

Competence Evaluation and Management in Logistics

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Abstract

This paper describes survey results regarding explicit and tacit knowledge in logistics processes as well as the German competence evaluation tool “Berufswertigkeit”. These results can increase productivity in logistics qualification and logistics processes and will support the development of an Industry Qualifications Framework Logistics (IQF-L), derived from the EQF concept.

Keywords: Logistics Education, Competence Evaluation, Competence Management, Berufswertigkeit, IQF-L.

Introduction

Logistics education and competence management is increasingly in the center stage of logistics and operations management research (Canen and Canen 2004, Gammelgaard and Larson 2001, Halldórsson and Skjøtt-Larsen 2004). This is essential in order to enhance productivity in logistics companies and supply chains on a global scale as increasing technology implementation as well as complexity and flexibility requirements enhance the competence level needed by employees to efficiently manage logistics processes. Therefore the standardization and professionalization of competence management and education in logistics is a major strategic challenge for companies and logistics research alike for the coming decades (Klumpp 2012, Mentzer et al. 2004, Roth 2012, van Assen 2000).

This *business-level* requirement is met with *system- and country-level* needs in logistics and education: Globalization and modern logistics management are fraternal twins of our modern economic system in terms of efficient supply chains – and Germany has been one of the major winners of global trade and logistics markets (World Bank 2010, 2012). Further on, this global economic division of labor will be challenged regarding even more participating countries as well as aligning their footprint with increasing sustainability and resource shortage restrictions – wherein the competences of logistics managers and employees will play a very important role in the competitiveness of industry, retail and logistics companies (Hildebrand and Roth 2008, Klumpp et al. 2013).

One of the major management tasks in the future is therefore the *evaluation and selection of employees* in logistics according to their competence profiles and levels – and one major research paradigm in this field addresses the so called “signalling” of personnel, indicating that by formal certificates or other criteria such as amount of working experience these people signal their (supposed) competence to the employer (Laing 1993). This can apply to external selection processes (hiring) as well as to internal promotion and position change processes for employees and is also true for the selection of participants in further education measures (Liu 2009, Roth

2008). In the light of resource shortage and efficient management, employers have to work with this signaling paradigm to a certain degree – and research would have to provide viable assumptions about the reach of this paradigm in logistics practice (Roth 2010) – which would be a valuable asset in any human resource strategy for large and small logistics companies throughout the world (Klaus et al. 2010). Also, this would severely affect the structure and behavior of logistics education providers in the initial education (vocational training institutions, universities) as well as in the further education segment (Roth and Klaus 2008).

In order to follow up this important research question regarding logistics education and competence management, this article first in the following second section provides details about the Berufswertigkeit concept, developed in Germany for competence evaluation in business practice (Klump 2007, Klump et al 2011). Afterwards, a case study research is described in order to depict the important distinction of explicit and tacit knowledge in logistics (section 3). Section four describes implications for the internal processes of organizational learning in logistics – whereas section five describes macro-economic implications through the standardization effort of an Industry Qualifications Framework Logistics (IQF-L). Finally, section six gives a conclusion and an outlook for further research.

Competence Evaluation with the Berufswertigkeit Concept

In order to evaluate the overall competence level of logistics employees the measurement concept of Berufswertigkeit was used in the presented 2012 survey in Germany; in telephone interviews with 1.068 logistics employees from different corporate fields and levels their education biography (school and further degrees, business practice experience) as well as the 36 indicators of the Berufswertigkeitsindex (BWI) were evaluated and documented. The following figure 1 depicts the overall result of this survey in the group share distribution of BWI values.

