



## AN OVERVIEW OF THE COMPETENCIES IN LOGISTICS SECTOR IN SLOVENIA

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**ABSTRACT:** The goal of the paper is to introduce the expected and in our research detected competencies in Slovene logistics sector. We can describe competencies as skills, knowledge and abilities needed for successful work, in our case in logistics and supply chain with stress on industry 4.0. Our research focus will be on all three dimensions: skills, knowledge and abilities.

We made a qualitative research and analyzed 108 job advertisement published between beginning of January until the end of February 2020 in Slovenia. 56 different competencies- skills, abilities and formal education expectations were detected.

In the end we will according to our own research present competencies that are expected by companies in Slovenia in logistics sector. We will list them in four different groups of competencies: technical, methodological, social and personal. We will also discuss which are specific for industry 4.0.

### INTRODUCTION

The aim of the paper is to consider the expected competencies of a logistics experts in Slovenian companies connected to the logistic sector. In the first part of the paper we discuss theoretical issues that include the study of definitions of competencies, their components and how competency profiles required for each job are formed. Then we elaborate on the profession of logistics experts. Through the analysis of responses we came to the conclusion that Slovenian companies prefer the characteristics and abilities of the individual over professional knowledge and skills, which are also very important to successfully perform logistics functions.

Competencies can be examined from organizational in individual point of view. Competencies of individuals are getting a lot of attention and are presented as more and more important in organizations, because they help individuals to do their work successfully which results in better company performance. Given that there is a strong battle for jobs in the market, individuals have to be very good at performing their work to be competent experts in their field, and also compete with their competitors. For an individual in it not enough to have only formal education to be competitive with



others, it is also important to have experience, skills, additional knowledge, personal characteristics etc. (01)

The aim of this paper is to present the skills, abilities and knowledge needed for successful work in logistics in Slovenia and place Slovenia into the competence maturity model. First of all we will theoretically define competencies. This part will be followed by competencies in logistics in Slovenia and what Slovene companies expect from logistics experts. In the last part of the paper, we will present research results of qualitative analysis.

Thus, as a result, we will present logistics competences detected as important in Slovene logistics sector and in industry and logistics 4.0.

## DEFINING COMPETENCIES

There are several definitions of competencies. We are going to present some of them. Competencies can be in general described as “capability or ability” (2) (3). The behavioral approach describe competencies as a “set of related but different sets of behavior organized around an underlying construct called the intent” (4). Competencies will in our case be presented in both aspects individual and organizational one. Kohont (5) describes competencies from workers point of view as “a whole of interrelated skills, knowledge, motivation, self-image and values that and individual knows, wants and is able to successfully use in a given work situation.”

Another important author in field of researching individual’s competencies is Majcen. She (6) thinks that competencies of individuals consist of activation, use and integration of knowledge, motivation, abilities, self-esteem and value system of an individual in certain situations The main goal is to fulfil tasks and solve problems successfully.

We can summarize the arguments of Majcen (6) that competencies of individual are characteristics that help individuals to carry out their tasks successfully and solve problems, encountered in their workplaces. These characteristics are: knowledge and experience, skills and abilities and other personal characteristics (6).

Other type of competencies important for our research are organizational competencies. These can be described as competencies needed in the organization for growth or remaining competitive in the market. Organizational competencies provide an inventory of expected behaviors, skills and attitudes which lead toward successful performance of the organization. Organizational competencies depend heavily on the competencies of the employees employed in organizations (7).

## INDUSTRY 4.0 AND RELATED COMPETENCIES

We are facing with the important transformation regarding the way we produce products, which is based on the digitization of manufacturing. We are talking about fourth revolution of the manufacturing, which is called Industry 4.0. We can say that Industry 4.0 is linked with the now-days trend of automation and data exchange in manufacturing technologies. It is upgrade of the Industry 3.0 which has been focused on the automation of specific business processes. Lots of research have been done about this topic and how the skills and knowledge should be changed and thus related competencies (8), (9),(10).



In article Industry 4.0: Required personnel competencies (8) is represent that according to Burke et al industry 4.0 factories are:

1. Connected, which means data are flowing from production plane, between various subsystems or departments or from the supply chain.
2. Optimized, so running algorithms are optimizing every aspect of operation with minimum human intervention.
3. Transparent, which means extensive use of metrics allow easier control of operation and at the same time transparency in order processing within the supply chain.
4. Proactive either in quality aspects, or in replenishing the inventory of in preventive maintenance,
5. Agile, so quality enables a smart factory to implement schedule and product changes fast and with minimal intervention.

