

III. LOGISTICS COMPETENCIES IN DIGITAL SUPPLY CHAINS

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THE IMPACT OF CHANGES IN THE ECONOMY ON THE COMPETENCES OF LOGISTICS

ABSTRACT

Background: The purpose of the articles is to show the impact of changes in the economy in the field of sustainable environment, digitization and supply chain resilience on the development of logistics competences. The article is based on the author's personal experience as a member of the research team developing a new qualification framework for the logistics profession in the European Union.

Cognitive research goal: identification of key areas of changes in the economy over the last 6 years and learning about their impact on the recruitment and management process of logistics employees (junior, senior and strategic management), based on the opinion of experts (CEOs and directors of companies) . Three areas were selected: sustainable environment, digitization and supply chain resilience

Methodological purpose of the research: revision of the currently binding qualifications framework (ELA QF). The goal was achieved thanks to two workshops, attended by over 30 top-level managers, and individual interviews carried out by the author with the management staff of logistics companies and manufacturing companies in Poland.

Results: under development; **partial results:** verification should be carried out in Business Principles, Core Management Skills and Supply and Logistics Design.

Practical aspects: revision of the ELA QF in 2020, add new competences that will take into account new trends.

Conclusions: Level 4 competences should be higher than before in the above areas. There is a large variation in the meaning of the three areas mentioned in relation to business. This may indicate some immaturity of the above concepts.

Keywords: revision ELA QF, resilience in logistics, sustainability in logistics, digitization in logistics, competences of logistics

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INTRODUCTION

A frequent feature of world economic developments in the 2010s has been a simultaneous occurrence of two opposing trends, something which Zygmunt Bauman referred to as a time of interregnum [Bauman et al 2017]. In the ensuing commotion, old paradigms tend to disappear while new ones have yet to emerge – and this also impacts the way the new phenomena are being analyzed. Previously social scientists (or mathematicians for that matter) resorted mostly to methods that were specific to their particular discipline, while only rarely taking an interdisciplinary approach. But the present day's complex process can no longer be understood by following that trodden path, and hence the need for interdisciplinary teams, whose members' diversified knowledge and different points of view offer better chances of grappling with the intricate realities of today's world.

Such a team, comprising five representatives of different academic communities and different countries, has been established with the purpose of reviewing – and, possibly, revising – the Qualification Standards for logistics competence which were laid down by the European Logistics Association (ELA) back in 1998, and which were subsequently, from 2014, aligned to the EU's European Qualification Framework (EQF). The standards, which have been developed with the participations of experts and subject to their consent, can be instrumental in assessing professional logisticians' knowledge, skills and competences. They cover 13 areas of competence (modules) and three competence levels: Level 4 (Supervisor/Operational Management), Level 6 (Senior Management) and Level 7 (Strategic Management).

Out of the many changes taking place in the 21st century's second decade, three have been found to exert major influence on supply chain operations: threats to environmental sustainability, digitalization, and supply chain resilience (speed of adaptation to ongoing changes). Consequently, the team members proceeded to find out – working with practitioners – how these changes will influence logisticians' present and future competences. It was assumed that, just as in the existing version, the structure of the competences model should be in line with the European Qualification Framework, thus translating into 13 areas and three levels of competences.

The first major challenge encountered by team members – this author among them – was to reach a common understanding of the trends under discussion. With managers pointing to a very wide variety of their different aspects – depending on the sector and operational scale, i.e.

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regional, European, or global – it was agreed that individual team members would propose approaches to the trends in question that would be as objective as possible. That provided a point of departure for further discussion (after obtaining the managers' approval). Below, the reader is presented with an aggregate approach taken as a result of the ensuing analysis.

