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Sustainability in Logistics Service Quality: Evidence from Agri-Food Supply Chain in Ukraine

Irina Dovbischuk

Dual Study, IU International University of Applied Sciences, 28359 Bremen, Germany; irina.dovbischuk@iu.org

Abstract: The purpose of this paper is to explore which attributes of logistics service quality (LSQ) are associated with the superior LSQ in rural territories of the developing economy of Ukraine. The data were collected from 52 Ukrainian agrarian companies. Ukraine was chosen because of the high potential of its agricultural sector, which has been one of the world's largest exporters of agricultural goods for years. This paper investigates LSQ from the perspective of agri-businesses and addresses sustainability. The primary data were obtained in a survey of clustered samples of agri-businesses in rural Ukraine. An exploratory factor analysis (EFA) was conducted with the Stata 16 software to test one hypothesis. This study builds on the expectancy–disconfirmation paradigm in service management research and the related service quality in order to compare the perceived and expected quality of social and environmental sustainability-related aspects of LSQ to test two hypotheses. The findings revealed that service quality in agricultural logistics is a five-dimensional construct. Its five dimensions are reliability, digital transformation, corporate image, environmental sustainability, and quality of customer focus. Furthermore, the study delivers evidence that the perceived and expected quality of the social sustainability-related aspects of LSQ are substantially different. As the study's data collection process was interrupted by the Russian–Ukrainian war, the proposed model was only tested with 52 enterprises in an agri-food supply chain in rural Ukraine. Such a small sample is one of the study's limitations. The research has great managerial implications as managers can use the explored attributes as a basis for customer satisfaction analyses or benchmarking in agricultural logistics. This is the first work exploring LSQ in rural Ukraine. The major contributions of this paper are the explored dimensions of LSQ with EFA. The study presents the first and most current data about LSQ from four united territorial communities in the rural center of Ukraine.

Keywords: logistics service quality; Ukraine; agricultural logistics; agri-food supply chain

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1. Introduction

For most of the past decade, the world has been consuming more food than it has been producing it, and the impacts of COVID-19 have further increased global food insecurity [1]. These further enhanced the importance of reliable and efficient logistics. Logistics is an essential part of "agri-business" [2] (p. 2) and agri-food supply chains, and it plays a crucial role in decreasing costs, achieving time reductions, increasing value co-creation and flexibility, as well as securing competitive abilities. Ramos et al. [3] proposed twelve factors in the context of a system for measuring the agri-food supply chains' performance in a developing country: planning, supplier performance, finance, production, demand, inventory, transportation, warehousing, flexibility, quality, innovation, and customer service. This paper answers their call for an in-depth investigation of the metrics related to the different aspects of LSQ.

Other studies in the evolving research field of agricultural supply chains [4] propose breaking down logistics into logistics infrastructure and organization [5] or planning of logistics operations [6] without a concrete proposal for how to measure shippers' expectations. Thus, with the exception of halal food [7], studying logistics in agri-food supply

chain settings lacks the customer perspective. This paper aims to fill this research gap with some evidence from an emerging economy.

Following the International Monetary Fund's classification [8] (pp. 89–92), many recent research publications discuss LSQ in the so-called advanced economies [9–12] or in emerging markets or economies in transition in Asia [13–20], while only a few focus on LSQ in Latin America [21] or Europe [22]. This publication fills the gap about expectations and levels of logistics quality in emerging and developing European economies, collecting evidence in rural Ukraine.

Ukraine has been the world's leading exporter of sunflower oil for many years and one of the leading global exporters of grains such as corn, wheat, barley, and sunflower seeds [23]. The success of its agriculture sector is highly dependent on transportation systems and logistics competence. A poor transportation system and the absence of storage facilities are some of the challenges hampering agri-food supply chains. Logistics competence and improving logistics infrastructure can improve the agricultural supply chain. Hence, this paper focuses on agri-logistics and is based on empirical data, collected from agri-businesses in the geographical center of the country. To the best of the author's knowledge, there are no publications on LSQ in rural Ukraine.