According to Pricewaterhousecoopers survey (11) the most important challenges to be faced with the implementation of the Industry 4.0 are:

1. Lack of digital culture and training (50% of the respondents)
2. Lack of a clear digital operations vision and support / leadership from top management (40%)
3. Unclear economic benefit and digital investments (38%).

The skills needed for Industry 4.0 are numerous and diverse and that has been recognized in various studies (12), (13). Leinweber in his study clustered the identified competencies into four main categories:

- Technical competence such as state-of-the-art knowledge, process understanding, technical skills, etc.
- Methodological competencies including creativity, entrepreneurial thinking, problem solving, conflict solving, decision making, analytical skills, research skills, and efficiency orientation.
- Social competencies such as intercultural skills, language skills, communication skills, networking skills, ability to work in a team, ability to be compromising and cooperative, ability to transfer knowledge and leadership skills.
- Personal competencies that includes flexibility, ambiguity tolerance, motivation to learn, ability to work under pressure, sustainable mindset and compliance.

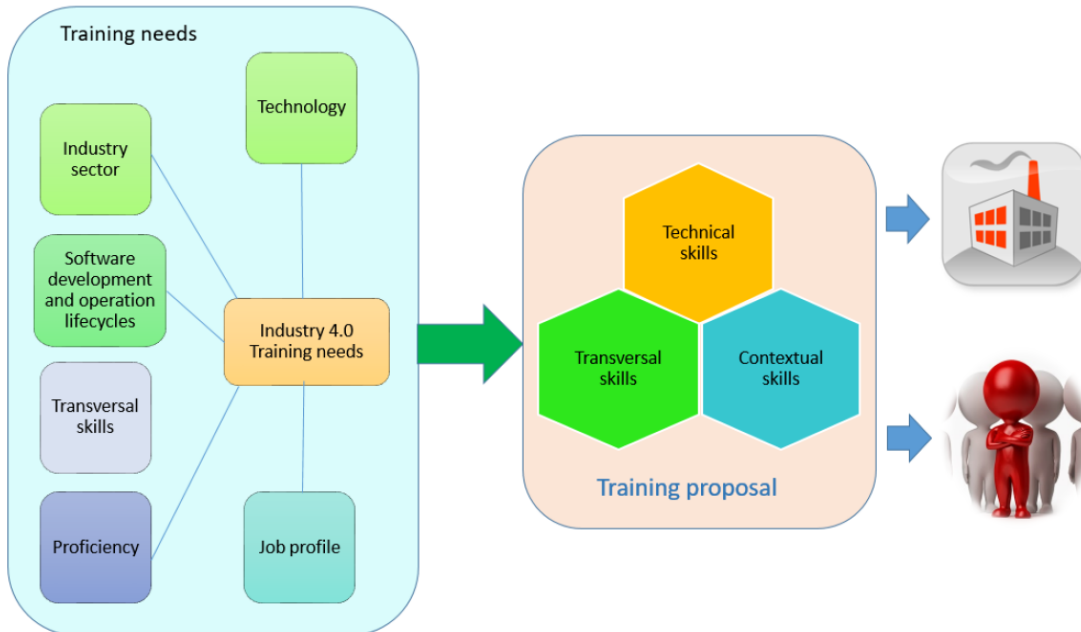
In this article (8) they proposed a framework. They wrote that an educational model for Industry 4.0 should take into account the following facts:

- There is no ‘technological determinism’,
- There is need to address different skills needs according to the specific Industry 4.0 ‘biotopes’,
- There are different workforce segments,
- There are different sectors using different subsets of the technologies under consideration,
- There are different product lifecycles according to which different development and operation processes need to be supported.

According to this they define the educational needs: technology, industry sector, software lifecycles, transversal skills, proficiency, and job profiles. By combining all these factors from these

dimensions should be able to provide a set of skills either at the individual level or at the enterprise level. The outcome of this assessment will be a set of skills needed. These skills are categorized in three categories: technological, traversal and contextual.

