



INDUSTRY 4.0 IN THE FURNITURE INDUSTRY - THE PROBLEMATIC ASPECT IN IMPLEMENTATION

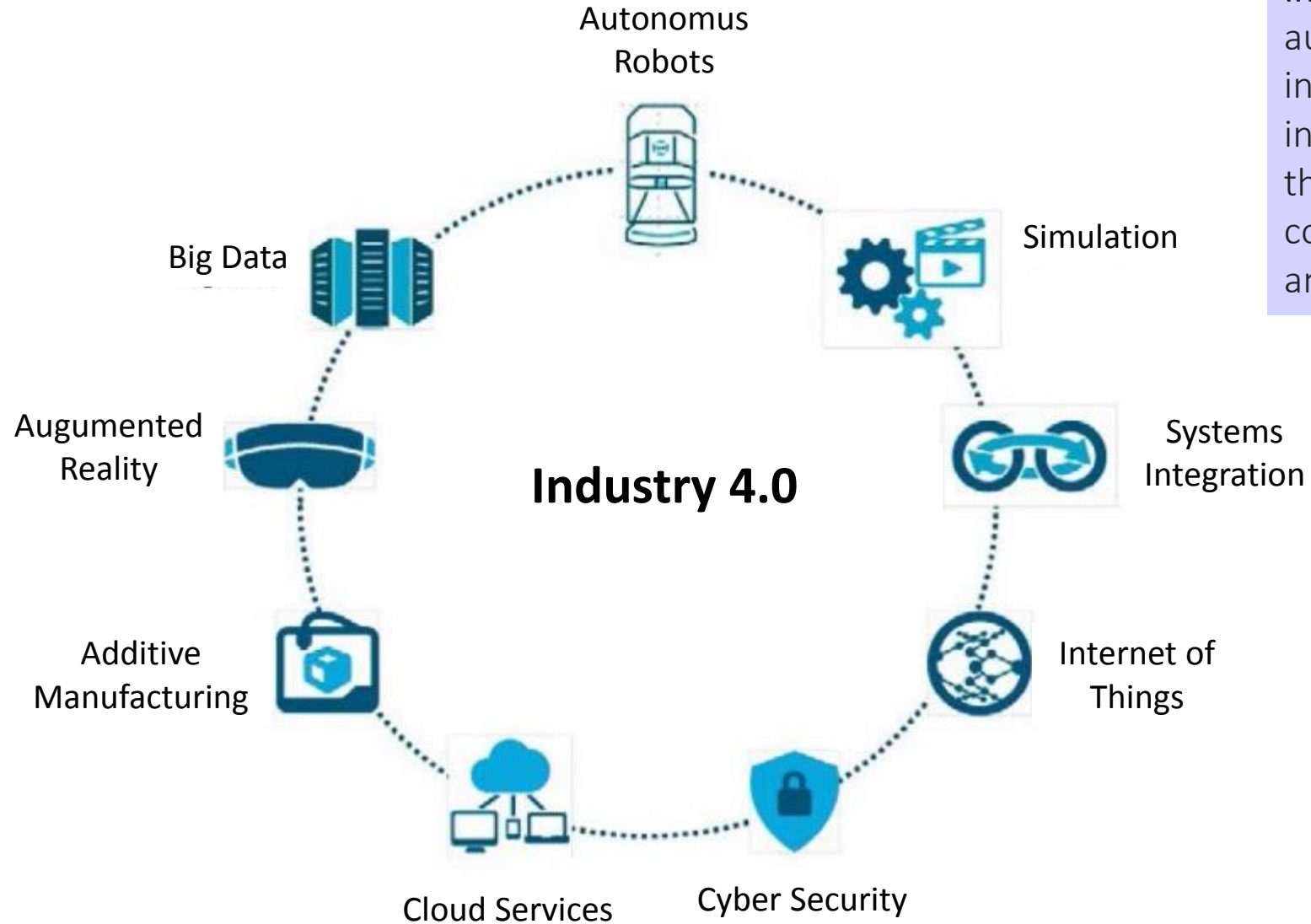
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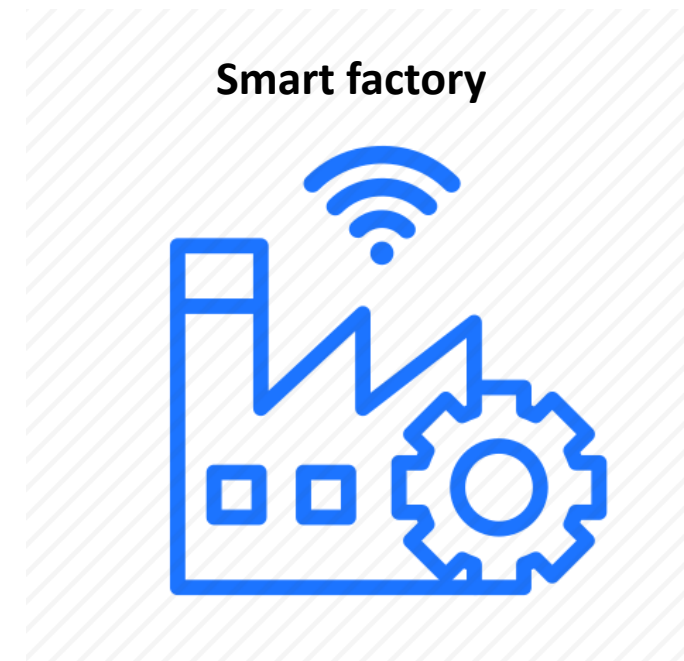
Koper, Slovenia, *June 16th - 18th 2021*



