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Student Competencies in Supply Chain Management: Expectations and Reality

Adrienn Munkácsi [a, *], Demeter Krisztina [a]

[a] Department of Supply Chain Management, Institute of Operations and Decision Sciences, Corvinus University of Budapest, Budapest, Hungary

Abstract

The ever-changing competency expectations and human resource shortages in the Supply Chain (SC) field underpin the relevance of our research. Both issues require the attention of all stakeholders (students and universities at the supply side, and employers at the demand side).

Therefore, the aim of this study is to use an inductive approach to help students wanting to enter the field of Supply Chain Management (SCM) to increase their preparedness by mapping the employer experiences and competency expectations.

In 2021 in Hungary, 64 corporate middle managers participated in the online questionnaire and shared their experiences of the competencies of recent graduates.

Using quantitative research, the results shed light on the most expected competencies, the increasingly important role of soft skills, the significant differences between the expected and the experienced traits, such as complex mindset, systems approach, humility and conflict management.

With the revealed results, this study contributes to the professional literature in two ways. On the one hand, it provides up-to-date data about employers' opinion of graduated students, which is rare in the literature. On the other hand, it helps to see the possible causes of the discrepancy between supply and demand in the SC labour market.

Keywords: higher education, logistics, supply chain management, supply and demand, skills, competency, labour market.

1. Introduction

One third of the current jobs could dramatically transform within the next five years, with some of the required knowledge and skills becoming redundant while the demand for new skills increases. It is therefore crucial that the changing competency expectations, which may be generated by technological developments but also by the pressure related to the shortening of order

* Corresponding author
E-mail addresses: munkacsi.adrienn@uni-corvinus.hu (A. Munkácsi), krisztina.demeter@uni-corvinus.hu (D. Krisztina)

fulfilment times (Chung et al., 2018) closely linked to the growth of e-commerce, are constantly perceived by education providers.

Nowadays, the labour market of the transport and storage industry is facing labour shortages and unemployment at the same time in Hungary. In 2021, the number of vacancies per quarter is on average 1.85 % (KSH.hu, 2022). The occurrence of this situation may have been caused by the discrepancy between labour supply and demand, the dynamics of its change, the constantly changing labour market requirements, the inadequate skills, attitudes and expertise (competency) of the employees, as well as the fact that the labour market's demand for human resources raised faster than the number of adequately qualified graduated people in the field of SCM, for example, due to the Covid pandemic.

In our research, we focus on the causes of this discrepancy by investigating the employer expectations (demand side) and the student competencies (supply side) to see where to intervene to reach a better match between the two sides. Our goal is, to influence SCM training, which hopefully will help to meet the expectations of the industry and narrow the gap between supply and demand.

As argued by Dubay et al. (2019) "empirical research on supply chain skill gaps is scant" (p. 144), which indicates the need for this kind of research. We have to know the nature and magnitude of the problem before taking corrective actions.

Therefore, in our research, we sought to answer the following questions:

RQ1: Which competencies do employers expect from graduated students?

RQ2: Which competencies are experienced by employers?

RQ3: Where do employers see discrepancies between their expectations and the current competencies of graduated students'?

2. Definitions and literature review

In this chapter we define the field and the researched topic (competencies) and then see what the literature have so far done.

The field of supply chain management

Before presenting the results, we should define the field (SCM) we are investigating. To do that, we use the definitions of professional organizations most closely associated with the field.

The Council of Supply Chain Management Professionals (CSCMP), which used to be the Council of Logistics Management till 2004, defines supply chain management as follows: "Supply chain management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third party service providers, and customers. In essence, supply chain management integrates supply and demand management within and across companies." (CSCMP website, 2023). The CSCMP also defines logistics as "part of supply chain management that plans, implements, and controls the efficient, effective forward and reverses flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers' requirements" (CSCMP website, 2023). Based on these definitions, the major areas of SCM are procurement, manufacturing (conversion) and logistics (including warehousing, distribution and reverse flow activities). Based on research, competency related studies usually cover the purchasing and logistics areas (Dubey et al., 2019).

Competency

The literature lacks a clear definition of the term competency and also shows inconsistent use of the term (Kotzab et al., 2018, Munkácsi, 2021).

Table 1. Competency vs. Competence

No	Term	Main Focus	Definition
1	Competence Competences	Task – Job	Competences are the tasks a person is capable of performing
2	Competency Competencies	Person	Competencies are the personal characteristics which make work performance possible

Source: Bozkurt, 2009

In our research we use the term competency (competencies) from Table 1. Competencies are usually represented as a combination of components such as knowledge, skills, abilities, capabilities and resources (Athey, Orth, 1999; Prahalad, Hamel, 1990; Sanchez, 2004; Munkácsi, 2021, European Union, 2006; ESCO, 2020).

