

# Romanian manufacturing competitiveness in the context of Industry 4.0

*While deindustrialization has been an ongoing trend across most European countries for decades, Industry 4.0 has the potential to increase manufacturing value added and revitalize industrial competitiveness. Manufacturing companies need to be ready to transform their business models and invest in the right technologies to succeed in the future.*

By Roland Berger

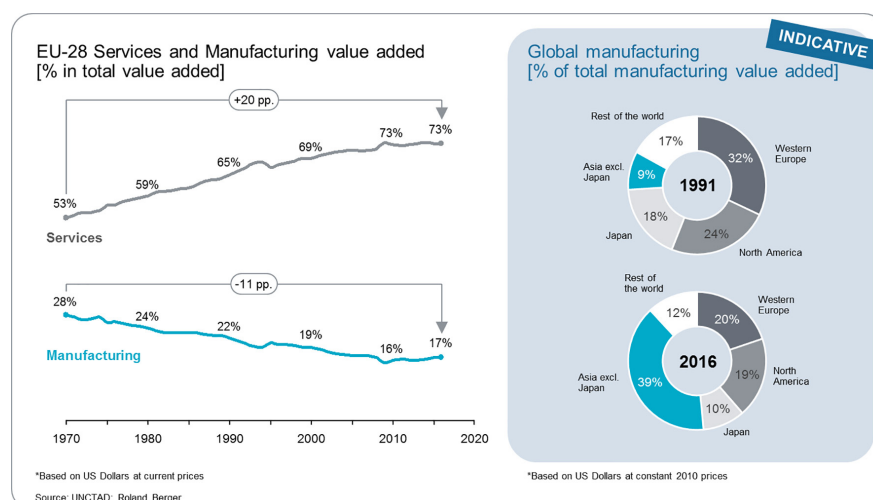
## The wider picture – Deindustrialization across Europe

Industry is a critical part of the European economy, having a contribution of 17% in total value added in 2016, according to latest UN data<sup>(1)</sup>. It serves as a key driver for research, innovation, productivity, job creation and exports and plays a vital role in the labor market,

where it generates primarily mid-salary jobs and employs workers with a broad skillset. Furthermore, industry performance is closely linked with services value-added, as manufacturing activities tend to engage various satellite services – ranging from equipment maintenance, telecommunications and IT to business-related services like accounting and consulting.

Nonetheless, over the past few decades, Europe has witnessed a clear deindustrialization trend, with services notably increasing their share of value added at the expense of manufacturing (**Exhibit 1**). This phenomenon was partly driven by production outsourcing and the rise of emerging industrial economies such as China or India which have captured an important share of the world's manufacturing and industry-related value-added.

**Exhibit 1 – Services and Manufacturing Value Added in Europe and Global Industry Value Added**



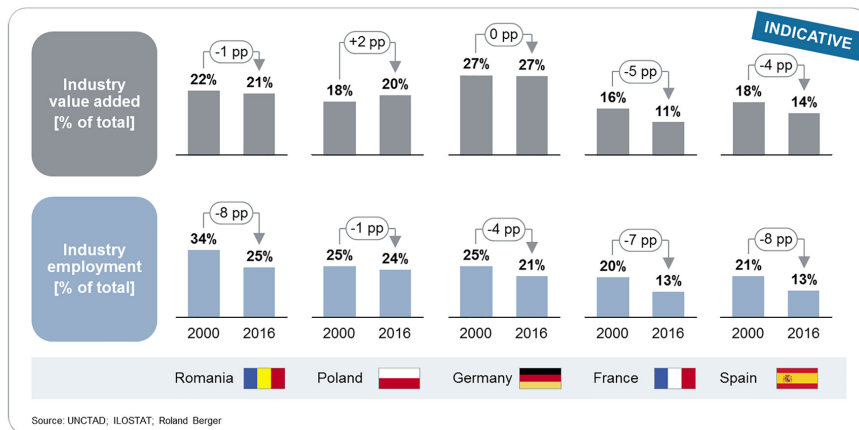
Moreover, as manufacturing productivity increased, driven by the rapid advancement of factory automatization and the widespread use of IT and electronics in the production process, the number of employees working in industry has reduced considerably. In addition to a sharp decline in industrialization rate, some countries such as Spain or Portugal lost up to 20-25% of their manufacturing jobs since the year 2000.