INTRODUCTION



Industry 4.0 - the current trend of automation and data exchange in manufacturing technologies, including cyber-physical systems, the Internet of things, cloud computing and cognitive computing and creating the **smart factory**.





INTRODUCTION

INDUSTRY 4.0 QUESTIONS:

- *Why adopting Industry 4.0 in Manufacturing?*
- *How Industry 4.0 will impact the manufacturing systems?*
- *What problems does Industry 4.0 solve?*
- *How the current processes will change?*
- *How the capabilities of managing new processes will be available?*
- *Are additional capabilities needed? How can they be achieved and how much will they cost?*
- *How the overall manufacturing process will be impacted: how bottlenecks will evolve, how they can be further managed?*
- *How end-to-end process knowledge will be secured?*
- *How the roles and responsibilities will change?*
- *How will the Lean Six Sigma methods and tools be integrated and further developed?*
- ...
- **ARE WE READY?**
- **What is our current state of play in relation to the expectations of Industry 4.0?**
- **Are we currently using the solutions required in Industry 4.0?**
- **Does the size of our company matter during the transformation into Industry 4.0?**
- **How can we accelerate the transition to Industry 4.0?**
- **What are the challenges/problems faced by companies in implementing Industry 4.0?**





METHODOLOGY

AIM OF THE RESEARCH: Identify current status and problems in the field of transformation 4.0 in the furniture industry.

SCOPE OF THE RESEARCH: Manufacturing companies from the furniture industry of **the SME sector** in southern Poland.

THE RESEARCH SAMPLE: 200 business entities (158 completed the questionnaires)*

* requirements: *minimum 10-year period of running a production activity and the size of employment classifying the enterprise in the SME sector;*

* type of production: 32% - a unit type of production, 53% - serial production, 15% - mass production

2 PARTS OF THE RESEARCH:

Part I. Characteristics of research entities and evaluation of the current state: *type, form of production, automation and the used software.*

Used tool: *the questionnaire survey*

Part II. Problems encountered in transformation 4.0: *the identification of obstacles and problems related to the use of various types of instruments aimed at modernizing the enterprise*

Used tool: *the expert interview*



METHODOLOGY

Part I. Characteristics of research entities and evaluation of the current state

- | | |
|--|----|
| 1. Type of production: unit, serial, mass | |
| 2. The level of automation and robotization of production, assembly, transport and storage operations; | a) |
| 3. Use of an autonomous transport system; | b) |
| 4. Use of the product modeling programs; | |
| 5. Use of the modeling production processes programs; | |
| 6. Use of the CIM system (Computer Integrated Manufacturing); | |
| 7. JIT (Just in Time) and KANBAN integration with suppliers and customer; | |
| 8. VSM (Value Stream Mapping) studies for the current state of the enterprise; | |
| 9. Measurement and monitoring of the value stream and the manner of performing these operations (manually, computer system); | c) |
| 10. Use of industrial robots; | |
| 11. Use of the TPM method (Total Productive Maintenance); | |
| 12. Use of OEE indicators (Overall Equipment Effectiveness); | |
| 13. Identification of products, tools and materials in the system; e.g., the use of chips, bar codes or RFID (Radio-frequency identification); | |
| 14. Possibilities for sending commands directly by the system to particular elements; | d) |
| 15. Types of process database, database servers (own or Cloud) and their security; | |
| 16. Use of 3D printing technology during product prototyping; | |
| 17. Use of 3D printing technology during the production process; | |
| 18. Individualization of the product, mass customization and application of modular structure of products; | |
| 19. Use of AI or artificial intelligence in an enterprise. | |



