Industry 4.0 Aimed at Accounting System

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Abstract: *Industry 4.0 means a current trend of digitalisation and related automation of production and changes at the labour market brought together with the Industry 4.0. More and more internal as well as external integration occurs, more and more data is collected for analysis and decision making, top management requires access to data in real time, we transfer to unified protocols, the quantity of wireless communication devices grows and thus the level of isolation of company systems is considerably reduced. This text discusses the digitisation within the accounting sphere. With its case study it shows how the requirements on presentation and information sharing of accounting and taxation sphere change: options to send tax documents in electronic form, links to Internet banking, XML communication, Internet shops or accounting in mobile phones. This text aims to provide the view not only on the accounting software but also on work of book-keepers. Thus the text presents the view on the whole accounting system within the environment of Industry 4.0. The final part of this text discusses the readiness of companies to the Industry 4.0.*

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1 Introduction

The scientific and technical development can be divided in several revolutions (Tab. 1). First three of them resulted from the technical revolution and the revolution in electronics and mechanics. (Halenár, 2016).

The first industry revolution was based on the production mechanisation with the use of water and vapour energy. The second one included the electricity in the industrial production, the third one than has brought the automation using the electronics and information and communication technologies. (Vacek,2016)

The current stage of the industry development can be described as the revolution of informatics and communication. This causes the high level of globalisation and foundation of companies of which the existence is based on the communication (Halenár, 2016). This trend is called as the Industry 4.0.

The Industry 4.0 related to the previous wave but there is a convergence of technologies that tears down wall among physical, digital and biological worlds. The convergence technologies usually include information and communication technologies, biotechnologies and nanotechnologies and cognitive technologies.

Table 1 Four waves of the industrial revolution

Wave	Year	Characteristic features
1	1784	Vapour, water, mechanic production
2	1870	Division of labour, electricity, mass production
3	1969	Electronics, ICT, automated production
4	?	Cyber physical systems

Source: Schwab, 2016

Schwab (2016) mentions three reasons why the current transformation is not a simple prolongation of the third industrial revolution: these are its speed, scope and system effect. When compared to previous industrial revolutions the fourth one develops rather exponentially than linearly, with all resulting consequences.

Kopp and Basl (2017) state that it namely means the combination of new IT technologies, especially of Internet things and new production, transportation and industry, handling technologies plus new materials and related processes.

The German Institute of normalisation characterises the Industry 4.0 as a fusion of real and virtual world. There will be a world in which the information technologies are fully integrated in production processes. Systems in production, logistics or services will communicate with each other in a new, intelligent way. Thanks to the Industry 4.0 the production cycles get shortened, need of clients are registered in real time or the maintenance is mostly automatized (DIN, 2017).

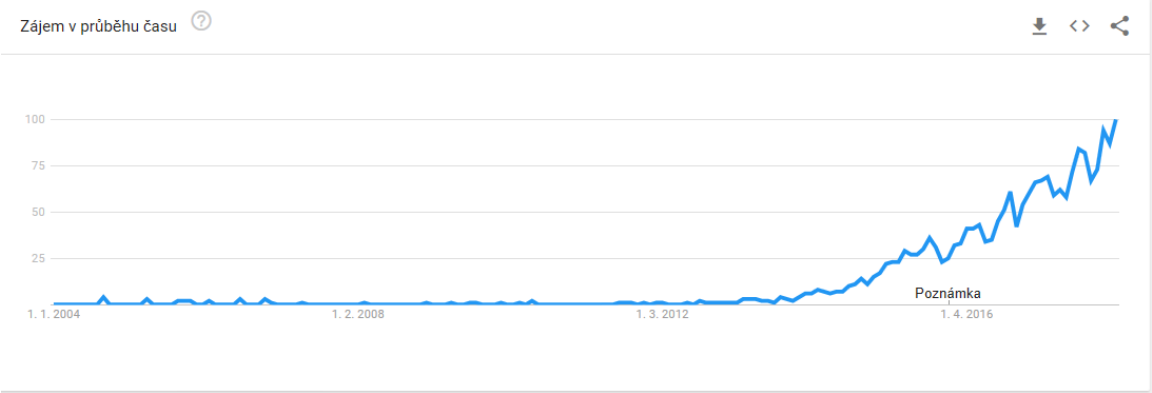
The term Industry 4.0 is characterised by the European Union (namely the European Parliament) as a notion for a group of quick transformation in design, production, operation and use of systems (European Union, 2015).