ENVIRONMENTAL SUSTAINABILITY, RESILIENCE AND DIGITALIZATION IN SUPPLY CHAIN – BREAKING DOWN THE NOTIONS

ENVIRONMENTAL SUSTAINABILITY

In analyzing Environmental sustainability in supply chain, the following comes to the fore:

1. Reducing the company's carbon footprint [Centobelli et al 2017] by cutting down on emissions through reduction of the overall number of miles driven, and deployment of autonomous vehicles, starting with the electric-driven; the focus must be on developing sustainable solutions to transporting many goods across great distances;
2. Reducing the amount of waste products driving with the empty truck from a destination to a distribution center in another city;
3. Alignment with Governmental Regulation and Goals depending on a company's location (it could face many different environmental regulations and status for production and shipment); Government-driven regulations have a basic goal of ensuring future regulation the resources to survive and it has a share in this responsibility;
4. Reducing the amount of energy consumed: shipping a single item is inefficient; shipping multiply items by consolidation could be less damaging than shipping 20 different trucks across multiply states;
5. Thinking beyond cradle-to-grave (circular economy and loop-of-supply chain).

Sustainability is a complex affair, and so partnerships and broad collaborations are crucial to solving the greatest challenges that emerge here. The goal of a sustainable logistics system is to improve profitability and reduce environmental impact for long-term performance [Carter and Rogers 2008, Gimnez et all 2012]. Table 1 illustrates one way in which the question of sustainable environment in logistics can be approached.

Table 1. Sustainable Logistics Perspectives

Perspectives	Criteria	Sub-criteria
Economics	Quality	Quality of Product Lead Time
	Responsiveness	Demand Responsiveness
	Cost	Manufacturing Cost Logistics Cost
	Profit	Return of Investment Market Share Profit Margin On Sale
	Mobility	Intensity of Goods Transport
Environment	Resource Usage	Energy Usage Water Usage Land Use Raw Material Use
	Pollution	Air Pollution Water Pollution
	Emission	CO2 Emission
	Waste	Waste Disposal
	Eco-Efficiency	Product/Service Value Environment Influence
Social	Health and Safety	Employee Safety Health Care Benefits
	Quality of Life	Accident Education and Training Working Condition

Source: Wichaisri S., Sopadang A., Sustainable Logistics System: A Framework and Case Study, 2014 DOI: 10.1109/IEEM.2013.6962564

RESILIENCE VS VOLUNTARIBILITY VS SUSTAINABILITY IN SUPPLY CHAIN – THEORITICAL VIEW

Under the Gallopin model [2006], resilience, vulnerability and sustainability are mutually related with each other. In the absence of unequivocal definitions of these notions, though, (perhaps, a result of their being used in multiple fields of knowledge) it is not possible to pinpoint the direction of these relationships [e.g., Pettit 2010]. In the opinion of the present author, supply chain vulnerability has to do with the structure of the entire supply chain and the role of its individual links. If there is a single dominant link, then the vulnerability of the whole chain will be largely influenced by the vulnerability of that particular link. But where there are several key links, it is the relationship between them and the strength of their interconnections that will define

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the vulnerability of the entire supply chain. A useful tool in such analysis may be provided by network theory, as applied in sociology [Sztompke 2007]. Where networks are inclusive towards potential new partners we also have inclusive supply chains (networks). Too strong relationships between partners, in this writer's view, may impair the resilience of the entire chain, just as the case would be with too weak relationships. And strong relationships may result in the supply chain's inclusiveness turning into exclusiveness towards outsiders, in what could be described as a kind of supply-chain tribalism. Similar situations occur in other particular links. For example, as demonstrated by research conducted by the present writer, the openness of logistics operators to new recruits from other sectors is fairly low, indicating an exclusivity-oriented organizational culture, preventing influences from different cultures.