RESULTS

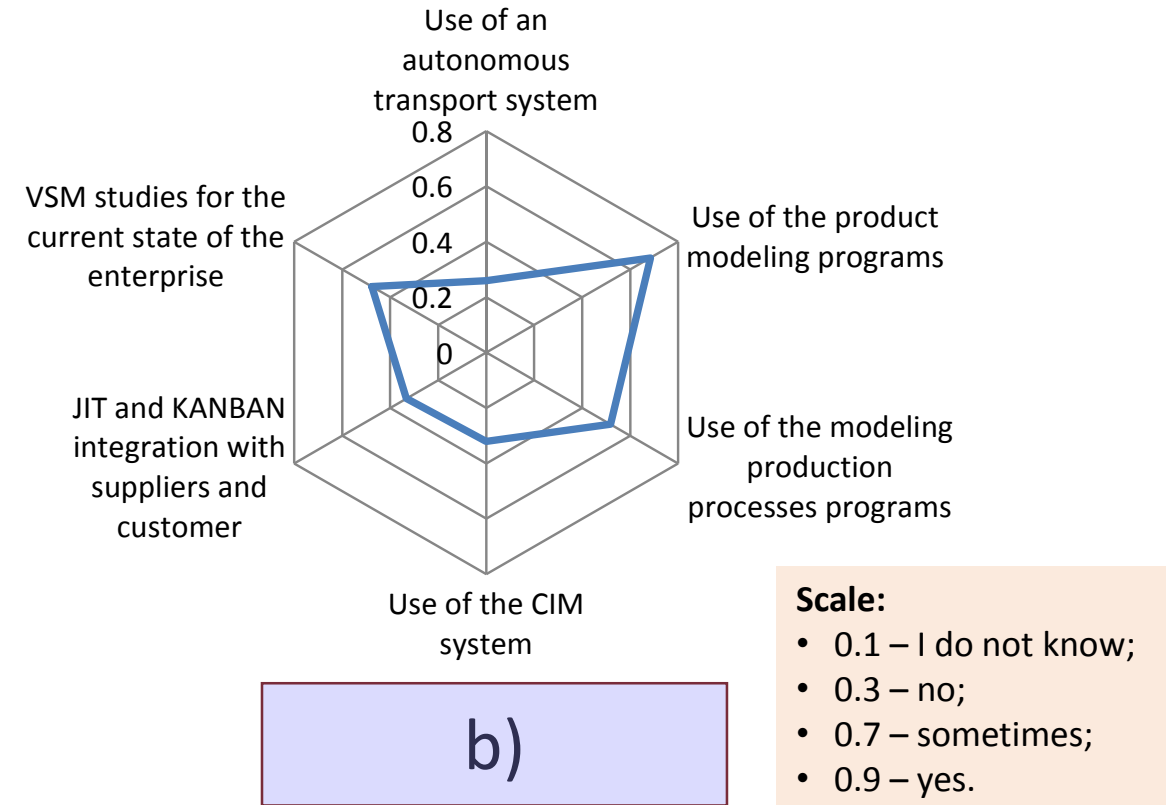
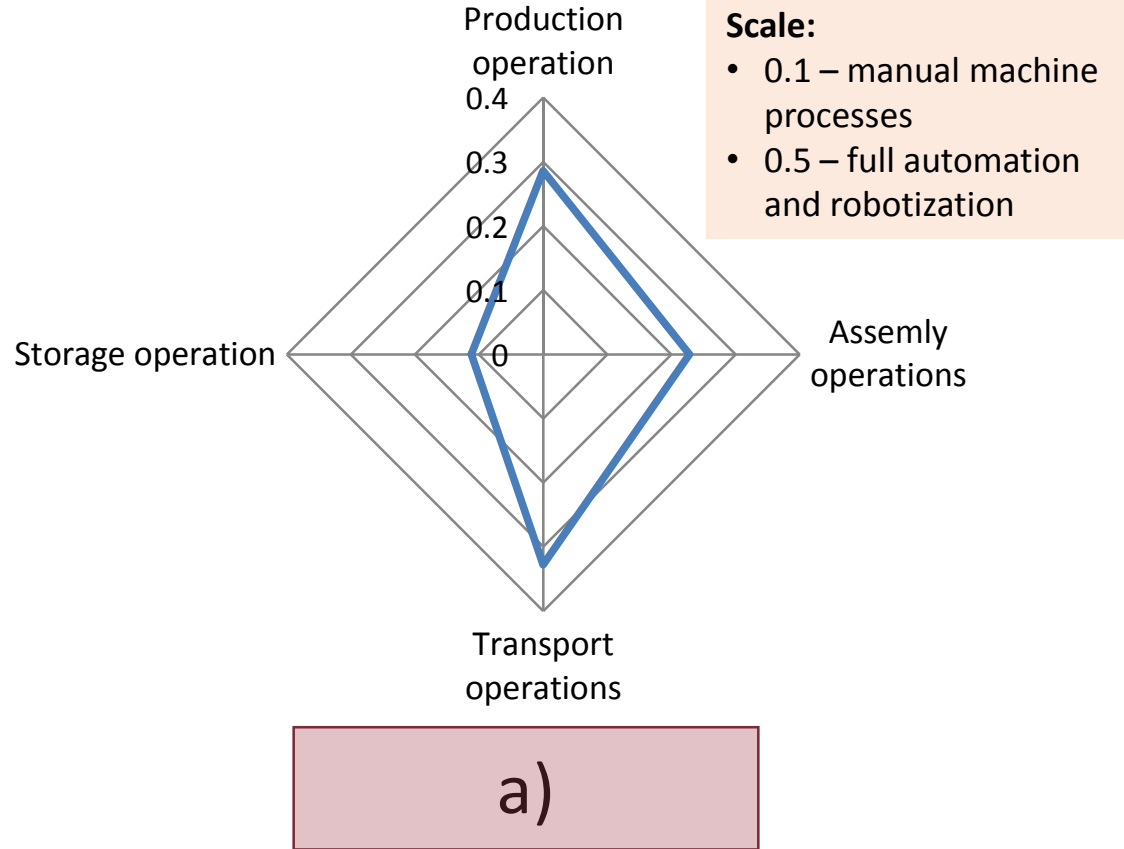