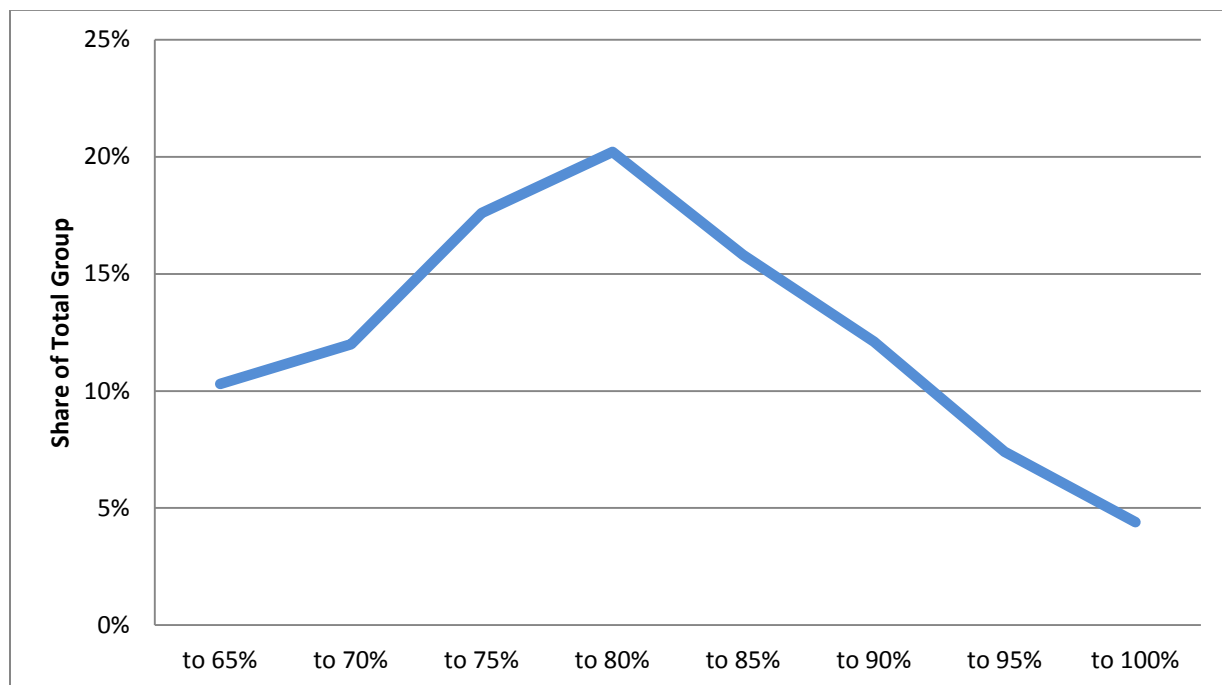


Figure 1 – BWI competence distribution, 1.068 logistics employees (Germany, 2012)

Source: Klump et al. (2013), 52.

In the logistic sector the access to education and knowledge for everyone, in particular the newcomer in the logistics sector has to be improved. One more aspect is to observe that the demographic change in Germany and elsewhere has to be counteracted with more flexible continuing education offers – wherein the practice experiences of the employees have to be measured and integrated. All these reasons require a *competence measurement concept* which is suitable, practicable and compatible in every economic sector and in particular the logistic sector. The measurement concept “Berufswertigkeit” fulfils these requirements of a general competence measurement instrument. Linked to the concept of employability, this is a concept of competence measurement of persons with different (formal) education degrees. The criteria for an effective competence measurement have been empirically adapted of the modern business practice. Hereby, different education degree holders can be compared and results are practice- and output-oriented. The evaluation instrument “Berufswertigkeitsindex” was already developed in previous “Berufswertigkeit” studies 2008 and 2010. It includes the following 36 qualification requirement criteria that represent modern work competence requirements which will be used to calculate the “Berufswertigkeitsindex”:

- Efficiency
- Independence and own initiative
- Flexibility and adaptability
- Work virtues
- Stress resistance
- Motivation and ability to lifelong learning and maintain to own competence profile
- Coordinate the work- and lifetimes
- Creativity
- Loyalty
- Risk-taking
- Charisma
- Ability to write and speak in German
- Knowledge for foreign language
- Ability to apply modern information- and communication technologies (work place)
- Communication and rhetoric
- Assertiveness
- International and intercultural competence
- Customer focus
- Skills in mathematics and statistics
- Preparation of cost estimates and quotations
- Planning, implementation and documentation of orders and projects
- Negotiations capacity
- Analytical problem-oriented work
- Quality management (optimization of processes and products or service quality)
- Conceptual and strategic implementation of industry-specific knowledge and experience
- Identification with the company
- Strategic orientation, determine / control the complete company
- Understanding solutions of complex technical problems
- Basic knowledge of business administration
- Perception of functions of management and organization
- Conceptual working in immediate workplace