In identifying the characteristics of the notion of supply chain resilience, another valuable instrument may be provided by analyzing the notion of elastic (flexible) thinking (understood here as "resilience") in respect of particular persons' traits, as applied in psychology. Psychologists usually see elasticity as capacity to swiftly and effectively adapt to the circumstances, and to cope with adversities. Within the analysis conducted by this author, the term "adaptiveness" could also be used. In psychology, people with elastic minds are seen as exhibiting features such as ability (based on experience) to work out a strategy to avoid repeating errors; emotional balance and calm in stress situations; realism (optimism) resting on solid argumentation; and confidence in their own potential. Such people are empathetic (meaning that they understand not only the feeling of another but also the context of particular situations); they can motivate themselves to action and focus on responses to a given problem. People's behaviors is precisely the stuff of behavioral economics, in its search to better understand economic process. A system's capacity to react to unexpected developments is described by N.N. Taleb [2013] using the notion of "antifragile". Actually an antifragile system has the capacity to learn, by inputting shocks and disruptions (whether external or internal). So we see here more of "resilience plus" (this author's designation), rather than a typical case of resilience where, in accordance with what physics teaches us, a substance yields to an external force and then springs back into shape. We can describe such a system as self-learning, and this also holds for the supply chain understood as a system (network) of interconnected elements.

From the systemic viewpoint, it is important to understand the interdependencies between various activities taken within the supply chain, so as to ensure that the system is in a state of

dynamic balance. Consequently, it is recognized [Fiksel 2006] that resilience (speed of adaptation to new environment) should take into account the economic, environmental and ethical factors that add up to sustainable development.

DIGITALIZATION IN SUPPLY CHAIN

The notion of digitalization, just as those previously mentioned, has not been unequivocally defined, which translates in practice into a multitude of approaches and interpretations. For the most part, though, writers point out to the outcome of digitalization, namely a change in the company's business model and its strategy. Digital transformation begins with what is known as digitization, involving analogue-to-digital data conversion [Rachinger et al 2018]. The process of digital transformation is applied to the restructuring of economies, institutions and society at the systemic level [Brenne and Kreiss 2016, Unruh and Kiron 2017]. In the context of the supply chain, a useful definition is provided by Gartner company, a global digital-technology consultant: “Digitalization is the use of digital technologies to change a business model and provide new revenue and value-producing opportunities; it is the process of moving to a digital business” [Gartner IT]. Another definition comes from i-scoop: “Digitalization means the use of digital technologies and of data (digitized and natively digital) in order to create revenue, improve business, replace/transform business processes (*not simply digitizing them*) and create an environment for digital business, whereby digital information is at the core” [i-scoop.eu]. A still broader notion is that of digital transformation, understood as a complete rethink of how technology and a business interact – a true transformation that puts the user at the heart of everything the business does, whether it concerns its staff, its customers or its partners. The key pillars of digital transformation are mobile, cloud, big data and social. According to McKinsey [McKinsey&Company 2016], the transformation of a traditional supply chain into a digital one requires two enablers: capabilities and environment. An organization should have a built-in digitalization potential, which means it should recruit employees with adequate competence profiles. Another factor activating supply chain transformation has to do with the deployment of a two-speed enterprise architecture, where a separate division with a start-up dynamic and culture is built into the company's organizational structure. Featuring flexible organizational arrangements and equipped with state-of-the-art IT systems (running independently of legacy systems), such division enables fast development, trials and deployment of new solutions.

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In the context of these analyses yet another factor should be taken up, one which actually comes to the foreground, given the growing complexity of ongoing processes in the economy and absence of advanced artificial intelligence solutions. This is the risk factor. Nowadays standardized processes in unmodified form can only rarely be seen in practice. And yet they provide a point of reference in building Scenarios A, B, C and D – depending on how the event that has disturbed the standard is classified. It is important here that a value map is drawn, as a compromise between the expectations of the client and the resource constraints on the contractor.

EXPECTATIONS OF LOGISTICIANS' FUTURE COMPETENCES IN THE CONTEXT OF THE RESEARCH CONDUCTED

RESEARCH METHOD CHOSEN BY THE INTERNATIONAL TEAM

It was in 2018 that the European Logistics Association (ELA) decided that the qualification standards for logistics competence (all levels: 4, 6 and 7) would come up for review, reflecting the dynamic changes in the economy and the fairly long time that had passed since the previous edition of the European Qualification Standards for Logistics Professionals (ELAQS). A five-member team was appointed, headed by the ELA president and comprising academics from Italy, Austria, Estonia and Poland, who specialize in logistics while simultaneously having practical experience with the sector. The team set themselves the task of sounding business representatives on key challenges expected to emerge in coming years and on the competences logisticians would need to respond to these challenges. The year 2020 was set as the deadline by which to revise the existing qualification framework. The proceedings of the team, conducted in cooperation with practitioners, are presented below, in Table 2.

