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Development of Logistics Studies as an Example of Adapting Higher Education to the Needs of Knowledge-Based Economy

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Abstract

The development of the modern economy depends on the efficiency of complex global logistics chains. Logistics employs modern management and telematic technologies, whereas knowledge management is the basis for growth of efficiency and effectiveness of logistics chains. A particular role is played by the universities which educate the future workforce for the Transport-Forwarding-Logistics (TFL) sector. Based on the data from the POLON system, it may be concluded that logistics education is common, especially at the economic and technical universities. According to the Polish statistical data, the graduates find jobs very quickly, whereas their remunerations are higher than the average. The activity of universities in respect of research and education for the purpose of logistics is a factor in the growth of competitiveness of this economy sector. However, it is necessary to improve the study programs, using knowledge of practitioners and results of scientific research.

Keywords: education in the field of logistics, labour market, employability of graduates

JEL: A23, I25, J24, L91

Introduction

The modern economy gains competitive advantage thanks to the use of knowledge. In particular, it is essential to use the potential of universities in research and education for the purpose of the economy. An example in this area is the activity of Polish universities in respect of transport and logistics. The Transport-Forwarding-Logistics (TFL) sector has key significance for global competitiveness. Poland is the European leader in logistics. Initially, low employment costs were the source of competitive advantage. Currently, an increasingly important role is played by quality, including work organization, which requires an inflow and activity of highly qualified staff. Polish universities are increasingly more active in educating logisticians. In this respect, they use the potential of research staff, whereas their educational offer more and more frequently includes studies at all levels, taking into consideration postgraduate studies as well.

The purpose of the article is to show how higher education in Poland adapts to the needs of the knowledge-based economy by teaching logistics. The research was based on the review of statistical data concerning the fate of graduates; the ranking of engineering studies was also subject to analysis. The paper presents the educational activity of universities in light of the development of the TFL sector.

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1 Identification of TFL market needs in respect of specialist higher education

The business activity in the TFL sector is closely related to comprehensive handling of processes of movement of various types of goods between domestic and foreign entities. Such movements are connected with the phases and stages of processing (quantitative and qualitative transformation of goods), transport, and storage, and they occur with various frequencies, with the involvement of technical, economic and organizational factors (Kisperska-Moroń and Krzyżaniak 2009, 12). The entities active in the TFL market perform tasks in the field of: movement and transport of goods, warehousing and storage, packing, handling materials, stock control, order implementation, demand forecasting, production planning, purchases, appropriate customer service level, location of plants and warehouses, handling returns, supply of spare parts and after-sales service, waste collection and removal (Coyle, Bardi, and Langley 2002, 69). These entities vary in terms of size, scope of activity, ownership form, range of operations and capital. Generally, it may be concluded that the TFL sector in Poland has evolved under the influence of the economic reform, growing competition, internationalization and globalization processes, as well as development of IT systems. The following periods can be indicated in the source literature (Ciesielski 2005, 10):

- until the end of the 1980s — traditional transport sector, with clear division into transport, forwarding and postal services
- 1990s — vision of integrated logistics services, formation of the so-called packages of logistics services
- end of the 1990s — concept of supply chain management and optimization, as well as supply network based on close cooperation between logistics operators, manufacturing and trading companies

Along with the development of IT systems and use of the Internet, new opportunities emerged for company activity in the area of electronic data exchange, automatic identification systems, business models, etc. (Ciesielski 2011, 130–147; Ciesielski and Długosz 2010, 110–156; Gołembska 2013; Wyrwich-Płotka 2018). Among the entities providing services in the TSL market, entities determined as 2PL (Second Party Logistics) — suppliers of simple logistics services providing services such as transport, storage and loading, 3PL (Third Party Logistics) — logistics operators providing logistics services as complex business solutions for certain or all functions of supply chain management; apart from forwarding activity, they also offer to their customers storage and handling inventories, transport and handling cargos, different types of marketing services, financial services related to contract implementation, as well as 4PL (Fourth Party Logistics) — specialized integrators of logistics services having extensive knowledge and offering to their customers a range of logistics services that go beyond the traditional logistics. These entities enter production processes offering creation of added value for products during movement in a supply chain, developing comprehensive and complex solutions of logistics problems in close cooperation with 3PL type entities (Rydzkowski 2004, 34–35). The geographical range of 4PL activity is either global or continental. Along with the development of e-commerce, the notion of 5PL (Fifth Party Logistics) as a virtual supplier of logistics services also appeared. 5PL are service providers of integrated logistics services — i.e., they manage a supply chain on the strategic level and focus on delivering logistics solutions along the entire supply chain, developing agile networked supply chains. 5PL logistics combines 3PL and 4PL methods, as well as controls all operations in a supply chain using IT technologies.[1] Apart from supply chain integration, management and control, a 5PL company may also offer services such as call center, webshop development or online payments. The basis for operation of logistics service providers of this type is the economies of scale that they are able to offer to their customers. Their goal is to provide a solution at the highest level of quality for the lowest possible price.[2]