- Planning and control procurement and logistics processes
- Staff requirements and staff mission planning / staff development
- Team, staff and leadership
- Improving responsible care
- Legal knowledge

The “Berufswertigkeitsindex” is to be calculated as a summed and non-weighted index of individual evaluation of the 36 qualification requirement criteria. The value range of the “Berufswertigkeitsindex” begins with 0 and ends at 100. The output-oriented measuring concept Berufswertigkeit serves as a basic field-evaluation concept for the development of such an European Qualification Framework for the logistics industry and integrates the required investigation of competences (Klump and Schaumann, 2007).

For the 2012 survey in Germany, 1,068 persons from the logistics sector were questioned and these represent 379 female and 689 male respondents. 75.7% of the respondents are from the German state of North-Rhine Westphalia (NRW) and the remaining 24.3% are from Hesse. The respondents represent various professional levels at their working place. 88.6% are employed as white collar workers like branch managers, team leaders and office clerks in their company and 11.4% work in the warehouse or as truck drivers (blue collar workers). The following table shows the ten worst evaluated competence criteria of the respondents. Interestingly, white collar workers as well as blue collar workers have evaluated eight identical criteria poorly (table 2) – where improvement i.e. in the form of training measures is needed.

Table 1 – Ten worst evaluated competence requirements (blue and white collar workers in logistics)

Blue collar worker		White collar worker	
Preparation of cost estimates and quotations	2.50	Leading and conducting complex tasks as well as project management	2.14
Planning, implementation and documentation of orders and projects	2.50	Planning and control procurement and logistics processes	2.16
Strategic orientation, determine / control the complete company	2.50	Staff requirements and staff mission planning / staff development	2.20
Legal knowledge	2.50	Strategic orientation, determine / control the complete company	2.22
Solving complex tasks independently	2.50	Legal knowledge	2.26
Knowledge for foreign language	2.60	International and intercultural competence	2.32
International and intercultural competence	2.60	Basic knowledge of business administration	2.36
Leading and conducting complex tasks as well as project management	2.60	Team, staff and leadership	2.36
Quality management (optimization of processes and products or service quality)	2.70	Quality management (optimization of processes and products or service quality)	2.56
Team, staff and leadership	2.80	Understanding solutions of complex technical problems	2.66
Basic knowledge of business administration	2.90	Conducting research	3.34
Conducting research	3.80		

Surprisingly, despite the high importance for logistics services, both groups do not have enough quality management competences and require more knowledge regarding this subject. White collar workers show significant weaknesses in conducting research endeavours – which is

important for the logistics industry for increasing competitiveness worldwide and economical progresses. Significant weaknesses shown by the blue collar workers are regarding leadership, basic knowledge of business administration and international competences (foreign languages or intercultural competences), even though these competences are supportive for the daily operative work e.g. in the communication with international truck drivers. The following figure shows a comparison of the same negative eight evaluated criteria of both groups that present a small difference between the evaluations of the different criteria.

