Assessing the Maturity Levels of SMEs for Industry 4.0

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ABSTRACT

Digitalization entails profound changes in how industries operate. With the improvements in enabler technologies Internet of Things, cyber physical systems, cloud systems etc.) such changes, will be inescapable. While these changes are taking place in the industries, one of the most important issue is to determine whether the company is ready for Industry 4.0 transformation. SMEs (small and medium-sized enterprises) that are not adapting to digitalization transformation will lose their competitive power.

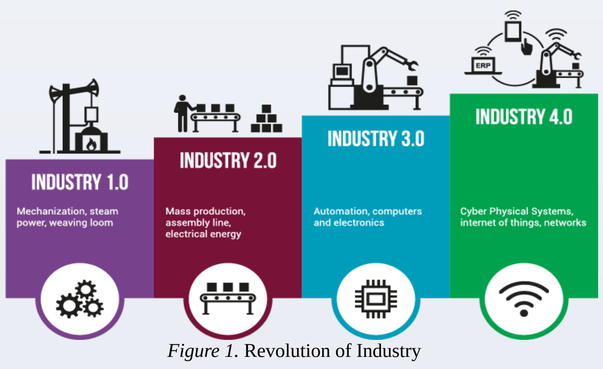

Figure 1. Revolution of Industry

In this project, we will focus on supporting SMEs by developing Maturity Assessment Tool with FESTO Company. This tool examines Industry 4.0 readiness of the SMEs, that includes understanding of the position-maturity level of the SMEs. In this project, two different assessment tools which are “Industry 4.0 Readiness Impuls Online Self Check" and "Industry 4.0-Enabling Digital Operating Self-Assessment PwC” have been examined, literature review have been done and based on three concepts, which are smart product, smart operation and smart factory, as assessment tool have been developed.

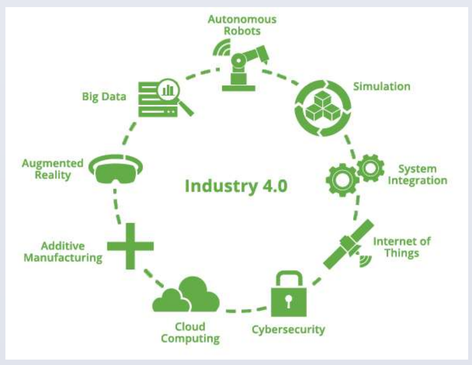

Figure 2. Enabler Technologies

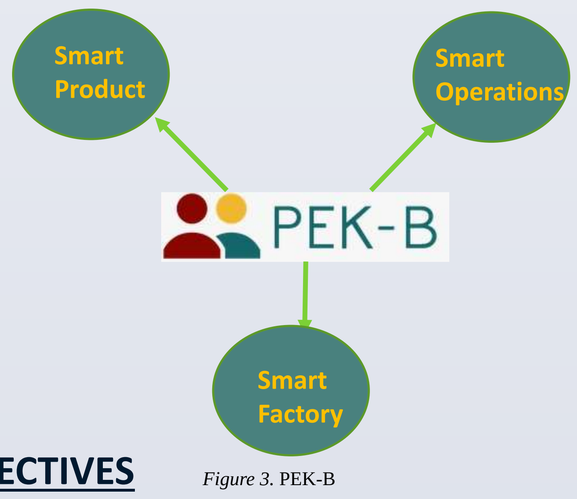

Figure 3. PEK-B

OBJECTIVES

Our projects main objective is, developing a questionnaire for SMEs to assess their maturity level in terms of Industry 4.0 based on three concepts. These concepts are smart product, smart operations and smart factory.