In filling the above-mentioned gaps, this paper focuses on the development of metrics on logistics-related factors in the agri-food supply chain and collects evidence about expectations and levels of logistics quality, thus adding to the scant literature on emerging and developing European economies. Last but not least, this paper investigates LSQ from the perspective of agri-businesses using scales that address sustainability.

This paper aims to test the pre-defined conceptual model of the dimensions of LSQ in the agri-food supply chain in the developing economy of Ukraine and to test whether there is a substantial difference between the expected and perceived factors affecting LSQ with regard to social and environmental sustainability.

The paper is structured as follows: The introduction is given in Section 1. The statistical methodology, hypotheses, sample profile, and data collection are outlined in Section 2. Section 3 encompasses a literature review and the conceptual model. Analysis and discussion are given in Section 4. The paper is rounded off with conclusions in Section 5.

2. Method

2.1. Statistical Methodology and Hypotheses

This study builds on the expectancy–disconfirmation paradigm in service management research and the related service quality (SERVQUAL) approach. There are numerous studies on the approaches such as SERVQUAL [24], SERVPERF [25], or the Kano model [26] with scales and dimensions to assess LSQ in particular, largely contributed by Bienstock et al. [27] and Mentzer et al. [28] and further revised by other scholars (for example, [29–31]). Compared with the existing literature on LSQ, this study builds on the expectancy–disconfirmation paradigm [32] and proposes a model of LSQ similar to the research conducted by Thai [33]. The pre-defined conceptual model consists of six dimensions and 26 explanatory attributes: quality or reliability of customer focus, digital transformation, physical distribution service quality, corporate image, sustainability, and timeliness.

In order to examine which measures can describe and quantify LSQ in Ukraine's developing economy, the pre-defined factor structure will be re-explored with EFA to test the proposed allocation of explanatory attributes to six dimensions:

H1: *Quality of logistics service is a construct of 26 identified attributes associated with the six dimensions of reliability, digital transformation, physical distribution quality, corporate image, sustainability, and timeliness.*

According to SERVQUAL, LSQ can be measured as the difference between customers' expectations and customers' perceptions of the received service. For this purpose, respondents were asked to select on a 5-point Likert scale the perceived level and their expected

level for LSQ based on 26 attribute-related statements in accordance with the pre-defined conceptual model. The comparison of perceived and expected quality for each attribute shows the need for improvement with regard to that attribute and tests the following hypothesis:

H2: *There is a substantial difference between the expected and perceived social attributes of LSQ.*

H3: *There is a substantial difference between the expected and perceived environmental attributes of LSQ.*

2.2. Sample Profile and Data Collection

The data for this study to measure LSQ attributes were collected from agricultural enterprises in four united territorial communities (UTCs) in the Uman district of the Cherkassy region in Ukraine from 1–23 February 2022. The UTCs were established as a result of adopting the law on the voluntary association of territorial communities in 2015. This law granted UTCs the same power as cities of regional significance and improved their budget allocation in proportion to their area and population. Table 1 shows some general information about these UTCs and the sample profile for each UTC. In all UTCs, the share of agricultural land is high and the economy of all four UTCs has an agrarian specialization. As Table 1 shows, the entire population of agricultural enterprises equals 205 companies. Initially, 119 enterprises were selected randomly with a comparable share of farms to the total agri-businesses in each UTC.

Table 1. Determined sample frame of enterprises in four rural UTCs.

United Territorial Community (UTC)	Mankivka	Ladyzhynka	Palanka	Dmytrushky
Year established	2020	2018	2017	2019
Number of settlements	19	11	18	12
Area, km^2	478,234	322,955	488,497	309,698
Agricultural land, %	92.1	83.3	76.1	77.8
Number of agricultural enterprises (surveyed, %)	106 (7)	23 (16)	44 (21)	32 (8)
Farms, % (surveyed, %)	90 (71)	57 (63)	64 (39)	69 (50)

Source: Author's desk research [34–36] (pp. 6, 8), [37] (pp. 12, 14).