In the following picture the authors introduced their proposal about Industry 4.0 competencies framework:



**Figure 1:** Industry 4.0 competence framework (8)

Some authors (9) are focused on exploring the managerial competencies of future managers and engineers. According to their research they identified eight competencies, which was based on existing studies and analyzes in (14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24 and 25). These competencies are: Creativity, Entrepreneurial thinking, Problem solving, Conflict solving, Decision making, Analytical skills, Research skills, Efficiency orientation.

In 2017, the authors did a research among selected experts in automotive and pharmaceutical industries they prepared a questionnaire survey. The experts were high qualified managers employed in transnational companies. In their study respondents were asked to indicate of selected competencies. There were 10 experts in each industry sector, who filled in questionnaire.

Results from the automotive industry apply in particular to competencies related to entrepreneurial thinking, analytical skills and time management abilities. The diversity was noted in the assessment of research skills. The authors' opinion is that the finding is likely to be related to the fact that the value of such competencies for managerial staff in the industrial sector is underestimated.

Replies submitted by experts from the pharmaceutical industry are similar with regard to the decision-making skill. All respondents from the sector consider it to be very important for Industry 4.0 workers. Similarly to the automotive industry, the greatest variation was observed in the assessment of



research skills.

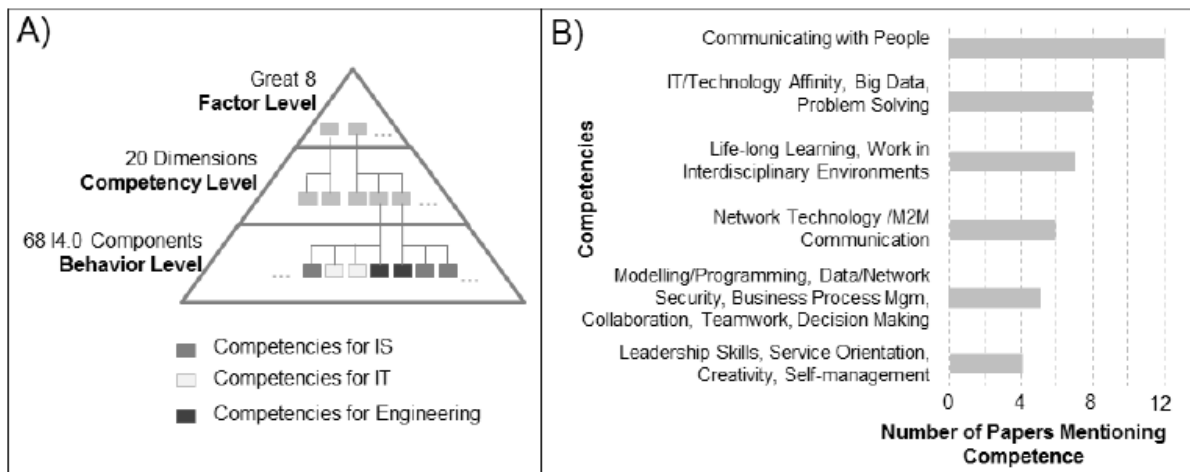
In general, authors agree that Industry 4.0 requires basic research, new solutions implemented in the economy, monitoring of practical effects of such implementations and identification of the potential for new implementations. According to that, employee support and improvement of their competencies are necessary.

Prifti, Knigge, Kienegger and Krcmar (10) analyzed employee competencies for employees with higher education in Industry 4.0. They focused on three areas that require higher education and will be of high relevance in I4.0: Information System (IS), IT, and Engineering. They focused on the question “What competencies are critical for job positions that require higher education for effectively and efficiently performing in I4.0?”

They found out that the most mentioned competency in the focus groups was big data/data analytics competency.

They presented the next most mentioned competency, which is process know-how and process management competency. The interdisciplinary competency will also play a new role in I4.0. They stressed that an engineer will have to collaborate with the IS and IT specialists in order to achieve results in the interconnected environment that we will face. The domain or analytical oriented competencies like IT and technology affinity, network administration, data security cloud architectures, programming, in-memory DBs were also important in the discussion. The participants also mentioned further behavioral competencies like customer orientation, decision making, communication, innovating, legal, ethics, and teamwork. According to this research and in comparison with the literature the authors added four new competencies that were mentioned in the focus groups but have not been found in literature: customer relationship management, IT architectures, machine learning, and predictive maintenance. Competencies in the dimension of leading, like leadership skills, or persuading and influencing like negotiating and emotional intelligence that were often mentioned and analyzed in the literature have not been mentioned at all during the focus groups. The mentioned competencies were generally more abstract, lacking high detail compared to the literature.