The Industry 4.0 trend is also important for the Czech Republic. That is why the government of the Czech Republic have approved its "Industry Initiative 4.0". The goal of the government is to strengthen the long-term cooperation of the competitiveness of the Czech Republic. In addition, this initiative tries to show possible directions that could support the Czech economy and industry and at the same time help to prepare the company for absorbing of this trend (Mařík, 2015).

In general, we can define the concept Industry 4.0 as a transformation of production as a separate automatized plant into a fully automatized and optimised production environments.

The interest in the issue of the Industry 4.0 nearly exponentially grows in last days, as shows the figure 1.

Figure 1 Interest in searching of the notion "Industry 4.0" at Google as per 30.4.2018 (100 % = maximum within the monitored period.



Source: Google (2018)

Although the Industry 4.0 namely relates to new approaches in implementation of new technologies in the production, this process is closely linked to financial records of inputs, intermediate outputs and outputs – to the accounting system. Many authors Chena and Thais (2016), Veza, Mladineo and Gjeldum (2015), Schuh, Popente, Varandani and Schmitz (2014) discuss the production optimisation. The other discuss the

standardisation of communication tools and software interfaces but the way how the accounting systems are changing and will change during the fourth industrial revolution have not been described yet.

This text aims to analyse, using a case study, the readiness for the Industry 4.0 and to describe the accounting system within the context of incoming industrial revolution.

2 Methodology and Data

The company that was chosen for the case study is a small engineering company that deals with modular production, it has 25 employees and the annual turnover about 70 million CZK.

It is evaluated based on five levels of digital company maturity (MPO, 2018).

1. The company has its established information system for production management, its Internet presence is passive (web page). The company starts to consider the digitalisation of processes, production, maintenance, product design etc. It has no defined digital strategy. There is even a partial capability to be linked in information flows within customer-client relations. The basic economic software enables it to communicate with some public administration authorities.

2. There is its interactive web presence, the company is software-controlled, it starts to understand the importance of data. There are fist integration projects, partial automatization, they consider the setting of digital strategy. There is a connection to information flows of customer-client chains (interconnected digital component codebooks, interactive digital catalogues, semi-automated orders, etc.).

3. Multi-channel presence (web, mobiles and tablets, social networks, etc.), the company has its defined digital strategy. The presence of data culture foundations projects, integration of data architecture, integrated automatization controlled in real time (MES), personalised products with virtual component.

4. Integrated multi-channel presence in digital world. In the company, there is a distributed and personalised digital strategy. The data architecture is integrated within whole production chain, from the communication and data sharing with the client up to the sub-suppliers. The use of digital diagnostics for prediction of failures and non-conformances in systems (production systems, measurement systems, etc.).

5. The company is a digitalisation platform connecting the online and the offline worlds in one fully integrated and economically effective ensemble. It offers a unique personalised experience to its clients through virtual products/assistants communicating with clients during the whole life cycle of the partnership relation. Through the advanced and most effective approaches (full automatization, 3D print, etc.) it performs the cyber-physical system able of individualised performance of eventual physical part of the product. It provides digitalised services to its partners and sub-suppliers and thus it globally controls the domain area.

3 Results and Discussion

It was found that the monitored company does not achieve at all nor the first level of readiness for the Industry 4.0. It has no implemented information system for production control. The production is scheduled based on physical book of orders. The order sheets are made in simple office programs but for the production itself they are passed in printed form. Nor the supplier-customer relations are controlled with information systems. The administered web pages are only passive.

Within the production the start of third industrial revolution rather comes in the analysed company as only two year ago the first automatized machine was bought, using a grant.

Kopp and Basl (2017) has found in their empiric research that only 11,17 % of companies is today preparing or performing pilot projects regarding this topic of the Industry 4.0.

In addition they found that micro companies (up to 10 employees) was not taking care of the industrial trend 4.0. What is more important, even the small and middle companies (from 50 to 250 employees) do only little for it. To date only 14,81 % of companies within the research of small companies are getting acquainted with this trend and only 11,6 % of middle companies within this category are about solving this trend.

The situation is different as for the accounting software, probably thanks to the fact that there is a pressure from public authorities and legislation so that the company is forced to present accounting outputs in electronic form.