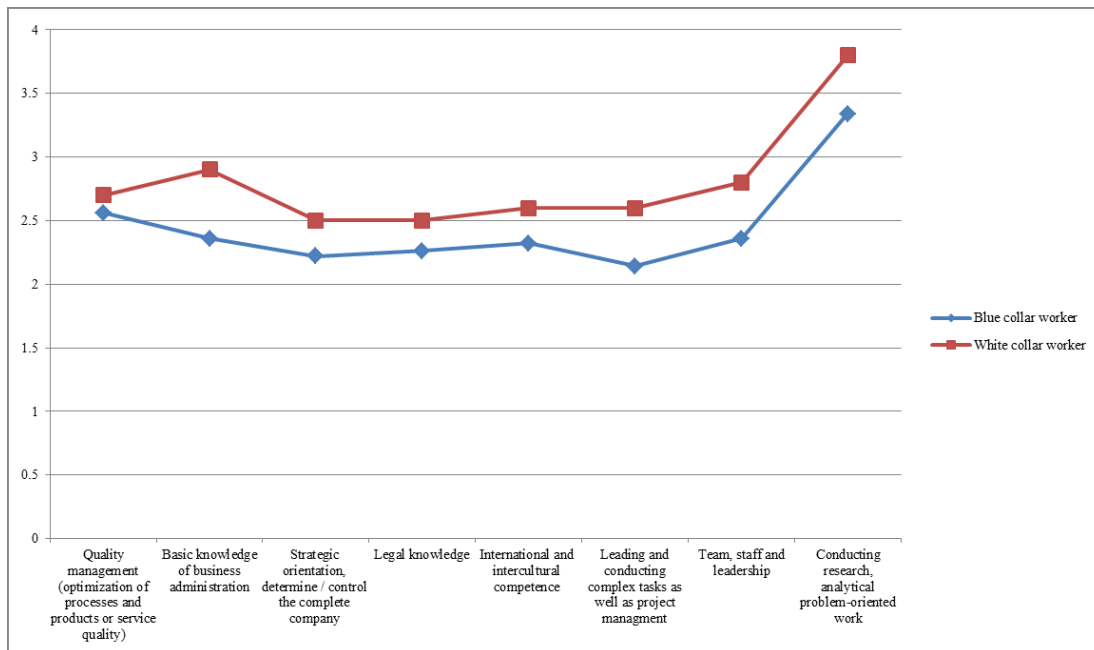


Figure 2 – Competence gaps for white and blue collar workers in logistics

The following table shows the ten best evaluated competence requirements by the blue and white collar workers – where ten out of ten criteria are the same with a small difference in evaluation values. Hereby, the social competencies of both groups such as loyalty, flexibility, punctuality, diligently and careful, independence and own initiative, identification with the company are distinctive. Further, both groups strive for efficiency in the logistics activities.

Table 2 – Ten best evaluated competence requirements (blue and white collar workers in logistics)

Blue collar worker		White collar worker	
Loyalty	1.30	Ability to write and speak in German	1.18
Punctual, diligently and careful	1.30	Loyalty	1.18
Efficiency	1.40	Identification with the company	1.32
Independence and own initiative	1.40	Punctual, diligently and careful	1.34
Ability to write and speak in German	1.50	Efficiency	1.36
Flexibility and adaptability	1.50	Independence and own initiative	1.38
Identification with the company	1.50	Flexibility and adaptability	1.46
Risk-taking	1.70	Stress resistance	1.62
Motivation and ability to lifelong learning and maintain to own competence profile	1.80	Risk-taking	1.66