Figure 1a. a) The level of automation and robotization of individual operations; (b) Assessment of the current state of the surveyed enterprises from the furniture industry

RESULTS

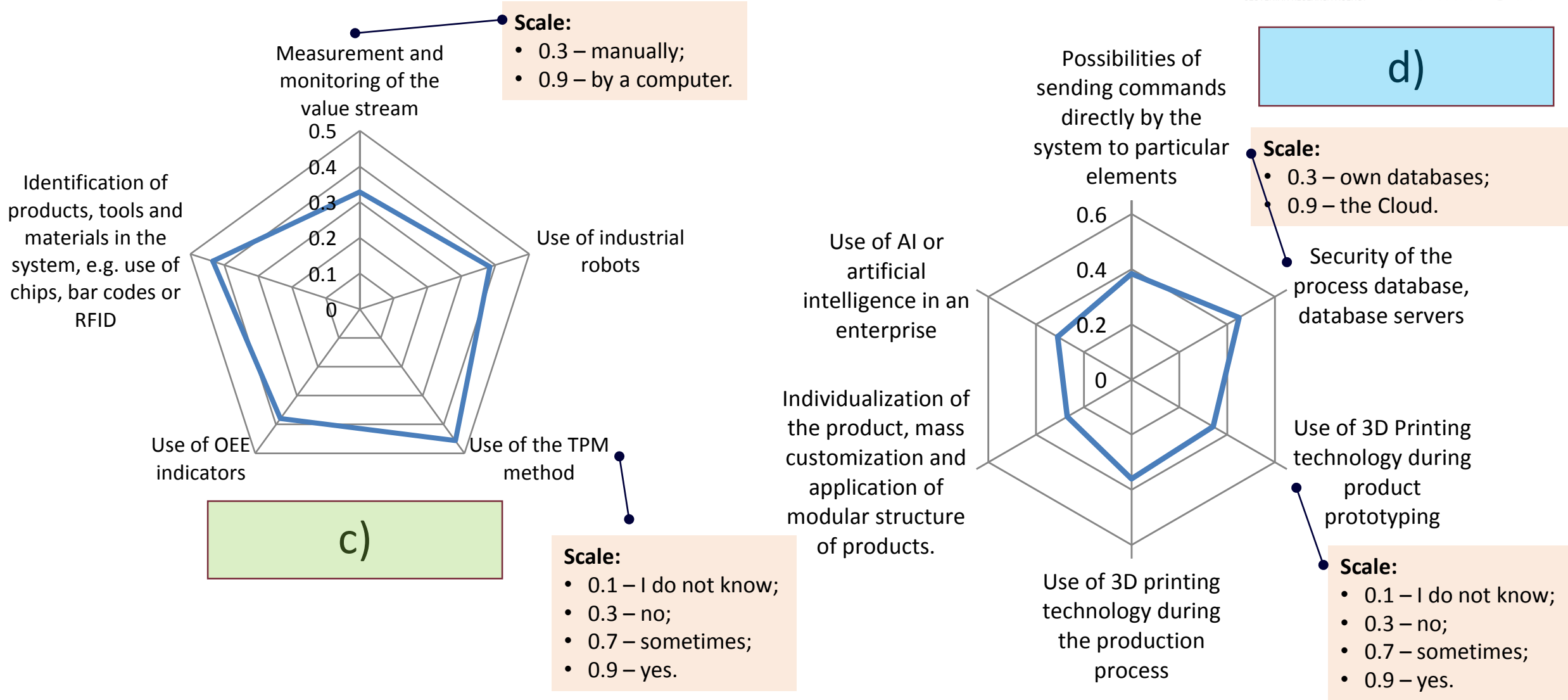


Figure 1b. (c), (d) Assessment of the current state of the surveyed enterprises from the furniture industry



Part II. Problems encountered in transformation 4.0

1. What are the obstacles associated with increasing the level of automation and robotization of production processes?
2. What are the obstacles associated with increasing the level of automation and robotization of warehouse processes?
3. What are the obstacles associated with increasing the level of automation and robotization of transport processes?
4. What are the obstacles associated with the use of robots and process simulation programs? a)
5. Is there a need to monitor processes in real time? b)
6. What are the obstacles associated with the monitoring of the processes in real time?
7. What are the problems with monitoring processes, documenting and selling data and their use in the field of process improvement and optimization?
8. What are the problems with monitoring and supervision over the material, product and tool during the process?
9. Does the enterprise see the need to switch to a pull system and use JIT, KANBAN or other systems?
10. What are the problems associated with the implementation of JIT, KANBAN or other systems or on the side of the system itself, people or integration with external entities? c)
11. What are the problems with the implementation and use of TPM?
12. What problems did the enterprise encounter when individualizing the product?