When creating the documents for the public administration, the file undergoes the check of data and the erroneous file is automatically refused. This control removes the sending of error messages.

The company has adopted well the electronic form of accounting documents so that it receives and sends its accounting documents in electronic form.

This was supported with the amendment of VAT Act that allowed, since 2013, the electronic tax document without electronic signature. Provided both parties agree on it and the document has all appurtenances it can be considered as valid. (Act on accounting No. 563/1991 Sb.)

The tax document does not need to contain nor a stamp nor a signature of document issuer. (Strouhal, Židlická, Knapová, Cardová, 2012).

It shall be noted that about seventy percent of tax documents are still in printed form in the company. The tax documents are send in electronic form only due to costs and time savings. They are in pdf format and after being received they are printed and processed as the documents received in paper form.

It is highly probable that the electronically sent invoices in current pdf format will be replaced by invoices in xml format, QR codes, etc. in the future that will enable their reading directly into the accounting system of the receiver. In addition to data copying, the error rate shall also disappear.

Now they have a format enabling the import of bank statements through the Internet banking. Before it was necessary to account every item of the statement separately. Today it works so that the bank statement is imported, but also its items are automatically accounted, with conforming value and variable payment symbol.

The XML formats enable the transfer of large volume of data in relatively small file. Such format are used not only for the communication with the public administration, but they could be also used within the company.

The analysed company owns a common accounting program that can currently import also document and list agendas: invoices, orders, offers, demands, receipt vouchers, release notes, transfer notes, production internal documents, cash documents, sale notes, jobs, addresses, storages, division of stocks, storages, stocktaking list, account coding, user´s lists, code series, groups of stocks, etc. All such agenda is also able to export, including balances and account day books. These exports/imports are not used by the company, besides the bank statements.

Till today no business partner has asked for sending of an invoice in XML format.

Besides the analysis of accounting system it is necessary to discuss also effects of the Industry 4.0 on the work of book-keepers.

Vacek (2016) thinks over competencies, knowledge and skills that will be necessary for working with smart technologies. He notes that today the computers still do not

manage to perform a simple work with people. The division of work, based on substitutability of people by machines, includes four groups:

- Work that can be done by people but robots can do it better (weaving machines, autopilot, mortgage pricing, tax declarations, evaluation of x-ray images),
- Work that the people cannot do but the robots can (serial processing, computer chips, web browsers)
- New works that can be done by robots (robotic surgery, remote control, computer games)
- Work that can be done only by people (personal services – taking care, education, doctors, art, athletics)

Brynjolfsson and McAfee (2014) state that the technological progress will bring, with advantages, also the loss of jobs based on performance of routine tasks, not only manual but also cognitive ones.

The question what jobs will be most endangered by the automatization is answered by Carl. B. Frey and Michal A. Osborne in their study "The Future of Employment" (2013) and they have concluded that during next 20 years about 47 % of jobs will be endangered, whereas the most secure, i.e. not endangered, are those that are hardly automatized and require developed cognitive knowledge, creativity, social and emotional intelligence.

There is a study that presents the methodology for estimation of job loss endangered by the automatization (Batten Institute, 2015).

Chmelař (2015) has performed the similar study in the Czech Republic. The general administrative workers, index of endangering by digitalisation 0,08, other officers 0,96, cashiers 0,93. On the contrary, the managing workers are endangered much less.

It result from the above stated that the routine work of book-keepers is much endangered.

Vacek (2016) note that the best way how to keep the job is to equip people with correct knowledge and skills.

Hennies and Raudjärv (2015) write that the employees shall accept other way of thinking and learn the integration in modern processes.

The role of book-keepers will change more and more quickly than in other professions.

In the future, the book-keepers shall have such knowledge and competencies to be able to manage and program new events. Their job will include not data insertion but data administration.

4 Conclusions

It was found that the monitored company does not reach nor the first level of readiness to the Industry 4.0 and that it has automatized its operation recently and thus launched its third industrial revolution.

It results from the above stated analysis of accounting system that the monitored company is conservative and passive to changes and that the largest move forward is made there where it is required by legislative conditions.

Within the performed analysis and outputs of other empiric studies this trend can be generalised for most of micro and small companies

As soon as the legislative requirements will change or under the pressure of large business partners it is probable that the work of book-keepers would change. The documents will be automatically loaded into the accounting system and thus the routine work of book-keepers will change in a highly professional and qualified work.

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