But not all European countries underwent the same development. Poland for instance was able to increase industrial value added since 2000, while Germany,

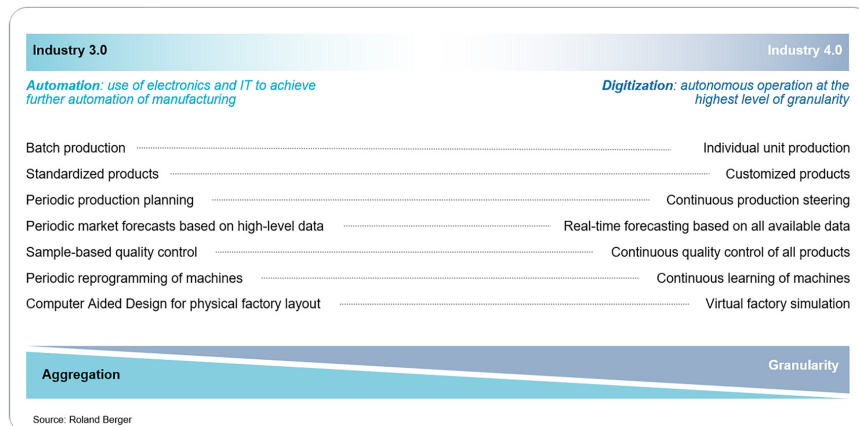
# BUSINESS TRENDS

**Exhibit 2 – Industrial value added and employment in selected European countries**

Industry value added and employment in selected EU countries

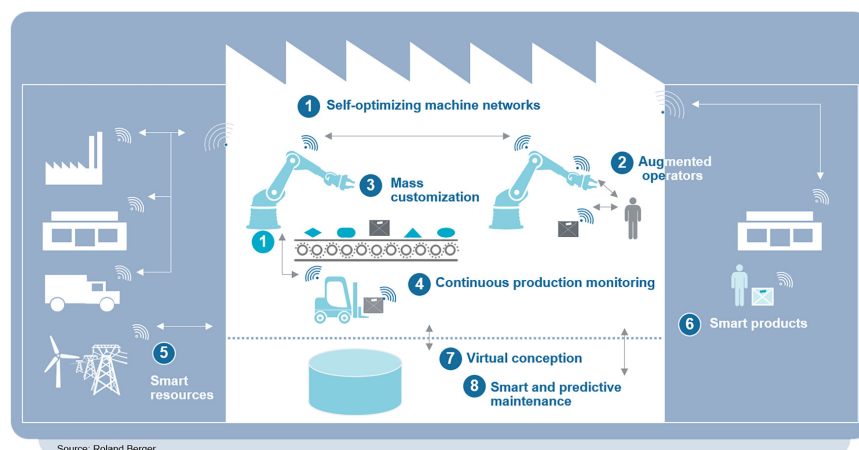


**Exhibit 3 – Main characteristics of Industry 4.0 compared to Industry 3.0**  
Selected characteristics of Industry 4.0 vs Industry 3.0



**Exhibit 4 – Industry 4.0 functional characteristics**

Selected Industry 4.0 concepts



which generates some 27% of economic value added from manufacturing, was able to maintain this share constant since 2000, despite a reduction in the share of manufacturing employment.

But even considering these exceptions, duplicating the strategy that Germany or Poland applied successfully in the past will likely not be a viable solution for the rest of Europe going forward. Instead, more attention should be directed towards the present day dynamic environment – an attempt to coordinate products, production and processes with the current economic situation, as well as capitalize on new opportunities unlocked by digital technologies, will most likely yield the most favorable results on the long term.

## Industry 4.0 – The key enabler for manufacturing competitiveness

Industry 4.0 is the industrial application of the digital transformation which is currently ongoing in most, if not all areas of human activity. Essentially, it represents the full integration and digitalization of the industrial value chain by combining new technologies from the “digital world” with traditional production systems from the “physical world”.

Automation and the widespread use of electronics and IT in production processes have been the hallmarks of manufacturing since the invention of the programmable logic controller in the late 1960's, but what sets Industry 4.0 apart is the fact that it allows for autonomous plant operation at an increasing level of granularity in key business processes. This is possible when value chain elements are completely interconnected and have the ability to react and adapt in real-time, when production units are decentralized, intelligent and self-optimizing/ self-organizing, and when the entire manufacturing process is highly modular and easily reconfigurable. **Exhibit 3** illustrates some of the key characteristics of Industry 4.0 in comparison to the

previous industrial paradigm which was defined by extensive production automatization.