RESULTS

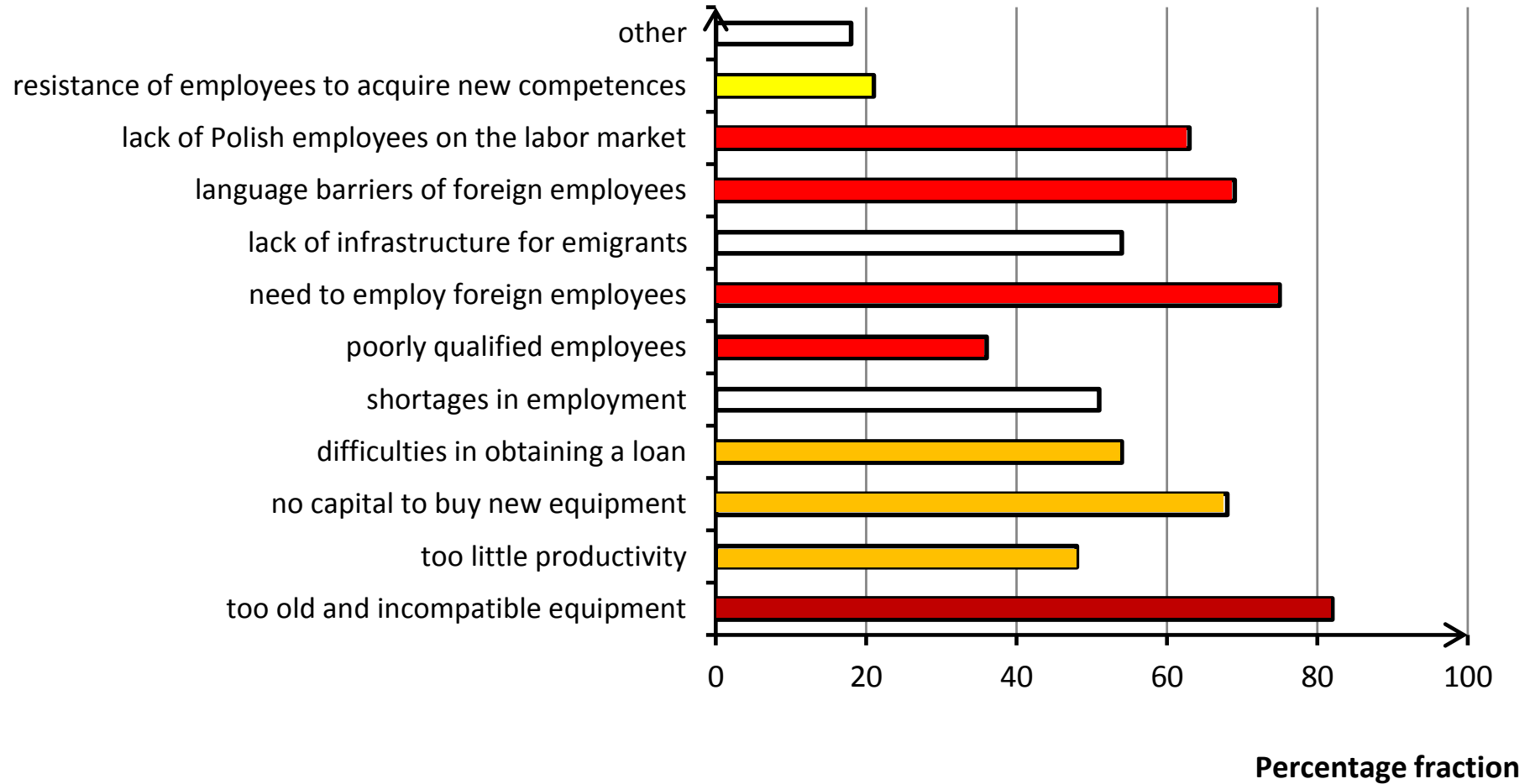


Figure 2. Obstacles in terms of increasing the level of automation and robotization of various processes in the enterprise

a)



RESULTS

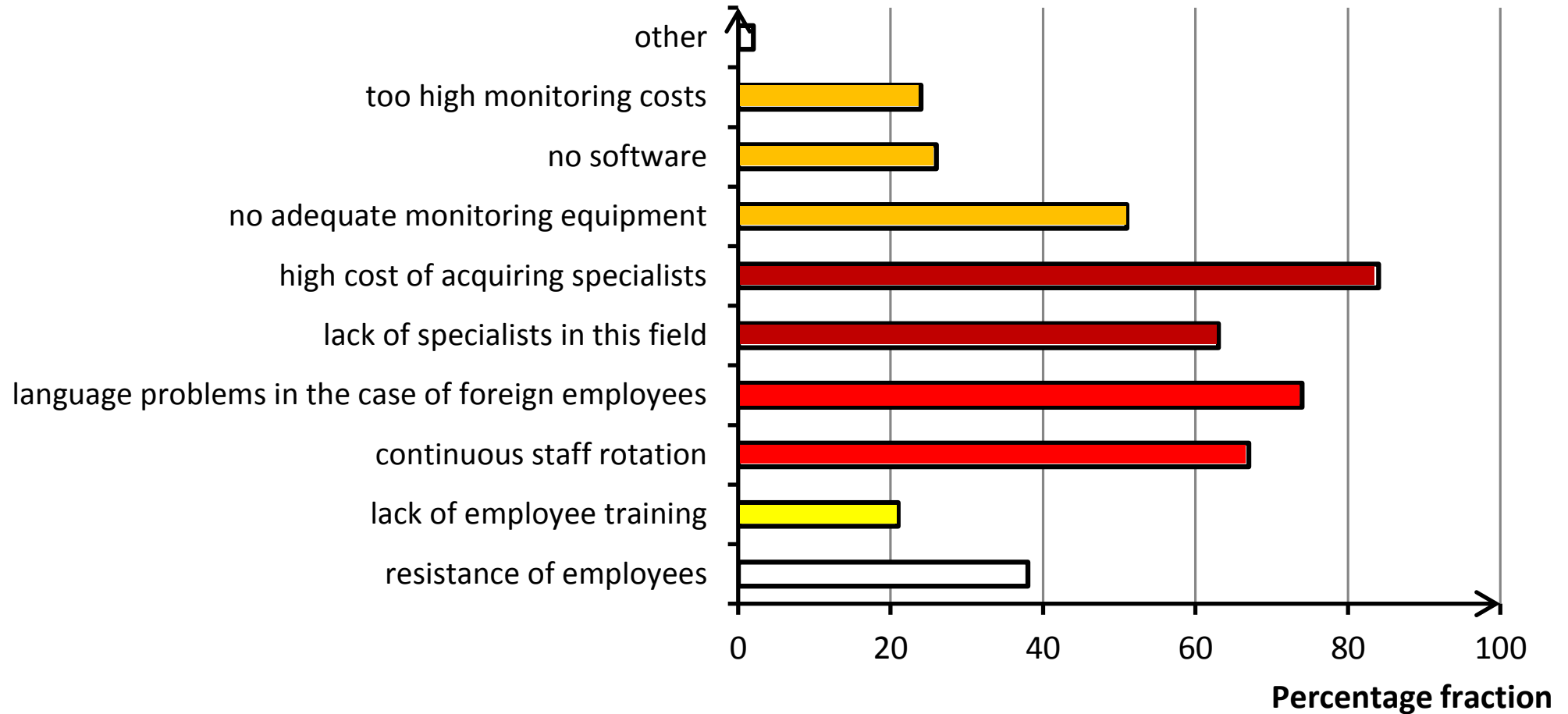


Figure 3. Obstacles in the area of process monitoring, documenting, and selling data and their use in the scope of process improvement and optimization, as well as monitoring and supervision of material, product and tool during the process implementation

b)