Based on the SHL UCF (26) they developed an Industry 4.0 competency model, which shows:



**Figure 3:** A) Industry 4.0 Competency Model Structure; B) Most Mentioned Competencies in the Literature (10)

## COMPETENCIES IN LOGISTICS SECTOR IN SLOVENIA

Several researches in field of competencies in logistics in Slovenia have been conducted in last years. Some of the latest studies has been shown that competencies needed in Slovene logistics sector are (27): good organizational skills, good analytical thinking, good communication skills, good knowledge of foreign languages (in most cases English, in many cases also German or Croatian), good negotiation skills, flexibility, accuracy, good in quick learning and willingness to learn, good logical thinking, good IT thinking, orientation towards innovations, good in analyzing big databases, good preparing reports, quick in decision making, good leading skills, good in supervision and control, planning skills. Legal knowledge connected with logistics, autonomy, good knowledge of warehousing, good selling and consulting skills in logistics and supply chain management, knowledge of managing logistics costs, good knowledge of specific documents needed for successful work in logistics, knowledge and understanding of different logistics techniques and technologies, positive attitude, self-esteem, lifelong learning orientation, ability to coordinate different tasks and departments.

This means logistics is very specific sector where multidimensional and interdisciplinary knowledge is needed for a successful work.

Competencies in case of logistics could be connected to formal education level only to a certain point, than informal lifelong learning and personal skills need to be considered. This is the reason why formal higher education institutions, European, worldwide and Slovene logistics associations and other institutions that are connected with the development of the field of logistics in Slovenia are important.





## METHODOLOGICAL FRAMEWORK

We made an analysis of 108 job advertisement published in the biggest HR online portal in Slovenia in period between the beginning of January and the end of February 2020. Since Slovene economy and job market in general very small is, these are all job advertisement published in this period in Slovenia. So the sample in our case represents the population. We collected all job advertisement, listed all competencies that were included in the job advertisement. 56 different competencies (skills, knowledge and abilities) were listed. Some competencies were stated on different way, but we united them according to the same meaning.

And all listed competencies present the basis for our qualitative analysis, which will be presented in next chapter.

## RESEARCH RESULTS

As we described in theoretical part of our paper, several authors identify different groups of competencies that are important for successful work in industry 4.0. We did analysis according to Leinweber’s research about competencies in 4.0 (13). So we listed all competencies in four different groups: technical, methodological, social and personal competencies. We listed them in order according to how often they were mentioned in online job advertisements and how stress they were in analyzed job advertisements.

We listed 56 competencies and listed them according to theoretical definitions in four different groups: technical competencies (19 competencies were listed), methodological competencies (4 competencies were listed), social competencies (16 competencies were listed) and personal competencies (17 competencies were listed). All competencies in detail are shown in Table 1.

**Table 1.** Technical, methodological, social and personal competencies in Slovene logistics sector

<i>Technical competencies</i>	<i>Methodological competencies</i>	<i>Social competencies</i>	<i>Personal competencies</i>
Good computer knowledge	Be able to take a professional approach	Management skills	Flexibility
Knowledge in field of EPR	Ability of systematic thinking	Good knowledge of English language	Positive attitude
Independent use of general computer application	Ability to work with huge database	Good knowledge of German language	Willingness for additional training
programs (word processing - advanced; spreadsheets - advanced; use of	Analytical knowledge	Excellent knowledge of Croatian language	Autonomy
			Self-initiative
			High responsibility towards work
			Reliability



databases - advanced)	Active knowledge of Serbian language	Conscientiousness at work
Knowledge of specific production lines	Ability to motivate teams and team orientation	Accuracy Precision Proactivity
Ability to acquire new technical knowledge	Team work ability	Fast at work Responsibility
Good knowledge in process oriented supply chains	Positive attitude towards co- workers	Independence Goal-oriented attitude
Finished higher education in logistics	Good coordination skills	Target oriented
Finished higher education in economics	Good communication skills	Operability
Finished higher education in technical field	Good organizational skills	
Material flow knowledge	Long-term cooperation orientation	
Experiences in warehouses and production	Experience in international trade	
Experiences in FMCG and working experiences in field of buyers/suppliers,	Good negotiation skills	
Experiences in field of selling food and managing food supply chain,	Positive attitude towards other stakeholders (especially buyers)	
Working experience in	Excellent selling skills	





