DOES INDUSTRY 4.0 INFLUENCE EFFICIENCY OF FINANCIAL MANAGEMENT OF A COMPANY?

Josef Horák

Abstract

The term "Industry 4.0" is connected with the birth of the Fourth Industrial Revolution that will be accompanied by changing tasks for machines, technologies, processes and employees. The concept of Industry 4.0 is used in the manufacturing sector in Europe with the leading country Germany. This concept represents a big opportunity for the Czech Republic as the traditional industrial country. English-speaking countries such as the United States of America or Great Britain use the terms "Internet of Things" or "Industrial Internet". Despite the different terminology, the concepts are based on cyber - physical systems. These systems are incorporated into smart factories and fundamentally influence a traditional production process. Industrial production will be fast, dynamic, highly flexible and will interconnect the demands of customers with production capabilities of their suppliers. Value added of the company will be possible to ensure through the interconnection of digital processes. The main aim of the paper is to discuss the influence of Industry 4.0 on the efficiency of financial management of a company in accordance with crucial changes in the industry and then answer the mentioned question if it is even possible.

Key words: Industry 4.0, industrial revolution, efficiency of financial management, challenge for higher financial performance

JEL Code: M11, O31, O33

Introduction

The submitted paper is a response to a new evolutionary and revolutionary changes taking place in industrial production. Fourth industrial revolution is a reaction to the changing environment of business. In order that the company could be successful in the market, it is essential to effectively respond to the ever-changing demand of its customers. For this reason, it is absolutely necessary to improve the technology and manufacturing equipment for a production. (Krabec & Venegas, 2015). It is possible to say that other technologies are

beginning to converge. It's communications, automation, and computer technology. A virtual world will be created as these technologies converge. After that, the virtual world will be reflected in the physical world.

However, changes will occur only on the supply side, it will change the demand. It causes the so-called individualized mass production - i.e. it is a mutual interconnection and individualized mass production. Enterprises will need to respond to changing market conditions, technological changes, and innovations so that they can meet their customers' demands while maintaining effective cost optimization. If the company does not accept these market conditions, it can face a financial distress and financial problems. (Čámská, 2014).

In order to be aligned individualized and, mass production will be created so-called digital twins. The digital twins will be the images of products that will be produced in future by the manufacturing company. Image of future products will be interconnected with the actual product and that is why it will influence the born of cyber-physical systems. It will be necessary to collect and store data due to the scale of production. As is evident from the above text, there will be an enormous increase in data. These Big data will have to be analysed very carefully. From these Big data, the company obtains the data that will be necessary to ensure an efficient production process. (Gorecky et al., 2014)

Any kind of assets equipped with a sensor can generate dozens of data streams, but a careful analysis may reveal that only a portion of these data is important for a detailed description of equipment performance and monitor its status. The company is then able to determine which data sources are linked, so that this company could accurately predict the quality of the equipment, its performance and condition. The company will get detailed overview needed for model performance equipment that will anticipate the impending deterioration of equipment or failure and recommend the most appropriate procedure in case of unusual behavior. (Hřib, 2016)

Due to the ongoing changes, it is possible to state that these changes will have a fundamental impact on the whole society. (Randáková et al., 2014) Changes in the goods market will be followed by radical changes in the labour market. This situation will influence an unemployment and a minimal wage in the economy. (Löster & Langhamrová 2012), (Pavelka et al., 2014).

Gradually there is a situation that many manual workers will be replaced by robotic production. This results in a shift of workers, particularly in services, which will always need human contact and social feelings between the company and its customers. These

evolutionary and revolutionary changes will start at first in the industry. They will be later followed by the sectors of transport, energy and after that by other sectors of the economy.

This whole process will affect the efficiency and competitiveness of enterprises and the national economy in general. For this reason, research and analysis of the issue of Industry 4.0 are one of the priorities of the Government of the Czech Republic.

1 Industry 4. 0 as a phenomenon

The principle of 4th Industrial revolution is based on the radical changes in the concept of industrial production. Production will take place in smart factories. These factories will be based on a completely new concept. Materials, work in progress, semi-finished products, finished products and production machines will share information each other. All processes will be decentralized, which will have an effect on the speed and efficiency of the entire production process. Intelligent manufacturing processes and the entire technology will be as key components of smart factories.