Table 2

Deadline	Participants	Activities	Purpose	Method
May-August 2018	ELA president, working with national chapters	Setting up a research team of five academics from ELA member countries	Providing methodology support for managers with a view to reviewing the qualification standards for logistics competence (2014 version)	Discussion and recommendations from national chapters, in the course of the Logistics Congress in Poznań in 2014
October 2018	ELA president	Sending a letter of invitation to ELA national chapters, to name representatives who would	Enlisting a group of top and middle-level managers to contribute to the review of existing qualification framework	A written invitation to heads of national chapters

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		attend a December 2014 workshop		
December 2018	Research team and practitioners	Diagnosing key changes in the economy, of crucial importance for supply chain architecture	Identifying the competences that will be useful in a changed supply chain architecture	Moderated discussion, individual work, working in pairs, brain storming, using online tools (mentimeter)
January-February 2019	Research team	Checking the results obtained	Setting the results obtained results in order, and defining their hierarchy	Comparing notes, posting the results on Dropbox (accessible to all team members)
March 2019	Research team and practitioners	Checking the results obtained in the second group (managers)	Double checking on the search for new competences	Individual work, use of online tools, discussion, sharing cases

Source: Author's compilation

Following the research process, a set of competences were identified and assigned to individual areas on Level 4 (Supervisory/Operational Management level European Junior Logistician), Level 6 (Senior Management level European Senior Logistician) and Level 7 (Strategic Management level European Master Logistician). The pattern of areas for which competences analysis was made is visualized in Figure 1 (in compliance with ELAQS 2014).

