, Baudrillard and Debord's reflections on the society of the spectacle. Lastly, the analysis of the scholars of the Frankfurt School on the cultural industry and on the processes of homologation and alienation made possible by the "overwhelming efficiency" of technology.

The danger of a predominance of science instrumental to the collectivist demands of territorial logic is indeed present, even if sometimes in the background, in a temporal diagram. This extends from Ferdinand Bordewijk, who in *Blocks* (1931) puts under indictment an abstractly rational model of the state, in which the individual is considered a danger to the perfection of the state, to Karin Boye, who in *Kallocain* (1940) explores the consequences of the

[14] E. Zamiatin, *We*, New York: P.E. Dutton, 1952, p.138.

discovery of a chemical compound that allows one to read the thoughts of individuals by annulling their last residual space of freedom.

The most complete and systematic analysis of the transformations caused by an instrumental use of science is in any case commonly found in *Brave New World* (1932). Going beyond the limits of an exclusive and immediate reference to the Nazi and Communist regimes, in this work Huxley presents a model of investigation in which elements, variously borrowed from Soviet Russia and the American consumer society, converge and combine with each other. The recovery of a scientific vision typical of classical utopia is converted into a dystopian perspective that amplifies its social and cultural effects, giving rise to what Huxley himself would have defined, in *Brave New World Revisited*, "the nightmare of total organisation".[15] The use of eugenic techniques, hypnopedic conditioning, and the use of a synthetic drug, the soma, capable of cancelling out the jolts of unhappiness of the citizens of the world state, are the instruments that allow for the preservation of a universally pacified order.

The result is an alternative vision, that of a mild and tame totalitarianism, which replaces the analysis of ideological propaganda and violent strategies of terror in place in the authoritarian regimes of the 1930s, with that of the instruments adopted by a hedonistic mass society, in which every individual identified with the community assumes the role of a subject functional to the productive needs of the system: "As a happy, hard-working, good-consuming citizen he's perfect".[16]. This is a scientifically advanced world built, however, on a reliable extrapolation of trends already in place in the 1930s, as attested by Bertrand Russell, who in the *Prefatory Note to the Second Edition* (1949) of *The Scientific Outlook* (1931) drew attention to the coincidence between his work and Huxley's novel, which in turn in a subsequent preface of 1946 specified that "the theme of Brave New World is not the advancement of science as such, it is the advancement of science as it affects human individuals".[17]

Orwell's dystopian projections would have been oriented along complementary and opposite lines of interpretation, and in his production he had re-

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[15] A. Huxley, *Brave New World Revisited*, London: Chatto & Windus, 1959, p.12.

[16] A. Huxley, *Brave New World. A Novel,* London: Chatto and Windus, 1958, p.194.

[17] Huxley, *Brave New World*, x. Among the most recent studies dedicated to Aldous Huxley, see: Alessando Maurini, *Aldous Huxley: The Political Thought of a Man of Letters*, Lanham: Lexington Books, 2017. Specifically on *Brave New World*, see, among others: Peter Edgerly Firchow, *The End of Utopia: A Study of Aldous Huxley's "Brave New World"*, Lewisburg: Bucknell U.P., 1984; David Garrett Izzo and Kim Kirkpatrick, eds, *Huxley's "Brave New World": Essays,* Jefferson: McFarland, 2008; Jonathan Greenberg and Nicholas Waddell, eds., *Brave New World: Contexts and Legacies,* London: Palgrave MacMillan, 2016. On the scientific implications of Huxley's literary-political analyses, cfr. June Deery, *Aldous Huxley and the mysticism of science*, London: Macmillan, 1998.

peatedly questioned the hypotheses formulated by Huxley in *Brave New World*, which, defined in a 1940 review as "a sort of post-war parody of the Wellsian Utopia" and "a brilliant caricature of the present (the present of 1930)",[18] was in his view an expression of a vision of the future that lacked any satisfactory explanation of power relations. Thus, making a similar choice to the one made in 1938 by Katherine Burdekin in *Swastika Night* (a representation of a patriarchal and chauvinist theocratic rule), Orwell in *Nineteen Eighty-Four* privileged the vision of a totalitarian oppression implemented through an exasperated and intentional technological regression, which in turn would have been the object of Aldous Huxley's criticism: "I feel that the nightmare of *Nineteen Eighty-Four* is destined to modulate into the nightmare of a world having more resemblance to that which I imagined in *Brave New World*".[19]

Indeed, in his non-fiction production, Orwell, sharing the anxieties expressed by E.M. Forster, had consistently expressed the fear that the unstoppable development of mechanical civilisation was inevitably destined to debase labour activities, moral beliefs and traditional human values. Therefore, in *The Road to Wigan Pier*, he states that the truest meaning of progress was identifiable in "the tendency of the machine to make a fully human life impossible" to the point of inhibiting intellectual evolution through an inherent paradox of progress:

> A machine evolves by becoming more efficient, that is, more foolproof—hence the objective of mechanical progress is a foolproof world—which may or may not mean a world inhabited by fools. Mr Wells would probably retort that the world can never become foolproof, because, however high a standard of efficiency you have reached, there is always some greater difficulty ahead. For example (this is Mr Wells's favourite idea—he has used it in goodness knows how many perorations), when

[18] George Orwell, "Review of *The Iron Heel* by Jack London; *The Sleeper Wakes* by H.G. Wells; *Brave New World* by Aldous Huxley; *The Secret of the League* by Ernest Bramah", 1940, in *The Complete Works*, edited by Peter Davison, vol. XII *A Patriot After All (1940-1941),* London: Secker and Warburg, 1999, p.211-212. Among the most recent studies devoted to George Orwell and in particular to *Nineteen Eighty-Four*, see among others: Craig L. Carr, *Orwell, Politics, and Power,* New York: Continuum Publishing Corporation, 2012; David Dwan, *Liberty, Equality, and Humbug: Orwell's Political Ideals,* Oxford: Oxford U.P., 2018; Abbott Gleason, Jack Goldsmith, Martha C. Nussbaum, eds., *On 'Nineteen Eighty-Four'. Orwell and Our Future,* Princeton: Princeton U.P., 2005; John R. Hammond, *A George Orwell Companion: A Guide to the Novels, Documentaries and Essays*, London: Palgrave Macmillan, 2016; John Rodden, *The Cambridge Companion to George Orwell,* Cambridge: Cambridge U.P., 2007; Nathan Waddell, *The Cambridge Companion to 'Nineteen Eighty-Four'*, Cambridge: Cambridge U.P., 2020. Specifically on the scientific implications of *Nineteen Eighty-Four*, see: Everett Mendelsohn and Helga Nowotny, *'Nineteen Eighty-Four': Science between Utopia and Dystopia,* Dordrecht: Reidel, 1984.

[19] A. Huxley, 'Letter to George Orwell', 21 October 1949, in *Letters of Aldous Huxley*, edited by Glover Smith, New York and Evanston: Harper & Row Publishers, 1969, p.605.

> you have got this planet of ours perfectly into trim, you start upon the enormous task of reaching and colonising another. But this is merely to push the objective further into the future; the objective itself remains the same. Colonise another planet, and the game of mechanical progress begins anew; for the foolproof world you have substituted the foolproof solar system—the foolproof universe. In tying yourself to the ideal of mechanical efficiency, you tie yourself to the ideal of softness. But softness is repulsive; and thus all progress is seen to be a frantic struggle towards an objective which you hope and pray will never be reached.[20]

In accordance with these assumptions, *Nineteen Eighty-Four* represents a complete reversal of the dystopian canons proposed by Huxley and Zamjatin, to which it substitutes a scientific imagery characterised by the use of a method of "negative amplification"[21] because it focuses on the technological evolution of tools and devices (the Speakwriters, the Memory Holes, the Rocket bombs, the Telescreens) already in use in the English society of its time and made functional to the strategies of conditioning and repression of the totalitarian regime of Oceania.

However, although *Nineteen Eighty-Four* proposes a critical investigation focused on totalitarian domination, precisely because of its dystopian status, it expands its boundaries, ending up by imposing itself as a reflection on the relationship between the individual and power, which is inevitably susceptible to extending to the degenerative dynamics of mass society and consumption. In this perspective, the spectacularization of the techniques of power and its depersonalization effects described in his last novel end up being reunited, albeit latently, with previous non-fiction analyses on the processes of literary and cultural massification, expressed in particular in the essay *The Prevention of Literature* (1946): "Probably novels and stories will be completely superseded by film and radio productions. Or perhaps some kind of low-grade sensational fiction will survive, produced by a sort of conveyor-belt process that reduces human initiative to the minimum".[22]

Moreover, while focusing their attention on different manifestations of totalitarian phenomena and developing their implications from different angles, both Huxley and Orwell in the course of their theoretical reflections had highlighted the alienating effects of industrial civilisation which, in their differ-

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[20] G. Orwell, *Keep the Aspidistra Flying*, 1936, *The Complete Works*, vol. IV, p.182.
[21] S. Manferlotti, *Orwell*, Firenze: La Nuova Italia, 1979, p.100.
[22] G. Orwell, *The Prevention of Literature*, 1946, *The Complete Works*, vol. XVIII: *Smothered Under Journalism, 1946,* p.378.

ent ideological reverberations, risked completely altering social and political relations and the very notion of humanity. Indeed, applying the interpretative categories delineated by Foucault in *Il faut defendre la société* to *Nineteen Eighty-Four* and *Brave New World*, it is possible to identify, on the one hand, the presence of a "disciplinaire" mechanism that bears on a "corps individualisé, comme organisme doué de capacités", and on the other hand, the presence of a technology "de securité"[23] directed toward the people and in which the bodies are placed within biological and social complex processes.

The utopian overthrow and the emancipation of mankind

In the face of a predominant diffusion of the dystopian genre, which from the second half of the twentieth century tended to align itself with the paradigms codified by Zamjatin, Huxley and Orwell, developing its ramifications in diversified, but generally more delimited, directions of investigation,[24] the relationship between science and politics was nevertheless the subject of utopian reinterpretations. It represents an attempt to propose a renewed and positive vision of the collective and individual needs of a humanity projected towards the future:

> Inspired by the movements of the 1960s and finding new imagery in the alternatives being explored in the 1970s, the critical utopia is part of the political practice and visions shared by a variety of autonomous oppositional movements that reject the domination of the emerging system of transnational corporations and post-industrial production and ideological structures. As industrial capitalism and the nation state give way to a world-wide automated production maintained by structures of power that no longer seem to be controlled by particular human beings, the ground of radical politics is shifting from the older strategies of class struggle at the point of production to broader and deeper challenges in

[23] M. Foucault, *Il faut défendre la société*, Paris: Gallimard, 1997, p.221-222.

[24] As Nick Lawrence states: "A rejection of routinised dystopia lays the way open for a return of more explicit forms of utopian thinking: in cultural terms, the revival of radical fantasy, SF and other forms of speculative fiction; in sociological terms, a renewed interest in models of post-capitalist transition, organisation and planning. Yet the dominance of dystopia in literary circles shows little sign of giving way to the efflorescence of utopian imaginaries that marked the last spring tide of speculative experimentation during the crisis period of the late 1960s to early 1970s, when socialist-feminist authors such as Ursula K. Le Guin, Samuel R. Delany, Marge Piercy and Joanna Russ took up the brief of imagining radical alternatives to the status quo in fictional form"- Nick Lawrence, "Post-Capitalist Futures: A Report on Imagination", in *Ethical Future and Global Science Fiction*, edited by Zachary Kendal, Aisling Smith, Giulia Champion, Andrew Milner, New York: Palgrave Macmillan, 2020, p.309.

the general name of autonomy and justice far humanity and nature.[25]

Indicative in this sense is the choice of Viscont Samuel, who already during the Second World War, in a minor utopia, the *Unknown Land* (1942), interpreted the need for an improvement in the living conditions of the English population made possible, in his opinion, by an extension of democratic principles. Describing the landing of a naval expedition on the island of Bentsalem (the one hypothesised by Bacon in *New Atlantis*), and thus directly linking up with a positive image of scientific innovations, Samuel contrasts totalitarian dystopias with a liberal scientific utopia. From his point of view, this was actually applicable in the England of his own time and based on a common and peaceful life, inspired by solidaristic and egalitarian principles. In Bentsalem "a community consists of nothing else than a number of men and women, who have organised themselves in various ways for various common purposes".[26] This was made possible by a conception of progress and science not limited to its materialistic components:

> science in Bensalem never went through the phase o materialism which marked European science in the latter part of the eighteenth century and during the nineteenth, and which is not yet altogether spent. Here, as with you, the sciences dealing with materialism were those that were first developed – chemistry, astronomy and physics in general. But we were not led by their rapid triumphs into the mistake of thinking that everything could be treated on the same footing and by the same methods. With us the sciences that dealt with life and mind – physiology, psychology – came close behind; they advanced almost as fast, and were fully as successfully. They saved us from the error of believing that the universe could be explained in terms of atoms and stars, chemical combinations and electrical impulses.[27]

It is therefore significant that even within post-war dystopian literature, the need to re-establish a more balanced and reciprocal relationship between man and science emerges in an increasingly pressing way, and therefore, as Corrado Alvaro explained in his unfinished novel *Belmoro* (1957), not only a science at the service of man but also a humanism that is not against science. In this case, too, it would be Huxley who would offer the most suggestive literary expression of these instances in one of the rare utopian works of the 20th century, *The Island* (1962), his last novel, set in the imaginary community

[25] Moylan, *Demand the Impossible*, p.10-11.
[26] S. V. Viscont, *An Unknown Land*, London: Allen and Unwin, 1942, p.72.
[27] Samuel, *An Unknown Land*, p.144.

of Pala, a true counterbalance to the dystopian forecasts of *Brave New World*:

> Between the Utopian and the primitive horns of his dilemma would lie the possibility of sanity—a possibility already actualized, to some extent, in a community of exiles and refugees from the Brave New World, living within the borders of the Reservation. In this community economics would be decentralist and Henry-Georgian, politics Kropotkinesque and co-operative. Science and technology would be used as though, like the Sabbath, they had been made for man, not (as at present and still more so in the Brave New World) as though man were to be adapted and enslaved to them. Religion would be the conscious and intelligent pursuit of man's Final End, the unitive knowledge of the immanent Tao or Logos, the transcendent Godhead or Brahman. And the prevailing philosophy of life would be a kind of High Utilitarianism, in which the Greatest Happiness principle would be secondary to the Final End principle—the first question to be asked and answered in every contingency of life being: 'How will this thought or action contribute to, or interfere with, the achievement, by me and the greatest possible number of other individuals, of man's Final End?'[28]

The Island, by subverting some of the canons of the utopian tradition (i.e. Pala does not shy away, unlike previous utopian cities, from confrontation with the outside world) and converting the political applications of *Brave New World* into a positive sense, describes a harmonious community in which natural birth control, a new arrangement of family and interpersonal relationships, as well as the religious pluralism and the acceptance of suffering and death, are not the consequence of artificial political domination. They are the result of a conscious adaptation to rules of conduct that allow for the development of individual spontaneity and the preservation of the emotional and sentimental dimension of human existence. Rejecting the materialistic hedonism of *Brave New World* and proposing an alternative to the logic of domination of totalitarian regimes as well as the competitive dynamics of industrialisation as an end in itself, Pala imposes himself as the hope for a new way of conceiving human associations. He is able to reconcile, thanks to the synthesis between philosophy and psychology, the positive aspects of the Western and Eastern traditions.

Even if the novel ends with the threat of an invasion, while keeping Pala's final destiny suspended, the meaning of this experience must be found precisely in the awareness of its precariousness: "There has never been a society in which most good doing was the product of Good Being and therefore con-

[28] Huxley, *Brave New World*, p.viii-ix.

stantly appropriate. This does not mean that there will never be such a society or that we in Pala are fools for trying to call it into existence".[29] The invitation to take note of a moral commitment open to the possibility of a change in the world but at the same time able to cope with external pressures ("Try to keep them in order, try to change their minds, hope for a happy outcome and be prepared for the worst").[30] In this sense, it can also be read as the only solution to the drifts of the controversial and difficult relationship between science and politics and as the only factor able to re-establish a centrality of man in a social environment increasingly conditioned by technological innovations.

In this perspective, *Island*, precisely because of its constitutive precariousness, constitutes not only an alternative to the dystopian projections centered on the subjugation of man to science, but also a sort of ideal premise of other and subsequent utopian visions (Callenbach's *Ecotopia* or Ursula K. Le Guin's *The Dispossessed*, to mention only the best known), which, as Tom Moylan pointed out,[31] would have continued to propose a possible conciliation of man with the natural, social and political environment.

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[29] Aldous Huxley, *The Island. A Novel*, London: Chatto & Windus, 1962, p.39.
[30] Huxley, *The Island*, p.39.
[31] As Tom Moylan states: "The new utopias, in other words, managed to sublate utopian expression. While preserving the utopian impulse and the utopian form, they nevertheless destroyed both the anti-utopian rejection and the utopian compromises that had come to haunt the utopian tradition. They therefore transformed utopian writing into a new object suited to the aesthetic and political demands of the historical situation. […] Such utopias, I argued, were "critical" of the socio-political situation and of the utopianism that had always endeavored to oppose it. In this light, they adopted the feminist and Maoist practices of "criticism-self-criticism," and they incorporated the meaning of the Frankfurt School use of the term *critical* as opposed to *instrumental* reason (that is, of "critique" as opposed to ideological capitulation or consent). Finally, they were "critical" in the sense that underlies the activist understanding of the degree of mass involvement needed to organize effectively". Moylan, *Scraps of the Untainted Sky,* p.83.

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4 Transformation of Public Labour Relations in the Process of Society 5.0

Gökçe Cerev and Emine Elif Ayhan

Introduction

Changes in the social structure caused by technological advances have encouraged states to reorganize public services. The quantitative and qualitative dimensions of public services offered by states vary according to public administration models and are shaped in a way that can meet social needs. Today, the effect of technology on the public services offered by the states has begun to be more noticeable than in the past.

States provide public services through public employees. Public employees play a key role in ensuring that public services are efficient, high quality and effective. While this increases the importance of public employees, it reshapes public labour relations. It is important to improve and develop public labour relations for public employees who have a great impact on the delivery of public services to the society. Public labour relations have unique characteristics distinguishing them from general labour relations. The most important feature in public labour relations is that the employer is the state. This situation causes the employee-employer relationship, which is in labour relations, to turn into a public officer-employer relationship. The core characteristic of the public official, which is identified with the state, and the social necessity of the public service are important in the emergence of the general framework of public labour relations.

Continuous changes in the social, economic and cultural structure of societies have also direct impacts on working relations. It is an inevitable result that the public administration policies shaping the relations between society and the state will also be affected by this change. New processes in public administration have resulted in the restructuring of

public services and public officials. The organization of public labour relations with changing approaches has become a necessity in terms of the sustainability of public services of the state.

When we examine the development processes of states from past to present, it is observed that the concepts of public service and public official have a common value. In the historical process, the new structural regulations that have occurred because of the change of societies have affected the public policies of their states. Although these have affected public policies significantly, the public service offered to the society and public officials performing this service have always been at the centre. In the historical development process of public labour relations, the prominence of the administrative model of the states has also been effective in determining the working conditions of public officials. The necessity and continuity of public service in terms of society has increased the importance of public labour relations within the organisational structure of states. States have to regulate public labour relations well in order to reveal the public benefit in the best and most efficient way in societies. Social change and progress has been a situation that accelerated these regulations.

Conceptual Framework of Public Official and Public Service

The basic elements that make up the state are society, land and sovereignty. Society, in other words, the population is the most basic realistic element of the state. The structure of the population is important for the formation and future of states. In order for the state to shape its existence completely, the society it has dominated must be administered within certain restrictions. In order to ensure this situation, regular and stable institutions are required. Public institutions are important structures that constitute the administrative and functional structure of the state and provide social order. The state has basic duties to fulfil in order to ensure its continuity over the society it dominates. The basic duties of the states differ according to their management styles. These duties, which are known as public service, are very important from a social point of view. States generally perform public services through public officials. This has ensured that the state, public service and public officials are important elements that complement each other. The level of development of states is determined according to the size and quality of public services.

The concept of public service is an important subject of both administrative and public law today and is a controversial concept.[1] The state structure, which started to take shape with the transition of humanity to agricultural society, started to develop and restructure after the industrial revolution. The first approaches to today's concept of public service were taken up with the School of Public Service (Bordeaux School) approach created by Leon Duguit, Roget Bonnard and Gaston Jeze in the early twentieth century. The basic principle in this approach is that the public service is in a position to explain the structure of the state. The Public Service School considers the structure of the state as the organizational model of the public service formed by the administrators. In this approach, the state consists of public services and the public service constitutes the main skeleton of the state.[2]

The public service reveals the functions of the state and has an important place in the fields of public finance, public economy and public law. Today, public service has become an important tool to fulfil societal needs. The state meets the needs of the society by producing goods and services through public service. While the concept of public service is being shaped in this direction, the main issues that stand out are as follows:[3]

- Public service is in a structure that provides social benefit,
- Public service is carried out within the legal framework,
- Public service is performed by public bodies.

In line with the developments that took place after the industrial revolution, the rapid impact of technology on social life, the increase in the importance of human rights and universal values have transformed the structure of today's states from the concept of public power in the past to the concept of public service. Today's states have the main feature of being service states that consider social benefit.[4] Although the way in which public services are provided varies according to the structure of the states, it has some basic principles in terms of content. These basic principles, expressed by Lovis Rolland as civil service laws, are also accepted as Rol-

[1] S. Derbil, "Kamu Hizmeti Nedir?", *Ankara Üniversitesi Hukuk Fakültesi Dergisi*, 7/3-4 (1950), p.78.
[2] L. Duguit, *Kamu Hukuku Dersleri*, translated by S. Derbil, Ankara: Ankara Üniversitesi Hukuk Fakültesi Yayınları, 1954, p.24-28.
[3] B. Çırakman, "Kamu Hizmeti", *Amme İdaresi Dergisi*, 9/4 (1976), p.76.
[4] C. Tutum, *Kamu Yönetiminde Yeniden Yapılanma*, Ankara: Tesav Yayınları, 1994, p.567.

land Laws. The basic principles of public services as follows:[5]

- Provided equally to all segments of society,
- Provided free of charge
- Provided in a continuous manner,
- They can be re-adapted according to social needs.

The provision of public service has changed significantly in the historical process. At the beginning of the nineteenth century, the approach of the state to intervene to the market and society on a low or limited level restricted public services to defence, security and public administration only.[6] However, the feature of the public service to meet the social needs has resulted in the reshaping of the services offered.

Public expenditures that emerged after the First World War created excessive economic burdens on societies, and after the Great Depression in 1929, public expenditures began to increase rapidly throughout the world. With the Keynesian Policies, shaped after the Second World War, public policies that became more visible in the social sphere expanded the scope of public services, but the increasing financing problem made the sustainability of this new era more difficult. In the post-1980 period, while the neo-liberal policies that emerged rapidly through globalization reshaped the organisations of states, this change affected the scope of public services as well. The regulation of the structure of the state and society according to market conditions as the basic approach of neo-liberal policies has led to a decrease in the level of public services, but its fulfilment in line with market conditions.[7]

The importance and impact of the public finance economy, which states have created in order to provide public services, has become even more significant today. In order to ensure the continuation of public services, it is necessary to carry out the public economy depending upon appropriate and effective conditions. Naturally, this requires the proper and correct use of public resources. Another important resource of the public economy is public officials, which is also referred to as human resources. In this sense, the importance of public officials in terms of producing and providing public service increases.

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[5] K. Gözler, *İdare Hukukuna Giriş*, Bursa: Ekin Kitapevi, 2005, p.263.
[6] V. Tanzi and L. Schuknecht, "Reforming Government in Industrial Countries", *Finance and Economic Development,* September 2-5 (1996), p.2.
[7] A. Işıklı, "Kamu Kesimi ve Siyasi Kesimin Demokratikleşmesi", *Mülkiyeliler Birliği Dergisi,* 20 (1997), p.76.

