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Robots – A Strategic Solution from Recovery to Resilience

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ABSTRACT: Robots together with the other components of Industry 4.0 represent an important part of the recovery and resilience strategy of the Member States. In short periods of time, the labor market is affected by the dislocations caused by robotics and automation, but in the long term, employees will be reoriented through retraining and thus more jobs will be generated that will ensure a lower unemployment rate. The paper analyzes possible strategies to help the Member States pass from recovery to resilience, which means getting to a higher level than before the shock or crisis. Strategic directions are designed based on composite Digital Economy and Society Index (DESI) subindicators and integrative concepts also are being approached. An example of integrative concept is autopoiesis, that metaphorical could be a solution from recovery to resilience applied on different countries refering to institutions, government by using the same strategy to selfrecover and grow from inside as an autonomous system. Other strategies are offered, the analysis of critical points seen as decisional aspects, the identification of the center of gravity and the existence of an operational plan within the strategic one. The strategic solutions that will lead to recovery and resilience, first of all, must have a vision.

KEYWORDS: robots, recovery, resilience, digitalisation

Introduction

"The digital shift was dramatic and ubiquitous, even among B2B industries, like Manufacturing, that, traditionally, have been comparatively slow to digital transformation" (Adobe 2021). "Manufacturing workers in lower-income areas tend to have lower skill levels and are therefore more vulnerable to automation. There is typically a difference in the number of robots per manufacturing worker between higher and lower-income regions, indicating that those in lower-income regions are, on average, less productive" (Cone 2019).

"Automation, though already advanced, can be further extended, e.g., to cover automated line replenishments, towards an extended use of industrial robots as well as to the deployment of collaborative and unfenced robots that work in close collaboration with humans" (European Commission 2019).

According to the International Federation of Robotics (IFR 2016), an industrial robot is "an automatically controlled, reprogrammable, multifunctional manipulator programmable in three or more axes, which can be either fixed or mobile for use in industrial automation applications". Industrial robots are fully autonomous machines that do not require a human operator and can be programmed to perform multiple manual tasks, such as welding, painting, assembling, handling materials or packaging. In the global context, the use of industrial robots is particularly widespread in Europe, where, on average, every thousand workers were exposed to 0.6 industrial robots in 1995 and 1.9 in 2016. By comparison, the number of units in the US of robots per thousand workers was 0.4 and 1.6, respectively (Figure 1). The increase in the number of robots per thousand workers is particularly high for China, where it exceeds the respective growth rates in the EU and the US after 2009.

"Given that robots perform their tasks at constant quality and almost an unlimited number of times, industries characterized by a large share of workers that carry out repetitive tasks may find it profitable to substitute workers for robots" (Carbonero, Ernst, & Weber 2018).

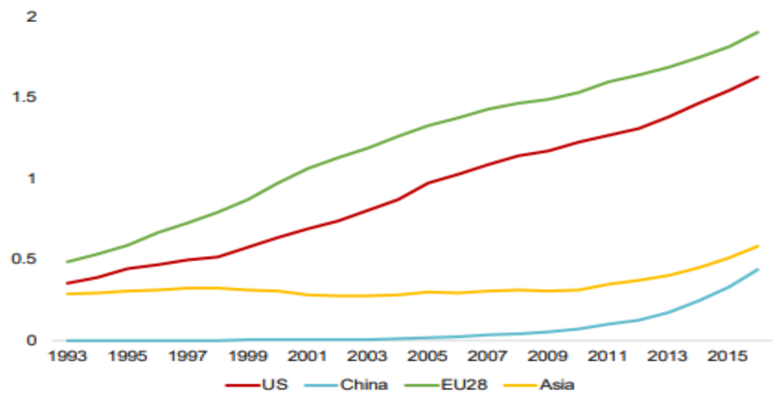


Figure 1. Robot density (robots per 1000 inhabitants)
Source: Data is based on IFR and EU-KLEMS