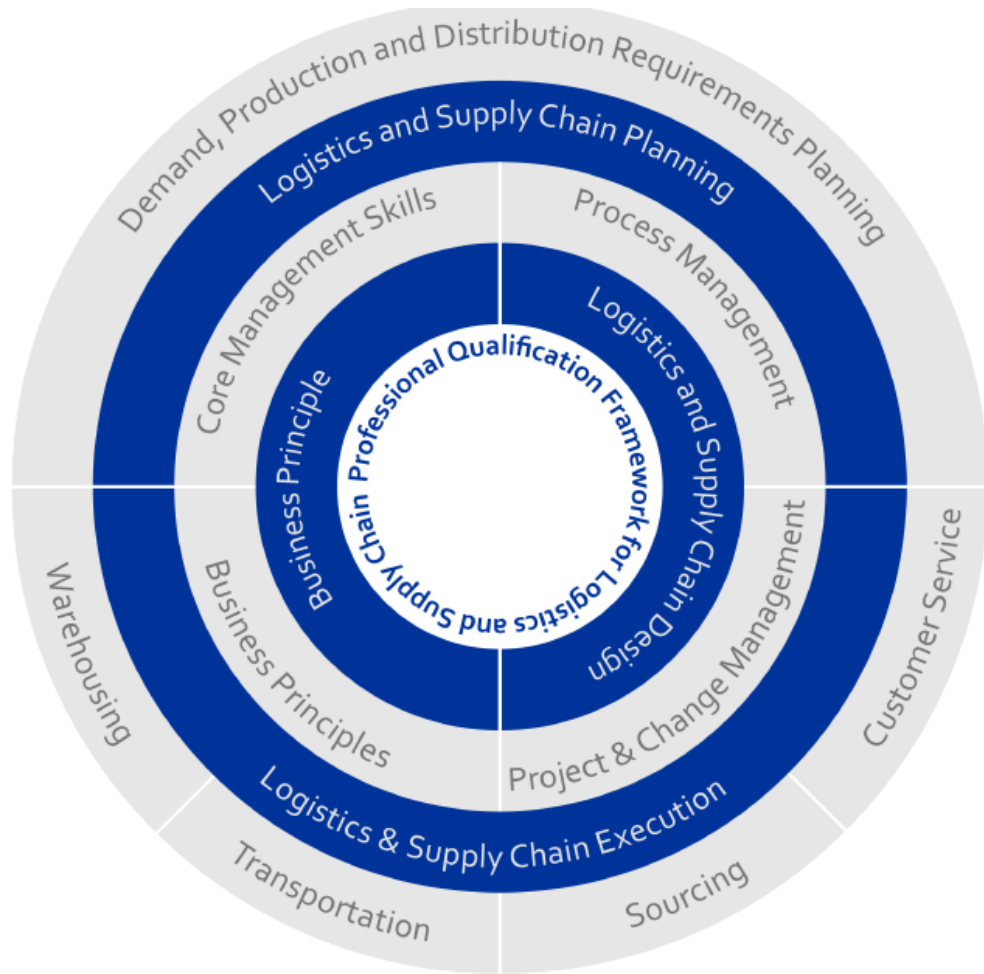


Fig. 1 Professional Qualification Framework for Logistics and Supply Chain.
Source: European Qualification Standards for Logistics Professionals 2014

The obtained results are presented later in this chapter.

PERSONAL INTERVIEWS

Additionally the present writer opted to conduct personal interviews in Poland with three top-level managers representing suppliers of logistics services (two globally operating foreign family firms, and one Polish company) and two other managers, from the automotive industry and the FMCG sector. These were standardized interviews, consisting of three parts. Information was sent by e-mail, and subsequently a conversation was held, either directly or by phone. Interview structure and questions for discussion are presented below:

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1. How does the manager's company understand the notions of digital innovation, environmental sustainability and supply chain resilience, and how does it translate into particular business activities?
2. How can digital innovation, environmental sustainability and supply chain resilience be measured at the manager's company and in the entire supply chain? Are any metrics already applied?
3. In the manager's opinion, which competences are of help when taking on these challenges? Are any persons at the manager's company who already have such competences (even in part)?

The interviews lasted from 2 to 5 hours (three telephone conversations to specify the subject matter in greater detail). In one case, during a meeting with two managers, a discussion broke out between themselves, each trying to clarify the meaning of the notions in question.

KEY TAKEAWAYS FROM THE RESEARCH

The most important conclusions from the workshops and interviews are these:

1. If changes to the existing standards are to be made, these should cover the key areas of Business Principles, Core Management Skills and Supply Chain Design, at all levels: operational, managerial, and strategic. In respect of the other areas, it was found that changes in the described competences are possible, but not necessary.
2. Given the complexity of ongoing processes, the biggest challenge is posed by employees' soft competences, especially related to leadership qualities (for 6 and 7 grade managers), teamwork in diversified groups (in terms of culture, gender, age, religion, etc.), and effective communication.
3. Awareness of the context of the changes being introduced is important also on Level 4, to ensure more effective operational activities.
4. The present qualification framework, in the opinion of some experts, goes into too much detail, and so consideration should be given to aggregating certain sections.

Tables 3, 4 and 5 present aggregate proposals concerning future competences for logistic professionals, supply chain managers and supply chain strategists, based on the findings from two workshops and personal interviews conducted by the present writer.

Table 3

Level	Expected future competences
Supervisory, Operational Management level European Junior Logistician (EJLog)	<p>Understands the value of resilience and operates within the guidelines</p> <p>Able to learn and obtain new qualification</p> <p>Ability to execute the solutions</p> <p>Ability to understand different point of views</p> <p>Capability to explain problems to the manager</p> <p>Understands and executes the new processes defined</p> <p>Understands link between shareholder value and sustainability development</p> <p>Understands the impact of supply chain disruption</p> <p>Understands the basic tools for supply chain resilience improvement</p> <p>Understands new technologies and the importance of data mining to better manage orders and procedures</p> <p>Is able to utilize & analyze different supply chain data to evaluate strategic logistics improvement projects</p> <p>Conducts risk mitigation projects (as preventive actions)</p> <p>Demonstrates "data-mining" skills and combines them into transparent set of supply chain parameters</p> <p>Expertise and adeptness in areas such as analytics, artificial intelligence, workflows and the Internet of Things</p> <p>Executes & shares best practices to include in the guidelines for environmental sustainability</p> <p>Executes actions required to deliver customer required value within the agreed timeframe and budget</p> <p>Prepares and presents complex business case analysis for decision making</p> <p>Understands application of different modes of transport / road: FTL, LTL, groupage network, parcels/ sea/ air / rail</p>