1. See: "5 PL." Entry in on-line Encyclopedia published by Governica, [accessed 2018.06.10], [@:] https://www.governica.com/5_PL; "Fifth Party Logistic Model (5PL)." Entry in on-line Logostics Glossary of Embassy Freight, [accessed 2018.06.10], [@:] https://www.logisticsglossary.com/term/5pl/.

2. See: Docdata: od 1 do 5, czyli poziomy w logistyce. Retailnet Shopping Center News, 2016.10.11, [@:] https://retailnet.pl/2016/10/11/112790-docdata-od-1-do-5-czyli-poziomy-w-logisytce/.

The opportunities to conduct or expand activity by companies in the TFL sector are varied, depending on the possessed resources and skills, as well as adopted organizational rules and action strategies. The impact of these factors on the scope and quality of provided services is the basis for general division of such companies into:

- companies building their activity on fixed assets,
- companies operating according to the network organization rules, and
- companies building their market position on skills (Witkowski 2010, 14–15).

Taking into consideration the above general division of companies in the TFL sector, logistics services can be divided into two basic categories:

- logistics services based on resources — physical services of transport and storage whose performance requires technical equipment, and
- services based on skills — services consisting in planning, organizing, supervising, etc., whose performance requires specialist knowledge, competences, skills and experience (Ciesielski 2005, 34).

There is no doubt that formation, development and functioning of contemporary supply chains, within which many complex logistics processes are carried out, requires highly specialist knowledge about decision-taking (often interrelated, from various areas of action) at the strategic, operational and tactical level. Such decisions most frequently concern: determination of key competences in selection of supply chain strategy, adjustment of the entire supply chain to the nature of demand and character of supply, development of the general supply chain concept — combination of functions and processes, determination of the scope and level of outsourcing, selection of suppliers and agents in distribution, designing the system of flow of raw materials, materials, components and finished products, selection of the stock management concept, decisions concerning the IT system, including system for information flow, selection of rules or model of risk management in a supply chain, decisions concerning relations between supply chain participants, selection of the cost management method, selection of location of logistic facilities and their equipment, formulation of transport management rules, etc. (Ciesielski 2009, 18).

The increased significance of knowledge about supply chain management had an impact on including it among the mandatory content of student education, not only in transport or logistics, but also in other courses (like management or international economic relations) (Witkowski 2010, 7).

As follows from the Business Report on TFL Market published by Gazeta Finansowa, the beginning of 2018 indicated further dynamic development of the warehouse and production market in Poland (Rynek TSL w Polsce 2018). Among other things, this is related to the growing investors' confidence in the domestic economy and significant increase of e-commerce market and resulting high investors' demand for stable revenue-generating facilities. In 2017, more agreements than ever were signed for BTS (build-to-suit) facilities — i.e., any type of warehouse facilities that are designed and built according to the individual preferences and for the purpose of a dedicated customer). The largest amount of new surface in 2017 was commissioned in the Warsaw are (503 600 m^2). The biggest commissioned buildings in Poland were: Panattoni BTS Amazon Szczecin (161 000 m^2), BTS Amazon Sosnowiec (138 000 m^2) and Goodman BTS Zalando Szczecin (130 000 m^2). The largest lease transaction in 2017 was the agreement signed by Panattoni with a company from the e-commerce sector for construction of BTS set of buildings with the size of 146 000 m^2 in Gliwice. According to the statistics of the Central Statistical Office, the direct share of transport and logistics services sector in Polish GDP increased by over one fifth from the moment of Poland's accession to the EU (increase from 5,4% in 2004 to the level of 6,5% in 2015).[3] Poland is also increasingly becoming the first choice country for the biggest logistics companies. The employees needed in the market are not only individuals with several years of employment and experience in the TFL sector, but also young workers (often students in the final year of studies or graduates with little experience in the TFL sector) for whom employers create development programs, thus building their capital for the future.

