Study of the Readiness of Czech Companies to the Industry 4.0

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Abstract: The article deals with the results of the questionnaire survey that analyzes the readiness of Czech companies on the trend of the Industry 4.0. It means mainly whether Czech companies are interested in the fourth industrial revolution and whether they are ready for this trend. The readiness is expressed in defined levels.

Key words: Industry 4.0, Industry 4.0 readiness, Internet of Things, 4th industrial revolution

1. Introduction
Recently, there has been increasingly discussed trends known as the Industry 4.0. They are based on a combination of new IT technologies, Internet of Things mainly, and new production, transport and handling technologies plus new materials and related processes. These trends of the Industry 4.0 (sometimes referred to as the 4th Industrial Revolution) should affect most people and processes throughout society in the future. The Industry 4.0 concept is gradually gaining a more coherent concept, although it currently covers a wide range of aspects from the 4th Industrial Revolution on the one hand to the assertion of everything as a successful marketing wave on the other.

2. Industry 4.0
The term Industry 4.0 is currently mainly used in Europe. In the United States and English-speaking countries, this concept is called Industrial Internet. In some other countries, this concept is called an Internet of Thing or a smart factory. The Industry 4.0 concept has, in addition to a non-uniform title, even inconsistent characteristics. It also depends on how individual initiatives or companies decide on this issue (Deloitte, 2015).

The German Institute for Industrial Standardization characterizes the Industry 4.0 as a merger of real production with the virtual world. There will be a world in which information technology is fully integrated into production processes. Systems in production, logistics, or services will communicate with each other in a new intelligent way. Thanks to Industry 4.0, production cycles are shortened, customer needs are processed in real time, or maintenance is largely automated. The result of all these is smart factories (DIN, 2017).

The term Industry 4.0 is understood by the European Union (specifically by the European Parliament) as a term for a group of rapid transformations in the design, production, operation and use of systems. Marking 4.0 means that this is the 4th industrial revolution for the world (European Union, 2015).

In general, Industry 4.0 concept can be characterized as a transformation of production as separate automated factories into fully automated and optimized manufacturing environments. Production processes are linked vertically and horizontally within enterprise systems. Sensors, machines and IT systems are interconnected within the value chain across enterprise boundaries. For this purpose, the Cyber-Physical System (CPS) is the cornerstone for smart factories.

In developed countries, Industry 4.0 has been devoted to attention for a few years now. In these countries, national initiatives, projects or institutions dealing with Industry 4.0 are being set up or supported. As an example, we can mention Germany, which boasts the strategic initiative “Industrie 4.0”. France, the “Industrie du Futur” project is being developed. In addition to countries, this trend is being seen by more and more businesses (Muricky, 2016).

Industry 4.0 trend is also very important for the Czech Republic. Therefore, the Czech Government adopted the “Industry Initiative 4.0”. The Government's aim was to strengthen the long-term competitiveness of the Czech Republic. In addition, the initiative seeks to show possible directions of
development and outline measures that could support the Czech economy and industry while helping to prepare the company for absorbing this trend (Ministry of Industry and Trade, 2016).

3. Preparation of a questionnaire survey

This paper presents the results of the questionnaire survey. Its aim was the analysis the readiness of Czech companies on the trend of the Industry 4.0. It mainly means whether Czech companies are interested in the 4th industrial revolution and whether they are ready for this trend. The survey was conducted in March 2017. The ARES application created by the Ministry of Finance was used to identify companies. A questionnaire survey was sent to about 2,300 companies. Particularly, they were joint-stock companies, because these companies should have enough employees who could spend their time filling out the questionnaire survey.

The questionnaire survey consists of four parts, from social section, filtering, factual and identification questions and is divided into five blocks, namely:

- motivation and strategy of companies leading Industry trends 4.0,
- how companies control changes and how many companies have invested or invested in the implementation of Industry trends 4.0,
- which technologies are used by the company and which they intend to use in the future,
- how businesses collect, use, or share data, and how they handle their security, and how they deal with smart products,
- how company employees are ready for the fourth industrial revolution.

The specific form of the questionnaire survey can be found at [http://prumysl40.weben.cz](http://prumysl40.weben.cz).