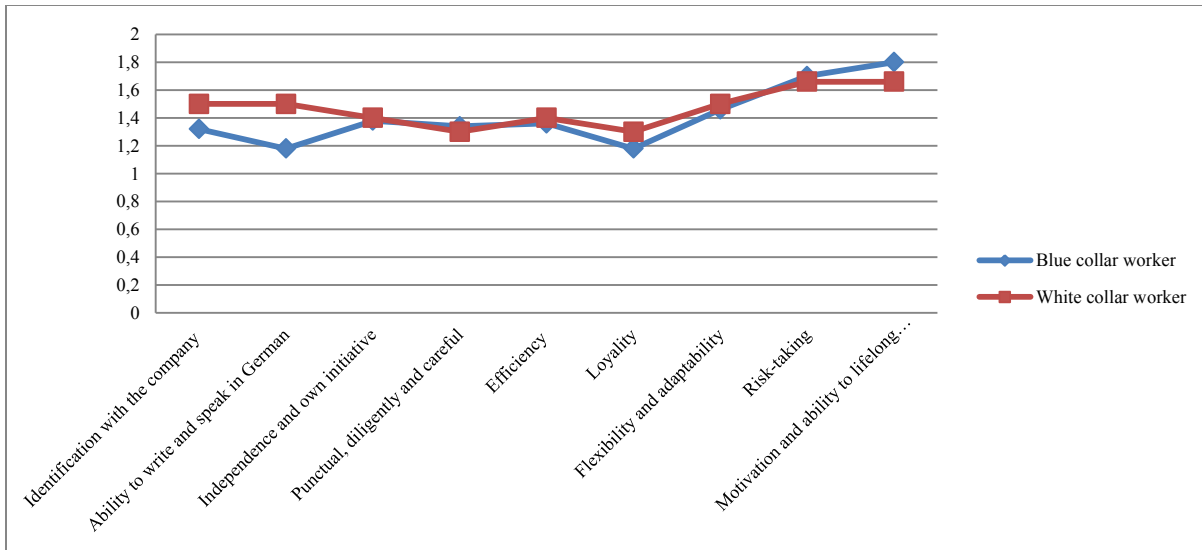


Figure 3 – Competence strengths for white and blue collar workers in logistics

Explicit and Tacit Knowledge in Logistics Processes

Furthermore, complementary to the described qualitative items of competence requirements in logistics practice the question of explicit knowledge and tacit knowledge is addressed. Two types of interviews with standardized questionnaires were conducted for the two different groups of employees and activities in logistics: (a) The first team is a ‘blue collar’ team for operational transshipment processes, which has a comprehensive knowledge in dealing with warehouses, storage, groupage, specific goods, on and off loading of swap bodies and trucks. (b) The second team of office clerks (white collar) is responsible for sales and customer relationship management. These processes are chosen because these teams have to have extensive knowledge about logistics, quality management, customer service, dispatching, laws, customs clearance, national and international area, multi-lingual, IT-technologies, warehouse, price, interfaces in a supply chain, marketing and competitors. A total of 22 employees contributed to this survey. The interviews were conducted on site and each person had to decide which processes belongs to which degree (0 to 100%) to tacit or to explicit knowledge characteristics. Tables 3 and 4 describe the allocation of explicit and tacit knowledge of the two groups from two companies in the logistic sector in Germany. E.g. the blue collar staffs state that dealing with dangerous goods is 100% explicit knowledge, because every information and agreed guidance for carriage of dangerous goods by road, air, sea and train is written down in guidelines like ADR (European Agreement concerning the International Carriage of Dangerous goods by Road). The most important information taken from table 3 and 4 is the overall average: Personnel in company 1 assert that the most processes belong to the tacit knowledge category with an average level of 71.47%. But for identical processes the blue collar staffs of company 2 affirm that only 52.64% of the handled processes are attached to the tacit knowledge field. The reason for this difference could be the fact that company 2 organizes more seminars than company 1. A further reason could be the different customer and goods structure which is handled the respective companies, requiring different knowledge characteristics.

Table 3 – Explicit and tacit knowledge with blue collar logistics employees

Allocation of explicit and tacit knowledge			
Company 2 n=6	Warehouse and terminal staff	Tacit knowledge	Explicit knowledge
	Maximum in %	100.00	100.00
	Average in %	71.47	28.53
	Standard deviation in %	24.38	24.38
	Minimum in %	40.00	0.00
Company 1 n=8	Warehouse and terminal staff	Tacit knowledge	Explicit knowledge
	Maximum in %	100.00	100.00
	Average in %	52.64	47.36
	Standard deviation in %	17.27	17.31
	Minimum in %	10.00	10.00

The following table represents the comparison of knowledge categories between the two companies as stated by the office – white collar – workers in sales and customer relation-ship management departments. In company 1 the employees collected their knowledge through business experience of many years – although most of them didn’t receive a vocational education as e.g. “Speditionskaufmann”, but they worked in this company for more than 20 years with “training on the job”. They evaluate the most processes with a high level of tacit knowledge, with an average of 64.54%. At company 2 the employees evaluate the most processes with an average of 63.00 % as explicit knowledge areas.