A study by the Joint Research Center (JRC), an integral part of the European science hub within the European Commission, reveals that in the pre-crisis period, the use of industrial robots in developed countries in 1995-2015 led to a small increase in the number of jobs. The same cannot be said for the pandemic period in the case of poorly and very poorly developed countries, the increase in automation and robotization has led to the dismissal of employees and the loss of an average of 30 employees at short intervals of three months, according to an analysis performed on employees of multinationals. The phenomenon created during the quarantine of low-level developed countries is the impossibility of companies to pay rents for workspaces and the replacement of routine work with the implementation of robotic process automation (Robotic Process Automation). In this way, the multinational corporations laid off their employees, thus increasing the unemployment rate. Those who lost their jobs had to retrain, companies and the Government did not support them by finding solutions for professional conversion and retraining of the field of activity. Thus, the labor market in countries less developed have suffered from the increase of the unemployed population and implicitly from the increase of the unemployment rate. Many of those made redundant, even if they worked in secondary or higher education, turned to ride sharing because taxis in big and crowded towns remained among the few businesses for which there were always requests that were not affected by the pandemic. Other industries that prospered were the pharmaceutical industry, to which are added the companies producing not only medicines and nutritional supplements but also those that produce consumables such as masks, disinfectant solutions, sterile media, etc. Based on reports from the Joint Research Center (JRC 2021), "the impact of robots on the labor market in developed countries has seen a slight decline in employment between 1995 and 2005 and a slight increase between 2005 and 2015." The labor market from countries less developed was not stable even before the pandemic, which made it even more vulnerable to the impact of the shock. Those who are advantaged and supported during this period are the employees in positions with higher education and the others with reduced skills in positions with secondary education have been displaced.

The intensified use of industrial robots has contributed to increasing labor productivity, eliminating routine work. The time left for employees is used for creativity. Robots, along with other components of Industry 4.0 lead to a paradigm shift.

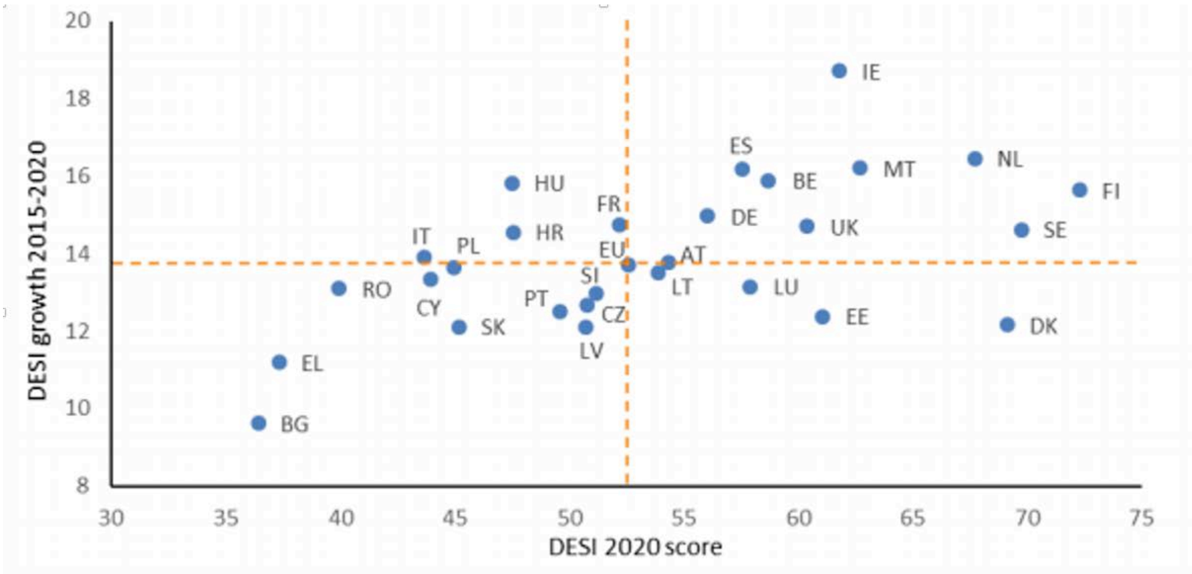
Recovery and resilience. Strategies for consolidating the countries

At present, the EU and Member States level focus is on identifying and integrating recovery and resilience strategies. The recovery implies a return to the highest level in the researched field, after the decline generated by the crisis. Resilience involves a strategy of returning to a higher level, which means that recovery is an integral part of resilience. The aim is to achieve in stages, gradually and to consolidate the resilience acquired by the state that applies such strategies of recovery and resilience by investing and developing new technologies and the implementation of industrial robots and services. The term resilience means a country's ability to withstand, adapt, recover and overcome the level it was at before it went through a crisis or shock.