4. Methodology of the questionnaire survey

In the assessment of the preparedness of companies to the Industry 4.0 trend, substantive issues were assessed and all aspects that are included in the material issues are considered as equally important for the implementation of Industry 4.0. It means all questions are equally important and they have a value of up to 10 points (in the interval <0.10>). On the basis of the obtained points, the companies were divided into individual levels of readiness for Industry 4.0. For this division, the model of ripeness of readiness, which is mentioned in the "Industrie 4.0 Readiness" report from VDMA (Verband Deutscher Maschinen- und Anlagenbau), was used. VDMA is the engineering association that brings together over 3200 predominantly medium and large engineering firms, and is the largest industrial association in Europe (VDMA, 2017). In 2015, VDMA made a survey of how its members were ready for Industry 4.0, and then members were divided into six levels, according to their readiness. Company could receive a maximum of 160 points in a questionnaire survey and therefore set the thresholds for the level of preparedness as follows:

- Level 0 was automatically assigned to respondents who responded that they did not deal with Industry 4.0, so they earned 0 points from the survey.
- Level 1 was obtained by companies that received points in their replies (0, 50)
- Level 2 was determined for companies that surveyed points in the range of <50, 90)
- Level 3 was obtained by businesses where their responses were rated at <90, 120)
- Level 4 was given to companies that earned points for their responses at <120,145)
- Level 5 was obtained by companies that scored points in the interval <145, 160> for their responses to the survey.

5. Evaluation of the questionnaire survey

The return on the questionnaire survey was 8.7%. Respondents' answers were read and checked to see if all required questions had been answered in a prescribed manner. It was also checked whether the respondents belonged to the target group of the survey. After the cleaning, 197 responses remained, which were ready for analysis.
5.1 Application of Industry 4.0 Principles by Companies

The first question from the questionnaire survey was filtering. Its goal was to divide businesses into those dealing with the Industry 4.0 and those not dealing with this trend. The questions were answered by 197 respondents. As can be seen from Chart 1, 152 companies (i.e. 77.16% of respondents) do not deal with the Industry 4.0. Additionally, 11.68% of companies indicated that they have been interested in the themes and practices of Industry 4.0 for a long time. The last but not the least, there are 11.17% of companies currently preparing or implementing pilot projects on the theme of Industry 4.0.

Graph 1 – Application of Industry 4.0 Principles by Companies (Source: own processing)

5.2 Business readiness levels with respect to the time devoted to the Industry 4.0

In the framework of the questionnaire survey, 22 companies replied that they were just beginning to deal with Industry 4.0 and 23 companies said they had been working on this topic for a long time. Figure 2 shows the frequency of each level of readiness according to the time of the Industry 4.0, or the fourth Industrial Revolution. It can also be seen from Figure 2 that some long-term businesses have achieved higher levels of readiness than the first pilot projects.

Graph 2 - Company Readiness for Industry 4.0 by Time of Considerations (Source: Custom Processing)
5.3 Readiness levels by enterprise category

Graph 3 shows the individual layout of readiness levels across company categories by their size. It is clear from the chart that micro-companies (up to 10 employees) do not yet engage in industry trend 4.0. More importantly, even small and medium-sized companies (up to 50 and up to 250 employees) are doing very little. Meanwhile, only 14.81% of companies in the small business category surveyed take this trend. And only 11.6% of medium-sized companies of all companies in this category are addressing this trend. The survey was also attended by 65 companies classified as large enterprises, and the positive thing is that 44.61% of these companies are already involved in Industry 4.0. This means that the bigger the size of the company, the higher the level of readiness.

Graph 3 - Readiness of companies by categories (Source: own processing)

5.4 Readiness level of main areas of companies

Figure 4 shows individual levels of company readiness by area, it means by questionnaire survey questionnaire blocks. Companies are least prepared for strategy. On the other hand, the best results were achieved in the field of change management and innovation and in this area of technology use. In these two areas, enterprises achieved above-average readiness, as can be seen from the graph.

Graph 4 - Readiness of main areas of companies (Source: own processing)
5.5 Total company readiness for Industry 4.0

Graph 5 shows the overall level of enterprise readiness. It is no surprise that the most represented level is level 0, which is represented by 77.16% of companies. This mark was won by companies not engaged in the fourth industrial revolution. The second level of readiness is 14.72% of the enterprises. The third level of readiness was achieved by 8 enterprises and 4.06% of respondents respectively. Additionally, level 3 accounts for 3.05% of companies, and to level 4 it is 1.02%. No enterprise has reached level 5 yet.

Graph 5 - Total Enterprise Preparedness for Industry 4.0 (Source: Own Processing)

6. Conclusion

Trend Industry 4.0 and related production in smart factories is very important for further industry development. Based on the above-mentioned findings of the thesis, it was found that some industrial companies are already involved in the field of Industry 4.0 in the Czech Republic. However, their number according to the conducted survey is not sufficient given the position of the industry in the Czech Republic. This is probably due to the fact, that Industry 4.0 requires considerable investment from the outset. Greater interest of companies in the industry trend of 4.0 would probably be triggered by government incentives or subsidies.

Most businesses not yet considering this trend have said that Industry 4.0 is not important for them today. This may be because these businesses are poorly informed about the potential benefits and impacts of Industry 4.0 implementation.

References


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