Human resource is crucially important for the state to fulfil its responsibilities towards society and to provide public services. The human capital of the public is also referred to as public officials. Today, the changing understanding of public service as a result of the impacts of globalization and technology on public policies has also led to the restructuring of public officials.[8] Public official is the human element of public administration.[9] The concept of public official is generally defined as a person who works in a public institution or public organization, dependent on the public, and produces public goods and services.[10] As conceptually stated, the public official is defined as a person who works dependent on the state and is obliged to perform public services, and this creates a tight bond between the state and the public official. This broad definition, which emerged in the conceptual framework of the public official, resulted in the definition of everyone in the public sector as a public official.[11]

Public official is also defined in a narrow sense apart from the broad definition. It is expressed as persons working in public legal entities, subject to public law, working with civil servants and administrative service contracts.[12] The definition of public servant in the narrow sense has also led to the formation of the concept of civil servant. It is important not only that public employees of different status come together under a single definition conceptually, but also that they are defined correctly in terms of public law. In the conceptual evaluation of the public official, the situation of the elected public officials is also an important issue that needs to be evaluated separately. It has been a controversial issue from past to present whether people such as deputy, mayor, and headman are included in the concept of public servant. This situation also reveals the importance of grouping in the definition of public officials. The emergence of the rights of public officials in line with their status increases the importance and effect of grouping processes.[13]

Development Process of Public Labour Relations

The concept of industrial relations, which forms the basis of labour rela-

[8] A. S. Gökalp, *Türkiye'de Memur Hukukunun Temel İlkeleri,* Ankara: Danıştay Başkanlığı Yayınları, 1981, p.9.
[9] Ş. Gözübüyük, *Yönetim Hukuku*. 12th Ed., Ankara: Turhan Kitapevi, 1999, p.159.
[10] Gözübüyük, *Yönetim Hukuku*, 1999, p.160.
[11] Gözler, *İdare Hukukuna Giriş*, 2005, p.554.
[12] Gözler, *İdare Hukukuna Giriş*, 2005, p. 233.
[13] Gözübüyük, *Yönetim Hukuku*, 1999, p. 28.

tions, is generally expressed as policies produced by employers and states to find solutions to the problems caused by the working conditions. Industrial relations was first used as the name of a commission established in the United States of America in 1912 and then it was mentioned in a researched conducted by the UK Department of Commerce in 1926. The education programme opened at the University of Wisconsin in the United States of America in 1921 was very important for Industrial Relations to find a place in the academic field.[14]

Industrial relations is a multidimensional and interdisciplinary concept. The multidimensional conceptual framework of industrial relations has led to its emergence in different interpretations. The approach of Sidney and Webbs, which is defined as the "Classical Approach" in industrial relations, is expressed as the most basic approach. Dunlop's "system approach", which examines industrial relations within a certain system, "conflicting approach", which includes different perspectives, and "sociological approach" stand out as other approaches.[15] The concept of industrial relations includes industry, agriculture, commerce and the public sector. Industrial relations, which is focused on solving problems related to working life in all sectors, is an important issue especially for employees. Public officials are also included in industrial relations which tries to produce social solutions to all professional issues of employees.[16,]

The position of the state, which is the main actor in industrial relations, in public labour relations is somewhat different. The public sector is the sector in which the state is actively involved in employee-employer relations in a multidimensional way. Public labour relations are shaped by the great influence of the state. Compared to the working relations of the private sector, the public sector has to produce policies that will ensure balance in the whole society. The state should produce socially multilateral industrial relations policies and implement these policies in public labour relations. This situation, which affects public labour relations, may differ according to the structure and power of states and public organizations.[17]

After the industrial revolution, the role of the state in labour relations

[14] B. E. Kaufman, *The Origins and Evolution of the Field of Industrial Relations in The United States*, Ithaca New York: Icr Press, 1993, p.10.
[15] M. Koray, *Endüstri İlişkileri*, İstanbul: Basisen Eğitim ve Kültür Yayınları, 1992, p.26.
[16] A. Tokol, *Endüstri İlişkileri ve Yeni Gelişmeler*, 2nd ed., Bursa: Dora Yayıncılık, 2008, p.2; D. Yoder, *Personnel Management and Industrial Relations*. New Delhi: Prentice-Hall, 1964, p. 7.
[17] James Perry and J. Anderson. "Comparing Public and Private Sector Labor Relations", *Handbook of Public Sector Labor Relations*, ed., Marcel Decker, New York, 1994.

began to become clear. First, the state, which focused on correcting the negative conditions in working conditions after the industrial revolution, was included in the working life in a limited and narrow way. In the following periods, because of other factors such as the development of societies, globalization and technology, the position of the state in labour relations has changed. The state fulfils different functions in labour relations and these functions vary according to the following components:[18]

- Legal system
- Social policy approaches
- Social features,
- Organization and economic power of the public.

Public labour relations is a system in which the state is directly involved in the system, influencing working conditions, and in which labour and capital come together institutionally. When the structure of public labour relations is evaluated at the macro level, the structure that is in direct relationship with public policies and administration and in which the state is in a position to reveal conflict and peaceful interactions as the main actor in the system comes to the fore.[19]

The great influence of the state in public labour relations is directly related to the roles it has undertaken in public administration. The roles of the state in the labour relations system are as follows;[20]

- The state is the employer,
- The state determines and implements the legal framework of the system
- The state directs employment,
- The state produces policies that will increase the capacity of labour,
- The State helps for the organization of labour,
- The state designs working relations by increasing social awareness.

While the state carries out its activities in different areas in the labour relations system, it carries out these activities in a more comprehensive manner within the public labour relations. The roles and functions set

[18] M. Çetik, and Y. Akkaya, *Türkiye'de Endüstri İlişkileri*, İstanbul: Ekonomik ve Toplumsal Tarih Vakfı Yayınları, 1999, p.13.
[19] Çetik and Akkaya, *Türkiye'de Endüstri İlişkileri*, p.14.
[20] R. Hyman, "The State in Industrial Relations", *Industrial Relations*, eds., P. Blyton, N. Bacos, J. Fiorito, and E. Heery, London: Sage Publications, 2008, p.24-28.

forth in public labour relations are important in shaping the public service and revealing the qualifications of public officials.[21]

In public labour relations, the state shapes the structure of labour relations in the country by conducting sample initiatives that set an example for private sector employers. The balancing and constructive position of the state in public labour relations has been effective in shaping the system from past to present.[22] Along with the public influence it exerts, the state directs its activities with its existing institutions and has a direct or indirect effect on labour relations. The culture, history and management approaches that make up the structure of the society have been a determining factor in the public policies produced by the state.[23]

The social change that gained momentum after the industrial revolution has also reshaped the needs of the society. Because of the reshaping of the needs, the quantitative and qualitative aspects of the public services provided by the states were also arranged according to these needs. The change in public services has directly affected the working relations of public officials. Public labour relations have entered the process of restructuring according to the status of public officials in the system. The change in social and political positions caused by technological changes in the historical process has created the legal framework by being effective on the rights of public officials.

Society 5.0 and the Reshaping of Social Structure

Technology has been one of the most important factors affecting and changing social structures in the historical process. The rapid progress of technology has not only affected the production models and products, but also the social, cultural, economic and political structures of the society. The concept of Society 5.0, shaped because of the change brought about by the concept of Industry 4.0, which is one of the important concepts of the new century, has been a concept that emerged in Japan. In the basic approach of the concept expressed in 2016, there is the idea of transforming the digital change occurring worldwide in terms of demographic, economic, social and cultural aspects and revealing the relationship of

[21] Hyman, "The State in Industrial Relations", p.36-40.
[22] D. S. Underwood, "Constructive Discharge and the Employers State of Mind: A Practical Standard", *Journal of Labor and Employment*, 1/1 (1998).
[23] F. M. Masters et al., "The State as Employer", *Industrial Relations*, eds., P. Blyton, N. Bacos, J. Fiorito, and E. Heery, London: Sage Publications, 2008.

technology with people in the most efficient way. Society 5.0, which is expressed as "Digital Society", "Creative Society" and "Super Intelligent Society" with other definitions, can be defined as the integration of technology and society and creating common benefits.[24]

Societies have a dynamic structure. The needs and conditions of the prevailing era require the change of societies.[25] Technology, which has an important place in the progress and development of the social structure, has led to the development of consumption-based features of the production process. The social development of humanity in the historical process is important to determine the effects of Society 5.0. Humanity has gone through certain stages until it reaches the concept of Society 5.0. These stages are as follows:[26]

- In Society 1.0, where humanity first emerged, in other words, struggled for existence, the basic value is to survive in nature. The current scientific and technological opportunities of the period are used for this struggle for existence.
- Society 2.0, in which the social structure and needs are shaped by primitive living standards, has been a period in which fundamental change has begun with the emergence of settled life. In this period, technological developments began to be used more in production, and the social and cultural relations of people in social life were reshaped.
- In Society 3.0, which started with the Industrial Revolution, which is also referred to as the Age of Enlightenment of humanity, reformist approaches came to the fore in social life. In this period, technology deeply affected social life with developments in different fields. The process, which started with the use of steam power in the weaving industry, continued with the development of the use of iron and steel, the advancement of transportation, and the introduction of chemistry, electricity and gasoline into human life. In this period, urbanization emerged with technology, and machines entered human life with different class structures in the social structure. With this period, technological advances began to shape societies.

[24] T. Dereli, "Ekonomik Kriz ve Enflasyon Ortamından Toplu Pazarlık", *Basısen Dergisi*, 54 (1995).
[25] Çırakman, "Kamu Hizmeti".
[26] Keidanren (Japan Business Federation), Toward Realization of the New Economy and Society. Reform of the Economy and Society by the Deepening of "Society 5.0", 2016; N. V. Tunzelman, "Historical Co-evolution of Governance and Technology in the Industrial Revolutions", *Structural Change and Economic Dynamics*, 14/4 (2003); M. Fukuyama, "Society 5.0: Aiming for a New Human-Centered Society", *Japan Spotlight*, 27 (2018).

- Society 4.0, which started in the last quarter of the twentieth century, when humanity learned to use information technologies effectively, is a period in which social life is integrated with technology. In this period, while information sharing, technology and information marketing came to the fore, mechanization was not only limited to production areas, but also became a direction for societies. While this period is called the information society, the effects of globalization also ensured the social and cultural integration of societies.
- Under prevailing circumstances, while information and digitalization are at the centre of society, humanity's most efficient use of technology for vital values is called Society 5.0. In this period, while technology has transformed into the most important social value of humanity, it has also deeply affected the social and cultural structure.

The main purpose of Society 5.0 is to integrate society with the digital world. It gives importance to the development of society in cooperation with technology. The development of social life, together with the values that society will find in its ongoing social life, leads to differentiation of social needs and expectations. In intelligent societies that emerged because of the integration of society and technology, the structure of states was also affected along with social life.[27]

One of the important factors in the emergence of Society 5.0 is Industry 4.0 and the change it brought about in production. The full-time communication of all units in production, which is revealed by the Industry 4.0 approach, and the use of technology in the most efficient way by increasing the total value has been the beginning of the digital change. Industry 4.0 has changed entrepreneurship approaches by introducing new business models. Technological values such as artificial intelligence, internet of things, and 3D printers in the system have affected social values along with the digital economy.[28]

Throughout history, humanity has passed through different social and societal periods. In these periods, technology has been an important determining factor. It is aimed to use the technological developments at the highest level for social benefit along with the Society 5.0 model.[29] The

[27] S. Russell and P. Norvig, *Artificial Intelligence: A Modern Approach*. Pearson Education Inc,, Prentice Hall, 2010.
[28] A. Soylu, "Endüstri 4.0 ve Girişimcilikte Yeni Yaklaşımlar", *Pamukkale Üniversitesi Sosyal Bilimler Enstitüsü Dergisi,* 32 (2018), p.55
[29] H. Hirsch-Kreinsen, "Digitization of Industrial Work: Development Paths and Prospects", *Journal for Labor Market Research,* 49/1 (2016); A. Yousefikhah, "Sociology of Innovation:

Society 5.0 aims to put life and all its stakeholders at the centre of digital change. A new social value is beginning to take shape by changing consumption patterns as well as affecting production models.[30] Because of the change in the social structure, it is expected that the super-intelligent society will emerge by leaving the communication between machines to machine-human communication with the proper and correct management of technology.[31] Today, knowledge-oriented change has become the most important competitive argument of societies.[32] The defining actors of Society 5.0 are cyber and digital mechanisms, people and communication.[33]

The change brought about by Society 5.0 may have an effect in the social structure, especially in the factors of production, which may lead to the substitution of labour with capital. With the increasing effect of technology, the prominent value of knowledge has made it necessary for individuals to increase their qualifications. It causes low-skilled workforce, simple business models, basic entrepreneurial inadequacies and exclusion from the system. In this case, the effects of the self-centred society model are combined with the digital world.[34]

The desire to use digital developments for the benefit of people has led to the emergence of Society 5.0. Society 5.0 produces solutions to social problems such as old age, natural disasters, poverty and quality of life by using the technologies revealed by Industry 4.0. With the values created by this approach, technology is integrated with society and becomes an inseparable part of society.[35] The negative effects of technology integration with society should not be ignored. Negative effects may occur such as the abuse of knowledge, damage to private living spaces, digital crimes, software crimes, unemployment in new business areas, and the disappearance of the concept of lifetime employment.[36,]

Social Construction of Technology Perspective", *Ad-Minister*, 30 (2017), p.33.

[30] M. Bortolini et. al., "Assembly System Design in The Industry 4.0 Era: A General Framework", *Ifac-Papers Online*, 50/1 (2017), p.5700-57052.

[31] Fukuyama, "Society 5.0: Aiming".

[32] M. Redclift, "Sustainable Development (1987–2005): An Oxymoron Comes of Age", *Sustainable Development*, 13/4 (2005), p.212.

[33] W. Macdougall, "Industrie 4.0: Smart Manufacturing for the Future, Technical Report", Germany Trade and Invest, 2014.

[34] K. Schwab, *Dördüncü Sanayi Devrimi,* transled by Z. Dicleli. İstanbul: Optimist Kitap, 2016, p.103-105.

[35] A.G. Pereira, et. al., "Industry 4.0 and Society 5.0: Opportunities and Threats", *Industrial Journal of Recent Technology and Engineering (Ijrt*e), 8/5(2020).

[36] N. Negroponte, *Dijital Dünya*, translated by Z. Dicleli, İstanbul: Türk Henkel Dergisi Yayınları,

It is currently not possible to assert the definitive effects of the transformation process that Society 5.0 will bring about. Arguments to the effects of Society 5.0 are both pessimistic and optimistic. The change that Society 5.0 will bring on the workforce is one of the most debated issues. The workforce will be redesigned with this change. Estimates are that the unskilled workforce can no longer hold on to the system. In particular, intelligent systems, robots, artificial intelligence are expected to replace the existing workforce, and digital intelligence and human intelligence will experience an algorithmic war on issues such as job creation-design.[37] This will affect key societal issues such as working conditions, social security, wages and poverty. Although the technological change brought about by Society 5.0 was in a different direction in the previous periods, it has different characteristics from the technological changes that created employment. The decrease in jobs and employment has the potential to trigger economic problems and the social policies to be produced should be built on this axis.[38]

Unlike other technological developments, Society 5.0's focus on quality of life, social responsibility and sustainability instead of production and aiming to increase the welfare level of the society has resulted in the combination of different systems.[39] Society 5.0 adopts the integration of technological advances with the daily life of people with the change it brings. With the welfare it will create in the social sphere, Society 5.0 aims to provide living comfort in line with the wishes of the individuals regardless of personal differences, to realize the social goals and to fulfil them in an integrated manner with technology.[40]

Society 5.0's paradigm of placing people at the centre of society and making them the focal point is the starting point for its social change.[41]

1996, p.207; C. B. Frey and M. A. Osborne, *The Future of Employment: How Susceptible Are Jobs to Computerization*, Oxford: Oxford Martin Programme on the Impacts of Future Technology, 2013.

[37] M. Frank, P. Roehrig, and B. Pring. *Makineler Her şeyi Yaptığında Biz Ne Yapacağız*, translated by E. Yılmaz, İstanbul: Aganta Kitap, 2019, p.52.

[38] Frey and Osborne, *The Future of Employment;* M. Ford, *Robotların Yükselişi*, translated by C. Duran. İstanbul: Kronik Kitap, 2018, p.65.

[39] C. M. Ferreira and S. Serpa, "Society 5.0 and Social Development: Contributions to A Discussion", *Management and Organizational Studies*, 5(4) (2018), p.27.

[40] Y. Shiroishi, K. Uchiyama, and N. Suzuki. *Society 5.0: For Human Security and Well-Being*, IEEE Computer Society, 2018; Fukuyama, "Society 5.0: Aiming"; M. E. Gladden, "Who Will Be the Members of Society 5.0? Towards an Anthropology of Technologically Posthumanized Future Societies", *Social Sciences*, 8/148 (2019).

[41] P. O. Skobelev and S. Y. Borovik, "On the Way from Industry 4.0 to Industry 5.0: From Digital Manufacturing to Digital Society", *International Scientific Journal*, 2/6 (2017), p.307-309.

The changes that Society 5.0 will bring about in social life are as follows:[42]

- To ensure that every segment of the society leads an easy and comfortable life by realizing their own lifestyle without any discrimination (age, gender, race, etc.),
- To ensure the emergence of new economies by creating new business models in production areas,
- To ensure that innovative approaches are used in solving social problems and building a better future,
- Ensuring that people become a part of active life by removing physical and social barriers in society,
- To ensure the emergence of social integrity and development by preventing technology from being limited to production only,
- To ensure that technology is produced in a society-oriented manner.

In line with these approaches, it is aimed that the technological changes of Society 5.0 will be a change management model that provides positive, curative and developmental contributions to social life and development. In this change, it is among the most important goals to prevent technology from being limited to production only and to try to integrate it with society and turn it into an element that serves humanity.

Impact of Society 5.0 on Public Labour Relations

The state and the public organizations created by the state are the most important assets of societies. In order to ensure social order and development, the organisation of the state is an important element that cannot be ignored. While the states provide social benefit, there are public services they have produced within the principles of the political system they are bounded. The provision of public services is important for society. The state performs public services through public officials.

Unlike the private sector, the public sector, where public service is provided, aims to create social benefit without profit in the values it creates. The main purpose of public service is to serve society better. This situation has led to the emergence of different perspectives in public labour relations. Public labour relations take place in a sector where the

[42] Fukuyama, "Society 5.0: Aiming"; E. Bryndin, "System Synergetic Formation of Society 5.0 for Development of Vital Spaces on Basis of Ecological Economic and Social Programs", *Annals of Ecology and Environmental Science.* 2/4 (2018), p.12; M. Riminucci, "Industry 4.0 and Human Resources Development: A View from Japan". *E-Journal of International and Comparative Labor Studies,* 7/1 (2018).

state performs both employer and other systemic functions, and where the positions of public officials are shaped differently from private sector employees. The concept of public law and public official created by the public sector reveals the integration of public employees with the state. The public sector is shaped according to social needs. The changes that will occur in the structure of the society affect the social needs, and this directly affects the public services offered. The change that Society 5.0 will bring about in society will affect public services.

The main purpose of public labour relations, which started to be reshaped with technological progress, is to provide the public service in the best way and to use public resources effectively and efficiently. Preventing waste in the public sector, supporting R&D investments, presenting new public services to the society, maximizing social benefit are important values. Ensuring the digitalization of public services by making use of effective resource management thanks to technology will positively affect the integration of the state with change. The renewal of public services together with technology will directly affect the qualifications and working conditions of public officials.

Thanks to the temporal and spatial advantages that technology will create in the public sector, public institutions and the services they provide will be able to be observed in terms of both the process and operational capacity. Thanks to the integration of artificial intelligence to the public, services and reporting for social needs will be seen faster, with alternatives, with multiple models and in real time. This will be the beginning of the change in public labour relations. The negative aspects of the public, expressed as public sector slowness or bureaucracy, will disappear.

Because of the change in the public sector, the qualifications of public officials, who are an important part of public labour relations, will also be affected. Artificial intelligence, robots, etc. of public services. The provision of public services with technological opportunities such as artificial intelligence and robots, as well as technological applications such as e-government and digital signature, are indicators that the public employment will decline. With this decline, the problems that Society 5.0 will create in terms of employment will also occur in the public sector. The leading role of the public in employment in many states will lose power. This situation, which seems to be negative, will actually provide a return as an increase in public resources with the decrease in personnel expenses, and the financial opportunities of the public will expand. At this

point, the public should ensure that new job opportunities are supported with R&D investments.

The change brought about by Society 5.0 will also have effects in the public sphere. The public services that central and local governments provide through technology will cause differentiation in actors within public labour relations. Public officials and public service will become a creative model. Public service will be provided under appropriate conditions and at a sufficient level, as public institutions provide accurate estimates of societal demands. Technology will be most effective in public spaces, thanks to a high level of social and individual security and a collaborative society with broad participation. Because of this change, public labour relations will also be affected. The most visible effects of the change brought about by Society 5.0 on public labour relations can be listed as follows:

- Society 5.0's people-oriented approach will reshape societal needs. This will result in the revision of public services. Revision of public services will directly affect the status of public officials.
- Employment in the public sector will decrease and the need for skilled labour will be reshaped accordingly.
- Intensive use of technology within the working conditions of public officials will increase the importance of education and R&D studies, while highlighting creative techniques.
- Working conditions and wage levels will change with the increasing qualifications of public officials.
- With the use of technology in public services, the workload of public officials will be reshaped.
- Improving the working conditions of public officials and making use of technology at the highest level in occupational health and safety will have positive effects.
- The transformation of public working conditions into a more dynamic structure will reveal different working models, especially flexible working in the public sector.
- Evaluation of public officials in terms of performance development and career advancement will be made with more realistic, numerical and full-time methods.

Evaluating the impact of Society 5.0 on public labour relations, qualified employees will come to the fore in public labour relations, better models will emerge in the fields of improving working conditions, personnel training, performance management, career planning and employee

benefits. While this situation creates improvements in favour of public officials, it will also positively affect the quality of public services.

Conclusion and Evaluation

Technological changes have always been effective in social life throughout human history. The speed and scope of the effects of technological advances that occurred after the industrial revolution in the social sphere have been far more visible than they were in the past. In the Society 5.0 approach, which is accepted as the last stage of social change, the development of technology in an integrated way with humanity and the main purpose of benefiting humanity made the effects of this period change multidimensional.

Because of the change in social structure, the needs of societies have also been renewed. One of the most important means of meeting social needs is public services. In this context, the change process has also affected public services and technology has rearranged the temporal and spatial aspects of public services. The change in the public service has affected public officials, who are the most important means of presenting the public service to the society. Public officials have come to a different position compared to the past in terms of quality and quantity. The differentiation of public officials has revealed the transformation of public labour relations with technology. The focus of change in public labour relations is technology.

Technology-oriented delivery of public services in Society 5.0 has impacts on different areas. Activities aimed at increasing the quality of life especially in cities and rural areas as well as developments in areas such as creation of accessible health and education services, effective energy production and consumption, digital communication, digital agriculture, digital economy and finance, technological R&D investments etc. have been the most recent emerging activities in public sphere. With all these changes, the importance of arranging the public labour relations of public officials, which has a significant impact on the integration of public services into Society 5.0, has increased. The following steps should be taken to harmonize public labour relations with Society 5.0:

- National public labour relations strategies should be reconstructed according to the possible effects of Society 5.0,
- The legal framework of public labour relations should be drawn according to the technological change brought about by Society 5.0,

- Society 5.0's labour demand should be taken into account in the professional choices and careers of public officials,
- According to the change brought about by Society 5.0, public working conditions should be arranged in a way that is employee-centred and working comfort and easiness is created.

The state should be pioneering, exemplary and inclusive with its public services in order to realize quickly the integration with the changes brought by Society 5.0. If the state wants to make the change in public services effectively and efficiently, it must first ensure the integration of public labour relations in which public officials are involved. As conclusion, the primary end goal of states should be the establishment of public labour relations that activate productive and technological potential and are compatible with employee-oriented digital change.

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5 Developing Countries and International Waste Trafficking: The Challenge of Fair and Sustainable Waste Disposal in Society 5.0

Pasquale Peluso

Introduction

Economic development, which has characterised the growth of the so-called industrialised countries, has led to an increase in consumption and consequently large quantities of waste to be disposed. The global production of urban solid waste is estimated to exceed 3 billion tonnes by the year 2050.[1]

The increase in waste production results from the variety of materials used, which have given rise to new diversified waste flows such as plastics and e-waste. The increase in demand for electronic products (3% each year) linked to the ever-shorter lifespan of these devices produces a steady growth in e-waste of 3-4% per year.[2] In 2019, 53.6 million tonnes of e-waste was generated. Since 2014, there has been a 21% increase in the generation of electrical and electronic waste worldwide.[3] The amount of e-waste produced could reach 57.4 million tonnes in 2021.

Plastics have been a major innovation that has changed people's daily habits and transformed society with applications in the medical field, in the automotive and aeronautics industry, in everyday single-use goods.

[1] S. Kaza et al., *What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050.* Washington, DC: World Bank, 2018.
[2] V. Forti et al., *The Global E-waste Monitor 2020: Quantities, flows and the circular economy potential.* Bonn/Geneva/Rotterdam: United Nations University (UNU)/United Nations Institute for Training and Research (UNITAR) – co-hosted SCYCLE Programme, International Telecommunication Union (ITU) & International Solid Waste Association (ISWA), 2020, p.24.
[3] V. Forti et al. *The Global E-waste Monitor,* p.13.

Single-use plastics account for 40% of all plastics produced in any given year. From 1950 to 2015, 6.3 billion tonnes of plastic waste were produced, of which only 9% was properly recycled, while 12% was incinerated and the remaining 79%, if not landfilled, was scattered into the environment.[4] Annual plastic production is around 300 million tonnes.[5] Many plastic products, however, have a life cycle of only a few minutes while being difficult to biodegrade. By 2050, 12 billion tonnes of plastic waste will have been produced.[6] Plastic pollution is one of the biggest environmental problems today, as according to some studies there could be more plastic than fish in the oceans by 2050.[7]

The rising price of commodities such as steel, copper and scrap metals[8] has drawn the attention of several South-East Asian states to the demolishing and recycling practices of ferrous materials, particularly those from ships. Around a thousand ships a year are dismantled because they have reached the end of their life cycle[9]. Italian shipowners scrapped around 90 ships on Asian beaches from 2010 to 2016.[10] Shipbreaking is a particularly dangerous activity due to the presence of highly toxic waste. More than 70% of ships are sold for demolition in South Asia. In countries such as India, Bangladesh and Pakistan, ships are dumped directly on the beach where they are dismantled by hand.[11]

Disposing of this large quantity of waste is a serious problem because only a small proportion is recycled correctly and safely. In the USA, only 35% of urban solid waste is recycled[12] and it is not much better in several European countries. The USA is the industrialised nation that produces around 12% of the world's urban waste and only accounts for 4% of the

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[4] R. Geyer et al., "Production, use, and fate of all plastics ever made". *Science Advances,* 3/7 (2017).

[5] V. Forti et al., *The Global E-waste Monitor.*

[6] F. Forzan "Un futuro senza rifiuti plastici? Con la chimica (forse), si può". *Il Bo Live, il giornale dell'Università di Padova*, March 23, 2021.

[7] Ellen MacArthur Foundation, *The Global Commitment 2021 Progress Report*, Chicago: Ellen MacArthur Foundation, 2021.

[8] Department of Eonomic and Social Affairs of United Nation, *Industrial Commodity Statistics Pocketbook 2018,* New York: United Nations, 2018.