Table 4 – Explicit and tacit knowledge with white collar logistics employees

Allocation of explicit and tacit knowledge			
Company 2 n=4	Office clerk	Tacit knowledge	Explicit knowledge
	Maximum in %	100.00	100.00
	Average in %	64.54	35.46
	Standard deviation in %	32.67	32.67
	Minimum in %	1.00	0.00
Company 1 n=4	Office clerk	Tacit knowledge	Explicit knowledge
	Maximum in %	70.00	90.00
	Average in %	37.00	63.00
	Standard deviation in %	15.76	15.76
	Minimum in %	10.00	5.00

Organizational Learning in Logistics

Results of the described competence analysis as well as a competence categorization (explicit, tacit) heavily influence internal corporate learning and knowledge processes and strategies. This is outlined further in this section, leading to the concept of an organisational learning cycle. For example logistic service providers executing pre-carriage and last-mile transport processes, the use of modern mobile telematics modules offers a large potential for personal learning and corporate knowledge management. For example, drivers could get more flexibility according to their staff assignment on different tours: The tracing of past routes offers the possibility to navigate drivers on routes which were already successful used by drivers in the past who have local knowledge of the region. In addition, state-of-the-art modules could be rigged with a digital camera so that pictures of shipping addresses could be saved and displayed on the screen. With this visualization drivers may save much time when delivering to new addresses because they would not have to search for loading ramps. The individual *tacit* knowledge of each driver could

be accessed through this integration of data by other employees. So the staffing of delivery tours gains in flexibility. Such applications would require a strategic knowledge environment in a company as different levels of tacit and explicit knowledge exist in relation to the overall learning motivation and set-up in logistics companies. In example the following context of an interaction between organizational learning environment and individual learning motivation could be applied (figure below).

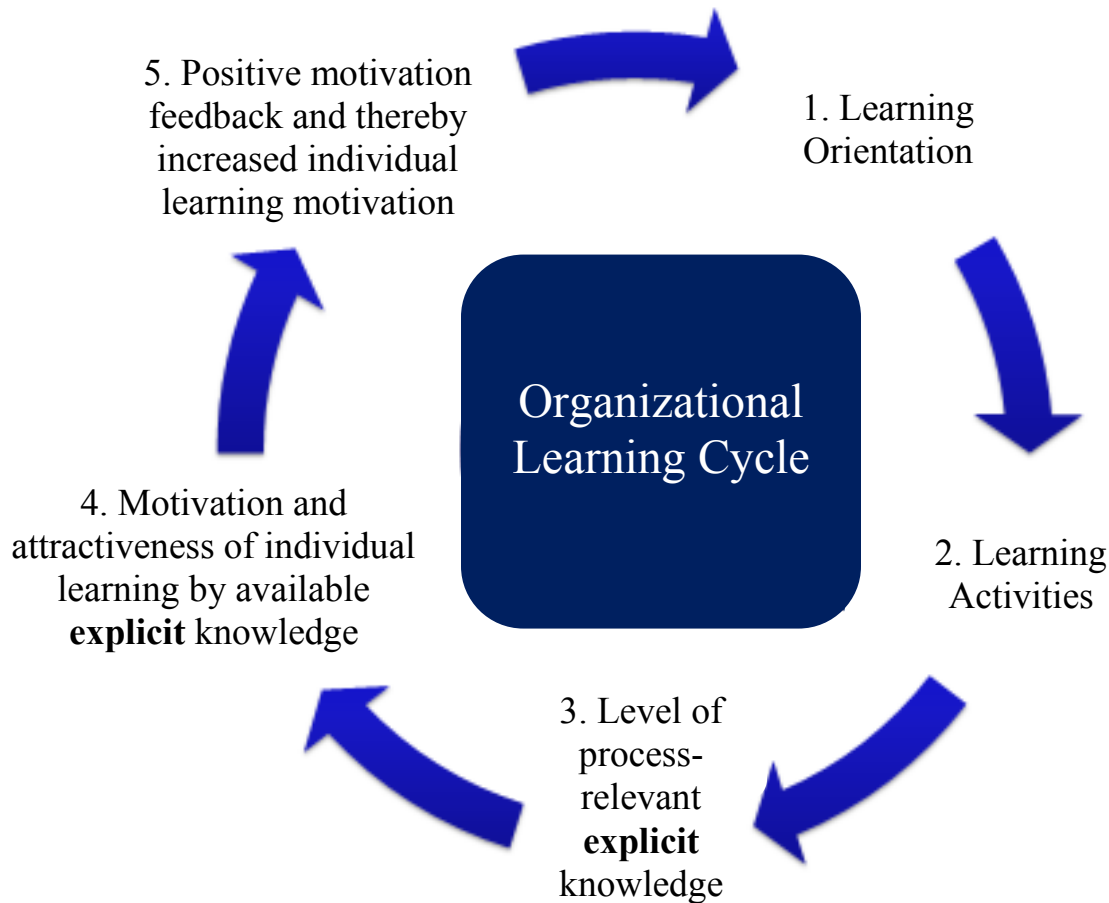


Figure 4 – Organizational-individual Learning Cycle

A Standardized Industry Qualifications Framework Logistics (IQF-L)