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international  
logistics

Working  
experience in the  
field of production  
planning

Work experience in  
distribution

Good knowledge of  
commodity material  
processes

Technical  
knowledge of the  
material assortment  
is an advantage

Commercial and  
economical  
knowledge

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What is important for successful work in logistics 4.0 systems is a good background knowledge of industry 4.0 and industry processes, machine learning, smart factories, understanding of logistics processes, smart services and products and knowledge in digital business model. In our analysis we are missing machine learning, since it has not been mentioned at all, also smart factories, services and products were not mentioned directly, but we can find them in descriptions like: flexible, adoptable, connected and systematic.

Logistics 4.0 is also connected to good knowledge in supply chain management and strategy, also managing values in supply chain, and in last few year also with blockchain technology and internet of thing concept. None of the last two has been mentioned in analysed online job advertisements directly, but could be found indirectly in the new technology knowledge in willingness to learn new concepts and gain new knowledge.

Big data analysing and processing and demand management are highly required in industry and logistics 4.0. And this can be also found in our analysed basis of advertisements in descriptions like: big data analysis, knowledge of Excel and other office programs, system thinking and demand forecasting and relationship building with all stakeholders (also buyers and demand). No artificial intelligence has been mentioned yet, but it is probably in case of logistics so, that other computer experts in team could have that needed knowledge and it is not that much stressed in logistics and supply chain jet.

Another important factor in logistics 4.0 is digitalisation and automatization of warehousing, inventory and transportation. Both of these cold be found in some parts in our research results. Since



digitalisation and automatization are changing working conditions rapidly also personal characteristics like flexibility, positive attitude, self-initiative, conscientiousness at work, accuracy, proactivity, responsibility, willingness for additional training and goal-oriented attitude are crucial. And for the same reason also systematic and analytical thinking is an advance. We think that this personal competencies can substitute some in our research missing knowledge of notions and concepts that will probably shape future in logistics, like augmented reality, autonomous vehicles and drones.

Other competencies are not only specific for logistics 4.0 but are important in general in logistics, especially foreign languages due to Slovene small economy and market and the fact that logistics and supply chain are internationally oriented.

## CONCLUSIONS

In this paper we presented a short theoretical background of competencies and competencies in logistics and supply chain. Competencies are in our article research on a personal/ worker level and are understood as skills, knowledge and ability needed for successful work. We also defined industry 4.0 and analyzed modern logistics from industry 4.0 perspective. Furthermore we discussed the development of logistics competencies in Slovenia.

108 job advertisements from logistics and supply chain field have been collected and analyzed. We identified 56 competencies and arranged them in four different types of competencies that have previously been recognized as important in industry 4.0. In the paper we identified which competencies Slovenian organizations expect from logistics experts: 19 technical competencies, 4 methodological competencies, 16 social competencies and 17 personal competencies.

One of finding is that Slovenian companies prefer personal characteristics and abilities as well as professional knowledge and skills when talking about logistics experts. Computer knowledge in widest understanding (ERP, huge databases analysis) are prefers, systematic and analytical thinking as well. Foreign languages, communication, coordination, negotiation and management skills are listed as very important as well. And when it comes to personal characteristics, flexibility, positive attitude, willingness to gain new knowledge, autonomy, reliability and self-initiative are listed often and marked as important characteristic needed for successful work in logistics and supply chain sector in Slovene companies.

We can sum up, that logistics is very multidisciplinary and interdisciplinary sector where wide range of skills, knowledge and attitude is needed. And they are in all cases mixture of technical, methodological, social and person skills. We are missing in our analyzed job advertisements directly some important notions of logistics 4.0, like digitalization and automatization of processes in logistics and supply chains, blockchain technology and internet of things concepts, but we think they are indirectly hidden in computer knowledge requirements and especially in personal characteristics and ability to gain quickly new knowledge. Namely, the logistics sector is developing so rapidly in the world that flexibility, self-initiative, high responsibility, reliability and autonomy are urgently needed.



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