Some concrete Industry 4.0 concepts which can be implemented in most manufacturing plants are illustrated in **Exhibit 4** and described in more detail afterwards.

**1. Self-optimizing machine networks** – Connection of machines, work pieces and systems in order to create intelligent networks that can interact with each other autonomously along the entire value chain

**2. Augmented operators** – Improved skills of human operators through the use of robots, tools and information systems that digitally enhance the real-world environment to make the workforce more flexible and efficient

**3. Mass customization** – Manufacturers' ability to accommodate high product variability and adapt to specific customer needs through flexible modular production techniques

**4. Continuous production monitoring** – Individual tracking of work in progress and finished products to ensure traceability throughout the entire production chain, as well as provide real-time quality management/ quality control

**5. Smart resources** – The usage of data and intelligent resource management techniques to optimize costs by reducing inventories to a minimum, avoiding stock shortages and simplifying order management

**6. Smart products** – Products and packaging equipped with sensors, processors and connectivity which allows

information exchange with the manufacturer and which can adapt based on the products' own state and environment

**7. Virtual conception** – Virtual design of processes and products in order to optimize process efficiency, prototyping costs and the use of capital

**8. Smart and predictive maintenance** – Digitally-enabled methodology to determine the condition of in-service equipment in order to predict when maintenance is likely to be required

Industry 4.0 has the potential to generate highly disruptive effects and it enables those who embrace it to increase their competitiveness. In addition, Industry 4.0 will also generate new and improved products and business models which can ultimately lead to new jobs being created, both within manufacturing as well as in adjacent sectors supporting the transition.

### **Romanian manufacturing – Between deindustrialization and digital transformation**

Along with other Eastern-European countries such as Poland or the Czech Republic, Romania is still one of the economies where the industry's role remains quite strong (over 20% of the national value added). One of the country's main advantages compared to other industrialized EU states is related to low-cost manufacturing, although this is becoming a less compelling strong point in the context of increasing salaries and worker benefits. Also, new production units that are being built are increasingly automated, have lower labor costs and provide a strong potential to enable rapid

growth of high value-added activities.

Roland Berger performed a pan-industry study of Romanian manufacturing companies in order to understand the current state of the sector and get the players' perspective on topics such as deindustrialization and digital opportunities brought about by Industry 4.0.

Fifty (50) plant managers (general managers and technical/ production managers) working for manufacturing companies of all sizes, and from a diverse set of industries, took part in the study. While the results are not statistically representative for the entire industrials sector in Romania, the insights derived provide a solid indication for existing trends and key future developments in the market.

Surveyed plant managers almost unanimously (98%) consider manufacturing to be a key driver for Romania's future economic competitiveness. At the same time, many acknowledge the ongoing deindustrialization process (industry value added dropped from 36% in 1990 to 21% by 2016) and the majority see government-driven solutions as key levers to prevent and even reverse this trend. The top 3 levers to avoid deindustrialization as quoted by survey respondents include infrastructure development (90%), a coherent national industrial strategy (78%) and the development of a technically-oriented educational system (69%).

Furthermore, up to 57% of respondents quoted supportive governmental policies regarding taxation as an important lever to avoid deindustrialization and 43% mentioned competitive energy prices. **Exhibit 5** shows the full list of factors under consideration.

In terms of the current level of competitiveness, almost all surveyed managers consider their companies as being competitive or very competitive in

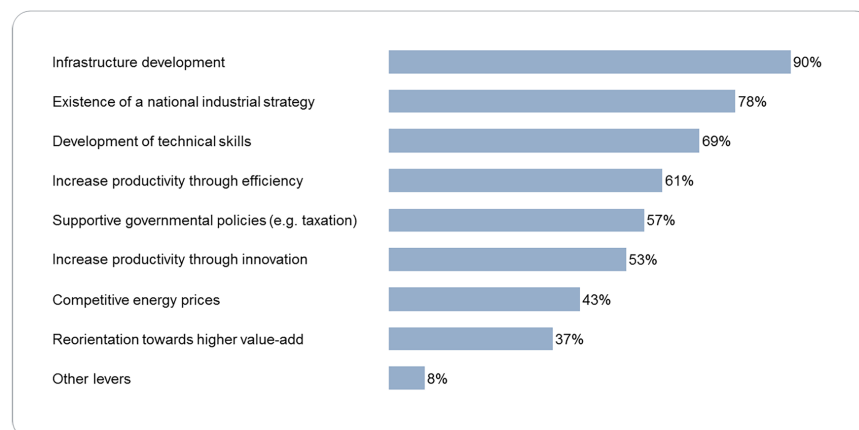
*Industry 4.0 represents the full integration and digitalization of the industrial value chain by combining new technologies from the “digital world” with traditional production systems from the “physical world”.*