We adopt the definition of competency used by ESCO (2020), and the Council of the European Union (2006): "The proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations, and in professional and personal development. It is one's ability to combine knowledge, skills, and attitude (KSA) to show the expected behaviour when performing a professional task." European universities also use this KSA system to form their assurance of learning outcomes.

According to Gruzdev et al. (2018), Myers et al., (2004), formal skills and theoretical knowledge acquired during university studies are less important for effective work in business than personal qualities. However, the development of these qualities does not yet meet the expectations, which is also supported by the dissatisfaction of the students. Today, the expectation presented in the "Iceberg model" of Spencer et al. (1993) is more and more confirmed, where selection based on personality traits is the basis of efficiency because professional knowledge can be easily acquired.

The research presented above thus supports the growing importance of soft skills and the relegation of professional knowledge to the background, which is now noticeably complemented by the expectations related to attitudes.

Competencies required in the areas of SCM

Since in the last years, employees with the right competencies are of increasing strategic importance, individual competencies receive more and more attention in SCM research (Hohenstein et al., 2014; Dubey et al., 2019).

Bak et al. (2019); and Ellinger and Ellinger (2014) treat it as a fact that soft skills are becoming increasingly important in the logistics sector. Moreover, they have indicated that key hiring decisions tend to focus on soft (interpersonal and relational) skills, while hard skills have become a standard requirement (Kuzminov et al., 2019; Bak et al., 2019). Competency is a key factor in achieving excellent performance and competitiveness in the supply chain (Derwik, Hellström, 2017).

The biggest challenge for training institutions today is therefore to establish and maintain close cooperation with the companies involved, to identify new demands and expectations in the labour market, to monitor changes, to react to them as quickly as possible and to equip the students with the competencies that meet the market demand. (Thai, 2012). In the literature, however, we do not find much research, which address this problem by discovering the gap between required and experienced competencies. Required competencies (see Table 2) are more frequently screened.

The competencies are approached in different classifications. Derwik et al., (2016), in their research, grouped the competencies used by managers working in different areas of SCM into five broad categories: business managerial competence (30-40 %), generic competence (20-30 %), behavioural competence (15-30 %), functional competence (5-20 %), SCM expertise (0-5 %). Clearly, the functional knowledge and expertise of SCM seems to be the least required competencies. In the framework of Myers et al. (2004), the four types of skills were social skills, decision-making skills, problem-solving skills, time management skills. We reorganized the different classifications according to the knowledge-skills-attitude (KSA) breakdown and are summarised in Table 2.

In 2014, the Hungarian Association of Logistics, Purchasing and Inventory Management mapped the expectations and experiences of logistics career starters in the Hungarian market by an online questionnaire. The most important soft skills appeared to be motivation, diligence and learning ability, while the least important category was stress tolerance. The experience of the employers has shown that the areas where graduates should improve the most are precision, diligence, adaptability, shyness, resilience and excessive self-confidence. Docility and easy integration into the existing organization met the expectations well. In sum, the experience scores were on average lower than expected, which not only confirmed the existence of a market gap between education and practice, but also suggests companies' reservations towards recent graduates. This gap and the lack of systematic research investigating the gap initiated our research.

Table 2. Required competencies (KSA)

References	Required competencies (KSA)
Derwik, Hellström, 2017; Flöthmann et al., 2018; Jordan, Bak, 2016; Karttunen, 2018; Kotzab et al., 2018; Murphy, Poist, 2006; Thai, 2012	Hard skills: computer/software skills, financial management, foreign language, analytical skills, cost control, Knowledge about: basic logistics, mathematics, professional experience, logistics related regulations, basic technology, business ethics, local and international business regulation, sustainable logistics systems, reverse logistics, impact of globalization, modeling of operating systems
Bak et al., 2019; Derwik, Hellström, 2017; Jordan, Bak, 2016; Karttunen, 2018; Murphy, Poist, 2006; Thai, 2012; Kotzab et al., 2018; Flöthmann, et al., 2018	Soft skills: decision-making skills, business communication, teamwork, ability to plan, interpersonal relations, problem-solving skills, time management, intercultural management, leadership, infrastructure planning and management, collaboration, innovation and entrepreneurship, stress management
Bak et al., 2019; Jordan, Bak, 2016; Murphy, Poist, 2006; Karttunen, 2018; Kotzab et al., 2018	Attitude: motivation, proactivity, flexibility, adapt to change, learning to learn, enthusiasm, self-confidence

Notes: KSA = Knowledge-Hard skills, Soft skills, Attitude
Source: our own construction

3. Research methodology

The basis of the online quantitative research and the determination of the examined competencies in this study was provided by literature research (EU, 2006; Hofstra et al., 2020; Derwik et al., 2016; Derwik, Hellström, 2017; ESCO, 2020; Flöthmann, Hoberg, 2017; Munkácsi, Demeter, 2019; Patóné, 2006; Pató et al., 2021; Thai et al., 2011).