3. [In the journal European practice of number notation is followed — for example, 36 333,33 (European style) = 36 333.33 (Canadian style) = 36,333.33 (US and British style). — Ed.]

Knowledge expected by the employers concerns broadly understood logistics consulting as support in taking decisions in the field of warehouse, procurement, production and distribution logistics. This is also knowledge in the area of economic, technical and functional solutions for particular logistics areas, such as warehouse, distribution center, logistics center, automatic identification system and IT systems. It is also knowledge in the field of optimization of logistics processes, transport processes, logistics costs, costs of transport, warehouse, production, distribution, etc. It is the ability to use specialist software applied in supply chains.

2 Higher education offer for logisticians (evaluation of programs)

Education in the field of logistics takes place in many technical and economic universities in Poland at first and second cycle degree full-time studies, first and second cycle degree part-time studies, postgraduate studies and vocational colleges. Among the universities offering courses in logistics, the following can be mentioned: War Studies University, University of Bydgoszcz, Katowice School of Economics, Cuiavian University in Włocławek, Jan Benedykt Solfa University of Łużyce in Żary, International University of Logistics and Transport in Wrocław, Angelus Silesius University of Applied Sciences in Wałbrzych, Jan Amos Komeński State School of Higher Vocational Education in Leszno, Szymon Szymonowic State School of Higher Education in Zamość, State School of Higher Education in Ciechanów, State School of Higher Education in Konin, Białystok University of Technology, Częstochowa University of Technology, Łódź University of Technology, Opole University of Technology, Poznań University of Technology, Ignacy Łukasiewicz Rzeszów University of Technology, Silesian University of Technology, Kielce University of Technology, Pomorze University in Starogard Gdański, University of Social Sciences in Łódź, Warsaw University of Life Sciences, Jan Wyżykowski University, University of Economics in Katowice, University of Economics in Kraków, University of Economics in Wrocław, Jan Kochanowski University in Kielce, University of Łódź, Maria Curie-Skłodowska University in Lublin, University of Opole, Siedlce University of Natural Sciences and Humanities, University of Life Sciences in Lublin, University of Szczecin, Kazimierz Pułaski University of Technology and Humanities in Radom, University of Białystok, University of Warsaw, University of Zielona Góra, Eugeniusz Kwiatkowski University of Business and Administration in Gdynia, Gdańsk School of Banking, Poznań School of Banking, Toruń School of Banking, Wrocław School of Banking, University of Business and Administration in Łuków, WSB University in Dąbrowa Górnicza, University of Economics and Innovation in Lublin, Prof. Szczepan A. Pieniążek University of Economics and Humanities in Skierniewice, University of National Economy in Kutno, University of Economy in Bydgoszcz, Warsaw Academy of Computer Science, Management and Administration, University of Information Technology and Management based in Rzeszów, Poznań School of Logistics, Polish Air Force Academy, Prince Kazimierz Kujawski University of Entrepreneurship based in Inowrocław, Academy of Management and Administration in Opole.

As can be noticed from the above-presented list of universities providing education in the field of logistics, the offer in the educational market is broad and available both in large academic centers and smaller towns. The comparison of teaching programs did not cause any problems when ministerial educational standards for specific study courses applied and determined both the scope of subjects and teaching contents as core and special courses. There were specializations created within courses. At the moment, universities with academic eligibility are to a large extent free to shape their educational offer.

In accordance with the teaching standard in logistics, it was possible to educate within 6-term bachelor degree studies and 7-term engineering studies.[4] A graduate of bachelor degree studies gained general knowledge and skills required for operational logistics management within the functional departments of business entities. They familiarized themselves with the essence of managing contemporary business entities (organizations) and principles of logistics activity of business

4. See: Standardy kształcenia. Published by Rada Główna Nauki i Szkolnictwa Wyższego, 13 February 2007, Warszawa, [@:] http://www.rgnisw.nauka.gov.pl/inne-dokumenty-2007/standardy-ksztalcenia.html.