*The top 3 levers to avoid deindustrialization as quoted by plant managers in Romania include infrastructure development (90%), a coherent national industrial strategy (78%) and the development of a technically-oriented educational system (69%)*

# BUSINESS TRENDS

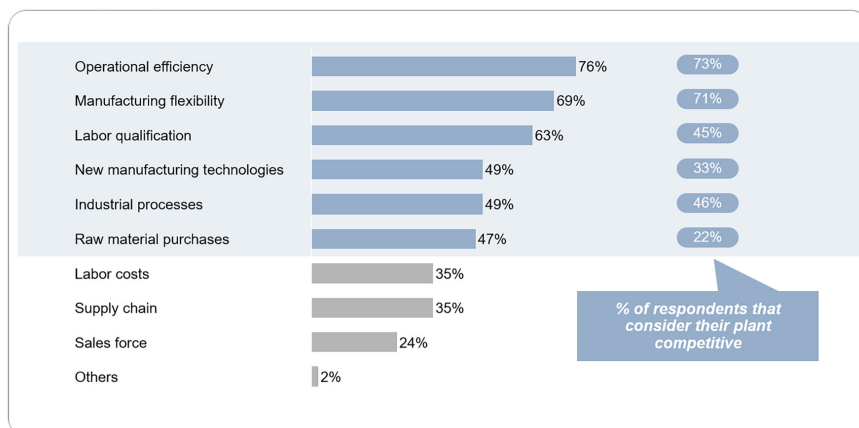
**Exhibit 5 – Key levers to prevent/ reverse deindustrialization in Romania**

Key levers to prevent deindustrialization in Romania [% of respondents]



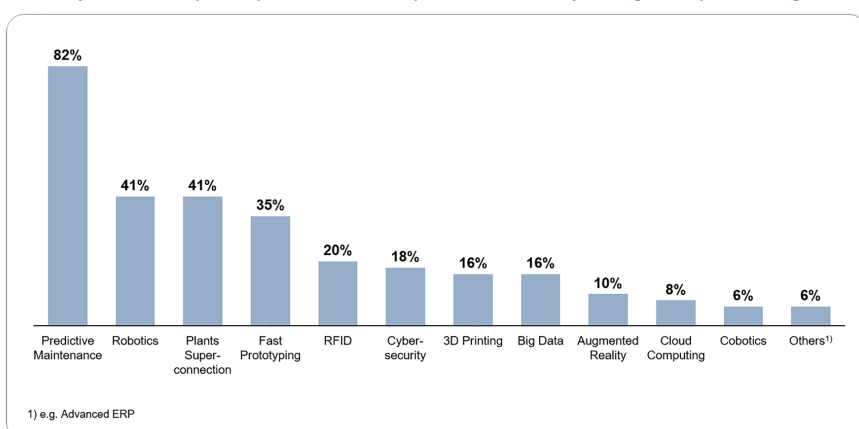
**Exhibit 6 – Drivers for future manufacturing competitiveness in Romania**

Manufacturing key success factors and player competitiveness [% respondents]



**Exhibit 7 – Industry 4.0 concepts expected to be most impactful over the next 5 years**

Industry 4.0 concepts expected to be impactful within 5 years [% respondents]



their markets, with few exceptions, primarily among respondents from smaller plants. Most notably, managers in automotive and shipbuilding are the most optimistic about their companies. By comparison, managers working in chemicals and plastics, process industries and some selected consumer goods sectors, feel the least positive about their plants' competitiveness.

When it comes to securing future competitiveness, the majority of study participants consider operational efficiency (76%), manufacturing flexibility (69%) and a qualified workforce (63%) as key success factors. However, only about 2 out of 3 managers who indicated operational efficiency and manufacturing flexibility as critical also believe their companies are today competitive in these fields. The gap is even higher for labor qualification, where less than half of managers who consider this a critical driver for future competitiveness, also recognize their own company as being strong in this area.