In three of the four UTCs, the share of farms in the sample is half or higher. Respondents were asked to complete the survey questionnaire per email. They were not motivated by any rewards for completing the survey. The respondents' profile is shown in Table 2: 50% of respondents are farms. A high share of farms (67%) is typical for the agricultural enterprises in Ukraine at the national level [38]. The analysis of responses showed that 63.5% of respondents' companies has fewer than 50 workers.

The questionnaire was written in Ukrainian. The translation into Ukrainian was amended by Ukrainian experts. Some rewordings of logistics-related terms and outsourcing-related services took place. Finally, the heads of four communities were invited to give their suggestions. The questionnaire with an introductory letter employed closed questions and was rounded off with instructions for a structured interview (in case a company was selected for an in-depth interview).

Table 2. Respondents' profile.

Category	Responses	Frequency	%	Cumulative %
Firm type				
	Farm	26	50.0	50.0
	Limited Liability Company	15	28.8	78.8
	Private enterprise	8	15.4	94.2
	Production cooperative	1	1.9	96.2
	Others	2	3.8	100.0
Position	Executive	30	57.7	57.7
	Management	22	42.3	100.0
	Firm size			
Firm size	≤50	33	63.5	63.5
	51–100	14	26.9	90.4
	101–500	5	9.6	100.0

Some respondents were contacted by email and invited for an in-depth structured interview. Three weeks after sending the first mail, a reminder was not possible because of the Russian aggression with projectiles hitting Uman. The beginning of the war was defined as the cut-off date. The survey resulted in 32 responses over a period of three weeks. Thus, the response rate was around 27% (119 contacted enterprises/32 completed questionnaires). In parallel, 20 in-depth structured interviews took place. The qualitative data collected using structured interviews helped to triangulate quantitative data collected with a questionnaire in order to gain a better understanding of a typical agri-food supply chain and the characteristics of its logistics. This kind of triangulation is known as "between (or across) methods" for cross-validation when two distinct methods are found to be congruent and yield comparable data [39]. The overall response rate of the population contacted per email and interviewed personally equals 43.7%. In order to increase the response rate [40], the local university's support for the survey was gained, and UTCs' and settlements' heads. These organizations are familiar to the population (e.g., their former university or their local head). Furthermore, the cover letter was personalized and appealing, giving an optional possibility to receive a report on the study's results.

3. Literature Review and Conceptual Model

Recent literature reviews on the published works on LSQ have been conducted by Michalski and Montes-Botella [21] and Arabelen and Kaya [9]. Siddh et al. [41] investigated the LSQ of an agri-food supply chain. The pre-defined conceptual model consists of six dimensions and 26 explanatory variables as shown in Table 3. The six dimensions are quality or reliability of customer focus (REL1–REL4), digital transformation (DIG5–DIG8), physical distribution service quality (DSQ9–DSQ13), corporate image (COR14–COR17), sustainability (SUS18–SUS23), and timeliness (TIM24–TIM26). The description of each dimension will be given below.

To measure the quality or reliability of customer focus, the research uses the original SERVQUAL questionnaire. This group of attributes is necessary for focusing on customers in addition to the focus on the attributes of the service itself, as it was proposed in the original questionnaire. These attributes reduce the risk of emphasizing logistics attributes that might not be consistent with what customers really value [21,42,43].

Table 3. A pre-defined conceptual model of LSQ.