According to the speeches at the "Building a Resilient Europe in a Globalized World" conference in Brussels in 2015, resilience is based on 3 important attributes: anticipation, interaction and a multidisciplinary approach. Permanent solutions are needed that do not surprisingly, governments should be able to apply a strategy to dissipate the shock in order to make it less felt. Resilience is a dynamic process that needs to be strengthened through knowledge, research and innovation. The effects of the crisis within the state, to make it more stable and more secure, to share the impact of the shocks felt by EU member states and the Monetary Economic Union (EMU) and to share existing risks at micro and macro level.

Contributions to integrating robots in the digitalization process

EU Member States in the period 2015-2020, before the pandemic, recorded increasing trends in the level of digitalization of the economy and society. This leads to the idea of progress and development in the direction of digitalization. Ireland had the highest level of progress compared to the period before COVID-19, followed by the Netherlands, Malta and Spain. These countries performed at that time with values according to the DESI score above the EU average, with sustained and investment-focused policies in all areas where digitalization has penetrated. "Finland and Sweden are among the leading digital performance leaders on the map of digitalization, but in terms of technological progress they have been slightly above average, as are Belgium and Germany" (European Commission*,* DESI 2020a). Being developed countries that have had high periods of performance ahead of other countries since 2000, in 2020 they were in a position of slight growth, and in the pandemic period, they had the highest recovery capacity and resilience to the economic and social shock felt.



Source: DESI 2020, European Commission.

Figure 2. Digital Economy and Society Index (DESI) –
EU States Members progress în the period 2015-2020

The reporting was done on the 27 EU Member States, including the United Kingdom of Great Britain and Northern Ireland (UK) and the data were registered including 2019. Denmark, Estonia and Luxembourg recorded values showing a low level of digitalization but still remain among the best performing Member States in the DESI ranking. Luxembourg is pursuing the development strategy including the digital transformation of business, which is not that at a high level. The same is the case of Estonia, which is not very competitive in terms of connectivity and business transformation. Figure 3 shows the DESI ranking on the 5 composite sub-indicators: Connectivity, Human Capital, Use of Internet, Integration of Digital Technologies, Digital Public Services.

Table 1. The structure of DESI in 2020

1 Connectivity	Fixed broadband take-up, fixed broadband coverage, mobile broadband and broadband prices
2 Human capital	Internet user skills and advanced skills
3 Use of internet	Citizens' use of internet services and online transactions
4 Integration of digital technology	Business digitisation and e-commerce
5 Digital public services	e-Government

Source: European Commission 2020a, Digital Economy and Society Index (DESI)

Connectivity refers to the existing infrastructure that provides the framework for digitalization. Of the EU Member States, only 17 have been co-opted for the pioneering 5G band, Finland, Germany, Hungary and Italy being the most prepared and for connectivity as a whole and Denmark, Sweden and Luxembourg are at high values. Countries less developed don't appear on the digital map of Europe and is not considered to have high connectivity, although here the Internet works excellently, special 5G relays have been placed and the online infrastructure is very well prepared. Human capital as an indicator consists in the development of digital skills that will be useful especially in periods when travel is prohibited. **The use of Internet** is another priority indicator that refers to individuals' access to the Internet for telework, e-commerce, e-government services, but also entertainment and Social Media platforms. **The integration of digital technologies** involves transforming businesses and adapting them to new ways of working with employees, collaborative platforms or teleworking to ensure a consolidated recovery in the short, medium and long term.