entities, essence of systematic and process approach in logistics, principles of controlling information flow, funds, human and material resources, as well as essence of logistics customer service. They gained knowledge in the field of organization and improvement of operational logistics activity in business entities. A graduate of engineering studies gained knowledge in the field of functioning of modern logistics systems and fundamentals of economic science, organization and management, as well as managerial skills. They familiarized themselves with solving logistics problems by means of engineering methods and techniques, including in the field of: designing logistics systems and logistics processes; managing specialist logistics functions and logistics processes; using IT logistics management support systems; managing costs, finances, capital, as well as staff selection and training. A graduate was prepared for work in: manufacturing companies; logistics companies; designing and consulting units specialized in logistics, as well as economic and administrative units, in which logistics, technical, economic and IT knowledge, as well as organizational skills. Second cycle degree studies in logistics were 4-term for bachelor degree studies and 3-term for engineering studies respectively. A graduate of second cycle degree studies gained extended knowledge in comparison with the first cycle degree studies in the field of logistics of business (manufacturing, commercial, service) entities and other organizations operating within a supply chain. They were prepared to perform duties at logistics managerial positions and implement free market logistics strategies. They familiarized themselves with economic and financial conditions of logistics activity of business entities, essence of creative approach to business and law governing logistics activity of business entities, operational strategies of business entities, essence and types of competition in domestic and foreign markets, mission and goals of logistics in companies and other organizations, as well as significance of qualitative competition in logistics customer service. They acquired skills in planning, organization and implementation of logistics processes in business entities, implementation of systematic logistics solutions applied in company management, indication of opportunities to reduce logistics costs, creation of new logistics potential for companies and organizations, modification or introduction of new logistics strategies intended to improve the domestic and international competitiveness of business entities.

When analyzing the teaching programs in logistics, it can be noticed that in a majority of cases universities use the scope of subjects resulting from standards, creating specializations that correspond to the market needs. The following examples of specializations in the educational offer of universities in the field of logistics can be specified (both Polish- and English-speaking): logistics in trade and forwarding, warehouse logistics and cargo management, logistics and organization of production, logistics of manufacturing company, logistics in trade and services, logistics of trade and distribution, logistics manager, logistics services, international logistics and forwarding, logistics of small and medium-sized companies, logistics services management, logistics in organization, e-commerce in logistics, international logistics, transport logistics, business logistics, transport in logistics systems, logistics systems, logistics process engineering, logistics in company, logistics in crisis situations, military logistics, International Logistics, Logistics of Trade and Distribution. When assessing the available educational offer, it may be concluded that it is very diverse, especially within specializations, creating opportunities to gain highly specialized knowledge and skills useful in the TFL sector, depending on the needs and scope of activity of entities operating in this sector.

3 Assessment of employability and average remuneration after higher studies in the field of logistics

For many years, the graduates of higher studies had to face high risk of unemployment, or at least an extended period of job search. Many of them went abroad to look for a job. Currently (since 2016), the unemployment level in Poland has decreased so much that graduates of many courses are employed already during the studies. The period of waiting for employment and risk of unemployment are becoming less important; however, they continue to indicate the compatibility between the courses of studies and the needs of the economy and labor market. The latest available comparative data are from 2016; however, it shall be assumed that the situation in the labor market in 2018 is significantly more favorable.

The data concerning graduates of second cycle grade full-time studies (based on ELA — i.e., "economic fate of graduates" system reports)[5] were used in order to assess employability and average remuneration. Part-time students quite frequently work and study at the same time; therefore, full-time studies appear to be more representative in order to assess the effectiveness of higher education in respect of preparation for work. Additionally, the analysis was limited to second cycle grade studies, because first cycle degree studies are usually continued due to the fact that the Bologna model, in which employment is taken up after completing the first (implicitly: professional) cycle degree, has not been fully formed yet. It shall be noted that ELA system data illustrate the situation in the labor market with certain delay. The research was prepared in May 2018, when the data for 2015 were available; in the first half of June 2018, third ELA edition with the data for 2016 was made available, and certain data from that edition were included in the tables and description. Changes both in the labor market and education market occur faster; however, the undeniable advantage of the ELA system is the fact that there are data enabling comparison, although a commentary taking into consideration the specificity and dynamics of the above-mentioned changes is necessary.

