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*What gets us into trouble is not what we don't know.  
It's what we know for sure that just isn't so.*  
Mark Twain

### **To work differently. The Fourth Industrial Revolution**

#### **Abstract**

The term *Industrie 4.0* was first used in 2011 at Hannover Messe, the world's leading trade fair for technology, innovation and automation. A draft strategy for the development of the German economy was presented during that event, in which the innovative computerization of production processes was to play the key role. Seven years after that announcement, specialists are assessing the possibilities of these changes, also in the conditions of the Polish economy. The article focuses on changes in human resource management and the ability to measure the achieved order of the organization's functioning against the challenges of a globalizing economy.

#### **Keywords**

Industry 4.0, ordomanagement, resource administration order

#### **Introduction**

The challenges of globalization trigger revolutionary changes in the perception of behavior, actions and values, both at national and global level. Specialists define nine criteria for global enterprises: innovation; shareholder returns; social and environmental responsibility; the ability to acquire, train and retain talented people; quality of goods and services; financial health; management of company assets; and finally, the ability to adapt to global business requirements business (G. Gierszewska, B. Wawrzyniak, *Globalizacja*, Poltext, Warsaw 2001, p.70). Enterprises are now perceived as the main subject of the globalization process, and according to B. Wawrzyniak, as such they must meet much more difficult challenges than they used to. First, the new role of enterprises is not yet clearly defined. Second, enterprises are dealing with the issue of national identity. Third, enterprises are being increasingly traded by being bought and sold, which is a largely uncontrolled process. It is believed that the

solutions adopted under a global strategy should include a diversified set of measures facilitating innovations. These innovations are focused on creating competitive advantage.

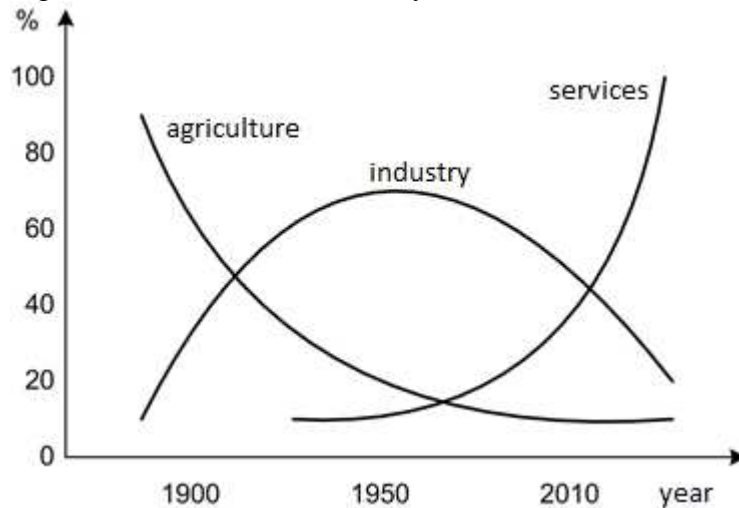
In this paper, the need to combine innovation and regulation is postulated, with a view to effectively adapting to global changes.

- **Industrial revolutions**

As many as 700 professions are to be replaced by robots in the near future. This implies major challenges looming ahead, not only economic but social as well. Dynamic changes, especially in the area of technology, make it extremely difficult even for experts to predict which jobs will turn out to be the most prospective in the future. However, forecasts indicate that demand for logisticians and financial analysts is going to increase. Some years from now, the labor market will largely rely on automation and robotics, thus prompting disappearance of many traditional professions on the one hand, and an increased demand for employees specialized in the operation, maintenance and servicing of existing solutions, as well as for designers of new and improved solutions adapted to the changing needs of consumers on the other hand (G. Gierszewska, B. Wawrzyniak, *Globalizacja*, Poltext, Warsaw 2001, p.80). Experts are unanimous in predicting a dynamic growth in market demand for software programmers, IT specialists, network administrators, data controllers, computer-controlled machine operators, automation specialists, electronic engineers, electronic mechanics, or drivers of various vehicles. Electromobility is, therefore, a rewarding field to get schooled in. Medical practitioners, healthcare professionals and trained caretakers will easily find jobs in the future, with a similar demand forecasted for professions related to the organization of free time and pursuit of interests and hobbies, such as sports trainers, gym instructors, animators, food-service workers, tour operators and event organizers (G. Gierszewska, B. Wawrzyniak, *Globalizacja*, Poltext, Warsaw 2001, p.80).