Factor	Variable	Measurement
Quality/reliability of customer focus [21,42,43]	REL1	When logistics company/department promises to do something within a certain period of time, it fulfills the promise.
	REL2	When a customer has a problem, logistics company/department shows a sincere interest in solving the problem.
	REL3	Logistics company/department provides the adequate services from the first time onwards.
	REL4	Logistics company/department insists on flawless service.
Digital transformation [27,33]	DIG5	Logistics company/department applies IT and electronic data interchange (EDI) in customer service.
	DIG6	Logistics company/department applies innovative IT in customer service.
	DIG7	Logistics company/department uses IT to make order information available.
	DIG8	Logistics company/department is capable of tracing shipments using IT.
Physical distribution service quality [27,33,44]	DSQ9	Logistics company/department uses modern logistics equipment and facilities.
	DSQ10	Logistics company/department delivers at proper place.
	DSQ11	Logistics company/department delivers at proper time.
	DSQ12	Logistics company/department delivers intact and without loss or damage.
	DSQ13	Logistics company/department has an error-free documentation.
Corporate image [33,45]	COR14	Logistics company/department has a reputation for reliability in the market.
	COR15	Logistics company/department has a record of professionalism and consistency in satisfying customers.
	COR16	Logistics company/department has a reputation for matching words with actions.
	COR17	Logistics company/department pays attention to its ethical image.
Sustainability [31,46]	SUS18	Logistics company/department is engaged in community activities.
	SUS19	Logistics company/department has a performance statement and a vision for community responsibility.
	SUS20	Logistics company's/department's behavior is socially responsible and concerned about human safety.
	SUS21	Logistics company/department fulfills logistics with minimal environmental pollution.
	SUS22	Operations of logistics company/department are environmentally safe.
	SUS23	Logistics company/department offers training to employees.
Timeliness [33,47]	TIM24	Logistics company/department picks up and delivers on time.
	TIM25	Logistics company/department delivers within a proper transportation time.
	TIM26	Logistics company/department provides services at the promised time.

The digital transformation factor aligns with the general definition of digitalization. It commonly encompasses two components: digital implementation of communication and digital conversion of data. Both components are considered to be important for integrating information flows between supply chain stages using particular technologies such as RFID [48], cloud-based solutions such as e-platforms [49], standards such as Electronic Data Interchange (EDI) for Administration, E-Commerce and Transport (EDIFACT), and capabilities to follow the path or current location of a delivery from the starting point to wherever the object currently is in real time. The latter can significantly influence satisfaction as Gil Saura et al. [47] showed in their investigation of the perception of LSQ among 194 Spanish manufacturing companies in a supply chain with high levels of ICT. Furthermore, the use of information and communication technologies (ICT) maximizes farmers' profit and minimizes the product price for consumers [50]. Previous research has shown that the quality of information sharing affects the supply chain food quality performance [51] and that the level of digital transformation is an important competence for coping with dynamic business environments such as COVID-19 [52].

Physical distribution service quality addresses physically observable operational attributes, composed of aspects relating to timeliness, availability, and condition [44]. A favorable and attractive corporate image is central in Grönroos's [45] service quality model. As proposed by Thai [33], it relates to the customers' overall perception of logistics service providers (LSPs) as the company's reputation for reliability in the market, its professionalism and consistency in satisfying customers, its reputation, and its ethical image.

The sustainability factor addresses the social and environmental criteria. A comparison of six reporting initiatives on sustainability [46] shows that efficient use of resources and climate change mitigation are most frequently included in the environmental dimension. The proposed model does not encompass measures for the economic dimension, but environmentally friendly supply chain practices are relevant to the operational and financial performance, as the analysis of 232 LSPs shows [53]. Social sustainability is measured through labor practices in all six initiatives [46] such as employees' training and human safety, and social responsibility. Furthermore, engagement in community activities, the availability of a performance statement, and a vision for community responsibility address the stakeholder concept [31] and round off the sustainability factor.

The timeliness factor encompasses three time-related issues including timeliness of shipment pickup and delivery, transportation time, and the reliability of the total order cycle time. The timeliness factor is the most significant dimension for LSQ in many logistics studies [33,47].

4. Analysis and Discussion

First, the dataset was checked for nonsensical answers. For this purpose, two additional statements, 27 and 28, were included to the category "Perceived level of logistics services": "Logistics company/department does not use IT to provide order information" and "Operations of logistics company/department are not environmentally safe". These variables were reverse-coded to be compared with statements DIG7 and SUS22 from Table 3. A closer review of the two pairs of reverse-coded factors revealed no nonsensical answers.