RESULTS

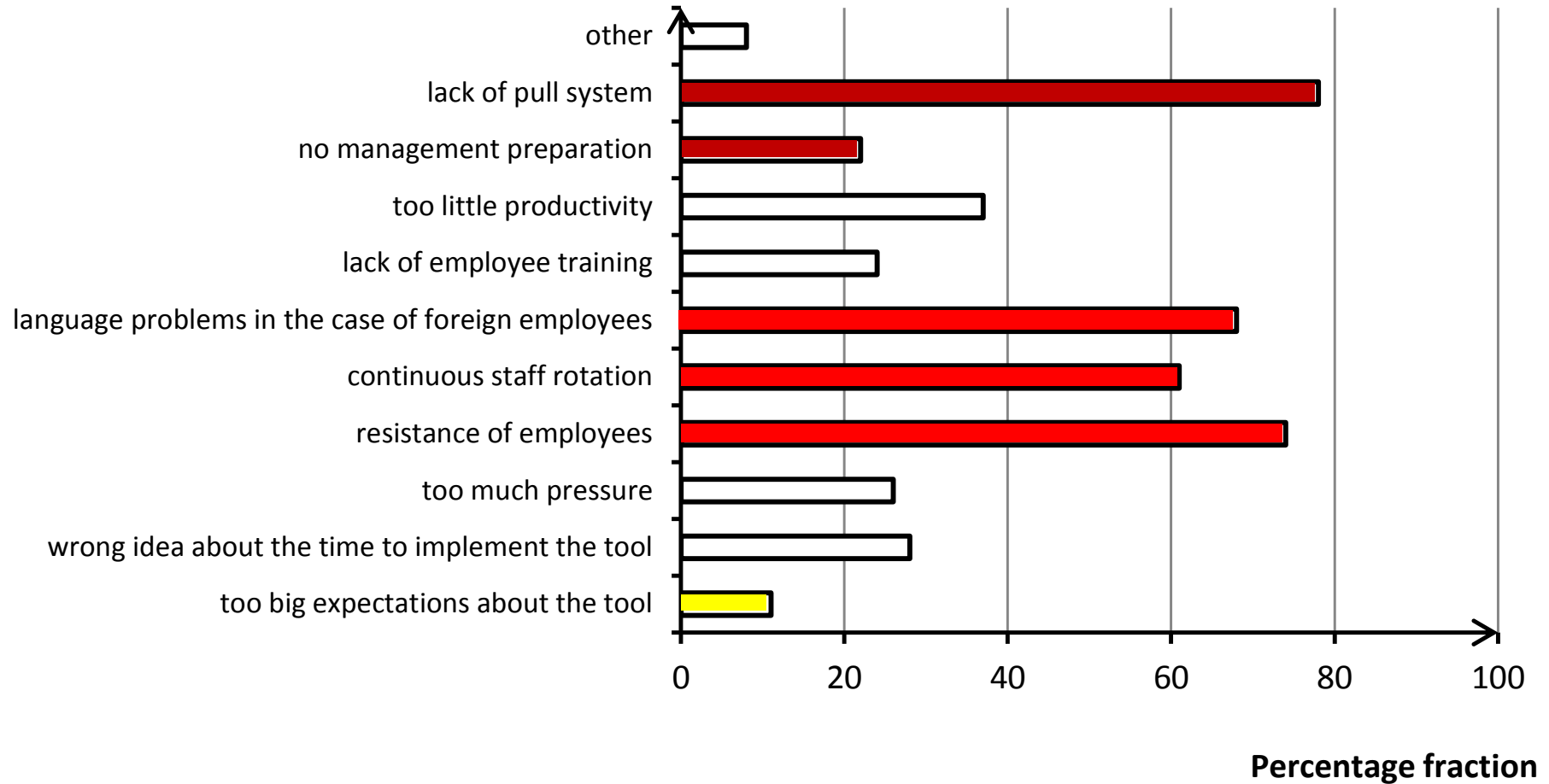


Figure 4. Problems with the implementation of various systems



CONCLUSION

Polish SMEs from the furniture industry are still unprepared for the implementation of Industry 4.0. There is a long journey ahead of them, not a short trip towards Industry 4.0. Polish SMEs is at the beginning of the road to Industry 4.0. They're in the early phases of Industry 4.0.