[9] I. Jenssen et al., *Impact Report 2018-2019,* Brussel: NGO Platform on Shipbreaking, 2020.

[10] P. Heidegger et al., *Annual Report 2015*, Brussel: NGO Platform on Shipbreaking, 2016.

[11] T. Nøst et al., "High Concentrations of Organic Contaminants in Air from Ship Breaking Activities in Chittagong, Bangladesh", *Environmental Science & Technology*, 49/19 (2015): 11372–11380.

[12] W. Nichols, and N. Smith, *Waste Generation and Recycling Indices 2019, Overview and findings,* Verisk Maplecroft, 2019, p.5-6. Available at. https://www.circularonline.co.uk/wp-content/uploads/2019/07/Verisk_Maplecroft_Waste_Generation_Index_Overview_2019.pdf.

world's population.[13] Some European countries such as the Netherlands, Austria, Switzerland and France also show a large disproportion in the rate of waste generated per resident population.

The amount of waste produced in the world is increasing considerably every day. The explosive growth of some so-called emerging countries is also contributing to this, driven by industrial development, at enormous environmental cost. China and India, for example, together produce 27% of the world's waste and account for 36% of the world's population. Asian countries are the ones where technologies and procedures for the disposal and recycling of technological waste are less effective than in the whole world.[14]

Electronic, plastic and metal waste produced in industrialised countries is welcomed as a resource by the markets of developing countries. In addition to some particularly carcinogenic elements such as lead, cadmium and mercury, it also contains plastics and precious metals, the proceeds of which attract armies of poor people living in extreme poverty, who are ready to extract these materials, risking their lives, in order not to die of hunger and to try to survive.[15]

The problem of international waste shipments

International waste shipments have long been used as a ploy by some private individuals and/or states to dump huge amounts of waste, mostly to the detriment of developing countries and often with ridiculous fees and serious damage to human health and the environment.[16]

The handling of this waste is carried out using fragmented and sometimes inadequate international legislation. One of the first international agreements, although not binding, was the "Cairo Guidelines and Principles for the Environmentally Sound Management of Hazardous Wastes" issued on June 1987. Subsequently, the Basel Convention of 1989 was issued to curb the dimensions and significance of the phenomenon.[17] The Convention represented a political compromise between the desire of many developing countries, particularly African states, to ban interna-

[13] Nichols, and N. Smith, *Waste Generation.*
[14] V. Forti et al., *The Global E-waste Monitor.*
[15] J. Ottaviani, "La repubblica dei rifiuti elettronici", *Internazionale,* July 15, 2015.
[16] S. M. Müller, "Hidden Externalities: The globalization of hazardous waste", *Business History Review*, 93/1 (2019).
[17] J. Clapp, *Toxic Exports: The Transfer of Hazardous Wastes from Rich to Poor Countries,* Ithaca: Cornell University Press. 2021.

tional trade in waste, and the desire of many industrialised countries to continue to exploit the possibility of disposing of their waste in other countries.[18] The African states' dissatisfaction with the contents of the Basel Convention led them to promulgate the Bamako Convention in 1991, which prohibited the import of hazardous waste into Africa from states that had not signed the treaty. Recently, the European Parliament and the European Council have also approved a new European Regulation (1013/2006) that applies to international shipments of waste, including non-hazardous waste, when a European Union country is involved.[19]

The Basel Convention procedure for transboundary movements of hazardous wastes is based on the prior informed consent of the importing State, which, in the knowledge of all the necessary information, can decide whether to confirm the movement or whether to request further information or whether to deny permission to proceed with the movement. The transboundary movement can only take place if the exporting state has received written consent from the importing state and if there is confirmation of a contract, between the exporter and a waste disposer in the receiving state, specifying the environmentally sound management of the waste.[20]

Many developing countries, even though it is clear that the goods shipped are not goods that can be reused and that there is no contract between the exporter and the disposer in the importing country, give their consent to the movement of this waste, electronic or plastic or ferrous or other, either because of its commercial value, sometimes very minimal, which it retains despite being discarded, or because it contains expensive materials that can be extracted. In developing countries, these goods find a market made up of intermediaries, dealers, repairers and second-hand dealers ready to give a new life to what are in fact not used objects but waste, and which are transferred from one State to another in violation of the Basel Convention.[21] These States will then take to landfill those that are broken or unusable or that end their short lives. Indeed, the average

[18] P. Birnie et al., *International law and the environment,* New York: Oxford University Press, 2009, p.476.
[19] M. Medugno and T. Ronchetti, "Economia circolare e trasporto transfrontaliero dei rifiuti", *Ambiente & Sviluppo*. 10 (2018), p.646-664.
[20] M. M. Mbengue, "Principle 14 of the Rio Declaration on Environment and Development", ed., J. Viñuales, *Commentary of the 1992 Rio Declaration on Environment and Development,* Oxford: Oxford University Press, 2015, p.383-402.
[21] K. Baldé et al., *The global e-waste monitor – 2014.* Bonn: United Nations University, IAS – SCYCLE, 2015.

life cycle of electronic devices, when suitable for use, does not exceed two or three years.

Article 1 of the Convention classifies as hazardous the wastes listed in the Annexes to the Convention, or defined as such in national legislation and notified to the Secretariat of the Convention.[22] Therefore, the qualification of hazardous waste is left to the assessment of the importing state. This entails the possibility that a waste qualified as hazardous by a State of export is not hazardous for a State of import, the interpretation of the parties being sovereign and discretionary.[23] This makes it easy to circumvent the rules of the Convention itself to tackle illegal and uncontrolled movements of hazardous waste between States. This means that States can evade their international legal obligations by claiming that the waste they manage, export or import is not covered by the Convention.[24] In the case of waste falling within the scope of the Convention, the country of import has the final say in authorising the shipment.

This authorisation, according to Article 4(9) of the Convention, should also take into account "the existence of the necessary facilities or disposal sites required to dispose of the waste in an environmentally rational and effective manner", since waste may be exported if the exporting country does not have sufficient disposal capacity or suitable disposal sites and if the waste is required as a commodity by the importing country.[25]

In all cases where the transboundary movement is carried out without notification, without the consent of the States involved, or when the consent has been obtained by fraud or falsification, or when the disposal of hazardous waste or other waste is carried out in violation of the rules of the Convention, the crime of illegal traffic in hazardous waste occurs. If such an illegal trafficking takes place due to the behaviour of the exporting State, the Basel Convention allows the importing State to repatriate the waste, which cannot be contested, delayed or prevented by the parties involved. If the importing country is responsible for transboundary illicit trafficking in waste, it must ensure that the imported waste is disposed of

[22] P. Birnie et al., *International law and the environment,* New York: Oxford University Press, 2009, p.477.
[23] A. Scarcella, *La normativa ambientale,* in Bilanzone C. et al., *Manuale Ambiente 2017*, Milano: Wolters Kluwer, 2017, p.1-172.
[24] O. Barsalou and M. H. Picard "International Environmental Law in an era of Globalized Waste", *Chinese Journal of International Law*, 17/3 (2018), p.888.
[25] J. Crawford, *Brownlie's Principles of Public International Law,* Oxford: Oxford University Press, 2019, p.347.

in an environmentally sound manner.[26]

The need for Asian and southern countries to obtain commodities at very low cost encourages the illegal trade in waste, with very high costs in terms of public health, pollution and corruption.

The Retrofront of China and Other Asian Countries

Illegal waste trafficking is fuelled by much stricter environmental regulations and controls in developed countries, and by the particularly high cost of disposing of hazardous waste. Industries therefore seek to dispose of hazardous waste by exporting it to developing countries, where disposal costs are considerably lower. In addition, many waste flows, including plastics, are difficult for industrialised countries to manage because the infrastructure for their disposal or recycling is not in place. In some cases, the market for recycled material does not offer high profits for the companies that would have to recover it and, therefore, it is sent abroad.

For this reason, the dependence of North American and European countries increased over time on China and several Asian countries that had become the world's biggest importers of solid waste[27] and on African countries that imported waste in the form of used electronic equipment. Industrialised countries exported 87% of global plastic waste which was imported mainly from East Asian and Pacific countries. Between 1992 and 2018, China imported 45% of global plastic waste and in 2017 imported 70% of plastic waste generated by OECD countries.[28]

Since 2018, China, as a result of a major strategy, known as *National Sword*, has imposed a total ban on the import of non-industrial plastic waste and tightened controls on the import of 24 categories of solid waste, particularly plastic waste.[29] Due to inefficient plastic waste recovery and treatment systems, industrialised countries have had to deal with tons of plastic and have been forced to look for other Asian and Pacific countries such as Malaysia, Indonesia, Turkey and Thailand willing to import it. Global waste flows have thus been reversed.

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[26] S.A. Khan, "Clearly hazardous, obscurely regulated: Lessons from the Basel Convention on waste trade", *American Journal of International Law Unbound,* 114 (2020), p.200-205.
[27] L. Hook and J. Reed, "Why the World's Recycling System Stopped Working", *Financial Times*, October 25, 2018.
[28] A. Brooks et al., "The Chinese import ban and its impact on global plastic waste trade", *Science Advances,* 4/6 (2018).
[29] T. Tran et al., "The Impact of China's Tightening Environmental Regulations on International Waste Trade and Logistics", *Sustainability*, 13/2 (2021), p.987-1000.

Between the end of 2018 and 2019, the so-called "*Beautiful China*"[30] policy, which aims to create a greener economy, also influenced other importing countries to start limiting the import of waste. Malaysia, which has become the biggest recipient of plastic waste, has implemented a programme to combat the illegal import of waste. Prime Minister Yeo Been Yin has argued that there is no justification for developed countries to send their rubbish to developing countries.[31] The Malaysian plan was unveiled just days after the Basel Convention was amended during the 2019 COP14, the Conference of the Parties to the United Nations Convention to Combat Desertification. In that forum, member states agreed to make the global trade in plastic waste more transparent by requiring the consent of the importing country to the shipment of non-recyclable, mixed or contaminated plastics and other hazardous waste. In addition, it was agreed that all plastic waste that can no longer be exported should be disposed of in the countries that produced it.[32] This aims to bring about changes in the production of plastic items. Thailand has also decided to ban the import of foreign plastic waste from 2021, while Vietnam is expected to follow from 2025 and the Philippines has put considerable pressure on the Canadian government to repatriate waste from that country falsely labelled as scrap plastic.[33]

These changes in waste import policies will make disposal and recycling even more difficult in countries that have so far preferred to simply dispose of waste by sending it to developing countries. In order to prevent waste being exported to Asian or African countries, the traceability of waste as such or concealed in the form of used objects and the verification of its treatment are particularly important.

In order to prevent international illegal waste trafficking, it is necessary to increase the synergies of intelligence and national and international risk analysis, as well as to homogenise the disciplines and the nature and extent of controls at EU level.

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[30] C. Fang et al., "Beautiful China Initiative: Human-nature harmony theory, evaluation index system and application", *Journal of Geographical Sciences*, (2020), p.691-704.
[31] M. Sembiring, "Global Waste Trade Chaos: Rising Environmentalism or Cost-Benefit Analysis?", NTS Insight. 2019, IN19-02.
[32] S. Wingfeld and M. Lim, "The United Nations Basel Convention's Global Plastic Waste Partnership: History, Evolution and Progress", *Microplastic in the Environment: Pattern and Process, Environmental Contamination Remediation and Management*, ed., M. S. Bank, Cham: Springer, 2021.
[33] C. Zhao et al., "The Evolutionary Trend and Impact of Global Plastic Waste Trade Network", *Sustainability*, 2021.

The Circular Economy for Sustainable Waste Disposal in Society 5.0

The exponential growth in production has brought the problem of waste management to the forefront of modern society's concerns. In Italy, for example, according to data from the Customs Agency, waste seized for illegal trafficking to foreign countries has tripled in 2020: from 2,251 tonnes in 2019 to 7,313 tonnes in 2020.[34] Illegal waste trafficking is caused not only by the increase in waste production but also by the high disposal costs for hazardous waste, which require special and complex processes. The proper disposal of one tonne of plastics and rubber, for example, costs between 200 and 250 euros.[35] In order to combat waste disposal through illegal trafficking, tools based also on technological development have been implemented.

The traceability of waste is a valid strategy for combating the commission of crimes and has always been carried out through the use of document-based tools. This traceability, defined as first level, founds its efficiency and effectiveness on the correct behaviour of the actors involved in the waste cycle chain: from collection, to transport, storage, treatment and/or final disposal.

Investigations and prosecutions of environmental offences have shown that the fairness and sense of responsibility of those involved in the waste management and disposal cycle is often not enough. Modern RFID technology can be applied to commodities, processed products and, therefore, waste to identify through the information contained in a tag, consisting of a microchip, an antenna and other components, the type, nature and traceability of an asset without the need for an operator. RFID technology is an automatic identification system based on the transmission of radio waves and can be validly used for waste tracking through low-frequency or high-frequency solutions to identify waste in larger geographical areas. Tags can be interrogated by tag readers, which are electronic devices capable of reading the information that has been entered with programmers and, since they do not need to be visible, can also be used in dirty environments where, for example, bar codes cannot be used.

[34] Commissione Parlamentare di Inchiesta sulle attività illecite connesse al ciclo dei rifiuti e su illeciti ambientali ad esse correlati, "Audizione del Direttore generale dell'Agenzia delle dogane e dei monopoli, Marcello Minenna", *Atti Parlamentari Camera dei Deputati – Senato della Repubblica,* June 9, 2021.
[35] Davide Madeddu, "Pneumatici 'Fantasma': Un Problema Sia Per L'ambiente Sia Per Gli Operatori Del Settore", *Ilsole24ore*, 2021.

In addition, there are wireless solutions for tracking such as Wi-Fi and WiMax. While the first has become commonly used, the second represents a new standard of Wi-Fi technology with the capabilities of operating on cells with a range of about 15 km and a bitrate of 75 Mbps. Wi-Fi and WiMax technology, due to the above-mentioned characteristics, are also suitable for a number of vertical business applications, including goods and waste tracking.[36] Finally, a valuable support for traceability is given by satellite systems that provide a geo-spatial positioning service with global coverage (GPS), which are becoming increasingly effective due to the increase in satellite coverage over time. This system allows goods, and therefore also waste, to be tracked in real time, providing a valuable contribution to combating illegal trafficking and to any emergency response.[37] In investigations, however, GPS is still used to locate containers full of waste and to trace the routes taken by them.[38]

But traceability, although necessary to ensure sound management of the waste cycle, does not appear effective in curbing the growth of global waste production. Today, innovation must ensure sustainability, defined as "the ability to meet the needs of the present without compromising the ability of future generations to meet their own needs".[39] Innovative solutions need to be found to maintain a high quality of life. Innovation must have a real and durable impact on the perceptions and lifestyles of people who use a given innovative solution in the economy and sustainability of their business so that it becomes a daily occurrence.

Today's industrial production does not consider sustainability as it is still based on the concepts that founded the economy of the throw-away free market, such as cheap production, profit maximisation, indiscriminate use of resources, and consideration of the impact of production choices on the future.

However, each individual does not constitute a separate world, but is part of a single living organism in which everyone has a role to play and the collective wellbeing derives from that of each individual. *Society 5.0*

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[36] Commission of the European Communities, 2006. *Green Paper of 12 December 2006 on Satellite Navigation Applications*. Bruxelles, 08.12.2006.

[37] H. Palmer and K. Johnson-Dubytz, *Holes in the Circular Economy WEEE Leakage from Europe. A Report of the e-Trash Transparency Project*, Seattle: Basel Action Network, 2018, p.110.

[38] V. Di Lecce et al., "A Multi Agent System for Hazardous Material Transport Management", *The 17th IASTED International Conference on Applied Simulation and Modelling*, Corfu, June 23-25, 2008.

[39] World Commission on Environment and Development. *Our Common Future*. New York: United Nations, 1987.

is based on this concept, which represents the future vision of a better society that should strive towards the ideal society based on an economic model that puts man at the centre. Technological innovation should be directed primarily at achieving sustainability, connecting individuals with the environment and with technologies. The human being must be placed at the centre of the production process and technology must be placed at the service of the worker. In this way, the needs of individuals to be met are also made clear. *Society 5.0* is based on the principles of cooperation and circular economy. However, studies show that in 2019 only 9% of the global economy was circular.[40]

The modern production cycle cannot be defined as circular because the criteria of easy recycling of the materials used or of the components, the durability of an object, the possible reuse at the end of its life cycle, and the damage to the environment resulting from disposal at the end of its life cycle are of little relevance in the choice of production methods. This is a linear economy in which *take-make-waste* does not ensure a prosperous future.[41] In contrast, an economy is defined as circular if it minimises resource extraction, reduces waste and maximises efficiency through regenerative design, re-use and recycling.[42] It is an economy that develops virtuous production processes with low environmental impact and high social value.

Technological innovation must enable society to secure more value for individuals and communities through a new way of redistributing wealth to contribute to economic growth and social well-being. The humanocentric society is first and foremost an inclusive and participatory society in social, political and economic terms.[43] The socio-economic system of *Society 5.0* is sustainable and inclusive, based on the principle of equity, and enables social challenges to be overcome through the support of digital technologies, artificial intelligence and robotics.

The ethical and cultural principles upon which the *Society 5.0* is based, in order to be implemented and enhanced, require a change in lifestyle, in the same way as what happened to counter the spread of the SARS-

[40] Circle Economy, *The circularity gap report 2019,* Davos: Circle Economy, 2019.
[41] H. Wilts and I. Bakas, *Preventing Plastic Waste in Europe (European Environment Agency Report 02/2019),* Luxembourg: Publications Office of the European Union, 2019.
[42] O. Niglio, "Il Patrimonio Umano Prima Ancora del Patrimonio dell'Umanità", *Cities of Memory*, (2016), p.47-51.
[43] United Nation General Assembly, *Transforming our world: the 2030 Agenda for Sustainable Development,* New York: United Nation, 2015.

CoV-2 pandemic virus. The key point is the shift from a linear economy to a circular economy that can realign human activity with the nature that surrounds and hosts it. We need to start looking at the economy from its essence: the rational use of available resources to achieve maximum benefit with minimum. Rapid urbanisation and population growth have had a major impact on the amount of waste produced every day.[44]

The *take-make-waste economy* means that most products end up in landfills, with an exponential increase in the amount of waste globally. According to the United Nations Environment Programme, approximately 11.2 billion tonnes of solid waste are collected worldwide each year, most of which is disposed of in landfills.[45] Developing countries receive a great quantity of waste from developed countries. According to the United Nations, it is imperative to minimise the amount of waste by developing new methods for recovering materials and recycling waste into usable products. The Japan-based UNEP International Environmental Technology Centre (IETC) supports the implementation of integrated solid waste management systems and the proper treatment of hazardous waste in developing countries.

Landfills in developing countries represent an unexploited potential for recycling electronic, metallurgical or plastic waste, which, by creating a circular economy, could be transformed into secondary commodities, creating an opportunity for innovation and economic growth in these countries. But, sound waste management strategies are needed. In Ghana, for example, the construction of an integrated e-waste recycling plant in Agbogbloshie and the establishment of a network of waste collection centres to support the work of the recycling plant have been planned. This project, a collaboration between the Ghana National Cleaner Production Centre and the United Nations Environment Programme (UNEP), will create around 22,000 jobs for residents.[46] In Senegal, 15 tonnes of plastic resins are produced per month from locally collected plastic waste through a small-scale but efficient recycling operation.

It is important to give developing countries access to the technology and investment needed to move from artisanal to more industrialised

[44] W. Nichols and N. Smith, *Waste Generation and Recycling Indices 2019. Overview and findings,* Verisk Maplecroft, 2019.
[45] United Nation Environment, *Putting the environment at the heart of people's lives, Annual Report 2018,* NewYork: United Nation Press, 2019.
[46] United Nation Environment, "Turning e-waste into gold: the untapped potential of African landfills", *U.N. Environment Programme*, September 24, 2018.

recycling systems. In this way, the informal sectors that are part of the waste cycle can also be brought into the system. The informal collection of waste in landfills could be supported and organised efficiently and safely in order to avoid the poor and unhealthy working conditions and pollution in those areas and to create poverty-reducing jobs.[47]

Similarly, the circular economy can help developing countries, which import different types of used objects from industrialised countries, to create a repair industry by training repair technicians. In fact, the circular economy can increase local employment through the implementation of recycling and repair practices that require new skills and can create new businesses that use secondary commodities from recovery chains to replace virgin commodities.

But the circular economy is an economic model that involves everyone. The design of materials and products that are durable, have a long life span, and are highly recyclable or reusable contributes to zero waste or reduced waste production.[48] Industrialised countries must start looking at waste as an opportunity to create value and not as a product to be disposed of as quickly as possible.

In September 2020, Italy implemented the European directives of the so-called "Circular Economy Package" with targets for recycling or municipal waste: at least 55% by 2025, at least 60% by 2030, at least 65% by 2035 and a limitation on landfilling of no more than 10% by 2035.[49]

As of 2019, the first steps have been taken to implement circular economy models globally. The *NetxGen Consortium* is a global consortium that promotes the design, marketing and recovery of single-use food packaging to address the global waste problem. The first initiative implemented by the *Consortium* called *NextGen Cup* is aimed at promoting recoverable solutions for cups used for taking away hot or cold drinks. The challenge proposed by *NextGen Cup* will enable the use of new materials and strategies for the recovery of disposable cups and the creation of long-lasting reusable cup systems. The Consortium is managed by Closed Loop Partners' Center for the Circular Economy. Companies such as Starbucks and McDonald's are founding members of the Consortium. Coca-Cola

[47] PREVENT Waste Alliance, *Together for a circular economy*, PREVENT Abfall Allianz, 2020.
[48] H. Wilts et al., *Prevention of plastic waste in production and consumption by multi-actor partnerships*, Bonn: PREVENT Waste Alliance, 2020.
[49] Ministero della Transizione Ecologica (MITE), *Strategia nazionale per l'economia circolare, Linee programmatiche per l'aggiornamento,* Roma: MITE, 2021.

Company, Yum! Brands, Nestlé, Jacobs Douwe Egberts and Wendy's are supporting partners. The Consortium evaluates useful solutions that can work globally and tests them in order to evaluate the implementation of pilot projects that can then be implemented on a larger scale. Starbucks, Unilever, Evian and McDonald's are among those who have switched from plastics to high-profile alternative materials. This trend will stimulate innovation and investment opportunities in the design, processing and disposal of materials and could eventually result in low-cost alternatives such as bioplastics.

Conclusion

Due to its greater transparency, the circular economy reduces not only the production of waste, but also illegal activities in the production and disposal of waste. In this way, it contributes to the creation of a more equitable and respectful society in developing countries, which can benefit from the circular economy as an opportunity for growth and development. In addition, the circular economy can create new production and consumption habits that can guide consumers towards more environmentally sustainable choices.

The European Regulation n. 1221/2009 defines the EMAS (Eco-Management and Audit Scheme) system to which any organisation (private companies and public bodies) that wants to assess and improve its environmental performance and communicate it to the public can subscribe. According to the European Commission, organisations that have an EMAS registration operate according to the principles of the circular economy.[50] The "*Ecolabel*" is a label for products and services that have a reduced environmental impact throughout their life cycle and allows consumers to recognise them. This label can only be used after voluntary certification by an independent authority and certifies services that have a lower environmental impact with the same performance and quality as others.

In Italy, the new National Electronic Register for Waste Traceability (RENTRI) has also been recently created, which allows waste traceability through the digitalisation of paper documents relating to waste movement and transport (waste identification forms, loading and unloading

[50] European Commission, *Moving towards a circular economy with EMAS. Best practices to implement circular economy strategies (with case study examples)*, Luxembourg: Publications Office of the European Union, 2017.

registers, MUD). The REcer allows to plan planning and programming strategies relating to the circular economy, as it provides an up-to-date "snapshot" of the actual state of the plants present on the territory, their type and treatment and recovery capacity, as well as a platform for monitoring End of Waste authorisations issued by the regions on a case-by-case basis.

To this date, the benefits of implementing the circular economy have not been given due prominence. It is a valuable tool for achieving the development goals set by the United Nations.[51] But the circular economy is also the only real alternative for creating an inclusive and participative society based on the principle of fairness. A society that aims at overall economic development through technological innovation with a focus on sustainable growth and human well-being.

This requires training of young new green professionals and economic operators, providing young people with adequate tools, knowledge and skills to participate in the transition and to be included in decision-making processes.[52] At the same time, however, circular economy processes need to be implemented in emerging countries by making them appreciate the potential of the circular economy.

Increasing waste production is a luxury that neither developed nor developing countries can afford. Durable, reusable materials that can be repaired or, if not, disassembled or recycled must be chosen from the design stage so that materials are recovered as much as possible and not disposed of. This is the only way we can take care of the environment, implementing circular economy processes that enable sustainable growth and equity for developing countries. This is the only way we can implement *Society 5.0* in a society that is seen as a new set of rules to achieve efficient needs-based social protection, improving the overall quality of life of people and therefore improving the quality of life for society as a whole.

[51] United Nation Environment, "Global Waste Management Outlook", *U.N. Sustainable Development,* New York: UNEP, 2015.
[52] Youth4Climate Driving Ambition, "Youth, Driving, Ambition", 29.09.2021.

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6 Smart Contracts and Contracting's Position in the Italian Civil Law: Technology for the Benefit of the Individual Contracting Party in the Perspective of A Human-Centred Society

Marzia Rossi

Introduction

In an era characterised by a strong interaction between man and technology, the need to place man at the centre of society and to put technology to the benefit of the individual also reverberates in the field of wealth circulation.

In this sense, the vision of the 5.0 society, as a society aimed at giving shape and substance to a conception of a future in which technology and human values are combined to raise the quality of life of each person, involves many fields and necessarily also the circulation of wealth.