Employers were asked about 32 competencies based on the literature sources listed in Table 2. The competencies and their values are listed in Table 4. Following the definition of SCM provided by CSCMP, we asked managers of any field of SCM to answer the questionnaire. The question to be answered, which gave the results of Table 4: "In your opinion, which competencies (competency = knowledge/proficiency + attitude + skills/abilities) should a recent graduate possess and to what extent when applying TO YOUR FIELD? (1: Not at all, 5: Fully).

The online questionnaire was delivered to the stakeholders through several steps (weekly newsletter, Facebook, LinkedIn) but only the personal inquiry (was made via email or LinkedIn) led to results. More than a hundred people started to fill in the questionnaire, but some of them did not finish, so we ended up with a total of n = 72. Respondents also indicated the area they manage (procurement, manufacturing, warehousing, distribution, logistics, inverse and other areas). Since many respondents do hold managerial positions in more than one area, that is why the number of individual responses add up to 101 (more than the number of the 72 respondents). The distribution of responses is presented in Table 3.

Table 3. Distribution of employer survey responses on specific areas of SCM

Procu-rement	Warehouse	Manufac-turing	Distri-bution	Reverse	Logistics and distribution managers	Other fields of SCM	Sum
12 (12 %)	20 (20 %)	10 (10 %)	17 (17 %)	2 (2 %)	27 (26 %)	13 (13 %)	101 (100 %)

Source: our own research (2022)

Among the respondents belonging to other categories, you can find providers of shipping, international shipping, lean management (and industrial engineering), complex logistics services, CEP (currier, express, parcel).

4. Results

In the following we provide an overview of the competencies that employers require of recent graduates and what they experience (expectations vs. reality). Significance testing and rank correlation were used to analyze the difference between expectations and reality.

Table 4 contains the 32 examined competencies. The list was created based on the literature. The competencies are arranged according to the most expected. The table contains the results of the significance test between expectations and reality (non-significant values marked with:*), and the strength of the existing relation between the order of expectations and reality, using rank correlation. The strong values of the rank correlation demonstrate that the competencies the graduates possess meet the expectations.

Table 4. Student competencies in SCM: the Employers' Opinion

No.	Competencies	Skills required	Experien-ced skills	Wilcoxon Signed Ranks Test Asymp. Sig. (2-tailed)	Rank Correlation ϱ =.80-1.0 "Very strong"
1	positive approach	4.68	3.74	,000	0.817
2	agility, being motivated	4.47	3.74	,000	0.804
3	communication skills	4.36	3.59	,000	0.790
4	willingness to experiment and innovate	4.36	3.74	,000	0.778
5	complex mindset, systems approach (develop..., plan.. , analyse)	4.35	2.70	,000	0.761
6	ability to use IT tools and software	4.24	3.97	,041	0.812
7	curiosity	4.23	3.89	,015	0.751
8	ensure cross-department cooperation	4.06	3.26	,000	0.728
9	creativity	4.02	3.45	,000	0.706
10	liaise with managers	3.97	3.02	,000	0.686
11	time management	3.97	3.14	,000	0.686
12	humility	3.95	2.79	,000	0.727
13	ability to analyse (large data sets)	3.88	2.95	,000	0.736
14	ability to plan (costs, stocks, customer needs, production)	3.88	2.76	,000	0.732
15	conflict management (liaise with colleagues)	3.86	2.73	,000	0.747
16	self-confidence*	3.86	3.73	,293	0.765
17	ability to follow rules (comply)	3.83	3.41	,007	0.785
18	organisational skills (manage staff)	3.71	2.97	,000	0.808
19	critical thinking	3.68	3.05	,000	0.807
20	ability to manage resources, inventories, costs, risks	3.48	2.71	,000	0.808
21	administrative skills*	3.48	3.47	,817	0.824
22	ability to control (monitor)	3.47	2.86	,000	0.860
23	ability to supervise	3.32	2.91	,001	0.863
24	skills for corporate development	3.27	2.47	,000	0.867
25	risk assessment skills (procurement risk ...)	3.21	2.30	,000	0.866
26	negotiation skills	3.12	2.67	,006	0.873
27	ability to train people	2.97	2.42	,001	0.881
28	ability to make forecasts (financial, dividend, economic trends)*	2.74	2.59	,353	0.878
29	management skills	2.64	2.14	,000	0.875
30	ability to build professional networks*	2.64	2.44	,140	0.862

31	ability to create contracts*	2.20	2.05	,244	0.851
32	ability to facilitate recruitment*	1.88	2.09	,139	0.824

Notes:
significant difference: - p< .05
ϱ=,80-1,0 "Very strong"
Source: our own research (2022)

5. Discussion

It can be said that the most expected competencies (RQ1) are positive attitude, agility, motivation, openness to innovation and change, time management (for work), the ability to use software and IT tools, curiosity, ensure cross-department cooperation, creativity. These required competencies mirror the dynamic changes of the environment, which requires flexibility and quick adaptation from employees. Furthermore, the computer skills became extremely important due to the digital transformation of the whole economy.