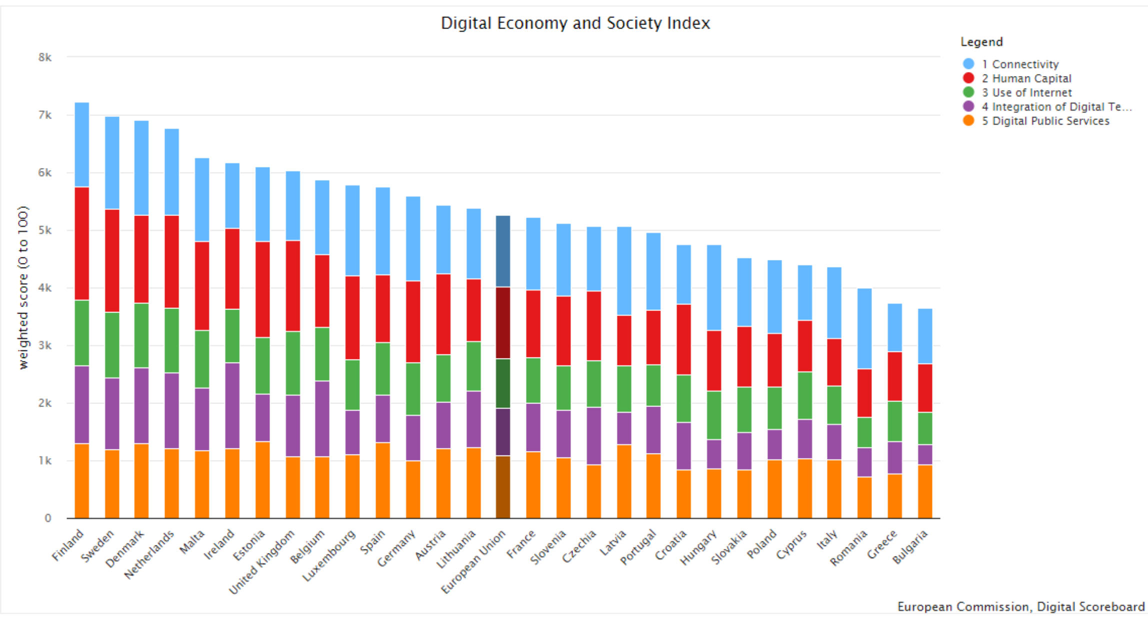


Figure 3. DESI, 2020 on composite indicators

Digital public services are a very important indicator especially during the crisis of COVID-19 were enhanced for the functioning of government activities in conditions of social distancing. These services include e-health, e-governance and the development of advanced technologies in Big Data and Artificial Intelligence.

Conclusions

Identifying common strategies will help Member States to develop resilience and shock resilience. Digitalization priorities are in descending order in the industrial sectors in the manufacturing industry, especially automotive, banking, JIT (Just in Time) payments, e-commerce and certain services, e-Education, e-Governance, e-Health. It should be noted how many units of robots are bought, how many are sold because production is dynamic, demand is high and supply is uniform. Another problem is the coexistence of different technological generations of robots. This required DESI analysis which provides data on the integration of digitalization. For the EU Member States, it is mandatory an objective determination of the priorities of technology transfer, technology diffusion and digitalization is required. The order of priority correlated with those mentioned above should refer to the automotive industry (belt operations), extractive industry, food, textile, medicine, research (a field of anvangarde), agriculture (drones for measuring soil temperature and degree moisture on large areas for crops). It is necessary first of all to identify the decisive points of gravity, the existence of an operational plan in which to operate a coherent and realistic strategic plan on the types of crises that could occur, but the mechanism must be applicable in any situation and the regenerative capacity of states must be achieved in a short period of time and over a longer period to consolidate their position in the resilience level. It could also be a mechanism of self-regeneration (Maturana and Varela 1980) through autopoiesis this integrative concept with dissipative character that gives to the system / economic process in close connection with other characteristics such as self-recovery, self-regeneration, autonomous and self-stabilization. There is a need, at the hypothetical stage for the time being, to develop a capacity for recovery from biological systems that can regenerate their limbs or to create certain behaviors that compensate for the role of the lost limb.

This concept of autopoiesis is desirable to be implemented throughout robots and other components of Industry 4.0, artificial intelligence (AI), IoT, Cloud computing, Big Data, Collaborative Platforms, Blockchain, Quantum Computers. It is imandatory that the digitalization strategy of EU Member States goes towards the concept of Digital Single Market, on reducing the gaps between various indicators because the components of Industry 4.0 have a growth trend also for the less developed countries, but not at the same level of those registered in the advanced countries.

Robots are a factor of sustainable development for all Member States, increasing their use contributing to bring again the economic growth from the field of social exclusion to that of inclusion and reducing inequities.

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