The graduates of logistics in 2016 waited for a job for a shorter time than the graduates of other courses: from approximately 1,7 months (in 2015 — 2,07) to 5,08 months (in 2015 — 4,36), whereby out of 11 identified universities educating at second cycle degree full-time studies, only in 2 cases (in 2015 — 3,00) this period was above the average for other courses. Even in 2015, the risk of being unemployed (understood as the percentage of the period of being unemployed in the first year after finishing studies, where the whole year is 100%) was also lower than in the case of other courses and amounted from 4% to 19%. The risk of being unemployed in the case of graduates of logistics was also lower than the unemployment rate in the administrative districts where they lived — the ratio between being unemployed in the first year after finishing studies and the average unemploy-

Tab. 1. The employability indicators for graduates of logistics, full-time studies, second cycle degree full-time studies

University/Faculty	Period of waiting for a job (months)		Risk of being unemployed [a]	Unemployment rate compared [b]
	in 2015	in 2016		
University of Łódź, Faculty of Management	2,07	1,70	6,20	0,95
University of Łódź, Faculty of Economics and Sociology	2,37	2,71	9,90	1,07
University of Economics in Katowice, Faculty of Management	2,40	2,69	7,10	1,12
University of Life Sciences	2,96	3,28	4,00	0,47
Poznań University of Technology	3,10	2,61	5,40	1,12
University of Szczecin	3,54	n.d. [c]	8,70	0,95
Military University of Technology	3,60	3,96	8,30	1,09
Rzeszów University of Technology	4,00	5,08	17,50	1,71
Silesian University of Technology	4,15	3,03	10,40	1,34
Częstochowa University of Technology	4,37	2,71	19,00	1,75
War Studies University	4,36	n.d. [c]	4,70	0,54

Source: Own study on the basis of reports generated by ELA system (Ogólnopolski system monitorowania…, op. cit).
[a] Risk of being unemployed (% of time in the first year after finishing studies), in 2015.
[b] Unemployment rate for graduates of logistics compared with the unemployment rate of higher studies in the administrative district of their residence, in 2015.
[c] No data available during the article was elaborated.

5. See: Ogólnopolski system monitorowania Ekonomicznych Losów Absolwentów szkół wyższych. Edycja 3. Ministerstwo Nauki i Szkolnictwa Wyższego, [accessed 2018.06.18], [@:] http://ela.nauka.gov.pl/.

ment rate in the administrative district amounted from 0,47 to 1,75 (tab. 1), whereas in 2016 it amounted from 0,46 to 1,71. Generally, the average employability of graduates of logistics is at a higher or average level; only in certain cases the level is lower than the average.

The ELA system also presents the average remunerations of graduates; however, these include average remunerations of graduates from all sources. The data collected in 2015 show that the salaries of graduates of logistics are approximately the same as the average values for graduates as a whole (tab. 2). The ELA system in the average remuneration category for 2015 records 1 449 courses (full-time, second cycle degree), whereas gross remunerations range between PLN 8 207 (macro-field of study: electronics, information technology and telecommunications at the University of Warsaw) and PLN 214 (Artes liberales — a unique field of study at the University of Warsaw). It shall be remembered that data may be distorted — e.g., due to the number of graduates from a course, doctoral studies undertaken by them, or long period of waiting for employment (low gross remuneration values), which is related to non-working in the acquired profession. Generally, the average employability of graduates of logistics is at a higher or average level; only in certain cases the level is lower than average.

The average values of employability indicators and remunerations for the graduates of logistics (full-time studies, second cycle degree) showed values higher than the average already in 2015, creating an optimistic image of education in this field. A widespread increase of remunerations was recorded in 2017 (in a majority of cases the increases were in double figures). Currently, due to the decrease in unemployment and dynamic development of the TFL sector, further improvement in respect of employability and salaries of graduates of this field of study can be expected.

Tab. 2. Remunerations of graduates of logistics, full-time studies, second cycle degree full-time studies

University/Faculty	Average gross remuneration (PLN) in 2015	Average gross remuneration (PLN) in 2016	Remuneration compared[a]	Change 2015/2016[b]
University of Łódź, Faculty of Management	2 541,97	2 951,70	0,67	16,1
University of Łódź, Faculty of Economics and Sociology	2 447,10	2 978,34	0,66	21,7
University of Economics in Katowice, Faculty of Management	2 541,91	2 844,58	0,63	11,9
University of Life Sciences	2 798,87	3 161,77	0,69	13,0
Poznań University of Technology	2 907,41	3 321,49	0,78	14,2
University of Szczecin	1 954,01	2 721,26	0,51	39,3
Military University of Technology	2 878,62	2 819,98	0,71	−2,0
Rzeszów University of Technology	1 931,32	1 844,61	0,54	−4,5
Silesian University of Technology	2 265,48	2 582,64	0,57	14,0
Częstochowa University of Technology	1 600,28	2 140,08	0,47	33,7
War Studies University	2 368,96	–	0,58	–

Source: Own study on the basis of reports generated by ELA system (Ogólnopolski system monitorowania..., op. cit).
[a] Remuneration of graduate compared with the average remuneration in the administrative district of residence, in 2015.
[b] Change of gross average remuneration in 2015/2016 (in %).