This seems to be well reflected in Fig. 1 showing changes that occurred in the U.S. labor market between 1900 and 2010.

Fig. 1. Jobs in the U.S. economy in 1900-2010



Source: own study.

All this is correlated with the upcoming changes in technology, sometimes referred to collectively as the Fourth Industrial Revolution. The term *Industrie 4.0* was first used in 2011 at the Hannover Messe fair. A draft strategy for the development of the German economy was presented during that event, in which the innovative computerization of production processes was to play the key role. After three subsequent revolutions: the Age of Steam, the Age of Electricity and the Computer Age, respectively, the time has now come to welcome the fourth era, namely that of digital clouds, the Internet of things and big data. Accordingly, the Fourth Industrial Revolution is the transition to cyber-physical systems and the creation of a smart factory. As part of this concept, unnecessary activities are abandoned and the production belt – automated via just-in-time manufacturing that uses intelligent software to access data from the global network, making independent decisions related to the operation of the plant. In this way, human error will become a thing of the past, and the whole production process will be significantly streamlined as it will be tested virtually in the area of prototyping and design of the production line. The Polish economy is just embarking on this path, as evidenced by the small number of robots in Poland per 10,000 employees –only 22, against 292 in Germany and 450 in South Korea. What, then, should be done to ensure that this system is embraced also in Poland? As argued by M. Kronowski, Polish companies must overcome their mental bias and unwillingness to communicate with the outside world, and stop perceiving solutions such as digital cloud as dangerous and not trustworthy (M. Kronowski, *Roboty na barykady*, Newsweek, 30/2016). Experts encourage assuming a holistic approach towards the company's operational activity - from receiving orders, through production, all the way to

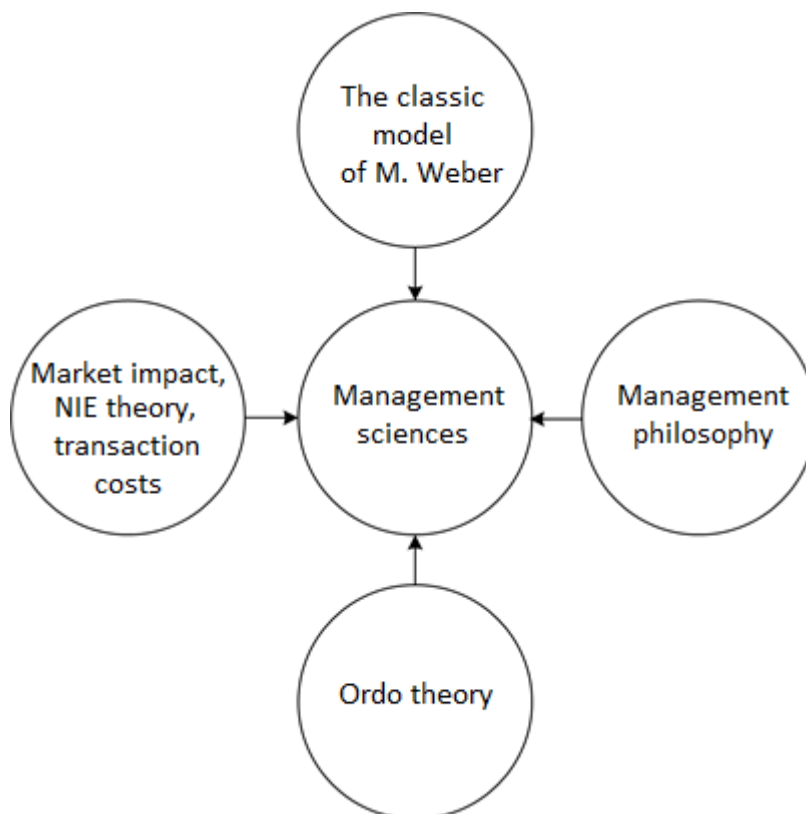
product delivery. In all this, however, solid infrastructure is required, and especially a countrywide high-speed Internet connection (*Ibidem*).