The next key component of the phenomenon of Industry 4.0 is the Internet of Things. All components in smart factories will collect data (Big Data). This data will be analyzed through computer technology, the company obtains the best information about the needs, behavior, and requirements of its customers, while the company will have information about the behavior of produced production. This leads to the involvement of customers in the manufacturing process of the company. Customers will receive products according to their wishes, the firm will be able to effectively respond to the wishes and requirements of its customers. The whole process will have another effect, which results in an overall cost reduction throughout the entire production process. (Shrouf & Miragliotta, 2015) This should result in an increase in the financial performance of the company.

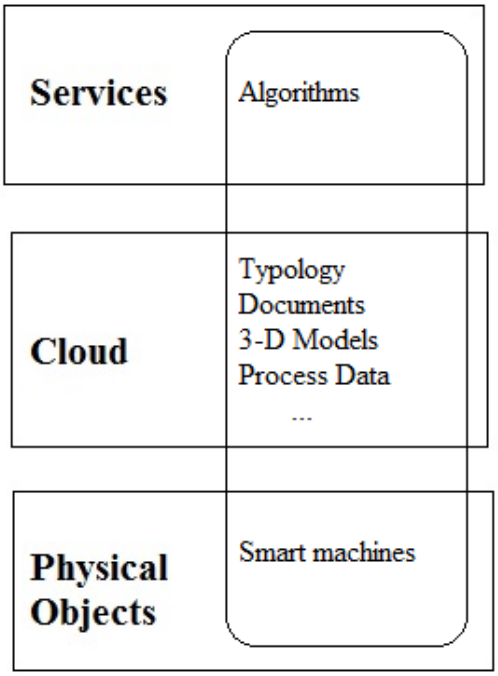
Raw materials, components, products will receive their own identity in smart factories. They could be interconnected, simulated and they could negotiate each other. The cyber-physical systems will be virtually put into operation and will be available to all authorized personnel or equipment. Cyber-physical systems require 3 main levels:

- Services based on available data.
- Data models of physical objects in a network infrastructure.
- The physical object. (Drath et al., 2014)

In the manufacturing process, the production company will have initially employ algorithms, through which the product can be produced. These algorithms will be owned by

the company or purchased as a service from an external entity. Subsequently, it will be possible to produce production based on the data stored in the cloud storage service. There will be kept the whole documentation of the produced products, 3-D Models, Process Data etc. In the end, there will be produced a product that will meet customers' requirements and wishes. (Mosterman & Zander, 2016) It is expected that customers will be able to produce the final products themselves in the future. The first step will be a purchase of algorithms from an external supplier, then usage of the stored data in which all the parameters and methods of manufacture of the product will be stored. The customer will print the final product through 3-D printer as a last step. This concept is shown in Fig. 1.

Fig. 1: Cyber-physical systems in Industry 4.0



Source: (Drath & Horch, 2014)

2 The current approach to financial management of the company

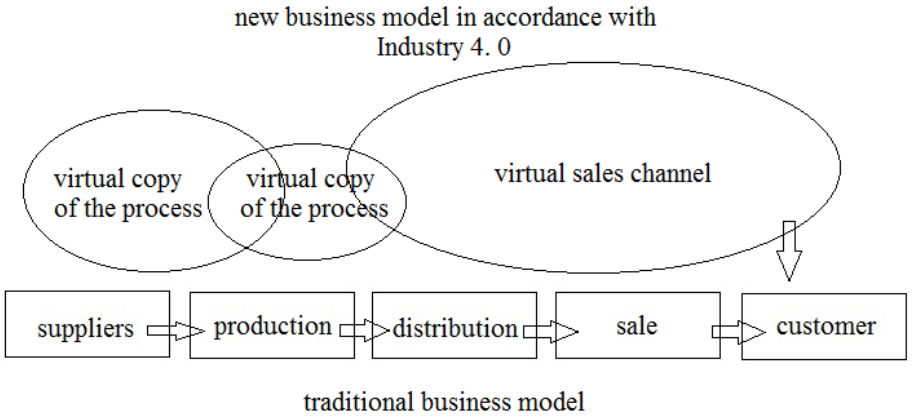
Financial management as a field of study has been developed since the beginning of the 20th century. The evolution of the financial management is divided into three main board phases (the traditional phase, the transitional phase and the modern phase). The traditional phase took place from the beginning of the 20th century till the end of 30's. The approach of the financial management was primarily focused on instruments of financing, institutions and procedures