In order to detect the existence of non-response bias, two techniques were used: extrapolation [54] and a comparison of respondents' characteristics known a priori with those of the population [55]. In order to determine the probable direction of bias, the last five returns were compared with the first five returns, assuming that late respondents are most similar to non-respondents because their replies took longest. The answers of the earliest five returns did not differ substantially from those of the latest five returns. Furthermore, respondents' characteristics such as shares of specialization types or shares of the organizational and legal form of ownership did not differ considerably from those of the population. Thus, it is assumed that non-response bias is unlikely to be an issue in the study.

In order to examine which measures can describe and measure LSQ in the developing economy of Ukraine, the factor structure was viewed using Varimax rotation with a Kaiser normalization approach. The initial correlation matrix was singular following the Bartlett's test of sphericity and Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy because mean values of several variables were in the high 4 to 5 range and almost perfectly correlated with each other. Having extracted these variables from the model, the KMO measure (0.6496) was greater than the minimum value of 0.60 normally suggested by Hair et al. [56].

The last run of EFA on the 22 measurement variables identified five factors with eigenvalues above 1. As Table 4 shows, these five factors explained 96.15 % of the variance. Three measurement variables were excluded because all respondents stated the same expectation level (5.0) for logistics service regarding these criteria (DSQ10, DSQ12, and DSQ13). For the first run of the factor analysis, one variable (TIM24—pick-up and delivery on time) does not load highly (>0.3) on any of the identified factors. This variable was excluded from the existing measurement scale. Table 4 shows a rotated orthogonal varimax component matrix which demonstrates how each variable item is loaded on each of the factors.

Table 4. General perception of LSQ by agricultural enterprises.

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
REL1	0.9984				
REL2	0.9984				
REL3	0.6861				0.7231
REL4	0.9984				
DIG5		0.9027			
DIG6		0.8547			
DIG7		0.8861			
DIG8		0.8031			
DSQ9		0.6740			
DSQ11	0.9984				
COR14	0.3186		0.4261		
COR15			0.4907		
COR16					0.9944
COR17			0.7802		
SUS18			0.8083		
SUS19			0.8059		
SUS20			0.6748	0.3960	
SUS21				0.9065	
SUS22				0.9012	
SUS23			0.5261	0.4264	
TIM25	0.9984				
TIM26	0.9984				
AVE	0.99	0.686	0.44	0.82	0.76
CR	0.99	0.92	0.84	0.9	0.86
Eigenvalue	6.8584	4.8008	3.1073	1.5822	1.1711
Cumulative variance	0.3764	0.6399	0.8104	0.8972	0.9615

Source: Author's illustration. Note: blanks represent abs loading <3.

Composite reliability (CR) and average variance extracted (AVE) were assessed to check the reliability of the model measurement. The internal reliability of all the observed variables in their measurement of each latent construct was assessed by CR, demonstrating that the observed variables have adequate internal consistency. A CR value of 0.6 or more was recommended by Fornell and Larcker [57] (p. 45). It could be concluded that all factors were based on reliably observed items with CR values in the range of 0.84–0.99, as can be seen in Table 4. Thus, the observed variables are adequate for representing the respective factors. AVE measures the amount of variance in the measured variables. It should be greater than 0.5 [57]. As depicted in Table 4, the AVE was only lower than 0.5 in Factor 3 (0.44). Nevertheless, it was accepted, because its composite reliability is greater than 0.6 and the convergent validity of the construct can be considered as adequate [57] (p. 46).

Factor 1 consists of six variables, namely, REL1 (staff's attitude and behavior to satisfy customers' needs), REL2 (responsiveness to customers' needs and requirements), REL4 (flawless service), DSQ11 (reliability of service (delivery at the proper time)), TIM25 (reliability of service (within a proper transportation time)), and TIM26 (reliability of service (at the promised time)). These last three variables belong to different factors in the pre-

defined model. Basically, these six measures in combination depict the reliability of LSQ. Factor 1 can be renamed "Reliability".