In the perspective of recovering a kind of Renaissance concept of society, the challenge of the model of 5.0 society is to configure digitalisation in such a way that it can contribute to the humanisation of the world, making it a better place. So, in this better scenario, services and applications exchange data with the purpose of pursuing social welfare and not a future controlled and monitored by artificial intelligence and robots. Not only that, but also the human personality can express itself in a better manner and man is once again the centre of society's interest and his intellectual capacities are once again fully valued.

In this direction, the recovery of the centrality of man can well be implemented in the context of negotiation through the use, precisely to the benefit of the individual, of the new technologies and new operational tools that are emerging.

Reference is made to the phenomena of blockchains, distributed ledger technologies (DLT) and smart contracts.

Smart contracts, specifically, for the operational advantages they bring, could be a useful tool to give an impetus to the humanisation of legal transactions, though with some caution.

Smart Contracts, Distributed Ledger Technologies and Blockchains

Smart contracts are the object of a growing interest in the legal debate mainly because they are now inextricably linked to blockchains or, more generally, to distributed ledger technologies,[1] even though they may not run on these technological tools.[2]

The definition of the concept of smart contract, which originated from the idea of putting (ever-increasing) computational power at the service of contracts, verily, is difficult to identify.[3] The same expression "smart", which recalls the notions of intelligence and speed of action, is contested by those who speak rather of a 'stupid' contract.[4]

The term "smart contract" was coined by Nick Szabo,[5] who theorised that «a smart contract is a computerized transaction protocol that exe-

[1] As regarding see: M. Giaccaglia, "Gli *smart contracts*. Vecchi e nuovi (?) paradigmi contrattuali nella prospettiva della protezione dei consumatori", *Diritto mercato e tecnologia*, May 20, 2020, p.7; P. De Filippi and A. Wright, *Blockchain and the Law. The rule of code*, Cambridge, Massachusetts: Harvard University Press, 2018; M. Giancaspro, "Is a 'smart contract' really a smart idea? Insights from a legal perspective", *Computer Law & Security Review*, 6 (2017), p.825-835; R. Holden and A. Malani, "Can blockchain solve the holdup problem in contracts?", *University of Chicago Coase-Sandor Institute for law & economics research paper*, Paper no. 846, 2017, https://ssrn.com/abstract=3093879, p.1-36; F. Longobucco, "Smart contract e 'contratto giusto': dalla soggettività giuridica delle macchine all'oggettivazione del fatto contratto. Il ruolo dell'interprete", in *Blockchain, politiche pubbliche, regole. Dalle semplificazioni amministrative alla digitalizzazione*, ed., S. Ciucciovino, M. Faiolia and A. Toscano, *federalismi.it* (2021, special issue), p.106-116; M. Maugeri, *Smart Contracts e disciplina dei contratti. Smart Contracts and Contract Law*, Bologna: Il Mulino, 2021, p.23-25; G. Rinaldi, "*Smart contract:* meccanizzazione del contratto nel paradigma della *blockchain*", in *Diritto e intelligenza artificiale*, ed., Guido Alpa, Pisa: Pacini Giuridica, 2020, p.343-375.

[2] See especially: F. Di Ciommo, "Smart contract e (non-) diritto. Il caso dei mercati finanziari", *Nuovo diritto civile*, 1 (2019), p.266-267; T. Gillespie, "Can an algorithm be wrong?", *LIMN*, no. 2, 2012, http://limn.it/can-an-algorithm-be-wrong/; Holden and Malani, "Can blockchain solve the holdup problem in contracts?", p.20; Maugeri, *Smart Contracts e disciplina dei contratti. Smart Contracts and Contract Law*, p.23-25.

[3] See: M. Finck, *Grundlagen und Technologie von Smart Contracts*, in *Smart Contracts*, herausgegeben von Martin Fries und Boris P. Paal, Tübingen: Mohr Siebeck, 2019, p.1-12; A. Stazi, *Automazione contrattuale e contratti intelligenti. Gli 'smart contracts' nel diritto comparato*, Torino: G. Giappichelli Editore, (2019), p.108-110.

[4] A. J., Kolber, "Not-So-Smart Blockchain Contracts and Artificial Responsibility", *Stanford Technology Law Review*, 21 (2018), p.198-234; Jeffrey M. Lipshaw, "The Persistence of 'Dumb' Contracts", *Stanford Journal of Blockchain Law and Policy*, 2 (2019), p.1-57.

[5] N. Szabo, "Smart Contracts: Building Blocks for Digital Markets", 1996; N. Szabo, "Formalizing and Securing Relationships on Public Networks", 1997; N. Szabo, "Secure Property Titles with Owner Authority", 1998.

cutes the terms of a contract». In particular, he specified:

> The general objectives of smart contract design are to satisfy common contractual conditions (such as payment terms, liens, confidentiality, and even enforcement), minimize exceptions both malicious and accidental, and minimize the need for trusted intermediaries. Related economic goals include lowering fraud loss, arbitration and enforcement costs, and other transaction costs.[6]

In Szabo's vision, in which there is no connection between the smart contract and digital ledger technologies, smart contract is a code suitable to execute a contract. It is a flexible tool, which brings with it the advantage of reduced human intervention, combined with lower costs and the guarantee of non-revocability and certainty of execution.

As a matter of fact, current view of the phenomenon is very complex and is increasingly moving away from the conception that considered the smart contract as an algorithm which, by entrusting machines with the task of binding performance, is able to prevent the parties from choosing whether or not to perform.

The term "smart contracts" is generally used to refer to computer protocols whereby the system automatically performs a specific service, if a predefined, computer-verifiable condition is met.[7]

These transaction protocols are of various types: they may run in digital ledger technologies or outside digital ledger technologies; they may not concern any profile linked to the agreement or may contain both the code describing the agreement and the activation of the execution; they are written in machine language and the code always operates on the basis of a logical structure of the type "if this than that"; they often have a user-friendly translation.[8]

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[6] Szabo, "Smart Contracts: Building".

[7] See, among the others: De Filippi and Wright, *Blockchain and the Law. The rule of code*, p.10-12; F. Delfini, "*Blockchain*, *smart contracts* e innovazione tecnologica: l'inforatica e il diritto dei contratti", *Rivista di diritto privato* (2019), p.167-178; E. William Di Mauro, "*Smart contract*: disciplina, criticità e risvolti pratici", in *Annuario 2021 Osservatorio Giuridico sulla Innovazione Digitale*, *Yearbook 2021*, *Juridical Observatory on Digital Innovation*, eds., Salvatore Orlando and Giuseppina Capaldo, Roma: Sapienza Università Editrice, 2021, p.72; F. Faini, "Il diritto nella tecnica: tecnologie emergenti e nuove forme di regolazione", *federalismi.it*, no. 16 (May 27, 2020), p.102-103; G. Pascuzzi, *Il diritto dell'era digitale* Bologna, Il Mulino, (2021), p.286-288; P. Sirena and F. P. Patti, "Smart Contracts and Automation of Private Relationships", *Bocconi Legal Studies Research Paper Series*, Paper no 3662402, 2020, p.3-5; Rinaldi, "*Smart contract:* meccanizzazione del contratto nel paradigma della *blockchain*", p.352-357.

[8] For these issues see: Maugeri, *Smart Contracts e disciplina dei contratti. Smart Contracts and Contract Law*, p.30-33.

From a technical point of view, in the case where the code allows the conclusion and execution of the economic transaction, the terms of the transaction itself are written in the source code – in the language of the machine – and the machine executes the contract; the machine takes charge of the exchange and executes it; once the activation has taken place, it cannot be interrupted, since it no longer depends on the will of the contracting party. Therefore, the smart contract is an operation: digital, in that the contractual clauses are incorporated into the software in the form of code; self-executing, in that fulfilment is governed by the inputs provided for in the code and is independent not only of the *animus solvendi* of the debtor, but also of the behaviour of the parties; irrevocable, in that, once started, the process of execution cannot be stopped or modified.[9]

Now, although the smart contract can also be conceived independently of the blockchain, it is the characteristics of digital bonding technologies, and especially of blockchains, which, at present, as we shall see in the following, guarantee smart contracts the security and reliability that make it possible to overcome the need to use a third and intermediary authority. In fact, this technology allows smart contracts to best express their potential for automating contractual exchanges.[10]

Therefore, the subject of this study, with a view to understanding the position of the contracting party and considering these contractual transactions from the point of view of reliability, are smart contracts using blockchains, which, in turn, are *species* of the general digital ledger technologies.[11]

Specifically digital ledger technology (DLT) is a technology that allows data to be recorded and stored in multiple databases. These archives simultaneously contain the same data that are stored and controlled by a

[9] See especially: L. Parola et al., "Blockchain e smart contract: questioni giuridiche aperte", *Contratti* (2018), p.684; Sirena and Patti, "Smart Contracts and Automation of Private Relationships", p.5-11.

[10] See: A. U. Janssen and F. P. Patti, "Demistificare gli smart contracts". *Osservatorio del diritto civile e commerciale*, 1 (2020), p.35-36; Rinaldi, "Smart contract: meccanizzazione del contratto nel paradigma della blockchain", p.349-352.

[11] M. Bellini, "Che cosa sono e come funzionano le Blockchain Distribute Ledger Technology DLT", 2018, www.blockchaininnovation.it/esperti/cosa/funzionano-le-blockchain-distributed-ledgers-technology-dlt/; Faini, "Il diritto nella tecnica: tecnologie emergenti e nuove forme di regolazione", 93-102; Maria Letizia Perugini, '*Distributed ledger technologies' e sistemi di 'Blockchain: digital currency, smart contract' e altre applicazioni*, Milano: Key editore, 2018; Rinaldi, "*Smart contract:* meccanizzazione del contratto nel paradigma della *blockchain*", p.369.

network of computers (nodes).[12]

The blockchain is, as just said, a type of distributed ledger, shared and immutable, which facilitates the process of recording and managing transactions and tracking assets in a defined network.[13] The structure of the blockchain is decentralised, open and secured by means of cryptography; transactions take place without any intermediary; the data recorded on the blockchain are unchangeable, since, once information has been recorded on such a distributed ledger, it cannot be modified or tampered with. The blockchain, more exactly, is a database structured in a chain of computer blocks, concatenated in chronological order in a manner, as mentioned, immutable, suitable for reliably maintaining a system of distributed digital registers capable of keeping indelible track of the transactions (transfers) carried out. Each block represents a few transactions; the origin and the time of execution of the transactions are attributed indelibly – by means of an asymmetric key encryption mechanism – and immutably – by means of a time stamp –. Each block is irreversibly linked to the previous block by means of a particular algorithmic operation (the so-called hash function): according to this system, a chain of blocks is formed (the blockchain), which is accessible and consultable by all nodes in the network. Before being added to the chain, each block is checked, validated and encrypted by a number of miners by solving a mathematical operation: consequently, the block cannot be tampered with. Moreover, any modification is subject to the approval of all nodes.[14] The decentralisation, verifiability and immutability of the blockchain guarantee the authenticity, integrity and reliability of the data.

Blockchains can be public or private.[15]

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[12] In these terms see: Maugeri, *Smart Contracts e disciplina dei contratti. Smart Contracts and Contract Law*, p.28.

[13] De Filippi and Wright, *Blockchain and the Law. The rule of code*, p.4-10; Holden and Malani, "Can blockchain solve the holdup problem in contracts?", p.15-20; Pascuzzi, *Il diritto dell'era digitale*, p.279-285.

[14] See especially: A. Benito, "Blockchain's Struggle to Deliver Impersonal Exchange", *Minnesota Journal of Law, Science & Technology*, 9 (2018), p.55-105; A. Benito, "Prospects of Blockchain in Contract and Property", *Economics Working Paper Series*, Working Paper no. 1696, 2020, Universitat Pompeu Fabra, Barcelona; A. Benito, and L. Garicano, "Blockchain: The Birth of Decentralized Governance", *Economics Working Paper Series*, Working Paper no. 1608, 2018, Universitat Pompeu Fabra, Barcelona; Di Ciommo, "Smart contract e (non-) diritto. Il caso dei mercati finanziari", p.267-271; Parola et al., "*Blockchain* e *smart contract*: questioni giuridiche aperte", p.681-682; Rinaldi, "*Smart contract:* meccanizzazione del contratto nel paradigma della *blockchain*", p.347-349.

[15] See: V. Bellomia, "Il contratto intelligente: questioni di diritto civile", *Judicium* (10 December 2020), p.8.

Public blockchains are based on a consensus between the participants in the platform: the consensus is consequently decentralised and all users can simultaneously control it in a widespread manner[16]. In public blockchains, in fact, the freedom of access to the network is absolute and the degree of transparency maximum: each user can view the entire chain, which is created and grows simply by the progressive increase of participants in the same[17]; the register is not held or controlled by any centralised entity and there is therefore no type of intermediation, but it is shared publicly and owned by the users themselves, who assume an equal role among themselves.[18] In this kind of blockchain the so-called peer-to-peer technology is fully realised[19] and a new concept of trust can be said to have been achieved, relating not to the central guaranteeing intermediary, but to the computer protocol and the system – which is able to verify all the transactions that take place.[20] Normally, these kinds of blockchain are also permissionless and anyone can freely access them, but they may not be if pre-identification of the participants in the chain is required for access.[21]

In private blockchains there is a central reference authority. This authority establishes, for the purposes of access to the chain, the conditions of access and the subjects that may enter the network through prior authentication and identification of the nodes.[22] They are normally permissioned.

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[16] Pierluigi Cuccuru, "'Blockchain' ed automazione contrattuale. Riflessione sugli 'smart contract'", *La nuova giurisprudenza civile commentata* (2017), p.109.

[17] Cuccuru, "'Blockchain' ed automazione contrattuale. Riflessione sugli 'smart contract'", p.109.

[18] V. Buterin, "On Public and Private Blockchain", *Ethereum Blog* August 7, 2015, https://blog.ethereum.org/2015/08/07/on-public-and-privateblockchains affirms: "*A public blockchain is a blockchain that anyone in the world can read, anyone in the world can send transactions to and expect to see them included if they are valid, and anyone in the world can participate in the consensus process - the process for determining what blocks get added to the chain and what the current state is. As a substitute for centralized or quasi-centralized trust, public blockchains are secured by cryptoeconomics - the combination of economic incentives and cryptographic verification using mechanisms such as proof of work or proof of stake, following a general principle that the degree to which someone can have an influence in the consensus process is proportional to the quantity of economic resources that they can bring to bear. These blockchains are generally considered to be 'fully decentralized'*".

[19] M. Manente, "*Blockchain*: la pretesa di sostituire il notaio", *Notariato*, 3 (2016), p.211-219.

[20] A. Contaldo and F. Campara, *Blockchain, criptovalute, smart contract, industria 4.0. Registri digitali, accordi giuridici e nuove tecnologie*, Pisa: Pacini Giuridica, (2019), p.39.

[21] Manente, "*Blockchain*: la pretesa di sostituire il notaio", p.216.

[22] Buterin, "On Public and Private Blockchain", *Ethereum Blog*, asserts: "*A fully private blockchain is a blockchain where write permissions are kept centralized to one organization. Read permissions may be public or restricted to an arbitrary extent. Likely applications include database management, auditing, etc internal to a single company, and so public readability may not be necessary in many cases at all, though in other cases public auditability is desired*".

Smart Contracts in Italian Civil Law

The examined technologies, which have long been studied by computer scientists and which until recent years gave rise to great perplexity among jurists,[23] are now being investigated more favourably by the latter.[24] Italian law experts have begun to take a greater interest in these technologies following the recognition of blockchain and smart contracts at institutional level.

In this sense, the European Parliament Resolution of 16 February 2017 on civil law rules on robotics,[25] has undoubtedly constituted, at European level, a first step in the direction of the recognition of the technologies under consideration.[26]

Another important document, fundamental for the purposes of this analysis, is the Resolution of 3 October 2018 precisely dedicated to distributed ledger technologies and blockchain.[27]

In this measure, the European Parliament pointed out that distributed ledger technology and blockchain have the advantage of enhancing citizens' autonomy by giving them, on the one hand, the opportunity to control their own data and decide which data to share in the register and, on the other hand, the ability to choose who can see these data. It also noted that distributed ledger technology can improve the cost efficiency of transactions by eliminating intermediaries and intermediation costs and increases the transparency of transactions. It also noted that distributed ligder technology can introduce an IT paradigm that democratises data

[23] See C. Licini, "Il notaio dell'era digitale: riflessioni gius-economiche", *Notariato* (2018), p.142-150; Manente, "*Blockchain*: la pretesa di sostituire il notaio", p.211-219; M. Nastri, "Nuove tecnologie: l'ultima domanda", *Notariato* (2018), p.485-488; R. Pardolesi and A. Davola, "'Smart contract': lusinghe ed equivoci dell'innovazione purchessia", *Il Foro Italiano,* V (2019), p.195-207; D. Restuccia, "Il notaio nel terzo millennio, tra sharing economy e blockchain", *Notariato* (2017), p.53-55; Stazi, *Automazione contrattuale e contratti intelligenti. Gli 'smart contracts' nel diritto comparato*, p.169.

[24] G. D. Finocchiaro, "Il contratto nell'era dell'intelligenza artificiale", *Rivista trimestrale di diritto e procedura civile* (2018), p.441-460; Roberto Moro Visconti, "La valutazione delle *blockchain: Internet of value, network digitali* e *smart transaction*", *Diritto industriale* (2019), p.301-311; A. Palladino, "L'equilibrio perduto della *blockchain* tra *platform revolution* e *GDPR compliance*", *mediaLaws - Rivista di Diritto dei Media* (2019): 150; G. Salito, "Smart contracts" (voice), in *Digesto delle discipline privatistiche*, *Sezione civile*, *Aggiornamento XII*, ed., Rodolfo Sacco, Torino: UTET Giuridica, (2019), p.393-400.

[25] European Parliament resolution of 16 February 2017 with recommendations to the Commission on Civil Law Rules on Robotics (2015/2103(INL).

[26] G. Passagnoli, "Ragionamento giuridico e tutele nell'intelligenza artificiale", *Persona e Mercato*, 3 (2019), p.80.

[27] European Parliament resolution of 3 October 2018 on distributed ledger technologies and blockchains: building trust with disintermediation (2017/2772/RSP).

and enhances trust and transparency by providing a secure and effective route for the execution of transactions. Above all, the resolution pointed to the need for legal regulation of these technologies, creating a favourable framework for their development by encouraging legal certainty.

About smart contracts, the document, while stressing that they can act as key factors in decentralised applications, highlights their potential and the importance of security and protection of personal data.

In this framework, the European Commission established, on 1 February 2018, the "EU Blockchain Observatory and Forum", and on 10 April 2018, the "European Blockchain Partnership", which is a European partnership on the topic between several Member States. Italy joined it in September of the same year.

In this context, the Italian legislator was among the first in Europe to dictate provisions regarding distributed ledger-based technologies and smart contracts. Law no. 12 of 11 February 2019, converting Decree-Law no. 135 of 14 December 2018, containing urgent provisions on support and simplification for businesses and public administration (the so-called Simplification Decree), in Article 8b, headed precisely «Technologies based on distributed registers and smart contracts», deals with the phenomenon. In fact, the provision sets out, firstly, the definition of "technologies based on distributed registers" (paragraph 1) and, secondly, the definition of "smart contracts" (paragraph 2), specifying, with regard to smart contracts, that they «meet the requirement of written form after computer identification of the parties concerned, through a process having the requirements set by the Digital Italy Agency with guidelines»; the provision contains the equation between the storage of the computer document through the distributed ledger technology and the electronic time validation referred to in Article 41 of the EU Regulation no. 910/2014 of the European Parliament and of the Council of 23 July 2014 (paragraph 3);[28] finally, the provision establishes that, for the purposes of producing the effect of the aforementioned time validation, the Digital Italy Agency,

[28] See Article 41 (Legal effect of electronic time stamps) of the EU Regulation no. 910/2014 of the European Parliament and of the Council of 23 July 2014, that states: "An electronic time stamp shall not be denied legal effect and admissibility as evidence in legal proceedings solely on the grounds that it is in an electronic form or that it does not meet the requirements of the qualified electronic time stamp" (paragraph 1); "A qualified electronic time stamp shall enjoy the presumption of the accuracy of the date and the time it indicates and the integrity of the data to which the date and time are bound" (paragraph 2); "A qualified electronic time stamp issued in one Member State shall be recognised as a qualified electronic time stamp in all Member States" (paragraph 3).

within ninety days from the date of entry into force of the law converting the decree, must identify the technical standards that technologies based on distributed records must possess.

The rule has been criticised in reason of the inadequacy and narrowness of the definitions therein contained and in reason of the lack of an organic discipline. This is also due to the fact that technological standardisation, which has been entrusted to the Agency for Digital Italy, is still being developed.[29]

However, it cannot be denied that it constitutes, on one side, the juridic acceptance of the phenomena in question and of technological progress and, on the other, the legislative recognition of the importance of these new technologies and of the transactions that can take place through them.[30] In this perspective, transactions that take place through distributed bonding technology and with the use of a smart contract are recognised by the legal system and can acquire a certain date and the probative value of a private agreement.[31]

Difficulties in the Systematic Framing of Smart Contracts in the Italian Civil Law System

In view of the above, it is rather difficult to precisely frame the phenomenon from the point of view of the Italian civil law system.[32] Not only, in fact, is the legal notion of smart contract far from being unequivocal, but the term smart contract is indifferently used to indicate heterogeneous phenomena, not necessarily relevant at legal level and therefore, despite the name, not always relevant to the phenomenon.[33]

In systematic terms, consequently a wide-ranging and diversified debate arises on the subsumability of the phenomenon within the scope of Article 1321 of the Italian Civil Code, that is on the possibility of con-

[29] See: Contaldo and Campara, *Blockchain, criptovalute, smart contract, industria 4.0. Registri digitali, accordi giuridici e nuove tecnologie*, p.147; Michele Giaccaglia, "Considerazioni su *Blockchain* e *smart contracts* (oltre le criptovalute)", *Contratto e impresa*, 3 (2019), p.945; Rinaldi, "*Smart contract:* meccanizzazione del contratto nel paradigma della *blockchain*", p.367-372.

[30] Bellomia, "Il contratto intelligente: questioni di diritto civile", p.3-4.

[31] Giaccaglia, "Considerazioni su *Blockchain* e *smart contracts* (oltre le criptovalute)", p.954.

[32] See mainly: Di Mauro, "*Smart contract*: disciplina, criticità e risvolti pratici", p.74-77; Alessia Palladino, "Dall'*homo loquens* all'*homo smart*: la contrattualistica del terzo millennio", *De Justitia* (2020): 96-103; Parola et al., "*Blockchain* e *smart contract*: questioni giuridiche aperte", p.685-686.

[33] Di Ciommo, "Smart contract e (non-) diritto. Il caso dei mercati finanziari", p.266.

sidering the smart contract as a contract pursuant to Article 1321 of the Italian Civil Code notwithstanding its automatic and heterodetermined operation.[34]

Concerning this, a current of thought recognises smart contracts exclusively as a tool for the negotiation, conclusion and/or automatic application of contractual or para-contractual relationships and therefore denies these transactions the nature of a contract and limits their relevance in the IT and technological field.[35]

Some scholars define smart contract as a means of managing an agreement reached before and elsewhere, a means of enforcing the contract.[36]

In a different perspective, other scholars believe that, in smart contracts – in correspondence with the requirements of *homo digitalis* oriented towards the more complete objectification of the exchange and the reduction of the element of will –, there is a real decline of the negotiation agreement. According to this view, this decline takes the form of a progressive disappearance of the reciprocal dialogue between the parties: specifically, in these transactions, just because of the transition from *homo loquens* to *homo videns*, the dialogue between the parties would be replaced by surrogates for verbal-linguistic communication or the mere exchange of services, so much so that the contract itself would end up being broken down into the combination of two unilateral acts and exchanges would take place in the absence of an agreement.[37]

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[34] The expression "legal smart contract" is sometimes used to identify the legally relevant category of intelligent contract. About this term, see: Giaccaglia, "Gli *smart contracts*. Vecchi e nuovi (?) paradigmi contrattuali nella prospettiva della protezione dei consumatori", 10; Maugeri, *Smart Contracts e disciplina dei contratti. Smart Contracts and Contract Law*, p.33; Rinaldi, "*Smart contract:* meccanizzazione del contratto nel paradigma della *blockchain*", p.353.

[35] S. McJohn and I. McJohn, "The Commercial Law of Bitcoin and Blockchain Transactions", *Suffolk University Law School - Legal Studies Research Paper Series*, Research Paper, 16-13 (November 22, 2016), p.1-24. About this opinion, see the remarks of: Francesco Di Ciommo, "*Blockchain, smart contract*, intelligenza artificiale (IA) e 'trading' algoritmo: ovvero, del regno del non diritto", *Rivista degli infortuni e delle malattie professionali* (2019), p.4; Parola et al., "*Blockchain* e *smart contract*: questioni giuridiche aperte", p.685-686; Carla Pernice, "*Smart contract* e automazione contrattuale, potenzialità dei rischi della negoziazione algoritmica nell'era digitale", *Diritto del mercato assicurativo e finanziario* (2019), p.133-134.

[36] I. A. Caggiano, "Il Contratto nel mondo digitale", in *Il Contratto del Terzo Millennio - Dialogando con Guido Alpa*, ed., Lucilla Gatt (Napoli: Editoriale Scientifica, 2018), p.61-67; S. Crisci, "Intelligenza artificiale ed etica dell'algoritmo", *Il Foro Amministrativo* (2018), p.1787-1816, spec. par. 5; Cuccuru, "'Blockchain' ed automazione contrattuale. Riflessione sugli 'smart contract'", p.111; Licini, "Il notaio dell'era digitale: riflessioni gius-economiche", p.146; Parola et al., "*Blockchain* e *smart contract*: questioni giuridiche aperte", p.685.