In accordance with the strategic concept of the European Qualifications Framework (EQF), a draft for an Industry Qualifications Framework Logistics (IQF-L) is delineated from the previously presented research results. This could strongly support and encourage especially *small and medium sized enterprises* in logistics to enhance their qualification systems and invest more in education and knowledge. The following table shows the details of such a standardized structure with eight levels of competences, matched with the relevant BWI sections e.g. level 1 with a BWL measure of up to 65%.

Table 5 – Industry Qualifications Framework Logistics (IQF-L)

	Logistics Competence Description
Level 1 - up to 65% BWI	He/she is able to conduct simple logistics tasks with specific introductions and orders, e.g. transport, warehousing and transshipment handling processes or registering of orders, labeling of shipments, data handling and electronic transfer, sorting and editing transport documents (loading lists etc.).
Level 2 - up to 70% BWI	He/she is able to conduct standard logistics tasks with general introductions and orders, e.g. operative tour and warehouse planning, data transfer from different IT systems (OBU, RFID, Scanner, Driving Times), document management and exceptions handling for loading lists, customer orders and planning.
Level 3 - up to 75% BWI	He/she is able to implement more complex logistics tasks with general introduction, e.g. long-term warehouse and tour planning, adaption to new customer orders or transport destinations, calculation of transport offers for customers and projects, national and international document management.
Level 4 - up to 80% BWI	He/she is able to complete complex logistics tasks with transfer of knowledge after general introduction, e.g. planning an intermodal and/or international transport, re-arranging a transport chain in SCEN contexts, establish new transport routines and document as well as handling processes for new destinations or origins of transports, leadership functions in operative teams e.g. tour planning, administration, sales or project groups in logistics.
Level 5 - up to 85% BWI	He/she is able to handle complex and demanding tasks in logistics operations, e.g. team leadership on all levels and in all areas, planning and presenting complex logistics concepts and projects, conducting holistic risk assessments and long-term calculations for logistics concepts, sales leadership (key account management) and conducting project and contract logistics (3PL, 4PL) management.
Level 6 - up to 90% BWI	He/she is able to complete independently demanding expert tasks in logistics, e.g. organizational leadership tasks for depots and hubs, complex calculation and research tasks e.g. carbon footprint calculations in logistics, planning and implementation of new logistics locations (warehouse, contract logistics depot), project leadership, also in international and intercultural settings.
Level 7 - up to 95% BWI	He/she is able to manage large and complex expert and leadership tasks in logistics, e.g. company leadership, top management support and project management on a strategic level with international links, establishment of new teams or services in logistics (facility and SCM ramp-up management), new strategic transport routes/resources or co-operations, application of operations research.
Level 8 - up to 100% BWI	He/she is able to plan and implement management tasks in logistics innovation and research & development, e.g. outline empirical research concepts in logistics or field testing technical innovations, to lead very complex logistics corporate structures and networks e.g. with strategy development and implementation as well as identification and realization of strategic competitive advantages in logistics.

Conclusion and further research

The described important research results in logistics education and competence management contribute to an increasingly standardized and professional dealing with qualification of logistics employees. This could contribute to enhanced competence levels throughout the global supply chains, especially among the small and medium sized companies in logistics and supply chain services. Furthermore, education systems of individual countries could adapt to these standards in order to further raise knowledge and therefore productivity levels in the logistics industry.

Further research should address testing and piloting of the developed IQF-L in order to adjust the categories and competence descriptors as well as attach further formal degrees to the levels of the framework. This should further increase acceptance and implementation options.

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