Factor 2 consists of five variables: DIG5 (application of IT and EDI in customer service), DIG6 (application of innovative IT in customer service), DIG7 (availability of order information using IT), DIG8 (shipment tracing using IT), and DSQ9 (availability and condition of equipment and facilities). The first four variables were initially assigned to "Digital transformation". Although the last variable is from "Physical distribution service quality", it also addresses the use of technologies in logistics operations relating to equipment and facilities. Thus, this factor keeps the original heading "Digital transformation".

There are seven variables loaded highly on Factor 3, namely, COR14 (company's reputation for reliability in the market), COR15 (record of professionalism and consistency in satisfying customers), COR17 (concerned about its ethical image), SUS18 (record of engagement in community activities), SUS19 (performance statement and vision for community responsibility), SUS20 (socially responsible behavior and concerns for human safety), and SUS23 (company offers employees training). Although half the variables belong to different factors in the initial model, they all indicate in one way or another the extent of a company's image as a reliable and professional partner, whether it is ethically responsible, and whether it is a caring employer and "a good company" in its community. The new dimension "Corporate social responsibility" should house these seven variables.

As Table 4 illustrates, Factor 4 includes two variables: SUS21 (logistics operations with minimal environmental pollution) and SUS22 (environmentally safe operations). Both variables were assigned to the dimension "Sustainability" in the initial conceptual model. These variables are the only two focusing on environmental sustainability and should be grouped to a new dimension "Environmental sustainability".

Finally, Factor 5 also encompasses two variables: REL2 (responsiveness to customers' needs and requirements) and COR16 (company's reputation for matching words with actions). In the initial conceptual model, the first variable was related to "Quality/reliability of customer focus", while the second variable belongs to "Corporate image". Their common ground is that they address the logistics company's efforts to understand customers' needs and requirements and satisfy them in a trustable and reliable way. Factor 5 is therefore named "Quality of customer focus".

Thus, the EFA results show a different number of dimensions (five instead of six) and a different allocation of explanatory attributes for LSQ in the developing economy of Ukraine. H1 is not supported. Nevertheless, the EFA shows that LSQ is a construct of 22 explanatory attributes which were partly re-assigned to the following five dimensions: reliability, digital transformation, corporate social responsibility, environmental sustainability, and quality of customer focus.

Finally, in order to test whether there is a substantial difference between the expected and perceived quality of logistics service, the mean score of respondents' answers about the expected level of sustainability-related LSQ attributes was compared with the mean score of respondents' answers about their perceived level of sustainability-related LSQ attributes. For this purpose, seven explanatory variables for the explored dimension "Corporate social responsibility" and two explanatory variables for the explored dimension "Environmental sustainability" were considered from the EFA results gained in the previous step. Mean score differences and their rank in the total list of 22 attributes are shown in Table 5. The lower the difference in mean scores, the higher the respondents' satisfaction. In other words, any positive difference in the mean scores indicates that the expectation is higher than the perceived level of the particular factor for LSQ on the one hand, and that a respective improvement will better match respondents' expectation level on the other hand.

Table 5. Difference between expected and perceived level of sustainability-related LSQ factors.

Variable	Factors for Corporate Social Responsibility	Expected, Average Mean	Perceived, Average Mean	Mean Score Difference	Rank
SUS20	Logistics company's/department's behavior is socially responsible and concerned about human safety.	4.575	3.462	1.113	1
SUS19	Logistics company/department has a performance statement and a vision for community responsibility.	3.846	3.115	0.731	2
COR17	Logistics company/department pays attention to its ethical image.	4.577	3.865	0.712	3
SUS18	Logistics company/department is engaged in community activities.	3.712	3.269	0.443	11
COR15	Logistics company/department has a record of professionalism and consistency in satisfying customers.	4.885	4.462	0.423	14
COR14	Logistics company/department has a reputation for reliability in the market.	4.846	4.462	0.384	18
SUS23	Logistics company/department offers training to employees.	3.962	3.596	0.366	19
	Factors for environmental responsibility				
SUS22	Operations of logistics company/department are environmentally safe.	4.519	4.468	0.051	21
SUS21	Logistics company/department fulfills logistics with minimal environmental pollution.	4.462	4.468	−0.006	22

Source: Author's illustration.