REASONS WHY:

**lack of implemented appropriate technical and IT solutions
(innovation and the level of advancement of the processes are rather low)**



high level of cost

the narrow product portfolio

lack of instruments necessary for optimal management of production processes or low level of their implementation (TPM, Lean*, Six Sigma)



the limited financial resources



problems with dishonest contractors <- lack of financial liquidity



low awareness of the need to introduce modern solutions to optimize production processes



micro and macroeconomic threats

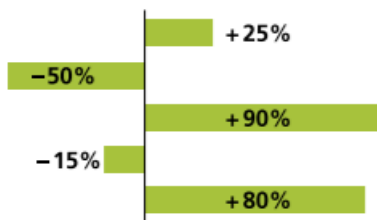
limited human resources in the form of qualified employees from the domestic labor market

the reluctance of the human factor to changes

😊 staff openness to acquiring new competencies and skills -> automation and robotization

* Average results obtained after implementing Lean

Performance
Lead time
Quality
Space requirement
Motivation





„Industry 4.0. Company size doesn't matter, company speed does”

94% of all furniture manufacturers in Poland are SMEs

investing money in new technologies and IT solutions to become more efficient and profitable with fewer employees

participation in Industry 4.0 conferences, reference visit to inspiring plants production, as a chance to accelerate changes

better the relevance of the offering -> shift from volume selling to enabling platforms and services capable of fulfilling a specific need

trusted partnerships - new openness and inter-organizational synergies as well as cooperation with trusted partners

new **synergies between more flexible local SMEs entities** - the fluid transfer of information and digital manufacturing technologies (**business cluster** -> **Polish Furniture Cluster**)



Speed booster factors of SMEs furniture industry towards Industry 4.0

actively applying for funding for research and development, research infrastructure and implementation of innovations-> **EU funds**
-> Smart Growth Program, Eastern Poland Program, and regional programs in a given voivodeship in Poland

additional funds in the form of **preferential loans and credits** -> interest rates in Poland have never been so low (0.1%)

implementation of **risk management**

co-financing of training, postgraduate studies, consulting services, coaching, mentoring -> Development Services Database: **Polish Agency for Enterprise Development** -> Center for the Development of Small and Medium Enterprises/ **Future Industry Platform foundation**

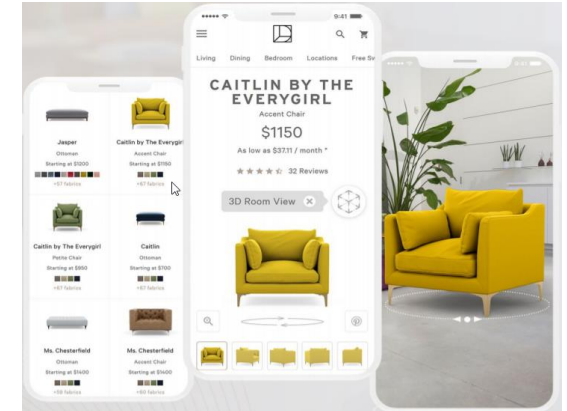
faster implementation of TPM program, Lean and Six Sigma solutions (these methods can help with Industry 4.0 processes; supporting the efforts of Kaizen teams to find *practical applications for new technology*; *risk assessment* in the implementation of IoT and Industry 4.0; ensuring that *customer engagement remains forefront* as organizations move into Industry 4.0; a *solid process* provided by LSS)



CONCLUSION



Trends Dominating the Furniture Industry in 2021
<https://www.furnituretoday.com/>



„Industry 4.0 is not a fad and everyone (asgmt. also SMEs) should views it as a trend that should not be ignored”

Industry 4.0 is still not a hot topic, but rather a hot air in Polish SMEs from the furniture industry



Polish production ready for Industry 4.0?

Key Conclusions:

- For more than **50% of the production companies in Poland** the term of fourth industrial revolution is commonly known. **Big producers (62%) showed greater knowledge of this concept than medium ones (41%) (the small show even less knowledge of this concept).**
- Many of the companies **have started** to implement 4.0 technological solutions (**36% of companies assess that they are at an advanced stage of implementing transformations**).
- There are **barriers to the implementation of new technologies**.

PSI Polska Report, 2019

Companies from the SME sector should not consider "whether" to adapt to the requirements of Industry 4.0, but "when" to start doing it /on a larger scale.



THANK YOU



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