[37] M. Farina, "*Smart contract* tra automazione contrattuale e disumanizzazione dei rapporti giuridici", *Giustiziacivile.com* (August 6, 2020), 4; Natalino Irti, *Norma e luoghi. Problemi di*

In a different line of thought, other authors refer, on the one hand, to the smart contract as a genuine contract and, on the other, to legal relationships that are automatically self-executing.[38]

There are also authors who emphasise the special way in which consent is manifested and in which the negotiation agreement is formed and concluded. These authors distinguish transactions that constitute the implementation of a previous underlying contractual agreement in the legal sense from those in which the smart contract introduces new relationships defined and applied automatically by the computer code, but not linked to an underlying contractual obligation.[39]

In the wake of these last two agreeable positions, it must be observed that, if the arrangement of interests contained in a smart agreement can be traced back to the meeting of the wills of the parties, it certainly constitutes a legally relevant phenomenon, to be framed within the contractual category and its rules.[40]

Advantages and Disadvantages of Smart Contracts for the Contractor

The development of new technologies and information technology undeniably entails economic, sociological and, to a certain extent, anthropological changes, with the consequence of confronting the jurist with challenges that were unimaginable a few years ago.

In the contractual sphere, the effects of the new technologies could be shattering, both because of the transactional vocation of smart contracts and because of the presence of self-executing clauses.

Certainly, several advantages derive from the above-mentioned characteristics of smart contracts, which distinguish them from traditional contracts.[41]

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geo-diritto (Laterza: Roma-Bari, 2001), p.182-184; G. Lemme, "Gli *smart contracts* e le tre leggi della robotica", *Analisi Giuridica dell'Economia*, 1 (2019), p.133.

[38] A. M. Gambino, "Vizi e virtù del diritto computazionale", *Il diritto dell'informazione e dell'informatica*, 6 (2019), p.1169.

[39] D. D. Sabato, "Gli *smart contracts*: *robot* che gestiscono il rischio contrattuale", in *Ragionevolezza e proporzionalità nel diritto contemporaneo*, eds., Giovanni Perlingieri and Alessia Fachechi, Napoli: Edizioni Scientifiche Italiane, 2017, p.378-419; Finocchiaro, "Il contratto nell'era dell'intelligenza artificiale", 443; Giaccaglia, "Considerazioni su *Blockchain* e *smart contracts* (oltre le criptovalute)", p.941-970; Stazi, *Automazione contrattuale e contratti intelligenti. Gli 'smart contracts' nel diritto comparato*, p.107.

[40] Bellomia, "Il contratto intelligente: questioni di diritto civile", p.12-15.

[41] See Ettore Di Mauro, "*Smart contract*: disciplina, criticità e risvolti pratici", p.77-80; Holden and Malani, "Can blockchain solve the holdup problem in contracts?", p.24-27; Parola et al., "*Blockchain* e *smart contract*: questioni giuridiche aperte", p.684-685.

Above all, smart contracts have the prerogative of efficiency and speed in the execution of the deal. In fact, since the execution is entrusted to software, they can be executed in real time with a clear saving of time for the contracting party.[42]

Secondly, smart contracts have the advantage of reduced costs. On the one hand, such agreements are not subject to commercial negotiations and, on the other hand, since the execution of the agreement is delegated to a decentralised computer network, they do not require the involvement of a third intermediary party.[43] As a result, there are no transaction or administrative costs.

Moreover, thanks to automatic performance and, consequently, to the certainty that performance will take place as agreed according to the consent mechanism, the costs of monitoring performance and the number of disputes that may arise are reduced. The same concept of performance thus changes. While the traditional contract remains subject to uncertainty, since the contracting parties may not perform – obviously if they are prepared to face the legal consequences of their non-performance –, the structure of the smart contract is impervious to voluntary non-compliance with contractual clauses[44] and performance is not dependent on the human factor.[45] The occurrence of the given condition gives rise to the event.[46]

Another positive aspect is the care taken in setting up the contract. As a result, since there is no human intervention and the agreement operates transparently, the execution of the smart contract is less inclined to errors and the risk of manipulation or fraud.[47]

One more advantage is clarity in the drafting of the agreement. In traditional contracts, the inherent ambiguity of natural language and any misinterpretation of the contract itself may lead to disputes or may be used instrumentally by one of the contracting parties to free itself from contractual conditions that it no longer wishes to respect. Not like that in smart contract. In smart contracts, indeed, this risk is averted by the fact

[42] Parola et al., "*Blockchain* e *smart contract*: questioni giuridiche aperte", p.684.
[43] Di Mauro, "*Smart contract*: disciplina, criticità e risvolti pratici", p.79; Parola et al., "*Blockchain* e *smart contract*: questioni giuridiche aperte", p.684.
[44] Cuccuru, "'Blockchain' ed automazione contrattuale. Riflessione sugli 'smart contract'", p.112; Di Mauro, "*Smart contract*: disciplina, criticità e risvolti pratici", p.78.
[45] Rinaldi, "*Smart contract:* meccanizzazione del contratto nel paradigma della *blockchain*", p.356.
[46] Di Sabato, "Gli *smart contracts*: *robot* che gestiscono il rischio contrattuale, p.400.
[47] Di Mauro, "*Smart contract*: disciplina, criticità e risvolti pratici", p.79.

that the dispositive provisions are incorporated in the computer code, whose language is unambiguous and highly predictable.[48]

In the face of these positive aspects, which in some ways give the contracting party a new individual centrality, critical aspects emerge, however, which call for serious reflection.

The unfavourable aspects are linked to the very characteristics of the digital system and the decentralised architecture in which smart contracts operate.[49]

Firstly, there is the problem of language. While the traditional contract is characterised by the comprehensibility, flexibility and pliability of natural language, the smart contract is characterised by the rigid binary dialectics of the programming code and the consequent immutability of the language.[50]

In addition, it must be considered that most people do not possess a high level of computer and programming skills. Therefore, to draw up an IT agreement, which must obviously include all the requests of the contracting parties in relation to their multiple interests, the collaboration and participation of persons capable of writing and reading algorithms is required.[51] This has some inevitable negative effects, such as the difficulty of authentically translating the will of the contracting parties and the possibility of agreements affected by errors, defects or vulnerabilities.[52] Furthermore, this can lead to additional costs, even if contained in the case of highly standardised agreements.[53]

Lastly, due to the rigidity of the code and the structural decentralisation of smart contracts, there is a risk of creating a self-referential system, resistant to external controls, even legitimate ones.[54]

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[48] Di Mauro, "*Smart contract*: disciplina, criticità e risvolti pratici", p.79-80.
[49] Di Mauro, "*Smart contract*: disciplina, criticità e risvolti pratici", p.81-86; Rinaldi, "*Smart contract:* meccanizzazione del contratto nel paradigma della *blockchain*", p.357-365.
[50] Di Mauro, "*Smart contract*: disciplina, criticità e risvolti pratici", p.80-81; Finocchiaro, "Il contratto nell'era dell'intelligenza artificiale", p.455-456; Lorenzo Piatti, "Dal Codice Civile al codice binario: blockchain e smart contracts", *Ciberspazio e Diritto*, 3 (2016), p.325-344; Rinaldi, "*Smart contract:* meccanizzazione del contratto nel paradigma della *blockchain*", p.357-358.
[51] Di Mauro, "*Smart contract*: disciplina, criticità e risvolti pratici", p.81; Cuccuru, "'Blockchain' ed automazione contrattuale. Riflessione sugli 'smart contract'", p.114; Manente, "*Blockchain*: la pretesa di sostituire il notaio", p.217-218.
[52] Rinaldi, "*Smart contract:* meccanizzazione del contratto nel paradigma della *blockchain*", p.360.
[53] Di Mauro, "*Smart contract*: disciplina, criticità e risvolti pratici", p.83.
[54] Di Mauro, "*Smart contract*: disciplina, criticità e risvolti pratici", p.83.

Moreover, because of the irrevocability, irreversibility and immutability of the automated relationships and their effects, in the event of unlawful, flawed or otherwise unfair agreements, the contracting parties would not be able to resort to self-defence instruments.[55]

Conclusions

In view of the above, there can be no doubt that the impact of technology on society, on the economy and on the circulation of wealth is a powerful and, in some ways, overbearing factor capable of bringing about changes of enormous scale.

Likewise, there can be no doubt that contractual automation, which is already in place at present, will become increasingly consolidated and developed in the future, especially for certain types of transactions, and that more and more citizens will use automated contracts in the regulation and execution of their economic relations.

Now, although the systematic placement of smart contracts presents – at least in the Italian legal system – significant issues on which the debate is rather heated and although there is no shortage of critical aspects determined by the peculiarities and specificities of this tool, it seems undeniable that smart contracts and blockchain technology contain an innovative potential to be taken into due account and to be observed and monitored carefully in the near future. This is also essential in order to provide adequate forms of protection for the interests at stake.

In this context, ample space could be reserved for a new conception of contractual relations, whereby, on the one hand, the individual contracting party is enabled, through the easy use of digital tools, to conclude, according to his or her own negotiating will, even very complex transactions and, on the other hand, the certainty of the fairness of the negotiation itself is ensured and adequate tools are provided to protect the contractual position of all contracting parties.

In a word, through a skilful use of technology, a renewed impetus could be given to the concept of contractual autonomy and to the centrality of the contracting party at every stage of negotiation, from the formation of consent to the execution of the agreement.

[55] Cuccuru, "'Blockchain' ed automazione contrattuale. Riflessione sugli 'smart contract'", p.116; Di Mauro, "Smart contract: disciplina, criticità e risvolti pratici", p.83; Rinaldi, "Smart contract: meccanizzazione del contratto nel paradigma della blockchain", p.362.

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7 The Identification of Potential Criminals from Phrenology to Artificial Intelligence

Giovanna Palermo

Introduction

The need to find parameters to be used for identifying potential criminals has seen the emergence of various studies and analyzes over time. The search in different eras for visible signs of the criminal tendency finds its foundation in man's need to recognize *de visu* the criminal, the one who cannot be trusted and who is afraid of. The need to tangibly recognize the delinquent man therefore finds its origin in the most primordial survival instinct.

This is the context of the phrenological approach to the study of delinquency which saw its creator and popularizer in the German doctor Franz Joseph Gall.[1] With his theory of "cerebral localizations", Gall[2] and

[1] Giovanna Palermo, "Criminalità e psicopatologia. La sindrome da molestatore assillante", *Rivista Italiana di Conflittologia* (2019), p.39; Claudio Pogliano, *Storie di cervelli. Dall'antichità al Novecento*, Milano: Editrice Bibliografica, 2017.

[2] F. J. Gall, *Sur les fonctions du cerveau et sur celles de chacune de ses parties. avec des observations sur la possibilité de reconnaitre les instincts, les penchans, les talens, ou les dispositions morales et intellectuelles des hommes et des animaux, par la configuration de leur cerveau et de leur tête*, Paris: Chez J-B. Baillière, 1822; F. J. Gall, *Organologie ou exposition des instincts, des penchans, des sentimens et des talens, ou des qualits morales et des facult s intellectuelles fondamentales de l'homme et des animaux, et du sige de leurs organes*, Paris: Chez J-B. Baillière, 1822. "Gall in particular advances the idea that there is a parallelism between the embryological development of the cranial bones and the underlying cortex, so that a different development of the various brain zones (responsible for the different inclinations) would correspond to similar modifications of the cranial vault", Giovanna Palermo, "Criminality and psychopathology. The profile of stalkers", *Agora International Journal of Juridical Sciences*, 12/2 (2018), p.77. Gall argued, in fact, that a person's strengths and weaknesses, morals, inclinations, character and personality could be determined by the physical characteristics of his brain. The German doctor identified 27 brain organs and claimed that certain areas of the brain map corresponded to that person's tendencies to commit criminal or deviant acts. Eg. one area corresponded to the tendency to commit murder, another area corresponded to the tendency to steal, etc.

other phrenologists hypothesized a correlation between the shape of the skull and the intellectual faculties and moral dispositions of the individual, reaching the point of finding the cause crime in the excessive development of the *centers of aggression*, *instinct of ownership*, *religiosity*, etc. Scholars argued that each individual's mental capacity is found in a separate part of the brain and functions independently of the others. They identified different numbers and names of the faculties, but all agreed that the crime was committed when "faculties", such as acquisitiveness and combativeness, had become "disordered". Phrenologists drew conclusions about this from the contours of the skull, assuming that the development of the various faculties or organs of the brain was reflected in the bumps and cavities of the skull.

Phrenology,[3] strongly supported by doctors, has encouraged the so-called "medical model of crime", which interprets criminal behavior as a disease, going so far as to argue that criminals, because they are sick, are not responsible for their behavior, a belief that became the basis for the legal defense of insanity.

Through the mapping of the brain,[4] phrenologists identified the connections between the brain organs, the seat and the external shape of the skull and the possible intellectual and moral references and the consequent behavior. Thus, in the case of hyperactivity, the inclination to fight is linked to the organ of courage, located at the level of the ears and in which the instinct of self defense and property reside; the organ placed above the auditory meatus, in which the carnivorous instinct is located, corresponds to the cruelty and inclination to murder and so on. The phrenological perspective, therefore, for which human behavior depends on a precise anatomical substrate, ends up questioning the traditional conception of the soul and the free will of which the Classical School had become the bearer, nourishing, in Italian criminal law, an idea of psychic deviance that redesigns the procedural treatment of the insane.

Among the Italian phrenologists Luigi Ferrarese, internal doctor of the Royal asylum of Aversa from 1838 to 1843, starting from the observation of human physio-psychological nature, elaborates an ideology of the de-

[3] Phrenology thus provided a biological and sometimes hereditary explanation for the crime. Phrenologist Johann Gaspar Spurzheim argued, for example, that crime could be inherited and that, through reproductive controls, it could be prevented in the next generation.
[4] Gall does not speak of phrenology but of organology, it will then be his pupil Spurzheim to introduce the term phrenology.

linquent and typifies the crimes: "1. In crimes with instinctive dominance and with little reflection and calculation; 2. In crimes with rational dominance with reflection and calculation; 3. In mixed crimes, that is, where instinct and intelligence with reflection and calculation contribute to take part".[5] The first group includes attacks on modesty, excesses of defense, etc., the second includes premeditated crimes, such as slander, fraud, betrayal, conspiracies against governments; while the third includes adulterers and all related crimes, such as the provocation of abortions and infanticides to conceal illegitimate offspring. Crimes of the first type "are more closely related to physical forces, to the influences and developments of internal organs, their diseases, etc." and push man, in the phase of the best physical development, to violence and "attacks on modesty"; those of the second type "have more relationships with moral education, with degrees of education, etc." with bad examples, with idleness and with "irreligion" and finally, those of the third class "(have more relationships) with everything that can have a relationship both to the physical and to the moral".[6] The Lucanian doctor gives as an example of the first case a murder committed on July 19, 1833 by a boy, about nine years old, against a six-year-old girl, "who he threw into the fire, and retained her by force, while the poor she made every effort to escape [...] and before this atrocity he had made other assassination attempts on another girl younger than himself".[7] As an example of a study of the second kind, Ferrarese recalls the case, reported by Filippo Pinel in his *Treatise on madness*, of "that madman, who, wanting to purify men with the baptism of blood, began by slaughtering his own children, and would have done the same with his wife , if she hadn't escaped" and that of Errichetta Cornier, reported by Georget in his *Medico-legal discussions on madness*, guilty of "an attack of *homicidal monomania* that would have merited only imprisonment , custody in a house of *fools* [...]".[8] In the minds of these criminals, according to Ferrarese, we find a growing malice and perfidy, which pushes them to follow a career of immorality and crime, as well as an increase in the *ideal sphere of villainy,* "[...] these insensibly evaded the everything from any dependence on social laws, violating their most sacred rights [...]and even

[5] L. Ferrarese, *Nuove ricerche di sublime Psicologia medico-forense*, Edinburgh, 1845.
[6] Ferrarese, *Nuove ricerche di sublime,* p.84-85.
[7] Ferrarese, *Nuove ricerche di sublime,* p.85.
[8] Ferrarese, *Nuove ricerche di sublime,* p.86

remorse itself, salutary pain of conscience, has been banished".[9] The criminals of the third type, which contain the shortcomings of the first and second class, are the most horrible, they are the true monsters of humanity, capable of combining the impulses that derive from temperament, passions and instinct with intellectual work of the crime and abandoning oneself to *every perverse slope*, to every insane desire. In this classification, the Lucanian doctor highlights the close connection between the moral and juridical responsibility of the offender and the morbid state of the organs.

In the wake of phrenological studies and physiognomy, in the second half of the nineteenth century, Marco Ezechia Lombroso, called Cesare, also influenced by ideas coming from social Darwinism, began to study the bodies of brigands, psychiatric criminals, women and minor criminals in the attempt to uncover the identification traces of potential criminals. The doctor from Verona collected multiple anthropological data (height, head measurements, weight, etc.), which he placed at the basis of what is remembered as one of his main theories, that of the born delinquent.

Thus Lombroso[10] comes to support the existence of a genetic predisposition to crime of inevitably antisocial subjects, which are characterized by some anatomical and psychological peculiarities typical of the atavistic man: facial asymmetry, low forehead, ear anomalies, up to the identification of the median occipital dimple at the base of the skull, on the one hand, and insensitivity to pain, cruelty and lack of moral sense on the other. In the Lombrosian vision, therefore, the potential delinquent could be identified precisely on the basis of his physical and persono-

[9] Ferrarese, *Nuove ricerche di sublime,* p.89.

[10] M. Gibson, *Nati per il crimine. Cesare Lombroso e le origini della criminologia biologica*, Milano: Bruno Mondadori, 2004; C. Lombroso, *L'uomo delinquente in rapporto all'antropologia, alla giurisprudenza e alle discipline carcerarie*, Milano: Hoepli, 1876; C. Lombroso, *L'uomo delinquente in rapporto all'antropologia, alla giurisprudenza e alle discipline carcerarie*, vol. I e II, Torino: Bocca, IV 1889; Gemma Marotta, *Criminologia. Storia, teorie, metodi*, Cedam: Padova, 2017; Pierpaolo Martucci, "All'inizio era il male: determinismo biologico e destino della criminologia di Cesare Lombroso", *Rassegna Italiana di Criminologia*, 42/1 (2013), p.52-61; D. Siegel, *The influence of Lombroso on biological and cultural criminology*. In *L'antropologia criminale di Cesare Lombroso: dall'Ottocento al dibattito filosofico-penale contemporaneo*, eds., L. Picotti and F. Zanuso. Napoli: Edizioni Scientifiche Italiane, 2011.
Lombroso observed hundreds of criminals of the time including Count Robbiati, known for having committed acts of lust with males of all ages, children, adults and the elderly; the Menesclou, who entered the cemeteries at night to unearth the bodies of women and violate "the most rotten corpse" and above all Vincenzo Verzeni, the strangler of Bottanuco and the brigand Villella, whose skull is now exhibited at the Museum of criminal anthropology Cesare Lombroso in Turin.

logical stigmata and the criminal, therefore, a "primordial" man, was predestined for a crime. The search for potential criminals by resorting to the relevance of bio-anthropological factors, led several scholars, after Lombroso, to tackle the issues of criminogenesis in the light of biological knowledge according to a typically naturalistic approach, seeking the causes of delinquent conduct mainly in organic factors, hereditary and in a predisposition to aggression.

Starting from the 1920s, the "constitutional-biotypological phase" developed with the figures of Achille De Giovanni,[11] Giacinto Viola, Ernst Kretschmer, William Sheldon and Nicola Pende. William Sheldon and Ernst Kretschmer, in fact, starting from the somatic aspect, argued that there was a close correlation between physical structure and human behavior, which could make it possible to identify possible criminals.[12]

At the end of the 1930s, Ernest Hooton,[13] with a research conducted over 12 years on over 13,000 inmates, reaffirmed the Lombrosian assumption of the biological and hereditary origin of the criminal tendency.

Leading exponent of the third generation of the Lombrosian school, Benigno Di Tullio,[14] in all his scientific production up to the 1970s, upheld

[11] F. Cassata, *Molti, sani e forti. L'eugenetica in Italia*, Torino:Bollati Boringhieri, 2006. For an in-depth analysis of De Giovanni, considered the founder of the constitutionalist approach in Italy.

[12] W. H. Sheldon, *The varieties of delinquent youth*, New York: Harper, 1949. In particular, Sheldon distinguished three physical types: endomorph, mesomorph and ectomorph. In his research he started by studying and identifying 150 traits, then reduced to 50, arriving at defining 3 main dimensions of temperament: viscerotonia, somatotonia, cerebrotonia. Subsequently he researched the relationship between physical structure and temperament. Between 1939 and 1942 Sheldon carried out research on juvenile delinquency, studying a group of 200 juvenile delinquents hospitalized in a re-education institution (originally 400, then reduced by excluding children with fewer penalties). The average somatotype of these children was calculated and compared with a similar age group of students and it was found that the offenders have a higher frequency of mesomorphic and ectomorphic physique. The Gluecks" studies also moved in this direction between 1950 and 1956.

[13] The American physical anthropologist studied human evolution and so-called racial differentiation, classifying and describing human populations. He identified the relationship between personality and physical type, particularly with respect to criminal behavior.

[14] B. Di Tullio, *Antropologia criminale*, Roma: Pozzi, 1940; B. Di Tullio, *Principi di Criminologia Generale e Clinica con note di psicopatologia sociale*, Roma: Istituto di Medicina Sociale, 1954; Benigno Di Tullio, *Principi di criminologia clinica e psichiatria forense*, Roma: Istituto di Medicina Legale, 1963. Di Tullio had identified three constitutional types: the constitutional offender with a hypo-evolved orientation, who had little intelligence, criticism, logic, little moral sensitivity, egoistic-aggressive instinctual instinct; the constitutional offender with a psycho-neurotic orientation, with neurotic psychic dynamics, and the offender with a psychopathic orientation, with personality disorders and character anomalies. The Molise scholar spoke of "crimes of a prevalently environmental nature such as those of an occasional type; and crimes of a prevalently biological nature, such as those of a constitutional or pathological type", for which it could be "believed that the hereditary factor plays a prevalent

the validity of Lombrosian biological determinism. The Molise scholar considered man "as a unitary compound in which the hereditary and acquired, biological and psychological, social and cultural forces are closely fused with each other, so that only the in-depth study of the single case can make known the real importance that belongs to the various factors of crime".[15] Di Tullio, however, while recalling that Lombroso had been the one who had started the studies on the delinquent in a bio-anthropological key, also recalled that eclectic phase of the Veronese doctor "in which equal importance is given to both biological and social theories".[16]

In the 1980s, the attempt to explain crime in a biological way saw the start of several studies in neurology and physiological psychology that tried to explain violent criminal behavior on a hereditary basis. Among the studies we remember those on the delinquency of biological parents, which would have a prevalent influence on adopted subjects compared to that of adoptive parents.[17] In particular, some neurophysiological studies have highlighted relationships between neurological defects (congenital or acquired) and propensity to aggression, defects which would be more frequent in violent criminals. In 1975 Fromm[18] distinguished a *benign-defensive aggression,* understood as an instinctual impulse programmed towards attack or flight, when vital biological interests are at stake, useful for survival, from a *malignant or destructive aggression*, which, instead, independent of instinct, would be the result of learning through interper-

part precisely in the genesis of what constitutes the phenomenon of the predisposition of crime", but "it must remain clear that the original or hereditary dispositional factor alone is not sufficient to justify the crime, whose development is always matched by the equally determinative action of the environmental factor". Benigno Di Tullio, *Principî di Criminologia Generale e Clinica e Psicopatologia Sociale*, Roma: Istituto di Medicina Sociale, 1971, p.157, 164, 165.

[15] (Benigno Di Tullio, *Principî di Criminologia Generale e Clinica e Psicopatologia Sociale*, Roma: Istituto di Medicina Sociale, 1971, p.88. Di Tullio, however, while recalling that Lombroso had been the one who had started the studies on the delinquent in a bio-anthropological key, also recalled that eclectic phase of the Veronese doctor "in which equal importance is given to both biological and social theories", Di Tullio, 1954, p.22.

In the 1980s, the attempt to explain crime in a biological way saw the start of several studies in neurology and physiological psychology that tried to explain violent criminal behavior on a hereditary basis. p.88.

[16] B. Di Tullio, *Principi di Criminologia Generale e Clinica con note di psicopatologia sociale*, Roma: Istituto di Medicina Sociale, 1954, p.22.

[17] R. R. Crowe, "The adopted offspring of women criminal offenders: A study of their arrest records". *Archives of General Psychiatry*, 27 (1972), p.600–603; S. A. Mednick, et. al. "Genetic influences in criminal convictions: Evidence from an adoption study", *Science* (1984), p.891–894.

[18] E. Fromm, "The anatomy of hu-mandestructiveness". *Contemporary Sociology*, (November 1974).

sonal relationships and would be used to expand one's power.

In modern times, neuroscience has sought to understand how biological and psychological processes interact in the development of aggressive behavior and, as genetic and social determinants, can contribute to the development of pathological forms of aggression. The reappearance of an organological idea at the brain level at the basis of aggression and violence was advanced in the case of Phineas Gage, who became the archetype in support of the theorized correlation between brain injury and subsequent modification of social behavior. The studies started from the analysis of this American worker, employed in the construction of railways, known for an accident that happened to him in 1848, who survived the wound inflicted on him by a metal rod that pierced his skull. After the accident, however, he had become a different person: intractable, devoid of verbal inhibitions, angry and antisocial, unable to assess the risks of his actions.

In 1928 Schlapp[19] and Smith argued that individuals suffering from endocrine disorders can be considered typical Lombrosian-born delinquents. The two scholars explained the particularly high rate of crime in the first generation of Americans born to foreign immigrants, with the transmission to the children of glandular disorders of the mothers, caused by the stress suffered by the travel, the initial impact with the foreign country and the economic worries. By identifying the cause of their criminality in the transmission of glandular disorders, Schlapp and Smith, unlike Lombroso, believed that this condition could change or in any case a therapy could be foreseen.