The mean score differences of the attributes for corporate social responsibility show a substantial difference between expected and perceived quality. The average expectation level of the respective seven attributes in Table 5 was stated to be either absolutely essential or very important (average mean score from 4.885 to 3.712), but the perceived quality of these social sustainability attributes of LSQ was substantially lower. The social sustainability attributes of LSQ seem to be upgradable and important for satisfaction with LSQ. The top ranked attributes SUS20, SUS19, and SUS17 offer the greatest potential from all 22 attributes to increase satisfaction among agricultural enterprises in Ukraine. On this basis, it may be concluded that the findings provide support for hypothesis H2.

Environmentally safe operations (SUS22) and logistics operations with minimal environmental pollution (SUS21) were stated as absolutely essential (average mean score of 4.519 and 4.462, respectively) and the perceived quality was approximately the same or slightly higher than expected (average mean score of 4.468). Moreover, these two environmentally related attributes of LSQ are at the bottom of the ranked list, offering the smallest potential to further increase the extent of perceived quality. Thus, there is no substantial difference between the expected and perceived environmental-related attributes of logistics service quality. H3 is not supported.

5. Conclusions

This study relies on the expectancy–disconfirmation paradigm in service management research and the related service quality (SERVQUAL) approach. According to this approach, LSQ can be described by comparing customers' expectations with customers' perceptions of the service received. The pre-defined conceptual model of the attributes of LSQ which are associated with superior LSQ in rural Ukraine was explored with EFA as a construct comprising five dimensions and 22 attributes. Last but not least, this paper investigates LSQ from the perspective of agri-businesses using scales that address sustainability. Customers'

expectations in terms of social sustainability-related attributes of LSQ are substantially higher than customers' perceptions. Customers' perceptions of environmentally-related attributes of LSQ are comparable with their expectations.

This study fills the following research gaps: it explores the metrics of factors related to logistics in the agri-food supply chain and collects evidence about expectations and perceived levels of sustainability-related LSQ attributes in emerging and developing European economies, which have previously been underrepresented in the literature. It delivers evidence about LSQ previously not given in the literature.

The findings support those of other studies that consider the factor of reliability as one of most important dimensions of LSQ [11], either in a developing country [18,20] or in Europe [22], as well as the quality of customer focus in an emerging logistics industry as a further important dimension of LSQ [13,16,21]. Moreover, this study delivers evidence that the emphasis on environmental and social sustainability in logistics operations is becoming more significant than found in previous research by Thai [33].

Logistics operations managers can use the explored attributes for evaluating their service quality and also for benchmarking or a gap analysis regarding their most important competitors in Ukraine. Furthermore, logistics operations managers should focus on the reliability and quality of their customer focus since these dimensions are considered to be most critical to increasing perceived LSQ. The expectations for corporate social responsibility are substantially higher than the perceived levels and that is why it is expandable. Factors such as social responsibility and human safety (SUS20), performance statement and a vision for community responsibility (SUS19), and ethical image (SUS17) offer the greatest potential among all 22 attributes to increase satisfaction among agricultural enterprises in Ukraine.

The validity and reliability of the proposed attributes can be further tested in the context of other emerging European economies. The role of LSQ can be tested at a different stage of an agri-food supply chain, e.g., the stage of the end consumer, investigating its effect on the perceived quality of the product and ultimate consumer satisfaction.

Finally, this study has the following limitations. Data collection was interrupted by the Russian–Ukraine war and data were only collected in selected UTCs in Ukraine so that the study's results cannot be generalized without additional testing in other territorial units of Ukraine. Moreover, this exploratory study analyzed expected and perceived logistics quality, which will very probably have changed after the Russian–Ukraine war, but can be used for future comparisons.

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