The least expected qualities are mainly leadership qualities, such as ability to train people, ability to make forecasts (financial, dividend, economic trends), management skills, ability to build professional networks, ability to create contracts, ability to facilitate recruitment. In our opinion, these competencies can best be developed at work and fresh graduates usually do not start as managers, so these abilities are not expected anyway from them.

Regarding the experienced competencies (RQ2), the students show the best performance in ability to use software and IT tools, curiosity, positive approach, agility and openness to innovation and change. Important result, that self-confidence is also relatively strong. On the one hand, the relatively high value of self-confidence might mirror a negative opinion from the employer side since they might feel baseless over-confidence from the students sometimes. On the other hand, it might be a good sign since the Hungarian education traditionally emphasize the mistakes and lacking instead of strengthening the good values of students.

Based on the significance test, except for six competencies (ability to facilitate recruitment, administrative skills, self-confidence, ability to make forecasts, ability to create contracts, ability to build professional networks), there is a remarkable difference between expectations and experiences (RQ3). The average deviation is 0.75. Only in the case of the ability to facilitate recruitment is experience better than expectations (but not significantly). The values of the correlation indicators show a very strong relation between the two categories, which confirms the adequacy of the developed competencies to market expectations. In other words, even if there are significant differences between expectations and experiences, still the more expected competencies are better than the less expected ones.

However, the significant differences draw attention to the fact that the degree of development must be adjusted to market expectations with greater emphasis. The most expected competencies (up to a value of 4) are mostly soft skills, which are more difficult to develop in training. Native and foreign language communication, complex mindset, systems approach, the use of software ability to analyse and IT tools are in our opinion, skills that can be developed in training and are not typical managerial competencies.

In the case of the complex mindset the huge deviation may, for example, be due to the structure of the education system, which treats each subject separately already in primary school and does not provide an opportunity to "cross-over" between them. At the university level, close cooperation with industry, e.g. by studying and working through specific cases, problems and questions, and applying a complex mindset to answer them, with systems approach, can help to replace this approach. This is why the case study is very popular as a teaching methodology tool in many cases. It also plays an important role in the competency development of the future logisticians, since an example from life/industry can also help to a great extent to meet the expectations showing the greatest deviation come to the fore in our research. The situations described in the case studies are therefore very important, because they allow students to get to know the tasks they are facing and during their solution they can develop the necessary competencies such as complex mindset, ability to use IT tools, ability to plan and analyze, risk assessment skills, time management, communication skills.

A weakness of the research is that it did not differentiate between the level of the positions held, because the position was not the subject of the research, it only asked for the general opinion of the regional managers about the master's degree students. We did not investigate the

competencies of bachelor's degree graduates or whether managers could/would differentiate between BA/MSc. The focus was on the positions that a recent graduate could fill in the given field. As further research directions, among qualitative methods, interviews and focus group discussions are possible within and between all three stakeholder groups.

6. Conclusion

In this paper we have shown, based on an online survey of 72 Hungarian supply chain managers what are their expectations of freshly graduated students and what reality they see.

It has been confirmed and is extremely important that soft skills are progressively becoming a requirement, more and more valued compared to professional knowledge, and that competency expectations are constantly changing. Hard skills are treated by employers as obvious or quick to learn. The development of appropriate competencies has become an essential element of both management and the organization of higher education. One of the tangible proofs of this is the competencies that can be found in the exit criteria of each course, which students need to possess to graduate.

The increased interest in SCM education and the changing environmental factors suggest that existing cooperation needs to be maintained, deepened, and expanded to ensure further relevant SCM education. The aim is therefore to train a "marketable" student, which entails the reorganizing of the training structure, the redefinition of the training output requirements, and the rethinking of the roles of professors.

Furthermore, social and economic changes require new competencies, which will call for a continuous review of the subject in the future.

This is why it is important that the educational system and, beyond that, the graduates meet these expectations as much as possible. The economic impact of logistics requires the use of more effective teaching methods, such as interactive learning, group projects, internships, periodical collaboration, etc. – which allow students to solve realistic problems independently, which deepens the acquired knowledge -, of which Munkácsi, Demeter, (2019) provides a more detailed overview. We note that logistics must be constantly reinterpreted over the years. For this reason, it is important that educational methods adapt to the changing industrial environment.

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