With the development of neuroimaging techniques, new research on the biological basis of crime has been stimulated. They analyzed the relationship between neuronal mechanisms,[20] aggression and violent behavior.

Specifically, Adrian Raine, a neuroscientist at the University of Pennsylvania, analyzed 792 killers with antisocial personality disorder and found that their prefrontal cerebral cortex was significantly smaller than that of the control group and that they had damage to the brain structures

[19] M. G. Schlapp and E. H. Smith, "The New Criminology", *International Journal of Psychoanalysis* (1928), p.314.

[20] The opportunity to examine neuronal morphology made it possible to recognize the role of a variety of brain regions in the development of aggression and violent behavior.

responsible for make moral judgments.[21]

Several studies have been conducted to understand whether aggressive and / or violent people have structural or functional alterations of the brain. Among these, the study "of 279 brain-damaged Vietnam War veterans revealed that those who had sustained injuries to the orbitofrontal cortex (OFC) and medial region of the PFC were more irritable, hostile and aggressive than controls.[22] Through other study methodologies, the researchers confirmed the existence of a strong link between the frontal cortex, aggression and violence (Bufkin & Luttrell, 2005)".[23]

There are two fundamental reasons behind this relationship between genes and human aggression: first of all, the circumstance, highlighted by Raine (Raine, et al., 2000, 119-127), that the alterations of the prefrontal cortex, found in aggressive subjects, cannot be justified by other environmental risk factors for antisocial conduct; then, as evidenced by Thompson (Thompson et al., 2001, 1253-1258), the fact that the research has shown that genetics explain 90% of the gray matter volume change in the prefrontal cortex.

> In view of these results on the possible role of genetics in the development of aggression and violence and on the basis of the new perspectives opened by molecular investigations, numerous researches have tried to identify the specific genes that contribute to orienting behavior, and in particular that violent. The starting point for these investigations was to be able to identify the possible biochemical pathways related to aggression and violence, among which those with greater scientific evidence are represented by sex hormones, stress and the HPA axis (hypothalamus- pituitary-adrenal), metabolic imbalances (hypoglycemia) and, above all, neurotransmitters (serotonin and dopamine) (Craig & Halton, 2009).[24]

These studies are aimed at verifying whether and how biological and

[21] A. Raine, et. al., "Reduced prefrontal gray matter volume and reduced autonomic activity in antisocial personality disorder", *Archives of General Psychiatry* 57 (2000), p.119-127; A. Raine, et. al., "Sex differences in orbitofrontal gray as a partial explanation for sex differences in antisocial personality". *Molecular Psychiatry,* 16/2 (2009), p.227-236; A. Raine, "From genes to brain to antisocial behavior. Current Directions". *Psychological Science*, 16/2 (2008), p.227-36; Id. *The anatomy of violence: the biological roots of crime*, New York: Pantheon Books, 2013.
[22] Jordanm et. al., "Frontal lobe injuries, violence, and aggression: A report of the Vietnam Head Injury Study". *Neurology*, 46 (1996), p.1231-1238.
[23] U. Gatti and G. Rocca, "Il comportamento violento tra biologia ed ambiente: la criminologia verso un "nuovo" approccio biosociale?", *Rassegna Italiana di Criminologia*, VI (2013), p.26.
[24] Gatti and Rocca, "Il comportamento", p.24.

psychological processes, as also genetic determinants, affect aggressive behaviors in order to identify potential criminals, through the use of the most modern brain imaging technologies.

The value of genetic factors on the tendency to crime is now also the subject of the most recent studies of epigenetics, through which the mechanisms responsible for heritable changes in the functions of the genome without modifications in the DNA sequence are analyzed. More than a century has passed since studies began to research biological and anthropological factors as the main or prevalent cause of the tendency to commit crime and today the new instruments seem to offer new possibilities for identifying potential criminals. In particular, artificial intelligence[25] now makes it possible to use methodologies and techniques that find applications in different sectors of our life and, for what interests us here, to identify "future criminals".

Artificial intelligence, according to an internationally accepted definition, is a discipline, typical of computer science, which, as Somalvico[26] notes, "studies the theoretical foundations, methodologies and techniques that allow the design of hardware systems and software program systems capable of providing to the electronic computer performances that, to a common observer, would seem to be of exclusive relevance of human intelligence".[27] Artificial intelligence has evolved and spread in many areas of ordinary life and also in the criminal and investigative fields.[28] Several

[25] The term was used for the first time in 1956, in the context of the Dartmouth Conference.
[26] An independent group of 52 high-level experts, appointed by the European Commission in June 2018 with advisory functions on artificial intelligence, defined it as "artificial intelligence (AI) systems are software (and possibly also hardware) systems designed by humans3 that, given a complex goal, act in the physical or digital dimension by perceiving their environment through data acquisition, interpreting the collected structured or unstructured data, reasoning on the knowledge, or processing the information, derived from this data and deciding the best action(s) to take to achieve the given goal. AI systems can either use symbolic rules or learn a numeric model, and they can also adapt their behaviour by analysing how the environment is affected by their previous actions. As a scientific discipline, AI includes several approaches and techniques, such as machine learning (of which deep learning and reinforcement learning are specific examples), machine reasoning (which includes planning, scheduling, knowledge representation and reasoning, search, and optimization), and robotics (which includes control, perception, sensors and actuators, as well as the integration of all other techniques into cyber-physical systems)". Una definizione di IA: principali capacità e discipline scientifiche, Commissione europea B-1049 Bruxelles, p.6.
[27] M. Somalvico, *Intelligenza artificiale*, Milano: Rusconi Editore, 1987; Id., *Intelligenza Artificiale*, Roma: Enciclopedia Treccani, 1991.
[28] In the presentation document of the Annual Conference of Police Experts, organized by the OSCE, dedicated in 2019 to the theme "Artificial Intelligence and Law Enforcement", one can read: "in their efforts to increase efficiency and effectiveness and to stay on top In

researches[29] have, in fact, underlined how artificial intelligence has had a strong impact in various criminal areas. In particular, a research by University College London[30] has identified 18 different types of crime that can be committed with the aid of AI: the classic counterfeiting of money, drug trafficking and more "technological" crimes. A particularly dangerous crime that tends to take hold more and more is the creation of *deepfake videos*,[31] that is, fake videos to spread fake news, manipulate public opinion, pilot voting intentions, destabilize governments.

In the financial field, a certain concern has emerged in common law systems for the use of AI systems in the so-called *cartel offences*,[32] i.e. the attempt to manipulate the market through the so-called social bots (software that simulate being human users). The type of cartell offense was introduced with the intention of preventing and possibly punishing agreements that could compromise the free market and, therefore, be contrary to the principle of competition. The reference is to the so-called *hard core cartels*, which provide for agreements for fixing prices, managing markets and customers, limiting production or supply, or even manipulating offers. Among these illicit agreements we recall the case of that type of fraud

step with technological innovations, authorities and law enforcement agencies around the world are increasingly exploring the potential of AI for their work. The growing amount of data obtained and archived by the police has also required more sophisticated methods and tools for their management and analysis, for the identification of patterns, the prediction of risks and the development of strategies to allocate human and where they are most needed. Although the use of AI in law enforcement work is a relatively new topic, some tools based on artificial intelligence have already been tested and are even actively used by police services in different countries around the world. These include video and image analysis software, facial recognition systems, biometric identification, autonomous drones and other robots, and predictive analytics tools to predict crime "hot spots" or even to identify potential future criminals, particularly criminals. highly dangerous".

[29] T C. King, et. al., "Artificial intelligence crime: An interdisciplinary analysis of foreseeable threats and solutions", *Science and Engineering Ethics*, *9979*/2 (2019), p.159.

[30] Matthew Caldwell, Jerone T. A. Andrews, Thomas Tanay and Lewis D. Griffin, "AI-enabled future crime", *Crime Science Journal* (August 2020), p.14.

[31] We remember the deep fake, which exploits the potential of artificial intelligence to make famous people move and speak with the words and faces of others.

[32] In particular, the crime of cartel offences was provided for by the Enterprise Act 2002 in the United Kingdom and provided for severe penalties but in fact remained inapplicable. Between 2003 and 2012, only one criminal case was initiated against individuals involved in the Marine Hose cartel. The reason for the difficulty of attributing this crime to those who acted to manipulate the market was found in the difficulty of proving that an individual had acted dishonestly. So in 2012 the government decided to eliminate the requirement of dishonesty and therefore broaden the scope of the crime. In Italy the crime of market manipulation has been introduced pursuant to art. 185 Legislative Decree 24 February 1998 n. 58 (TUF) to punish conduct capable of causing an alteration in the price of financial instruments.

known as pump and dump, which is expressed in raising, through false or misleading statements, the price of a bond, purchased at a reasonable price, to sell it at a higher price. This type of fraud occurs particularly in the cryptocurrency sector.

> The relative anonymity of crypto space has led it to become a breeding ground for illicit activities, such as currency theft (eg hack DAO), Ponzi schemes and pump-and-dump schemes that have gained popularity in cryptocurrency markets. in the last few years. Thanks to their end-to-end cryptography, programmability and relative anonymity, new social media tools, such as Telegram and Discord, have become the preferred communication vehicles for cryptocurrency enthusiasts.[33]

The research carried out by Jiahua Xu and Benjamin Livshits at Imperial College London, which led them to the creation of an algorithm[34] capable of predicting when pump-and-dump schemes are in place, appears to be relevant. The two scholars analyzed 412 pump-and-dump activities organized in Telegram channels from June 17, 2018 to February 26, 2019 and discovered patterns in crypto-markets associated with pump-and-dump schemes. In particular, they highlighted that the created algorithm is able to identify suspicious activities and among these, in particular, those that respond to the pump and dump scheme.

Social bots, as well as in the so-called *cartel offences*,[35] can be used as tools of harassment, direct or indirect: retweeting or liking negative tweets, for example, to invent a certain image of a person. We recall the case of Microsoft's "Tay" twitter, which from interacting with other users learned to make offensive and obscene tweets against a feminist activist.

Another area in which artificial intelligence is used is that of drug traf-

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[33] Jiahua Xu and Benjamin Livshits, "The Anatomy of a Cryptocurrency Pump-and-Dump Scheme", *Trading and Market Microstructure* (August 2019), p.1.

[34] This is a model that predicts the likelihood of pumping all listed coins in a crypto exchange before a "pump".

[35] In particular, the crime of cartel offences was foreseen by the Enterprise Act 2002 in the United Kingdom and provided for severe penalties, but in fact it remained inapplicable. Between 2003 and 2012, only one criminal case was initiated against individuals involved in the Marine Hose cartel. The reason for the difficulty of attributing this crime to those who acted to manipulate the market was found in the difficulty of proving that an individual had acted dishonestly. So in 2012 the government decided to eliminate the requirement of dishonesty and therefore broaden the scope of the crime. In Italy the crime of market manipulation has been introduced pursuant to art. 185 Legislative Decree 24 February 1998 n. 58 (TUF) to punish conduct capable of causing an alteration in the price of financial instruments.

ficking, the so-called business to business: remotely controlled drones and submarines allow to import, export and deliver drugs invisibly. For example, a case that is being watched today concerns the delivery of drugs in prisons, using small drones that are able to enter the prisoners' cells directly through the windows, avoiding all possible controls.

The potential criminal uses of artificial intelligence were examined in 2020 in the report developed by Europol, the United Nations Interregional Institute for Research on Crime and Justice (UNICRI) and Trend Micro, a leader in cyber security. It emerged that while "artificial intelligence promises to the world greater efficiency, automation and autonomy",[36] on the other hand it can be used in the criminal sphere to maximize opportunities and create additional innovative illegal activities. On this point, the report distinguishes the *harmful uses of artificial intelligence* from *abuses*: the former are typical of those criminals who use artificial intelligence for their activities; abuses, on the other hand, relate to cases in which crime attacks and exploits existing AI systems. Artificial intelligence, therefore, opens the way to new types of criminals, but at the same time it can be a valid investigative tool, to fight crime, with the possibility of using its technologies to identify potential offenders. In fact, thanks to its automatisms, the study of data and certain variables, AI is able to identify potential criminals.[37]

The Strategic Decision Support Centers (SDSCs) project was created in Chicago, it sees the local police collaborate with the Crime Lab & Education Lab of the University Of Chicago, to exploit the data, technology and human intelligence available "to make real progress on public safety and promoting trust between the police and the community".[38] For years, the *Crime Lab & Education Lab*[39] has been studying and analyzing data from the murders of previous years, in particular the crime patterns, the actual incidence of crimes, the number of arrests and the maps of the areas where the most crimes are committed. With the help of Big Data and machine learning, they are able to provide the local police with information on the timing and places where new killers could occur, in order

[36] So says Edvardas Šileris, head of Europol's European Cybercrime Center, in *New report finds that criminals leverage AI for malicious use – and it's not just deep fakes*, 2020.
[37] In this regard, we recall Steven Spielberg's film Minority Report of 2002, set in Washington in 2054, in which a computer system, the "Precrime", allowed to foresee future murders and arrest those who had the intention to commit them.
[38] https://urbanlabs.uchicago.edu/programs/strategic-decision-support-centers-sdscs.
[39] The need to create a network to prevent crimes arose in consideration of the high number of murders in the city: in 2016, Chicago suffered 769 murders, an increase of almost 60% compared to 2015.

to allow them to set up an intensification of the control of certain areas thus identified. In addition to predicting the places and times of any future murders, an attempt is also made to identify who could commit other types of crime, using a list of potential offenders, created following an analysis of some data: history of arrests, reasons for arrest , latest arrests, age at which the offense was committed and number of offenses committed. Therefore, only objective data are used to identify the subjects most at risk and the limit of this methodology is precisely that of taking into consideration only those who have already committed at least one crime.

Alongside this use of AI to provide predictive police systems, the use to create forms of biometric mass surveillance should not be underestimated. On this point, the resolution of the European Parliament adopted on 6 October 2021 on artificial intelligence in criminal law and on its use by the police[40] and judicial authorities in criminal matters, focuses, among other things, on the risks of discrimination deriving from use of AI, on predictive policing systems and the ban on biometric mass surveillance.

Physiognomy, long criticized from a positivistic perspective, today seems to find a new affirmation thanks to AI and the adoption of computer techniques capable of distinguishing the motive state and, therefore, the intentions of individuals from face analysis. Innovative in this regard are the studies of predictive analysis, facial recognition technologies and other aspects related to artificial intelligence (AI), used to develop a facial recognition system useful for predicting whether a person will commit a crime. The Chinese company Cloud Walk Technology has devised a system that analyzes both the face and the way people move, to detect suspicious or unusual behavior, such as, for example, walking in the same area back and forth for some time. This system, which can immediately identify suspects, is already networked with a police database of more than 50 Chinese cities and provinces.

Also interesting is the experiment carried out since 2013 in the United Kingdom, in the city of Durham, where an artificial intelligence system, called Hart (Harm Assessment Risk Tool) is used. It, by collecting data from 2008 to 2012 on criminals, tries to predict whether a person is at low, medium or high risk of committing a crime. A system of predictive crime algorithms has also been used in Italy since 2007, it is called KeyCrime

[40] Useful for preventive purposes are the new "smart" cameras, which are able to do a better scan of car license plates, face recognition (useful for looking for potential criminals) and the identification of anomalies, such as the presence of bags left unattended.

and was designed by the former assistant chief of the Milan Police Headquarters Mario Venturi. The system, created to combat robberies in the commercial field, differs from the others used in the international field, because its fundamental characteristic is to analyze the data available to correlate different crimes and determine which ones were committed by the same person or group of people. It is the cd. crime linking, which makes it possible to identify the repetitiveness of criminal conduct of some subjects and predict where they will carry out subsequent illegal activities.

The attempt to recognize potential criminals from facial features, which brings to mind the physiognomy studies of a couple of centuries ago, prompted two Chinese scientists from Shanghai Jiao Tong University, Xiaolin Wu and Xi Zhang,[41] to exploit the technologies of AI, in particular some special algorithms, to compare a series of faces of criminals with those of non-criminals to try to understand if a neural network was able to reliably distinguish them. It emerged that the system is able to give results with an accuracy of 89.5 percent.

The two scientists for the first time studied:

> Automated inference on criminality based solely on still face images, which is free of any biases of subjective judgments of human observers. Via supervised machine learning, we build four classifiers (logistic regression, KNN, SVM, CNN) using facial images of 1856 real persons controlled for race, gender, age and facial expressions, nearly half of whom were convicted criminals, for discriminating between criminals and noncriminals. All four classifiers perform consistently well and empirically establish the validity of automated face-induced inference on criminality … the most important discovery of this research is that criminal and non-criminal face images populate two quite distinctive manifolds. The variation among criminal faces is significantly greater than that of the non-criminal faces. The two manifolds consisting of criminal and non-criminal faces appear to be concentric, with the non-criminal manifold lying in the kernel with a smaller span, exhibiting a law of "normality" for faces of non-criminals. In other words, the faces of general law-biding public have a greater degree of resemblance compared with the

[41] X. Wu and X. X. Zhang, "Automated Inference on Criminality using Face Images", *Computer science* (2016): arXiv preprint arXiv:1611.04135.

faces of criminals, or criminals have a higher degree.[42]

As the phrenologists and Lombroso tried to identify potential criminals using anthropometric measures, physical and personological stigmata, so over time other possible indicators have been sought and today the use of AI, in a scenario of *Minority Report* and new physiognomy, opens up new perspectives of study and research, the results of which are already beginning to be visible and in the coming decades will most likely ensure the creation of databases of potential high-risk criminals.

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[42] Wu and Zhang, "Automated Inference", p.4038-4052.

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Society 5.0 Vision in Contemporary Inequal World

Emine Elif Ayhan and Çaglar Akar

Introduction

Poverty is a multidimensional and complex concept that aims to make sense of the levels of deprivation faced by an individual, household, or community. Inadequate access of the poor to resources and technology causes the production to be energy-intensive and increases the time spent in production activities. Jobs that require a lot of time and have low productivity are performed by poor segments of society. Especially children and women involve in these activities and are deprived because of technical inefficiency. Society 5.0 is a global vision that covers all humanity. Society 5.0 vision is a super-intelligent, human-centric, and technology-oriented approach for all. Society 5.0 does not only provide a mindset through improvements of countries in science and technology but also transforms countries' perceptions of political and economic fields in order to create the society of the future.

Poverty and Society 5.0

Poverty is generally regarded as a measure of the lack of basic needs in daily life of individual, household and community for their basic standard of living. Poverty can be measured in terms of lack of income or assets or capabilities like skills, knowledge and technology or it can cover all. Although poverty literature generally focuses on facts such as income, food, and shelter, the choice of indicators to measure need levels can be ambiguous and can't represent all basic needs. This difference leads the definition of poverty to enlarge to include social exclusion, and vulnerability in the development strategy.[1]

[1] Development Initiatives, Definitions and Measures of Poverty, 2016, accessed 2021. http://devinit.org/wp-content/uploads/2016/07/Definitions-and-measures-of-poverty.pdf.

Poverty is based not only on income level but it also covers indicators that directly related to deprivations experienced by society. Therefore, these priorities aim to popularize the poverty definition to relate poverty with social exclusion. This raises several reasons for the need to provide non-monetary poverty measures. There is a connection between poverty and deprivation of the things necessary for life. This deprivation has to do with what is necessary for life or for sustaining life. The concept of poverty always brings up the comparison of the observed situation with the standard (normative) situation, as the things necessary to sustain life will vary depending on the people, the society, the environment, and the conditions.

The aim of society 5.0 in the context of poverty is to balance economic progress with the solution of social problems. It is also to use technology for this purpose. It is to create technologies and systems that will pioneer and disseminate these technologies in the balancing process. Society 5.0, results as technologic and innovative global society that can create solutions for emerging problems and these crises can be overcome by innovative mindset that Society 5.0 vision has.

Different Approaches to Poverty

Poverty is a phenomenon that is difficult to define, which is affected by many factors and can be observed from many different angles. Since it can be observed from different perspectives, different definitions of poverty can depend on the perspective adopted and the points that need to be emphasized. Among the wide variety of possible studies, poverty can be classified as objective and subjective poverty; likewise, we can speak of absolute and relative poverty in accordance with the threshold selected. In addition, poverty is handled with social exclusion, bringing the multidimensional poverty phenomenon to the agenda.

Each of these point of views to handle poverty problem offers a different dimension on poverty. Different approaches provide rich information and multiple perspectives that must be combined to overview the whole poverty and inequality matter that adversely affect the whole world. Regarding this, we have created the following headings.

Absolute- Relative Poverty

The most general definition of absolute poverty; is a concept that ex-

plains the deprivation of basic human needs such as nutrition, health, shelter, access to clean drinking water, and education. The concept has an absolute feature as it takes into account the minimum food baskets or calories that a person must have to continue his life. To measure absolute poverty, it is necessary to determine the basic consumption needs of individuals to sustain their lives. Thus, the absolute poverty line is determined. Ravallion defines the absolute poverty line in two stages. The first stage is concerned with determining the level of benefit that represents the minimum standard of living. The second stage is the drawing of a monetary boundary using the level of utility determined between the poor and the non-poor.[2]

Relative poverty is defined by comparing the ability of individuals in society to meet their needs. According to this concept, the poverty of individuals depends not only on their income but also on the incomes of other individuals in society. In this case, while determining the relative poverty line; either the low-income segment of the population is taken, or a limit is determined at the average income level and those who fall below this limit are called the poor segment.[3] A person is considered poor relatively if his monetary earnings is lower when its compared to standard income of the community. The true cost of social inclusion goes hand in hand with living standards. Therefore, the relative poverty line is set in accordance with income standard of the country in question. For example, most OECD countries use a relative threshold that corresponds to a fraction of the average or median income.[4]

Objective- Subjective Poverty

An objective approach to the definition of poverty includes what causes poverty and predetermined assessments on the fight against poverty. Objective poverty includes normative observations and judgments about what creates poverty and what needs to be done to reduce poverty. It focuses on individuals' access to different types of resources.[5]

[2] M. Ravallion, *Poverty Lines in Theory and Practice*, World Bank Publications, 1998.
[3] H. Memiş, "Küreselleşme ve Yoksulluk İlişkisi", *Akademik Yaklaşımlar Dergisi*, 5/1 (2014), p.148.
[4] B. Decerf, "Combining Absolute and Relative Poverty: Income Poverty Measurement with two Poverty Lines", *Social Choice and Welfare,* 56 (2021), p.326.
[5] P. Saunders, *Welfare and Inequality: National and International Perspectives on the Australian Welfare State*, Cambridge University Press, 1994, p.223.

Subjective poverty is the idea people have about their standard of living. Most people feel poor if the people around them have more of them. The subjective approach, on the other hand, focuses on people's preferences in defining poverty. Subjective poverty, based on the concept of felt poverty, is not a widely used concept. Subjective measures generally refer to indicators of the standard of living that individuals in society truly enjoy. This concept focuses on people's preferences and how much they value goods and services.[6]

Due to the difficulties encountered in calculating the total benefit obtained by individuals, an objective approach is adopted to calculate the severity of poverty. According to the objective approach, people cannot always evaluate what is best for them. For example, almost all the methods used in the measurement of poverty adopt an objective approach and focus on the minimum nutritional requirement. However, people have very different evaluations and preferences about the amount and types of food they consume. While some people prefer the bundle of food that is necessary for their survival, others may focus on the bundle of food that is not important for their physical survival. For this reason, the subjective approach that leaves the definition of poverty to the evaluations of individuals and households can lead to significant problems and confusion in the measurement of poverty.[7]

Multi-Dimensional Poverty

The concept that is closely related to social exclusion and can be associated with lack of access or deprivation to goods and services that are urgent for community, regardless of being basic needs or not, can be labelled as multidimensional poverty. In this case, poverty can also be measured by non-monetary variables and deprivation indicators. It is important to understand that poverty is a term that can be interpreted in many different ways and is the result of multiple variables. Therefore, it is not possible to explain the term in a single and absolute way. Each definition requires different analysis method to acquire exact meaning.

It is crucial to express the importance of conducting poverty analyses

[6] M. Lačný, "Approaches to Subjective Poverty in Economic and Sociological Research", *Human Affairs*, 30/3 (2020), p.417-418.
[7] C. C. Aktan, and İ. Y. Vural, "Yoksulluk: Terminoloji, Temel Kavramlar ve Ölçüm Yöntemleri", in *Yoksullukla Mücadele Stratejileri*, ed., Coşkun Can Aktan, Ankara: Hak-İş Konfederasyonu Yayınları, 2002.

that take into account the different perspectives and multidimensional dimensions of the problem. Many articles tried to benefit from the basic methods of measuring poverty, but researches have an income focus in some parts and are based on monetary dimension or income subjectively fixed by households. Income is considered a good proxy variable for resources of household and a way to reach living standard. For that reason, there is a need to provide alternative poverty measures was asserted.[8]

Monetary poverty standard can explain the small part of the phenomenon and accepts that households with the equal income have same living standards. Also, while monetary standards are good indicators in quality of living, it does not show all possible circumstances.