used in capital markets and legal aspects of financial events. These elements formed the core of the financial management. The transitional phase took place from approximately 1940 to 1950 and was focused on the day to day problems faced by financial managers in planning, control, and working capital management. The modern phase (started in 1955) is based on the application of quantitative methods of analysis, valuation models, dividend policy, financial modelling, behavioural finance etc. (Chandra, 2011)

Development in the area of financial management was mainly influenced by the 2nd industrial revolution (electrically powered mass production based on the division of labour) and the 3rd industrial revolution (development of IT and automation of manufacturing). The companies had to adapt to these radical changes if they wanted to stay competitive. The same situation occurs during the 4th industrial revolution, in terms of which will be successful only those enterprises that will be able to respond timely to the changes and adapt their technologies so as they will able to effectively interconnect customers with their production possibilities.

End-to-end transparency is provided over the manufacturing process, facilitating optimised decision-making. Industry 4. 0 will also result in new ways of creating value and new business models in the economy. (Havle, 2016) The comparison of a traditional business model and new business model in accordance with the Industry 4. 0 is presented in Fig. 2. The new business model is based on the virtual copies of the processes of the suppliers. These processes will be interconnected with virtual copies of the processes in the production company. The most important channel will be virtual sales channel that will be interconnected with the virtual copy of the process of the production company.

Fig. 2: Comparison of a traditional business model and new business model



Source: own elaboration in accordance with (Havle, 2016)

The products will be produced in the smart factories. Due to the creation of new business models, it will be necessary to adapt to these models in companies in accordance with changes in the production system. The traditional view of production will be changed, production will be due to massive use of robotic devices more effective and will also respond quickly to changing customer demand.

Current corporate reports present information that occurred and impacted the company. Measurement of the financial performance of the company using the financial metrics is quite common in practice and well justified, but it does not allow for a clear analysis of casual relations. The company must be monitored and evaluated in a systemic way. Financial metrics are not enough sufficient as they do not cover qualitative aspects of elements and relations in the company system. The conflict between the need of the company to be competitive on a long-term basis and the rigid model of financial accounting unblocked some space for the new methodologies e.g. Balanced Scorecard. Financial metrics are no longer sufficient for the determination of strategy of the companies in the contemporary information age. Companies must come up with such a strategy so that their investments into customers, suppliers, processes, technologies and innovations create some value added. (Jáčová, 2011)

However, in the future enterprises will need to change the approach to financial reporting through the usage of generic predictive analytics, predictive modelling and prescriptive modelling. Generic predictive analytics generates information why the situation occurred. Predictive modelling will effectively predict variants of future development. Prescriptive modelling is based on information the best that could happen. All of these methods will have to use Big Data, from which they will filter out only the relevant information necessary for management decisions and financial management of the company. (Havelka, 2016)

3 Discussion

New business models radically change the view on the manufacture and sale of products, and consequently services. First, it will be a change in industrial enterprises and then the changes will be in services and consequently in society as a whole. As there is a change in production, the structure of production factors will be changed too. Companies will have to purchase new technologies (SMART technologies), which will require considerable initial investments. Without these investments, they will not be able to communicate with their suppliers or

customers in the future. Human work will be mostly replaced by robotic work. Companies will require especially highly skilled employees with knowledge of IT.

A lot of work positions will be replaced by robots in manufacturing, low and middle level of management. However, companies will have to adapt to these changes as well as reporting in the company. Many reports will be prepared by the smart machines. The human factor will be used for control and analyzation of relevant information. Here come following questions:

- Who will be responsible for reporting?
- Who will be the owner of the primary data?
- How will look like a flow of primary data?

The process of digitalization will have a crucial impact on the forms and methods of financial management. New ways of recognition and reporting of economic transactions will be required.

That is why new methods of control will be developed. They will use new methods for obtaining and processing information from Big Data. All changes will be supported by multidisciplinary changes such as financial management through IT technologies, financial and managerial accounting, IT ensuring of software and hardware, qualification of staff in IT etc.