Source: Author's compilation

Table 4

Level	Expected future competences
Senior Management level European Senior Logistician (ESLog)	<p>Listens to all team members carefully and combines lean thinking with agile (leagile)</p> <p>Defines sourcing strategies for resilience</p> <p>Incorporates new tech in SC processes and decision making</p> <p>Is leader to project teams and processes improvement initiatives at regional level</p> <p>Builds a culture of "best in class" thanks to right approach to events</p> <p>Able to plan and arrange collaborative actions (together with suppliers and customers) in order to raise SC resilience</p> <p>Ability to carry out an appraisal interview and give the feedback</p> <p>Represents ability to work seamlessly within and across companies, cultures, functions and geographies to drive change and action</p> <p>Plans risk avoidance and mitigation strategies</p> <p>Mediates flow of innovative initiatives throughout the organization</p> <p>Is able to calculate the footprint of the operation of company</p> <p>Agent of sustainability in the organization</p> <p>Analyzes and interprets the solicitations of the environment</p>

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	<p>Identifies & recommends sustainability development opportunities in the supply chain with highest environmental & social impact</p> <p>Uses lean techniques and tools to deploy operating standard for end-to-end supply chain</p> <p>Presents high problem solving skills – is able to make rapid decisions based on large amounts of information</p> <p>Understands the crucial importance of searching for and implementing innovations</p>
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Source: Author's compilation

Table 5

Level	Expected future competences
Strategic Management level European Master Logistician (EMLog)	<p>Demonstrates knowledge & expertise in supply chain processes transformation capabilities using lean, continuous improvement and innovation techniques</p> <p>Translates market into strategy (fast and agile methods)</p> <p>Mandates, reviews and makes decisions on resilience/risk management system</p> <p>Understands the cost of non-sustainability</p> <p>Defines a compliance system</p> <p>Sets the sustainability agenda (be a moral leader)</p> <p>Develops and achieves sustainability targets to reach strategic organizational goals</p> <p>Identifies strategic opportunities to execute sustainability initiatives by design, development and implementation</p> <p>Interacts, connects & leads cross-functional teams across Europe</p> <p>Researches markets for best practices and innovations in supply chain</p> <p>Cultivates relationship with external and internal suppliers and customers to develop programs and achieve organizational goals</p> <p>Has knowledge and is able to develop teams to use innovative tools & techniques which would help reduce costs, inventory levels and transit times</p> <p>Has high multi-level leadership skills which help achieve targets on a global, multi-channel, cross-functional basis</p>

Source: Author's compilation

CONCLUSIVE REMARKS

This chapter presents an approach to verification of the 2014 European Qualification Standards for Logistics Professionals. The verification process, necessitated by the changes taking place in the global and regional economy, has yet to be completed, but the workshops and interviews conducted as part of the project outlined herein helped diagnose competences of key importance for logisticians in the effective discharge of their responsibilities. Special emphasis was placed on communication skills, teamwork, quick adaptation to change, risk management, and technology proficiency. Much importance was assigned to discussion, seeking to understand what approaches practitioners take to the trends impacting supply chain

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management. Three trends were identified as key drivers of much needed change in the recruitment and training of logistics professionals, namely: sustainable environment, digitization and supply chain resilience. As it turned out, the understanding of these trends differed widely among managers, which may indicate that the development of these concepts remains very much in a nascent state. Also, some experts urged that the organizational structure of the company of the future be flattened, so as to expedite decision-making and shorten the distance between management layers, thus resulting in improved supply chain resilience.

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