On the other hand, people have different types of incomes that are not showed in monetary poverty standard and this additional income can be used to avoid poverty and to reach an acceptable living standard. These additional revenues can include savings, equity, etc. that can adhere the quality of life and affect poverty in good way. This additional earnings are not directly and uniquely linked to current material wealth, for example, education, family support or friends, access to credit, etc. There is another resource group. In addition to these theoretical examinations, studies have been conducted that analyse the relation between material deprivation and income poverty. These studies make sense of poverty by using both monetary poverty measures and multidimensional deprivation measures.[9]

Theories of Poverty

Literature has different theories related to poverty. All of these theories have contributed to poverty literature and useful in accordance with the meaning attributed to poverty. Concretely, a theory should explain who is poor and why in context of the definition of poverty used. Brady's three classifications of explanations of the causes poverty are accepted in this paper. According to this explanations of the causes of poverty can be classified into three theories: behavioural, structural and political.[10]

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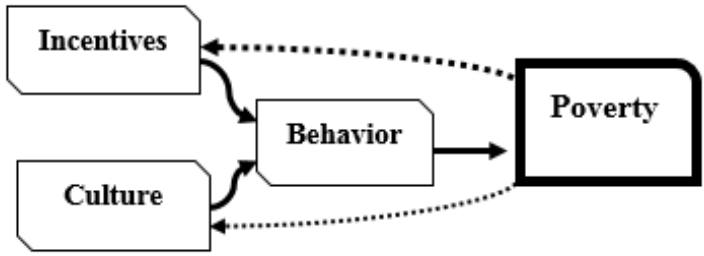
[8] L. Beccaria, and Ana Laura Fernández,"Measuring Multidimensional Poverty Using Households Surveys", *Problemas del Desarrollo*, 51/200 (2020).
[9] L. De, "Poverty and Its Measurement", *Instituto Nacional De Estadistica*, (2017), p.24.
[10] D. Brady, *Rich Democracies, Poor People: How Politics Explain Poverty*, New York: Oxford University Press, 2009.

Behavioral Theories

Some of the poverty traits can be explained structurally, but for the aim of research, these traits appear as beating variables and can be understand as a micro-level. Attributes for behavioural poverty considered may be skills, abilities, habits, family situation, or behaviours, but they can also be education, networks, or family resources. These qualities may be of individual or can be originated socially, but it is crucial to emphasize that some of these qualities have structural reasons, where they are taken as individual variables that each person possesses.[11] According to this explanation, the poor are poor because they engage in unproductive and poverty-increasing behaviours or engage in risks such as unemployment.[12]



Graph 1. Behavioral Theories[13]

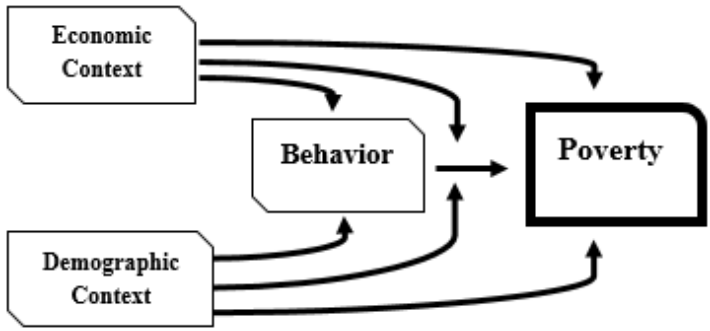
In behavioural theories, the causes of poverty are linked to the main sources of behaviour, in other words, incentives, and culture. With incentives, rational responses of goal-oriented individuals that result in problematic behaviours are addressed. Culture also focuses on behavioural patterns that guide the behaviour of the poor. In this case, the literature on the behavioural causes of poverty can be examined through the interactions between incentives and culture.

Structural Theories

Structuralism in structural theories of poverty refers to demographic and economic contexts at the macro and mezzo levels, representing the op-

[11] D. Calnitsky, "Structural and Individualistic Theories of Poverty", *Sociology Compass*, 12/12 (2018), p.3.
[12] M. Bertrand, Sendhil Mullainathan, and Eldar Shafir, "A Behavioral-Economics View of Poverty", American Economic Review, 94/2 (2004), p.419.
[13] D. Brady, A. Blome, and H. Kleider, "How Politics and Institutions Shape Poverty and Inequality", in The Oxford Handbook of the Social Science of Poverty, eds., David Brady and Linda M. Burton, New York: Oxford University Press, 2016

portunities and constraints available.[14] Researchers have developed what can be called structural theory to make sense of the phenomena that are variously called "the underclass," "the truly disadvantaged," "ghetto poverty," and "the jobless poor".[15] Theorists support this thesis do not perceive the individual as a source of poverty. They accuse the economic, political and social systems and believe that these systems cause individuals to have limited access to the opportunities and resources to earn income and welfare.[16]



Graph 2. Structural Theories[17]

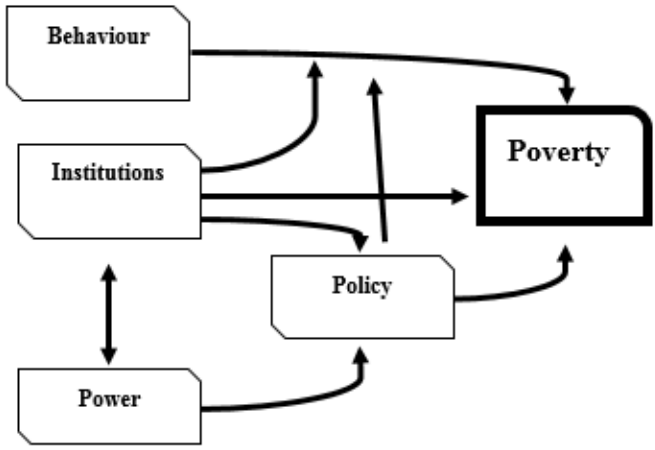
Graph. 2 shows that demographic and economic circumstances drive poverty through three channels. First, indirectly, structural circumstances cause problematic behaviour, which causes to poverty. Second, these mechanisms directly cause poverty, even a web of behaviours. Third, structural circumstances interact with behaviours to ease the behaviour-poverty relationship. This is why structuralists differ from behaviourists because economic and demographic circumstances do not work through behaviour.

Political Theories

Political theories assert that poverty is a political outcome resulted from power relations and collective choices about how resources are redistributed. States have mechanisms to shape poverty. These mechanisms organize the distribution of resources, insuring against risks, investing

[14] Calnitsky, "Structural and Individualistic Theories of Poverty".
[15] Brady, *Rich Democracies*,p.146.
[16] T. K. Bradshaw, *Theories of Poverty and Anti-Poverty Programs in Community Development*, RPRC Working Paper no. 06-05, 2006, p.10.
[17] Brady, Blome, and Kleider, "How Politics".

in talents, allocating opportunities, socializing normative expectations, and disciplining the poor.[18] Government policies affect racial inequalities, because mechanisms of government are responsible for mediating the differences in access to social policies.[19]



Graph 3. Political Theories[20]

Graph. 3 states that policy will strengthen institutions, which can lead to poverty. Power of governance and institutions to inspect the use of power reinforce each other, and institutions directly shape poverty and influence the behaviour-poverty link. Legitimate use of governance and strong institutions can eradicate poverty.

Society 5.0 and Individual Life Satisfaction

Happiness and wealth are phenomena perceived by the individual. Individuals' perceptions of happiness and wealth are defined in the context of social conditions. The lifestyle of the individual depends on how he interacts with society. However, society 5.0 is expected to be different from former societies. Society 5.0 is my future social vision. In Society 5.0, what will people value and what kind of happiness and wealth will they seek, what will poverty look like? Society 5.0 itself is about science and tech-

[18] Brady, Blome, and Kleider, "How Politics", p.128-130.
[19] C. M. Watkins-Hayes, and E. Kovalsky, "The Discourse of Deservingness: Morality and the Dilemmas of Poverty Relief in Debate and Practice", in *The Oxford Handbook of the Social Science of Poverty*, eds., Brady and L. M. Burton, New York: Oxford University Press, 2016, p.193-194.
[20] Brady, Blome, and Kleider, "How Politics".

nology. Thus, the type of society visioned here is the one that manufacture and sales are achieved through innovation and development through technology such as "a high degree of convergence between cyberspace and physical space" and a "super-intelligent society". In addition, the "super-intelligent society" can provide the necessary goods and services to those in need, at the right time and in the right amount; It is a society that can fully respond to a wide variety of social needs and is a society where all kinds of people can easily receive quality service, overcome age, gender, regional and language differences, and lead a vigorous and comfortable life.[21] In other words, society 5.0 is a society that does not have the usual aspects of poverty.

Countries have similarities and differences with each other. These differences affect their poverty situation. Poverty attributions of some countries may be behavioural, while others may be structuralist. For this reason, the causes of poverty can be seen differently. It can be accepted that the attributions of poverty differ according to the development level of the countries. Therefore, it can be said that the development level of countries can affect the appearance of poverty in society 5.0. Because the difference in development between countries will also affect the speed of society reaching 5.0.

The term "developing country" is sometimes used globally, sometimes misleadingly, and is generally used to distinguish non-industrialized countries from industrial countries. Many scholars have defined developing countries as being relatively poor compared to industrial countries in terms of real income and capital per capita.[22] On a global poverty line, poverty in richer countries is negligible. Developed countries can be defined as countries with negligible poverty at such a poverty line.

Society 5.0 is an inclusive society that allows the diversity of choices. Previous societal approaches have inclined to measure poverty by emphasizing economy and productivity rather than taking advantage of the unique characteristics of communities. In previous approaches, it is assumed that people live in monotonous residential environments where opportunities are limited, and there are opinions that they can adapt to a

[21] A. Deguchi et al., "From Monetary to Nonmonetary Society", in *Society 5.0; A People-centric Super-smart Society*, Hitachi-UTokyo Laboratory (H-UTokyo Lab.), Singapore: Springer, 2020, p.132.

[22] Ahmet Ali Karaca, and Bahri Şahin, "Ekonomik Gerikalmışlık ve Ekonomik Dengesizlik Kavramları Üzerine Bir Deneme", *ABMYO Dergisi* (2010), p.16.

stereotypical lifestyle. However, society 5.0 visions a society where people have freedom of choice related to residential environment and lifestyle. In this society people can save time for their hobbies. It is a society where people have access to services that fit to their particular interests, without isolating themselves from society for different preferences or different income levels.[23]

Society 5.0 provides the flexibility necessary to be equal globally in wide variety of cultures. For that reason, vision of Society 5.0 can find solutions for other social problems in different parts of the world.

Poverty and Inequality in Contemporary World: Adaptation to Society 5.0

Ability to use knowledge in the field of innovation and industry is an important asset that countries must acquire in order to be included in today's international trade struggle. With the aim of facilitating integration with international economies and attracting foreign capital to the country, countries make various concessions in order to make their own economies attractive.[24] Although there has been a noticeable improvement in income inequality between developed and developing countries in the last 25 years, there still remains a large income gap between developed and developing countries. For example, when comparing North America and Sub-Saharan African countries, there is a 16-fold income inequality between the two regions.[25] Production is the main driver of the current economic system. Industry 4.0, which forms the basis of today's information age; it exhibits a production-oriented approach that combines technology, production and data network. However, income inequalities and a purely production-oriented approach focus only on production, pushing people out of consideration.[26] It is noticed that income and opportunity inequalities around the world is causing the shortcomings in the production-oriented approach. This shortcomings started the search to place technology and production within the framework of a human-oriented approach. In line with this pursuit, in 2016 Japan Cabinet declared the

[23] A. Deguchi and K. Karasawa, "Issues and Outlook", in *Society 5.0; A People-centric Super-smart Society*, Hitachi-UTokyo Laboratory (H-UTokyo Lab.), Singapore: Springer, 2020, p.164.
[24] B. Erdil Şahin, "Impact of High Technology Export on Economic Growth: An Analysis on Turkey", *Journal of Business, Economics and Finance*, 8/3 (2019), p.165-166.
[25] United Nations, "Inequality – Bridging the Divide", 2021, https://www.un.org/en/un75/inequality-bridging-divide.
[26] C. M. Ferreira, and S. Serpa, "Society 5.0 and Social Development: Contributions to a Discussion", *Management and Organizational Studies,* 5/4 (2018), p.27.

Society 5.0 for the vision of how the new society will be shaped, which is predicted to depend on seventeen Sustainable Development Goals by the United Nations and determined as strategic targets in global context.

Society 5.0 sets out the goal of leaving no one behind in a global context, as outlined in the Sustainable Development Goals. Society 5.0 vision puts forward a common future for the foreseen society, offering solutions to global problems in a global context, access to information in a global context and international partnership, aiming to distribute science, technology and innovations equally to all nations as a goal.[27] Similarly, according to Hayashi et al. with the vision of society 5.0, Japan states that it aims to prepare for the future society in data formats, system integration and trained manpower. At the same time, the society will evaluate that 5.0 will contribute to the Japanese people to keep up with the transformation by contributing to the development of copyright, the provision of international norms, the unification of technology systems, data analysis, virtual intelligence.[28]

While the vision of Society 5.0 aims at the adaptation of all people to technological developments, the income and opportunity inequality between developed and developing countries is an important problem area. Income inequality between developed and developing countries and the unequal distribution of income within the country, the fact that all humanity does not have access to the same opportunities, is a major obstacle to the realization of the vision of society 5.0. For example, the COVID 19 epidemic has significantly affected global education systems. However, although the effects of the epidemic on the education system are felt by all countries, the damage to the education system of the epidemic has been greater in underdeveloped or developing countries that do not have fighting mechanisms to the emerging crises. In 2020 the COVID-19 epidemic, which spread all over the world and negatively affected the world economies in economic terms, negatively affected the improvement in income inequality. According to World Bank data, in 2020, while the richest 20 percent of the world lost 5 percent of their average income, the poorest 20 percent lost 6 percent of their average income. At the same

[27] Y. Shiroishi, K. Uchiyama, and N. Suzuki, "Society 5.0: For Human Security and Well Being", *IEEE Computer Society Cyber-Physical Systems,* 51/7 (2018).
[28] H. Hayashi, et. al., "International standardization for smarter society", *Proceedings of the 56th Annual Conference of the Society*, Kanazawa, Japan: Institute of Electrical and Electronics, 2017, p.264.

time, in 2021, while the richest 20 percent make up for half of the income they lost in 2020, the poorest 20 percent are expected to experience an additional loss of 5 percent in 2021.[29]

The suffering of the developing world during COVID 19 raises the question that will be developing world be able to adapt to the transformation of the world in the context of technology and innovation to achieve Society 5.0 with their already lack of resources to cope up with the current crisis. Adaptation to Society 5.0 vision requires sufficient human resources, economic, technological development background, and environmental sensitivity in this regard. If the capability is already lacking behind the developed world, in the near future developing world should accelerate their development process by increasing their investments in human capital, technology, and education. According to the study by the OECD, the COVID 19 epidemic highlighted the inequality experienced in the global context in terms of internet access, computer access, and the ability to use information technologies in teaching.[30] The fourth of the Sustainable Development Goals, which emphasize sufficient success in providing inclusive, equal education and lifelong learning for all humanity, has led to limitations in education due to the COVID 19 epidemic in the global context. It is clear that the global inequality experienced during the epidemic period in education will have an important effect in increasing the adaptation ability of all humanity to technology, which is the basic building block of Society 5.0. According to the United Nations, the restrictions in education due to the COVID 19 epidemic caused 101 million children between the first and eighth grades to fall behind the minimum reading proficiency level in 2020.[31]

In accordance with this argument; Haken 2021 posit that

> "If there's one thing that 2020 taught us it's that if we prepare for a health crisis as if it were only a health crisis, then we miss the boat. We learned that when a shock hits, as important as a strong economy might be; or even a good health system, or infrastructure, a necessary precondition for resilience is a stock of social capital. A country that cannot take collective action, a population that cannot make shared sacrifices, a country where there's no collective buy-in

[29] N. Yonzan et. al., "Is COVID-19 increasing global inequality?", October 7, 2021, https://blogs.worldbank.org/opendata/covid-19-increasing-global-inequality.
[30] A. Schleicher, *The Impact of Covid-19 on Education: Insights from Education at a Glance 2020*, OECD, 2020, p.4.
[31] UN Department of Economic and Social Affairs, "COVID 19 Has Wiped out 20 Years of Education Gains", 2021, https://sdgs.un.org/goals/goal4.

to a national strategy, cannot be resilient, no matter how good the economy is or how many doctors or ventilators you might have".[32]

Table 1. Fragile States Index 2021 (Bottom 15 and Upper 15 countries)

Country	Rank	Total	C1: Security Apparatus	C2: Factionalized Elites	C3: Group Grievance	E1: Economy	E2: Economic Inequality	E3: Human Flight and Brain Drain	P1: State Legitimacy	P2: Public Services	P3: Human Rights	S1: Demographic Pressures	S2: Refugees and IDPs	X1: External Intervention
Yemen	1st	111,7	9,4	10,0	9,4	9,8	7,7	6,7	9,9	9,8	9,7	9,8	9,8	9,7
Somalia	2nd	110,9	9,3	10,0	8,3	9,2	9,5	8,8	9,2	9,8	8,7	10,0	9,2	8,9
Syria	3rd	110,7	9,6	9,9	9,7	9,6	7,1	8,2	10,0	9,6	9,7	7,6	9,7	10,0
South Sudan	4th	109,4	9,7	9,2	8,8	9,2	8,9	6,7	9,5	10,0	8,7	9,5	9,9	9,3
Congo Dem. Rep.	5th	108,4	8,6	9,5	9,4	8,5	8,5	6,8	9,2	9,8	9,2	9,8	10,0	9,1
Cent. African Rep.	6th	107,0	8,0	9,7	8,1	8,5	9,6	6,6	9,0	10,0	9,3	8,9	9,7	9,6
Chad	7th	105,8	8,9	9,5	8,0	8,6	8,7	7,9	9,4	9,8	8,2	9,6	9,3	7,9
Sudan	8th	105,2	8,1	9,1	9,5	9,1	8,3	7,7	8,8	8,8	8,6	9,1	9,4	8,7
Afghanistan	9th	102,1	10,0	8,6	7,2	9,2	8,1	7,0	8,7	9,8	7,4	9,0	8,8	8,3
Zimbabwe	10th	99,1	8,6	10,0	6,1	9,4	7,7	7,1	8,8	9,0	8,0	9,3	8,2	6,9
Ethiopia	11th	99,0	8,4	9,2	9,5	5,9	6,7	6,6	8,8	8,9	8,4	9,4	9,1	8,1
Nigeria	12th	98,0	8,8	9,6	8,8	8,6	7,7	6,5	8,4	9,3	8,7	9,3	6,6	5,7
Haiti	13th	97,5	6,6	9,6	5,3	8,9	9,2	8,1	8,8	9,6	7,1	8,2	7,1	9,0
Guinea	14th	97,4	8,0	9,9	9,3	8,2	7,3	6,5	10,0	9,5	6,9	8,6	7,0	6,2
Cameroon	15th	97,2	8,3	9,3	8,7	7,0	7,6	7,1	9,0	8,6	7,5	8,8	8,3	7,0
Portugal	164th	26,8	0,5	2,5	1,3	4,8	2,0	2,8	0,8	2,9	1,1	3,3	1,8	3,0
Singapore	165th	26,6	0,7	4,0	2,2	1,6	3,0	1,9	3,7	1,5	4,5	2,1	0,7	0,7
Austria	166th	26,1	1,6	3,2	3,9	1,8	2,3	1,6	0,6	2,3	0,5	3,4	4,4	0,5
Germany	167th	24,8	2,3	2,3	4,0	1,8	2,5	2,0	0,5	2,0	0,8	2,1	4,0	0,5
Netherlands	168th	24,1	2,2	3,4	3,6	2,2	1,6	2,4	0,5	1,3	0,7	3,1	2,6	0,5
Ireland	169th	22,2	2,7	1,5	0,5	2,7	1,6	2,8	0,5	2,5	1,6	2,8	1,4	1,6
Australia	170th	21,8	2,7	1,7	3,1	1,6	1,8	0,5	0,5	2,8	1,7	2,9	2,0	0,5
Canada	171st	21,7	2,8	2,5	2,2	2,0	2,3	1,1	0,5	2,3	1,3	2,0	2,2	0,5
Sweden	172nd	21,4	2,7	1,8	1,7	1,9	1,7	0,7	0,5	1,4	0,9	3,3	4,3	0,5
Luxembourg	173rd	21,1	0,7	3,4	2,1	2,6	1,4	1,6	0,5	1,9	1,1	2,8	2,5	0,5
Switzerland	174th	19,9	1,6	1,0	2,7	2,0	1,8	1,1	0,5	1,6	0,8	3,2	3,1	0,5
Denmark	175th	18,8	1,7	1,4	3,7	1,7	1,2	1,3	0,5	1,4	0,9	2,3	2,2	0,5
New Zealand	176th	18,4	1,4	1,4	2,6	3,4	2,1	1,6	0,5	1,4	0,5	1,4	1,6	0,5
Iceland	177th	18,0	0,7	1,8	0,5	3,4	1,3	1,9	0,5	1,2	0,5	1,5	1,5	3,2
Norway	178th	16,6	1,8	1,1	3,3	1,9	1,0	0,8	0,5	1,6	0,5	1,4	2,2	0,5
Finland	179th	16,2	2,5	1,4	0,6	2,9	1,0	1,5	0,5	1,6	0,5	1,7	1,5	0,5

Source: (The Fund for Peace 2021)

The multidimensional poverty approach should be used to the developing world's poverty and instability problems to increase the resilience of developing countries to be able to successfully adopt Society 5.0 norms. The contemporary fragility of states is an important obstacle in front of

[32] "Fragility in the World 2021", *Fragile States Index*, 2021. https://fragilestatesindex.org/.

developing states to achieve successful transformation in technology, innovation, and human resources. The shocks caused by instability, pandemic spread, or conflict in one state can hinder the efforts to achieve global development for Society 5.0 which aims to create a global super-smart society that can foster through global development. In Table 1., a contemporary fragility overview can be observed. From the research on the fragility of the globe, the upper 15 countries and bottom 15 countries are regarded. From statistics of 2021, it can be clearly observed that the countries with high fragility are developing, failing, or failed states. On the other hand, the bottom 15 countries with lower fragility grades are developed countries. This discrepancy should be remedied in order to achieve the global standards in the development and leave no one behind the agenda of the Sustainable Development Goals of the United Nations. Fragile States Index consists of twelve sub-indicators that constitute the overall fragility grade of the country. If it is examined more closely, it can be understood that fragility is in correlation with the state's success in multiple dimensions. In addition, fragility grades which can contribute to conflict occurrence are high between developing, failing, and failed states. This correlation is a huge obstacle in achieving creating Society 5.0 which aims at global development without leaving no one behind.

International Efforts for Society 5.0 Vision

Although its boundaries have not been determined precisely, the whole world is in a transformation process in terms of technology and social life. It is a process that aims at global peace and technological integration, while creating a society integrated with technology, takes decisions to end the world's ecological balance and income inequality, increases integration into the global economy by reducing trade borders between countries with globalization process. This transformation also aims to eliminate poverty in the global context and put global peace and technological integration on the target list. The Sustainable Development Goals, which were formed by the United Nations in 2015 and accepted unanimously by all countries, are the solid proofs of this transformation in the global context.[33] Fragility is the important beginning point for determining where to start or how the problem of instability and inequality should be addressed. From the experience gained through the catastrophes in 2020 like the global pandemic and problems resulting from cli-

[33] UN Department of Economic and Social Affairs, "*Sustainable Development*", 2021, https://sdgs.un.org/goals.

mate change, it is understood that the most vulnerable countries have been affected by shocks more. In order to achieve the vision of society 5.0, which aims at equality of income, opportunity, and access to technology in the global context, it is obvious that the basic focus is human and it is necessary to establish a fighting mechanism against all the dangers that the individual may encounter. In this context, the concept of Human Security, which was put forward by Canada in 1994 by the United Nations in parallel with the lessons learned from the COVID 19 global epidemic, was brought back to the agenda in 2021 and determined as the main focus of strategy decisions.[34]

Human Security is an approach that focuses on people. All threats that a person may experience in his daily life are included in the scope of human security. Since Society 5.0 aims for the individual to reach a global norm and for all humanity to achieve the same technological integration; The United Nations has created an approach based on human security in order to eliminate all kinds of threats that may prevent the achievement of this goal and realize the sustainable development goals for all humanity. According to United Nations General Assembly, all people should have 'the right to live in freedom and dignity, free from poverty and despair… with an equal opportunity to enjoy all their rights and fully develop their human potential'.[35] Human security, first, safety from such chronic threats as hunger, disease, and repression. And second, it means protection from sudden and hurtful disruptions in the patterns of daily life – whether in homes, in jobs, or in communities Human security focus on an individual's wellbeing and self-realization. It is a concept built on three core values: freedom from want, fear, and indignity.[36]

Conclusion

It is important to understand that poverty is a multidimensional phenomenon that can manifests itself in different dimensions and is the result of variety of factors. Therefore, it is impossible to define it in a single and precise way. If there is a way to solve poverty problem in Society 5.0, it

[34] United Nations Trust Fund For Human Security, "What is Human Security", 2021, https://www.un.org/humansecurity/what-is-human-security/.
[35] United Nations General Assembly, "Follow-up to paragraph 143 on human security of the 2005 World Summit Outcome", 66th Session, Resolution adopted by the General Assembly on 10 September 2012.
[36] United Nations Trust Fund for Human Security, "Realizing the triple nexus: Experiences from Implementing the Human Security Approach", 2021, p.12.

would be beneficial to create society that can flourish in peace and innovation. The goal of Society 5.0 can be seen as the goal of combating multidimensional poverty, as it is a society that can fully respond to various social needs, where everyone can receive service in an easy and quality way, where there are no age, gender, regional and language differences, and where they can lead a happy and comfortable life.

However, today, countries; accept that they will not be able to reach the society 5.0 target at the same time, as they are socially, demographically, economically, and culturally different from each other. In this case, we claim that technology poverty will be at the forefront in the future. In this sense, mediating the effects of poverty and accelerating the development of the developing world through innovation and technology is at the heart of Society 5.0. Society 5.0 aims inclusive world society free from want, fear, and indignity. United Nations' declared goals for the future are in alignment with Society 5.0. Human security is an important concept for leaving no one behind in this rapidly transforming era. Individual development and freedom will empower the overall development of all humanity in order to achieve a society that can manifest true potential individually.