- **New relationships and interactions in the economy**

This article was propelled by research on the possibility of finding a way to adapt the enterprise management system to the requirements of the present times, including to the conditions of the Fourth Industrial Revolution. It was assumed that, when developing resource administration order, it is necessary to understand the nature of management along with its perspective of interdisciplinarity, evolution, diversity of concepts, and sometimes also lack of integrity. An argument is put forward that the insufficient use of conceptual apparatus which could be derived from other sciences - philosophy, psychology, law and physics –constitutes a certain deficiency of current academic discussion.

Fig. 2 provides a review of relationships - starting from M. Weber’s concept, through the philosophy of management, the new institutional economy, ordoliberal theory, to institutional control – showing what are arguably the most important factors influencing the discourse on management sciences and human resource management.

Fig. 2. From M. Weber to institutional control



Source: own study.

For the purposes of this paper, the focus is on human resources management and its different styles. An important element in this scheme is M. Weber's classical model. One of Weber's primary merits is that he defined the methodology of social sciences, rejecting the positivist conceptualization of natural sciences. He postulated to give the social sciences a strict and objective character by developing a methodology and philosophy appropriate for them (concept of ideal types), describing them with the use of a precise language and conducting historical and comparative research. According to Weber, understanding is only possible for rational actions. However, since he believed that human behavior was in most cases irrational, he proposed to study it in coupling with rational and logical ideal types. Examination of differences between the ideal and the actual type, in his view, allows to arrive at optimal solutions. In characterizing the ideal type, Weber proposes using three elements: law, tradition, and charisma (M. Weber, *Gospodarka i Społeczeństwo*, Wydawnictwo Naukowe PWN, Warsaw 2002, p.221). Interestingly, many of these concepts remain valid to this day.

Charisma is an important factor in the art of management. Charismatic authority translates into a guaranteed high quality of products and implementation of optimal projects. A. Blikle, in his book *Doktryna jakości. Rzecz o skutecznym zarządzaniu*, states that the main impediment to productivity, entrepreneurship and innovation of employees in most companies is the bad atmosphere at work, for which managers are most often to blame (A. Blikle, *Doktryna jakości. Rzecz o skutecznym zarządzaniu*, Wydawnictwo Hellon, Warsaw 2014). Blikle argues that a charismatic boss goes beyond the traditional "carrot and stick" approach, even departing from periodic (annual) ratings in favor of encouragement offered to employees and a good atmosphere in the workplace. Instead of degrading or promoting, an employee's needs can be identified to help them grow. A charismatic boss communicates with employees on partner terms, even though there may be difference of opinion. In fact, different opinions are necessary for employees to grow. There is no talk about how much one is worth, but what can be done to help one grow (*Ibidem*, p. 14). Referring to this element of M. Weber's concept, it is worth citing the reflections contained in the recently published book *Pracować inaczej*, whose author, F. Laloux, examines charismatic authority in the management of non-profit enterprises. He calls it "turquoise", placing it at the very end of the evolutionary timelines of management styles, ranging from the most aggressive to the most partner-like. Interestingly, he assigns a symbolic color to each of the styles (F. Laloux, *Pracować inaczej*, Wydawnictwo Studio EMKA, Warsaw 2015). The red style is a bloody leadership based on fear, with one commander and one form of punishment, and therefore absolute obedience

(street gangs, rarely companies and other organizations). Then there is the amber style - a group of managers work at different levels of a formalized hierarchy - subordination to the undisputed code (the army, Church). Moving on, there is the orange style - a hierarchical organization for which effectiveness, often at all costs, is the highest value. The enterprise operates as a machine, people are human resources, and utility is the only value that counts (corporations). The last of the hierarchical styles is the green style, driven by partnership principles, where equality, freedom and justice are the primary values. In the green style of management, man is not a resource, but a subject worthy of interest not only for what they produce, but also because of their individuality and needs (co-operatives and social co-operative movements). The turquoise style challenges previous traditions and reverses the order of things, being driven by a conviction that if good life is the basic value, it should be nurtured especially at work. Laloux argues that work should be organized so as to give meaning to what one does, leaving room for development, creativity and innovation. Central planning and budgeting are rejected in favor of forecasting aimed at making optimal decisions rather than holding employees accountable for specific tasks. It is necessary to abandon the principle that decision-making must be rigidly assigned to positions and accept that decisions are made by those who have the best knowledge about their subject. In a turquoise company, no supervision is required for employees to work, nor is anyone judged or motivated to work by traditional incentives. In a turquoise company, the hierarchy is stripped down to the necessary minimum (*Ibidem*, p. 54). Many authors consider F. Laloux's book to be a must-read among management books, including A. Blikle, who writes the following in the online edition of [www.empik.com](http://www.empik.com): "In the last 25 years, I have read about 100 management books. I would put this one in my top five, alongside the works of authors such as Deming, Drucker, Kohn and Kosewski, as it indicates the advent of a new paradigm of teamwork".