To achieve this objective, we defined our tasks as:

- Literature review
- Analysis and comparison of similar studies
- Development of questionnaire

PROJECT DETAILS

Impuls - Industry 4.0 Readiness Online Self-Check for Businesses

Figure 4. IMPULS

- Questions about what it has done in the past and is planning to do in the future..
- Object information, automatic identification, product memory, self-reporting, integration, localization, assistance systems, monitoring system are examined.
- Questions that determine how well the company's equipment infrastructure.
- Questions include information sharing

PwC - Industry 4.0 - Enabling Digital Operations Self Assessment

Figure 5. PwC

- To evaluate the stages of digitalization of everything which is includes sensors, IoT, optimization, automation, digital monitoring and control.
- To measure the degree to which products integrate digitization and design, planning, engineering, production, services and recycling.
- To measure the suitability of the digital sales approach, market and customer access, and the appropriateness of the pricing system.

PROJECT DETAILS

Digitization

- Hybridity as the product’s quality of combining both digital and physical components (Novales, Mocker & Simonovich, 2016)
- Product smartness comprises “seven characteristics, including autonomy, adaptability, reactivity, multi-functionality, ability to cooperate, humanlike interaction, and personality (Rijsdijk & Hultink, 2009)
- Connectivity refers to the product’s ability to communicate with other systems (Novales, Mocker & Simonovich, 2016)
- Servitization refers to service offerings integrated in manufacturers’ products in our case, enabled by the digital components of the product (Novales, Mocker & Simonovich, 2016).
- Ecosystem refers to a network of interacting actors in which individuals and organizations connect with each other to combine often complementary products and services to enhance the overall value offering (Novales, Mocker & Simonovich, 2016).

Customization of Products

Mass customization relates to the ability to provide customized products or services through flexible processes in high volumes and at reasonably low costs. (Silveira & Borenstein & Fogliatto, 2001).

Digital Twin

A digital twin can be defined, fundamentally, as an evolving digital profile of the historical and current behavior of a physical object or process that helps optimize business performance.

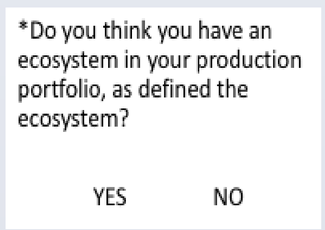

Figure 6. Ecosystem Question

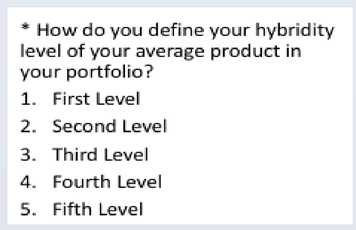

Figure 7. Hybridity Question

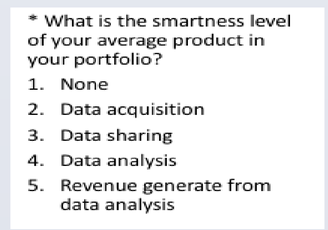

Figure 8. Smartness Question

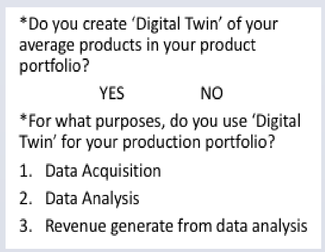

Figure 9. Digital Twin Question

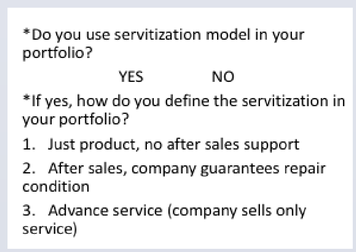

Figure 10. Servitization Question

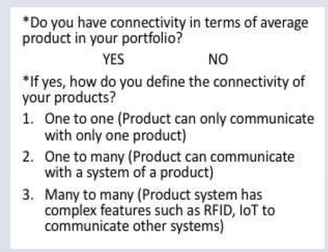

Figure 11. Connectivity Question

CONCLUSIONS

In conclusion, based on our research, to be adapted to the Industry 4.0 is essential for SMEs. With this study we provide a maturity assessment tool for SMEs in terms of Industry 4.0. While we were developing our assessment tool we have concluded that, enabler technologies, digitization of products, vertical and horizontal integration to value - supply chains have a vast impact to the maturity level for Industry 4.0.

For the future work, pilot studies of this project to the SMEs can be done. Based on the results revision of the project should be performed.

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