These results as illustrated in **Exhibit 6**, underpin the need for manufacturing companies to actively work to reinvent themselves and to invest in improving their operating models. The adoption of digital technologies is an important step in this direction, and the majority of local managers (63%) believe the level of digital maturity in their organizations is advanced. Once again, on average automotive companies seem to lead the pack in this respect, whereas chemicals and plastics producers appear to be most lagging behind.

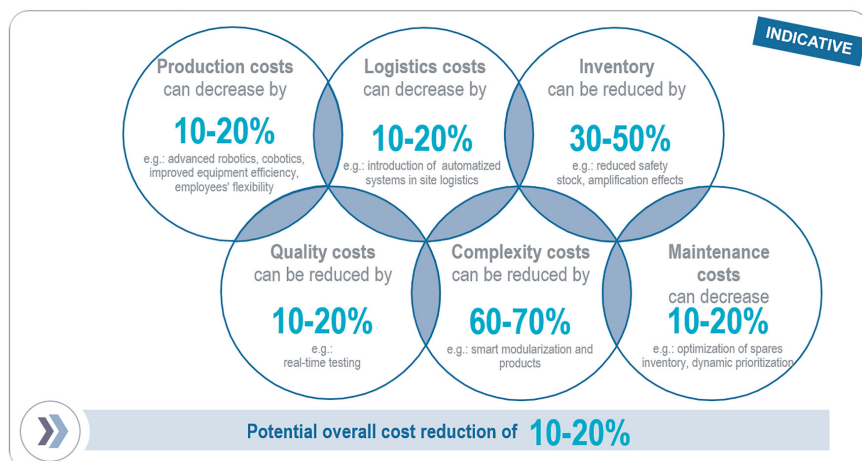
When asked about the disruptive potential of digital transformation in the manufacturing sector, most Romanian plant managers surveyed by Roland Berger are familiar with Industry 4.0 concepts. The vast majority (82%) have identified Predictive maintenance as a clear game-changer over the mid-term.



*The adoption of Industry 4.0 technologies in so called “smart plants” can generate overall cost reductions ranging between 10-20%, in addition to significant opportunities on the revenue side.*

**Exhibit 8 – Expected cost benefits of Industry 4.0 concept adoption in “smart plants”**

Expected cost benefits of Industry 4.0 adoption



Also, well over a third of plant managers believe Robotics, Plant super-connection and Fast prototyping will be impactful in the Romanian manufacturing landscape over the next five years. There is also a long-tail of Industry 4.0 concepts, from RFID to Cobotics (e.g. plant operators working in close collaboration with manufacturing robots), which a smaller number of respondents have identified as having an impact over the next five years. The full list is presented in **Exhibit 7**.

## Conclusions

Deindustrialization is an ongoing process across most of Europe, as both the share

of manufacturing value added and industrial employment have been shrinking for many years.

On the other hand, with the ubiquitous rise in digitalization, the next generation of production technology is currently being developed and adopted in plants across all industries. From smart, AI- and sensor-driven machinery, to augmented operators and predictive maintenance, innovative Industry 4.0 concepts have the potential to revitalize industrial competitiveness in Europe and across the globe.

A recent Roland Berger study found that

the adoption of Industry 4.0 technologies in so called “smart plants” can generate overall cost reductions ranging between 10-20% (see Exhibit 8). In addition, there are significant opportunities on the revenue side as well, driven by demand for new, innovative and increasingly customized products.

Romania remains one of the more industrialized countries in Europe, and the Roland Berger study shows that up to two thirds of interviewed plant managers perceive the level of digitalization in their companies as advanced. However, looking ahead to the next five years, much fewer are optimistic about their ability to remain competitive on the factors that they believe will be relevant.

This shows that in order to fully leverage the potential of Industry 4.0, manufacturing companies need to be ready to transform their business models and invest in the right technologies. Remaining idle and not being a part of the digital revolution will not be an option – companies need to take action now.

## Further reading

For further reading into the topic of Industry 4.0/ Digitalization in manufacturing, please check out our dedicated issue of ThinkAct magazine.

If you are interested in obtaining the full copy of the Romanian manufacturing competitiveness study, please reach out to the following contact persons at Roland Berger Romania.

## AUTHORS



**SZABOLCS NEMES**  
Principal  
Roland Berger



**MIHAI SAVA**  
Project Manager  
Roland Berger



**Roland Berger Strategy Consultants Romania**  
79-81 Popa Savu St., 011432 Bucharest, Romania  
Phone +40 21 306 0500, Fax +40 21 306 0510  
[www.rolandberger.ro](http://www.rolandberger.ro)