On the basis of the presented scheme of management order, a comparison can be made between the traditional management system and the so-called ordomanagement. The choice of ordoliberalism is due to the idea of established order proposed by this concept.

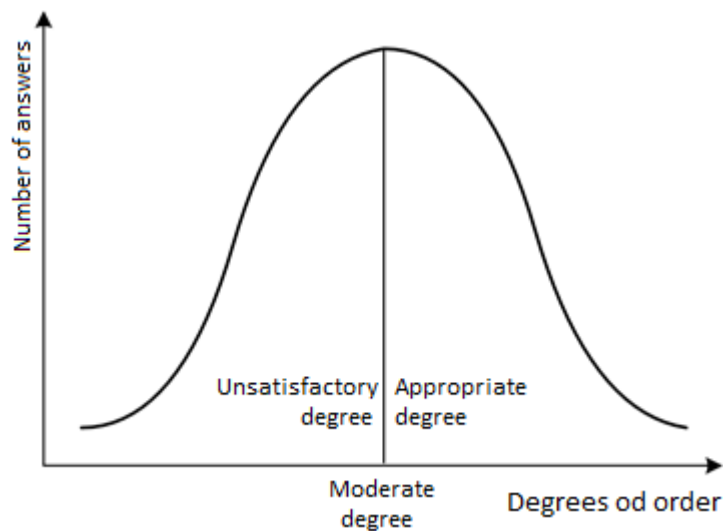
Tab. 1. Traditional management vs. ordomanagement

	Traditional management	Ordomanagement
Balance	Closed systems in a state of equilibrium (balance)	Sustainable business environment and the flexibility of economic order
Synergy	Pressure to identify synergies	Identifying synergies and anti-synergies
Networks	Interactions between enterprises only through the market	Organizing virtual organizations, relationship networks change over time, Industry 4.0 (Industrie 4.0 in Germany, and Smart Manufacturing Leadership Coalition in the U.S.)
Evolution	Lack of internal creative abilities	Logical incrementalism, evolutionism, the ability to take higher risk

Source: own study.

The proposed scheme served to draw up a measure of the order of the examined organizations (enterprises).

Fig. 3 Degrees of resource administration order



Source: own study.

where, in the case of disorder:

$p$  – index of the studied degree of order would probably need to be  $p = 1, \dots, 4$ , which would affect other parameters.

However, it can be assumed that there is no such disorder in the organization and then consider three levels of order based on the following formula, knowing that the average is

a moderate degree, a negative deviation is an unsatisfactory grade, and a positive deviation is an appropriate degree:

Data for calculating the order of the administration process:

$p$  – index of the studied degree of order,  $p = 1, \dots, 3$

$s$  - degree of adequacy, in the case under study  $s = 1, \dots, 4$

$r$  - index of the detailed criterion,  $r = 1, \dots, 40$ ,

$Z_{sp}$  – number of answers with the degree of adequacy  $r$  for  $p$  of the degree of the order of the management process under study

$$L_p = 1/40 \sum_{s=1}^4 Z_{sp} * s$$

$$O_d = \sqrt{1/40 \sum_{s=1}^4 Z_{sp} * (L_p - s)^2}$$

### Conclusions

In this paper, a suggestion is put forward for entrepreneurs to consider their business activity holistically in the face of upcoming challenges brought about by the Fourth Industrial Revolution. An important premise in this is the pursuit of an order-based approach. As aptly put by Martin Ford (M. Ford, *Światrobotów*, cdp.pl Warsaw 2016, p. 288), the dominant vision of a modern enterprise is a combination of innovation and regulation, a view endorsed in this paper by presenting the method of assessment of implemented undertakings in the examined enterprises. Also emphasized is the need to account for unemployment and the impact of technology on production processes in the method of measuring the order.

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