4 Leading universities educating logisticians in Poland

Courses of logistics in Poland are frequently supplemented with other courses or specializations. The dominating course is logistics (tab. 3); however, it shall be noted that education of a similar profile is carried out on specializations within other courses (e.g., at the University of Economics in Katowice — the course of economy includes specialization in transport and logistics; similar cases

Tab. 3. Specializations in the field of transport and logistics at universities in Poland in 2016

Specialization	First cycle degree full-time studies	Second cycle degree full-time studies	First cycle degree part-time studies	Second cycle degree part-time studies
Logistics	37	11	48	18
Transport	25	14	16	7
Total	62	25	64	25

Source: Own study on the basis of reports generated by ELA system (Ogólnopolski system monitorowania..., op. cit).

occur in other courses offered both by public and private universities). Logistics in the educational offer dominates in terms of quantity over the technical course of transport, where logistics issues are also taught.

Only a few universities have developed their education options so as to offer logistics as a course both within the first and second cycle degree studies. In particular this concerns engineering education, which is not separately recorded by the ELA system. In the ranking of engineering studies published by Perspektywy Education Foundation, in 2018 only 5 universities offered engineering studies in logistics with the possibility to continue within the second cycle degree (tab. 4). This shows that despite the universal and dynamic development of the sector, complex education in logistics is still unique. The data presented in the table 4 show that ranking positions are not directly connected with the risk of unemployment, whereas the quality of admitted students does have such a connection. The ranking indicators, and in particular their relation to the level of studies, are usually questionable. At this point, the assessment of their connection with the measurable education effects (economic fate of graduates) is difficult due to the short analysis period of the ELA system. Extension of system data resources will allow for more in-depth analyses.

Tab. 4. Ranking of Engineering Studies (2018) taking into consideration the unemployment risk

University	Ranking position		Unemployment risk		"Quality" of admitted students[b]	Prestige (recognizability)
	in 2017	in 2018[a]	in 2015	in 2016		
Silesian University of Technology	1	1 (100,0)	10,40	6,18	64,59	26,79
Military University of Technology	2	2 (98,4)	8,30	6,52	84,33	28,57
Poznań University of Technology	–	3 (96,5)	5,40	6,22	90,56	58,93
University of Economics in Katowice	–	4 (90,5)	7,10	4,21	100,00	100,00
Opole University of Technology	3	5 (73,4)	–	–	73,43	5,36

Source: Own study on the basis of reports generated by ELA system (Ogólnopolski system monitorowania..., op. cit), and ranking prepared by Perspektywy magazine (Ranking studiów iżynierskich Perspektywy 2018. Logistyka 2018. [accessed 2018.06.18], [@:] http://engineering.perspektywy.pl/2018/ranking/logistyka).

[a] Ranking points in brackets.

[b] As of matura grades.

Conclusions

The TSL sector plays a significant role in today's economy. Along with the development of transport-forwarding-logistics services, the demand for employees with relevant specialist knowledge, competences and skills has changed. Education in the field of logistics at universities in Poland is carried out within the framework of first and second cycle degree full-time and part-time studies, as well as postgraduate studies at many universities in large academic centers and smaller towns. The educational offer is very diverse, especially within specializations, creating opportunities to gain highly specialized knowledge and skills useful in the TFL sector, depending on the needs and

scope of activity of entities operating in this sector. Thanks to the reports from the ELA system, the assessment of—e.g., employability and remuneration of graduates can be performed (i.e., the relevance of education to the reported demand for employees in the labor market can be verified). As emerges from the conducted research on the graduates of second cycle degree full-time studies, the employability of graduates is at a higher or average level; only in certain cases the level is lower than average. The average remunerations of graduates of logistics are at a higher or average level; only in certain cases the level is lower than the average. Currently, due to the decrease in unemployment and dynamic development of the TFL sector, further improvement in respect of employability and salaries of graduates of this field of study can be expected.

Education in logistics at the level of higher studies is very diverse; however, it can be noticed that it is based not only on theoretical preparation of the academic staff, but also on the knowledge of practitioners and results of scientific research, as well as implementations. The study of the case of the University of Economics in Katowice shows how valuable it is to prepare graduates for work in a sector where knowledge management is a factor of competitive advantage.

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