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The Importance of Green Growth in the Society 5.0 Process

Ali Kemal Nurdoğan and Ali Arıöz

Introduction

Economic development is a multidimensional process together with sustainable economic growth aiming at reducing inequality, eliminating poverty and increasing the quality of life of people.

Technological developments, which are accepted as an important element for sustainable economic growth and development, play an important role in the restructuring of the industry and the changes in the social structure.

Realizing economic development and addressing to social problems are possible with the cooperation of nations aiming for a sustainable world. Economic growth and technological progress exist for this purpose, not for the welfare of a select few. It is important to benefit from the technological developments that have entered our lives with Industry 4.0 as an effective and efficient way to improve the quality of life of people, maintain healthy economic growth and solve the problems of the society.

Through influencing the production process and social life, the Internet of Things (IoT), big data and artificial intelligence which entered our lives with Industry 4.0, provides an important infrastructure for the creation of a new society able to solve various social challenges. This new society created will create a super smart society, i.e. the Society 5.0, which continuously develops new values and services and makes people's lives more harmonious and sustainable.

Society 5.0 aims to make the virtual world and the real world function together, and benefit from the technological developments achieved by Industry 4.0, with a consideration of the interests of the society.

Rising energy demand and consumption due to technological develop-

ments and population growth increases the pressure on the environment and natural resources. Implementation of a development strategy that does not have a well-established relationship between the environment and socioeconomic development may not attain the Society 5.0 goals.

The green economy, i.e. the green growth, comes first among the policies aimed at providing the energy needed with the lowest environmental and social costs in order to ensure sustainable development in line with the Society 5.0 targets. Green economy means creating energy efficiency and increasing the use of renewable energy.

The purpose of the study is to explain the importance and effect of the green growth in the transition process to Society 5.0.

Economic and Social Effects of Technological Changes

The mechanization process, which started with the invention of the steam engine in the late eighteenth century, is accepted as the beginning of the industrial revolution. With the birth of this process, people started to evolve rapidly from agricultural society to industrial society. After the invention of the steam engine, the increased production with the mechanical force which replaced the muscle power became uninterrupted with the use of electricity. Automation has been accelerated in production processes with electronic circuits which was developed in the second half of the twentieth century. As a result of the development of internet use in the twenty-first century, low-cost high-quality customized products have begun to be produced with the help of cyber--physical systems that can interact.

In the process that started with the Industrial Revolution and reached to Industry 4.0 level, technological developments have had significant impact on social change, industry restructuring and economic growth.

It has become an important goal after the Industrial Revolution for countries to achieve long-term sustainable growth which coud be defined as the increase in the production of goods and services and in the national income as compared to the previous year.

It has been long focused on issues such as accelerating economic development, preventing unemployment or controlling inflation without considering environmental problems, and has been aimed to increase production.[1] The growth achieved was tried to be explained by the pro-

[1] M. Dulupçu, "Sürdürülebilir Kalkınma Politikasına Yönelik Gelişmeler", *DTM Dergisi*. 6/20

duction factors.

In the Neo-classical growth model based on the studies of Solow and Swan,[2] technology is accepted as exogenous since the production function has diminishing returns to scale and the effect of technology is insufficient in explaining long-term economic growth. Neo-Classical growth theory was deemd to be insufficient to explain the long-term growth process, thus was replaced by the endogenous growth theory led by Romer[3] and Lucas[4] in the 1980s.

Technology, which is considered to be an exogenous variable in the neoclassical growth model, is included in the model as an endogenous variable in the endogenous growth model and the icrease in the output is regarded to be the result of this. The competitiveness acquired through the efficiency gains and cost advantage in production has increased the economic growth rates. While the developments in technology had a positive effect on growth, they differentiated the production techniques and created significant impact on the structure and distribution of workforce.

There has been a transition from a labor-intensive production to a capital-intensive production process with the technological developments, while the employment contracted in the short term, yet new employment areas were created in the long term. Some business and occupational groups disappeared, in return new technology-based business and occupation areas were created.[5] There has been a shift in the intensity of employment from the industrial sector to the services sector and the labor market has transformed into a stratified primary and secondary market. While high-skilled labor employment increased in enterprises using advanced technology and new production techniques, the employment of low-skilled labor, which supplies labor in flexible working conditions and in non-standard ways with no employment guarantee has increased.

Flexible production systems brought by high technology have changed the production process and demand for labor. On the one hand, the demand for high-qualified and skilled labor in the workforce increased, on

(2001), p.46-70.

[2] T. W. Swan, "Economic Growth and Capital Accumulation", *Economic Record*, 32/63 (1965), p.334-361.

[3] P. M. Romer, "Increasing Returns and Long-Run Growth", *Journal of Political Economy*, 94/5 (1986), p.1002-1037.

[4] R. E. Lucas, "On The Mechanics of Economic Development", *Journal of Monetary Economics*, 22/1 (1988), p.3-42.

[5] A. Şenkal, "Endüstri İlişkilerinde Yeni Paradigmalar: Mobilizasyon, Kolektivizm ve Esneklik Tartışmaları", *Çalışma ve Toplum Dergisi,* DİSK/Birleşik Metal-İş, 16 (2008), p.131.

the other hand a low-skilled reserve army of labor who could not adapt to new production processes was formed.[6] In the rapidly globalizing world, especially with the effect of developments in the ICTs and increased competition, flexible production system has been adopted and working relations have become more flexible accordingly. While employment in the industrial sector is decreasing, the increase in employment in the services sector, where white-collar, qualified and non-unionized workers are concentrated, and the widespread use of flexible working conditions have brought about a critical unionization problem for the unions. With the transformation, a new working class who can defend their rights individually, negotiate individually with the company they work for, who therefore do not need a union to obtain their rights, has emerged. The increase of qualified employees in working life has increased the importance of individual bargaining and Human Resources Management.

Industry 4.0, which expresses the fourth stage of the industrial revolution, affects the production process with the developments in mass media and transportation networks, as well as affects human relations and is influential on social change. Due to the transformative speed of technological developments and communication channels in economic and social life, competitive pressure is increasing at the global level, and countries are in strong competition.

While the weight of competition based on cheap labor decreases, high-tech ountries who can produce faster, more flexible and innovative based on high technology gain competitive advantages. The technology-driven transformation in production forms increases the demand for qualified labor and reduces the demand for medium and low-skilled labor who can be substituted with automation. Therefore, the share of medium-level jobs and wages in employment is declining especially in developed countries. New professions and ways of doing business are emerging with the developments in digital Technologies and countries are amaending their labor legislation to include different forms of flexible working.

Technological transformation limits the employment opportunities and income shares for low-income individuals with limited skill-development opportunities.

In addition to their effects on growth and employment, technological developments also create an effect accelerating the social change. While

[6] T. Erdut, "Yeni Teknolojilerin İş İlişkilerinin Yapısı Üzerindeki Etkisi", *Çimento İşveren*, 11/5 (1997), p.25.

the labor was important factor of production and had an important share in the value created in the process that started with the Industrial Revolution, low-qualified labor was replaced by capital with the transition to automated production with the introduction of electronic circuits.

The surplus value created through work strengthened the sense of freedom and ownership in individuals, and monetary behaviors began to come to the forefront. The sense of monetary gain arising from exploitation and plunder instincts has a detrimental aspect to the approach aiming to improve the social life. Marx mentions the effective role of the surplus value created by technological developments in the empowerment of the bourgeoisie. He explains that the surplus value created by the increase in productivity created through technological developments is exploited by the capital owners, nonetheless the real owner of the surplus value ought to be the working class.

According to Veblen, who examines the effects of changes in the technological development and changes in the cultural and organizational models on social change, the reflection of technological development goes far beyond its economic effects.[7]

Technology deeply affects man's relation with nature and society. The material change in the social base that has occurred with the development in the industrial field creates new ways of thinking, and this gets institutionized over time.

Technological developments are effective on social transformation, but what is the magnitute and direction? The extent to which technological innovations change the social structure is important. Therefore, the growth created by the increase in productivity through technological developments and the equal sharing of the income among social segments is the crux of the whole problem.

The Integration of Industry 4.0 and Society 5.0

Technological developments are integrated with digital transformation and are at the center of Industry 4.0 which includes different advanced automation systems, data exchanges between these systems and production technologies. By establishing a network covering the whole world with cyber-physical systems, information exchange, storage and use of

[7] B. Takay and D. Aydın, "Kapitalizmin Şövalyeleri ve Sanayi Kaptanları Üzerine", *Hacettepe Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 31/2 (2013), p.161.

information is ensured over the internet of things.[8]

The Internet of Things (IoT) is the instantaneous communication and connection of many appliances and devices (Things) with computers, tablets, smart phones, and smart watches with internet access.[9]

The society model that is desired to be created in future by integrating the cyber space created with Technology 4.0 with the real world is defined as the super smart society. The concept of a super smart society, the Society 5.0, was mentioned for the first time at the CeBIT Hannover in 2017. Society 5.0 was explained there as "Technology should be perceived by societies as an aid, not a threat."

The goal of Society 5.0 is to provide sustainable development in harmony with nature by solving social problems that offering a high quality of life to people.[10] Technology 4.0 focuses on industrial activities, while Society 5.0 prioritizes improving people's quality of life and increasing the welfare of the society.[11]

The main goal is to create a human-centered society in which both economic development and the solution of social difficulties are ensured with the help of full integration of the physical and the cyber space.

Society 5.0 not only proposes a new society model, but also emphasizes -unlike other social transformation phases- the importance of adopting global policies that are more fair, equal and focusing on improving the quality of life in the transition to the digital innovation economy.[12]

Sustainable Development and Society 5.0

Up until the 1970s, the traditional economic growth and development approach in the world economy focused solely on increasing the per capita income and welfare level, put it differently, on economic growth. The environmental problems that that came with the current development policies adopted until the 1970s were seen as the inherent and tolerable

[8] U. Dombrowski and T. Wagner, "Mental Strain as Field of Action in the 4th Industrial Revolution", *Procedia CIRP*, 17 (2014), p.101.
[9] S. Poudel, "Internet of Things: Underlying Technologies, Interoperability, and Threats to Privacy and Security", *Berkeley Technology Law Journal*, 31/2 (2016).
[10] R. Foresti, et. al., "Smart Society and Artificial Intelligence: Big Data Scheduling and the Global Standard Method Applied to Smart Maintenance". *Engineering*, (2019), p.2.
[11] N. Saracel and I. Aksoy, "Toplum 5.0: Süper Akıllı Toplum", *Social Sciences Research Journal,* 9/2 (2020), p.29.
[12] Yuko Harayama, "Society 5.0: Aiming for a New Human-centered Society", *Hitachi Review*, (Issue: Collaborative Creation through Global R&D Open Innovation for Creating the Future), 66/6 (2017).

consequences of the development process. Therefore, policies to eliminate environmental pollution rather than to prevent it were opted.[13]

Concerns on fossil fuel extinction, the deterioration of ecological balance and the decrease in ecosystem diversity have weakened the confidence for the current economic thought. Thus, a consensus has begun to emerge on the fact that it is necessary to take measures at all levels for alleviating those economic activities' adversary impact on the ecological balance and living species.

It has also been accepted along with this realization that a new and different development context is needed for examining the existing development practices and concentrating their ingredients.[14]

The view that natural resources serve the sustainability of production and consumption is a cue that the environment is merely considered from an economic perspective. However, the preservation of ecosystem balance is as important as creating or increasing the economic efficiency.

There is the potential to cause irreversible environmental degradation that will harm living things, vegetation and people, if the amount of waste is left to nature in excess of the ecosystem's capacity.

In this context, the United Nations Environment Program (UNEP) was launched in 1972 at the Stockholm Conference, the first major event to develop a comprehensive approach to the problems of interaction between global society and nature.[15] The 1972 United Nations Conference on the Environment in Stockholm was the first world conference to make the environment a major issue. The Stockholm Declaration,[16] which is accepted as the first international declaration on the environment, was made at the Conference.

The Declaration consists of 26 principles, emphasizing that living in an environment that provides freedom, equality and adequate living conditions is a fundamental human right. It not only enabled the rapid development of international environmental law, but also paved the way for the establishment of UNEP.[17] The Stockholm formulation does indeed

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[13] Y. Acar, *İktisadi Büyüme ve Büyüme Teorileri*, Bursa: Dora Yayıncılık, 2008, p.120.

[14] M. Özçağ and H. Hotunluoğlu, "Kalkınma Anlayışında Yeni Bir Boyut: Yeşil Ekonomi", *Celal Bayar Üniversitesi Sosyal Bilimler Dergisi*, 13/ 2 (2015), p.307.

[15] General Assembly, "Resolution Adopted by the General Assembly; 2997 (xxvii) of 15 December 1972, Institutional and Financial Arrangements for International Environmental Cooperation", 1972.

[16] Report of the United Nations Conference on the Human Environment, Stockholm, A/ CONF.48/14 1972.

[17] J. Hierlmeier, "UNEP: Retrospect and Prospect - Options for Reforming the Global

refer to a human's "fundamental right to adequate conditions of life, in an environment of a quality that permits a life of dignity and well-being. In 1982, the International Commission on Environmental Protection (WCED) was established.

In the report "Our Common Future" (Brundtland Report) published by the United Nations Environment and Development Commission in 1987, sustainable development is defined as the ability of human beings to meet their present needs without compromising the ability of future generations to meet their own needs.[18] It is suggested in the report that scarce resources should be equitably allocated between generations so that development can be sustainable in the future.[19]

At the United Nations Conference on Environment and Development held in Rio in 1992, sustainable development was adopted as the common goal of all humanity.[20] The Rio Declaration adopted at the conference consists of 27 basic principles that regulate the relations of countries with each other and with the world on environment and development issues.

The Declaration emphasizes the importance of developing partnership and cooperation for a healthy world future. The implementation document of the principles of the Declaration, the Agenda 21, aims at the international integration of development and environment issues. It was also stated in Agenda 21 that UNEP should be strengthened and financially supported to tackle the growing environmental problems.[21]

The United Nations Framework Convention on Climate Change (UNFCCC), which entered into force on March 21, 1994, constituted a fundamental step for the fight climate change.

However, as greenhouse gas emissions continue to increase on global scale and the adverse effects of climate change become apparent, the countries party to the UNFCCC have started to negotiate the Kyoto Protocol (KP) in order to strengthen the present Convention in a way to force countries to undertake binding obligations. After two and a half years of negotiations, the Protocol was accepted at the 3rd Conference of the Par-

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Environmental Governance Regime", *Georgetown International Environmental Law Review*, 14 (2002), p.773.

[18] G. H.Brundtland, *Our Common Future: Report of the World Commission on Environment and Development*, Oxford University Press, 1987, p.13.

[19] A. Alada, E. Gürpınar, and S. Budak, "Rio Konferansı Üzerine Düşünceler", İstanbul Üniversitesi Siyasal Bilgiler Fakültesi Dergisi, 3-5 (2012), p.95.

[20] İ. Al, "Sürdürülebilir Kalkınma ve Yeşil Ekonomi: Türkiye İçin Bir Endeks Önerisi", *Hitit Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 12/1 (2019), p.114.

[21] A/Conf.151/26, 12 August 1992.

ties held in Kyoto in 1997 and entered into force in 2005.[22] Thefore, the Kyoto Protocol could be labeled as an agreement aiming to reduce the use of greenhouse gases.[23]

At the UN Millennium Summit in September 2000, 189 countries signed the United Nations Millennium Declaration on today's most urgent challenges of human sustainability which roughly comprise the well-being of people, environmental concern and global co-operation. From this the following eight major development goals (Millennium Development Goals (MDGs) were identified and set to be reached by 2015:[24]

- Eraticate extreme poverty and hunger
- Achieve universal primary education
- Promote gender equality and empower women
- Reduce child mortality
- Improve maternal health
- Combat HIV/AIDS, malaria and other diseases
- Ensure environmental sustainability
- Develop a Global Partnership for Development

Specific goals set by the summit include halving the proportion of those without access to clean drinking water by 2030 and achieving a significant improvement in the lives of at least 100 million slum dwellers.[25] The target in the field of environment was determined as ensuring the environmental sustainability.

When it comes to 1992, the Rio+20 United Nations Conference on Sustainable Development was held on the 20th anniversary of the United Nations Conference on Environment and Development (UNCED). It resulted in a focused political outcome document which contains clear and practical measures for implementing sustainable development. UN Conference on Sustainable Develeopment (Rio +20), it have been launch a process to develop a set of Sustainable Development Goals (SDGs), which will build upon the Millennium Development Goals and converge with the post 2015 development agenda. The Conference also have adopted ground-breaking guidelines on green economy policies.[26]

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[22] Kyoto Protocol to The United Nations Framework Convention on Climate Change, https://unfccc.int/resource/docs/convkp/kpeng.pdf.
[23] Kyoto Protocol.
[24] General Assembly, "Resolution 55/2 of 8 September 2000", United Nations MillenniumDeclaration.
[25] General Assembly, "Resolution", 2000.
[26] General Assembly, Resolution 66/288 of 11 September 2012, "The Future We Want". https://

The United Nations summit for the adoption of the post-2015 development agenda was held from 25 to 27 September 2015, in New York and was convened as a high-level plenary meeting of the General Assembly. The final and most comprehensive step in sustainable development is the decleration Sustainable Development Goals, by the United Nations General Assembly. The goals prescribe the targets to be atained by 2030. These 17 main goal sets can be listed as short slogans as follows:[27]

Figure 1. Sustainable Development Goals

Source: https://www.un.org/sustainabledevelopment/news/communications-material/

The SDGs were developed as the future global development framework to succeed the Millennium Development Goals, which ended in 2015.

In order to balance economic development and solve social problems, the Society 5.0 goals, which point to a new society led by science and technology innovation, are in line with the "Sustainable Development Goals" adopted by the United Nations.

While the concept of sustainability expresses the continuity and permanence of the existing balance, the concept of development implies the change in the economic and social transformation processes.[28] Sustainable economic development, on the other hand, is the transformation of the country's production structure to produce high value-added goods and services, and increasing the quality of life by equitably sharing with

www.un.org/ga/search/view_doc.asp?symbol=A/RES/66/288&Lang=E.

[27] General Assembly, Resolution 70/1 of 21 October 2015, "Transforming Our World: The 2030 Agenda for Sustainable Development".

[28] Y. Gedik, "Sosyal, Ekonomik ve Çevresel Boyutlarla Sürdürülebilirik ve Sürdürülebilir Kalkınma", *International Journal of Economics, Politics, Humanities & Social Sciences*, 3/3 (2020), p.197.

the society. Sustainable development is an economic development that maintains the balance between the economy and the eco-system and is environmentally sustainable. It refers to a development model that can meet the needs of today's generations without prejudice to the ability of future generations to meet their needs.[29] It emphasizes equality of opportunity within and between generations, as well as the idea of addressing economic and environmental problems together. Environmental degradation is often irreversible. Therefore, the basic philosophy of sustainable development is to ensure that present and future generations benefit equally from the opportunities brought by development by evaluating the interaction of the economic and social structure and the environmental issues in a holistic way.

It is useful to consider the goals of sustainable development in terms of, economy, people, environment and technology. In terms of economy, waste should be recycled in way to change the lifestyles of societies and increasing efficiency in the use of energy and natural resources. The development of clean technologies using fewer resources should be encouraged and income inequalities should be reduced, access to education and health services should be ensured. In terms of human; the population growth rate should be reduced, rural development should be accelerated, migration to the city should be prevented, environmental problems caused by urbanization should be reduced, and social living conditions should be improved. In terms of environment; effective use of agricultural lands and water resources; improvement of strategies and technologies to increase agricultural production and productivity; protection of ecosystem and biodiversity; reduction of greenhouse gas emissions caused by human activities are aimed. In terms of technology; use of environment-friendly technologies, minimization of the use of natural resources, reduction in the use of fossil fuels over time and expansion of alternative energy sources, recycling of waste, development of public transportation systems and green energy technologies need to be ensured.[30]

The Importance of Green Economy in Society 5.0 Process

Eith the UNEP's definition which states that a green economy leads to

[29] Acar, *İktisadi Büyüme ve Büyüme Teorileri*, p.118.
[30] H. N. Bayraç, F. Çelikay, and M. Çildir, *Küreselleşme Sürecinde Sürdürülebilir Enerji Politikaları*, Bursa: Ekin, 2018, p.16.

"improved human well-being and social equality, while significantly reducing environmental risks and ecological scarcities." So it's low carbon, resource efficicent and socially inclusive. The use of technology achieved with Industry 4.0 means an increase in the production and the energy needed. Increasing energy demand and world population also increase the demand for natural resources. With the development of the concept of the internet of things and information and communication technologies, the need for energy is expected to increase even more. In addition, in line with the goals of the 2021 World Climate Summit, electricity consumption is expected to increase even more within the scope of accelerating the transition to electric vehicles.

The increase in production and population not only irreversibly destroy natural resources, but also bring about a soaring environmental damage. After the produced goods are consumed, they return to nature as waste. Natural resources, which have an important role in ensuring sustainable development, are decreasing due to their usage either as an input or end product in the production process and due to direct human damage.

While natural resources such as mines and oil are destroyed in the process of economic growth, some other resources such as soil and water are also polluted significantly and their quality decreases. Depletion of natural resources beyond their regenerative capacity, decrease in biological diversity, climate change and environmental pollution and disasters pose a global threat. Especially fossil fuels and greenhouse gas emissions cause environmental problems and lead serious environmental dangers. Climate change, which causes problems such as global warming and reduction in water resources, is caused by greenhouse gas emissions as a result of human activities. Therefore, it could be asseted that the climate change has teremendeous adverse impacts on many areas from geopolitics to economies and migration. While climate change puts pressure on natural resources and agriculture, the development of plant and animal species suitable for the changing climate and the protection of environment and biological diversity gain importance. As a result, the need for qualified labor and technology is increasing to meet the growing food demand with less resources.

Developed to overcome environmental and economic problems such as climate change, "green growth" or "green economy" is a model that aims to reduce environmental risks and ecological scarcity and also aims to keep a sustainable development without harming the environment. Green

growth is the product of an understanding that cares about the investment and consumption of goods and services that contribute to environmental improvements. It is considered by the UNEP as an approach that increases social equality and social welfare, while significantly reducing environmental risks and ecological scarcity. With this understanding, while contributing to environmental sustainability, it is also possible to contribute further to economic development, income increase, employment and poverty reduction.

In other words, the green economy encompasses the forms and products of economic activity that contribute to improving quality of life and the living environment while also modernizing the production process and making it more efficient.[31] Green growth is of vital importance in the consumption of natural resources and in observing the existing balance in the ecosystem. It can significantly reduce ecological problems and environmental risks, while simultaneously increase the human well-being and social equality. In this context, in an environment where green economy prevails, income and employment could increase with public and private sector investments, along with a simultaneous increase in energy and resource efficiency.[32]

A green economy should have four main features: i) helping to protect the ecosystem, ii) reducing consumption of energy, materials and water through efficient strategies, iii) reducing greenhouse gas emissions, iv) preventing and/or reducing the generation of waste and pollution of all kinds. Accordingly, for a business to be regarded as green, it must ultimately use environment-friendly methods of production.

Green production activities should encourage environment-friendly technologies to that eliminates pollution and reuse wastes. In this, it should be able to use effective resources, that is, the energy resources used in production and consumption should be among the options that do not harm the ecosystem. For businesses that act with environmental sensitivity; reducing the use of materials, reducing the use of energy, reducing the emission of toxic substances, increasing the recycling possibilities of materials, increasing the use of renewable energy opportunities, increasing product durability and service fatigue prevents the depletion or damage of natural resources.

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[31] B. Porfiriev, Green Economy: Realities, Prospects, And Limits To Growth, Moscow: The Carnegie Moscow Center, 2013, s.4

[32] Al, "Sürdürülebilir Kalkınma ve Yeşil Ekonomi", p.115.

The 26th UN Environment and Climate Conference (COP26), held in November 2021 with a one-year delay due to COVID 19, has now drawn the necessary framework for societies to evolve towards green and sustainable growth.[33]

The COP 26 brought about a couple of commitments made by the countries. Known as the Glasgow Pact, and three core policy areas as mitigation, adaptation and finance, the agreement mainy reemphasizes the long-term global goals:[34] i) to hold the increase in the global average temperature to "well below 2°C" above pre-industrial levels and ii) to pursue efforts to limit temperature increase to 1.5°C above pre-industrial levels.

In order to attain these target levels global greenhouse gas (GHG) emissions, including reducing global carbon dioxide emissions by 45 per cent by 2030 relative to the 2010 level and to net zero around mid-century was also agreed.

As adaptation phase, the countries would be in the position to adapt their industrial structure to a more sustainable form in order to strengthen their resilience and reduce vulnerability to climate change.

The Glasgow Pact also urges the developed counties speed up their provision of climate finance, technology transfer and capacity-building for adaptation so as to respond to the needs of developing countries.

Conclusion

Green economy or green growth is an understanding that prioritizes the investment and consumption of goods and services that contribute to environmental improvement. This understanding also argues that energy efficiency, use of renewable energy and the creation of new job opportunities in general are closely related to human well-being.

Social, environmental and economic issues constitute the main issues of sustainable development. While the principles of sustainable development are long-term, the green economy offers new and productive sources of economic growth, thereby creates new opportunities that will lead to healthy economic growth in the short term. Most importantly, green economy policies seek to identify the best options for economic development by focusing on economic and environmental interests. Therefore,

[33] The Results of COP26.
[34] Decision -/CP.26, Glasgow Climate Pact.

green economic development strategies contribute to sustainable development by creating a better policy framework to achieve sustainable development goals.

The green economy has a direct impact on the achievement of sustainable development goals. A solid ecological foundation must be established in order to ensure economic sustainability. Sustainable development goals without green economic policies may fail due to social marginalization and excessive resource consumption that may occur owing to pursuing traditional economic models.

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