Conclusion

Mostly large companies (e.g. ŠKODA AUTO, Siemens, Bosch, ABB, T-Mobile and a number of other innovators) deal with the problems connected with the Industry 4.0 in the Czech Republic. As is evident from the above text, financial management will be drastically affected by forthcoming changes in the economy. Large companies will have the opportunity to prepare for the changes in the production process and apply sufficient funds to ensure their competitiveness in the market.

On the other hand, many small companies will face enormous competition, in which large firms are able, thanks to increased sales effectively divide the investment costs associated with the digitization of production to their production. Small firms will not have enough funds to be able to efficiently prepare themselves for the upcoming changes and they will probably face considerable financial problems. Due to the changes in production, it will be necessary to ensure the new information provided by the financial accounting. New types of information will be useful for purposes of financial management, controlling and reporting.

Acknowledgment

This paper was created in accordance with the research project undertaken by the SKODA AUTO University and the SKODA AUTO.

References

Čámská, D. (2014). *Requirements for Models Predicting Corporate Financial Distress*. In: Loster, T., Pavelka T. (Eds.), 8th *International Days of Statistic and Economics,* Slaný: Melandrium, 316-323

Drath, R., & Horch, A. (2014). Industrie 4.0: Hit or Hype? [Industry Forum]. *EEE Ind. Electron. Mag. IEEE Industrial Electronics Magazine, 8*(2), 56-58. doi:10.1109/mie.2014.2312079

Gorecky, D., Schmitt, M., Loskyll, M., & Zuhlke, D. (2014). Human-machine-interaction in the industry 4.0 era. *2014 12th IEEE International Conference on Industrial Informatics (INDIN)*. doi:10.1109/indin.2014.6945523

Havelka, Z. (2016). Datová architektura, syntetická inteligence – průmysl 2025 aneb kolik andělů se vejde na špičku jehly? In: *PPP 4.0 – Připraveno pro Průmysl 4.0,* Brno, 16-22.

Havle, O. (2016). Průmysl 4.0 z pohledu MSP. In: *PPP 4.0 – Připraveno pro Průmysl 4.0,* Brno, 16-22.

Hřib, K. (2016). Internet věcí a Asset Management. In: *PPP 4.0 – Připraveno pro Průmysl 4.0,* Brno, 50-50.

Chandra, P. (2011). *Financial management: Theory and practice*. New Delhi: Tata McGraw-Hill Education.

Jáčová, H. (2011). Improvement of the Company Performance by Means of Successful Implementation of the Balanced Scorecard Model. *Finance and the Performance of Firms in Science, Education, and Practice*, 204-215.

Krabec, T., & Venegas, P. (2015). Fields: On the Visibility of Flows in Digital Business. *FAI Financial Assets and Investing, 6*(3), 5-22. doi:10.5817/fai2015-3-1

Löster, T. & Langhamrová, J. (2012). Disparities between regions of the Czech Republic for non-business aspects of labour market. In: Löster, T., Pavelka, T. (Eds.), *6th International Days of Statistics and Economics,* Slaný: Melandrium, 1-13.

Mosterman, P. J., & Zander, J. (2016). Industry 4. 0 as a Cyber-Physical System study. *Software and Systems Modeling, 15(1),* 17-29. doi:10.1007/s.10270-015-0493-x

Pavelka, T., Skála, M., & Čadil, J. (2014). Selected issues of the minimum wage in the Czech Republic. *E+M Ekonomie a Management, 17*(4), 30-45. doi:10.15240/tul/001/2014-4-003

Randáková, M., Bokšová, J., & Strouhal, J. (2014). Current issues of reorganization process in the Czech Republic. *J. Econ. Bus. Manage*, *1*(2), 68-73.

Shrouf, F., & Miragliotta, G. (2015). Energy management based on Internet of Things: Practices and framework for adoption in production management. *Journal of Cleaner Production, 100,* 235-246. doi:10.1016/j.jclepro.2015.03.055

Contact

Josef Horák
SKODA AUTO University
Na Karmeli 1457
293 01 Mladá Boleslav
Czech Republic
josef.horak3@savs.cz