RESEARCH IN LOGISTICS SERVICE QUALITY: A SYSTEMATIC LITERATURE REVIEW

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Abstract. Logistics Service Quality (LSQ) is recognized as an important tool in modern markets. In recent years, a number of researches in this field are growing rapidly. Numerous papers have been published in various industries and observation focuses. Different methods have been applied with a large number of dimensions. However, there are no papers in literature that provide a systematic review of researches in the observed area. This paper aims to investigate, systematize and analyse relevant papers dealing with the LSQ. The purpose of this paper is to form a systematic review of the different approaches, dimensions and focuses of measurement, analysis and improvement of the logistics services quality. The authors conducted systematic literature review to research papers published in academic journals. Different key words have been used for paper research in several databases. According to research question and defined criteria papers selection has been performed. The relevant group of papers is further investigated in more details. A total of 98 papers in 56 journals are identified. Three LSQ research focuses are identified. The review of the most frequently used dimensions of LSQ in different industries is made. The most appropriate and the most commonly used approaches for LSQ measuring are analysed. Most of the papers refer to empirical research and indicate the low level of LSQ. The review represents good basis of future researches, and also some kind of guidelines for practical application of LSQ in the field of transport and logistics.

Keywords: logistics service quality, customer satisfaction, quality analysis, logistics provider, SERVQUAL, literature review.

Introduction

The importance of logistics services is recognized in literature and practice. Logistics services are a valuable tool for achieving the competitive advantage and obtaining satisfied customers. Successful realization of the mentioned objectives largely depends on the quality of logistics services and keeping them in a long perspective. The significance of Logistics Service Quality (LSQ) in recent years is gaining importance. LSQ is equally essential for Logistics Service Providers (LSPs) and customers (Mentzer *et al.* 1999; Rahman 2008; Sharma, Kumar 2015, etc.). High level of LSQ provides the customer satisfaction, which still guarantees a safe position in the market, as well as revenue (Huiskonen, Pirttilä 1998; Franceschini, Rafele 2000; Baki *et al.* 2009; Meng *et al.* 2011, etc.).

As already stated, many authors in literature have evaluated LSQ, dealing with customer loyalty and satisfaction (Huiskonen, Pirttilä 1998; Franceschini, Rafele 2000; Jang *et al.* 2013), as well as with profitability and competitiveness of LSPs (Lai, Cheng 2003; Lai 2004; Thai 2008).

Likewise, LSQ is equally important for the successful realization of the Supply Chain (SC) according numerous authors (Fung, Wong 1998; Seth *et al.* 2006; Kannan, Tan 2007). Creating a clear distinction between different research focuses in the context of the LSQ is the first gap in the literature.

Regardless of the increasing number of papers in this field, there is still uncertainty, ambiguity and misunderstanding of what is considered to be LSQ. There is a permanent question as to what are the key dimensions, attributes and determinants presenting the best way to analyse, measure and improve LSQ (Mentzer *et al.* 1989; Feng *et al.* 2007; Hartmann, De Grahl 2011; Leuschner *et al.* 2013; Esmaeili *et al.* 2015; Lan *et al.* 2016, etc.). There is a lack of papers that analyse dimensions and attributes of LSQ, as well as differences in diverse sectors and change in time.

LSQ is often presented with descriptive and linguistic expressions that are often imprecise, vague and biased. The aforementioned further complicates the process of

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quality measurement, analysis and improvement. Different approaches and methods are used for solving this problem, from well-known like SERVQUAL, LSQ scale, Kano model (Franceschini, Rafele 2000; Kadłubek, Grabara 2015, etc.) to less known like Gray correlation model and Technology Acceptance Model (TAM) (Xu, Cao 2008; Bienstock *et al.* 2008).

Although the number of paper in this area is growing, there are still not enough approaches and models that deal comprehensively with this issue and systematize them. There are only short literature reviews in papers, which are mainly directed to particular approaches without any systematic and critical review of other methods.

In contrast to many areas in logistics related to review papers, to the best of our knowledge, there are no review papers in logistics that deal with LSQ. The authors intended to provide concrete scientific and practical contributions through a review of relevant literature. The idea is that the results presented in this paper can be used to create new scientific approaches and models for measuring and improving the logistics services quality. The goal is to provide greater accessibility and visibility of scientific results and applied approaches and models. This will ensure that scientifically and practically validated approaches and models are used more in solving real problems of LSQ in different transport and logistics systems. In this sense, the tendency is to explore the practical application of particular models and approaches with special emphasize on industries, dimensions, etc. The additional purpose of this research is to identify gaps and problems in previous research and to initiate and develop new research and comprehensive approaches. In this paper, the systematic literature review approach is used for researching the observed problem.

The paper is organized through several sections. In the Section 1, the research methodology with research questions, key words and selection criteria are defined. Approach for databases selection and paper analysis and selection is also presented. In the Section 2, the analysis of selected papers are carried out. In the Section 3, LSQ focuses are investigated. Dimensions and approaches are analysed in Section 4 and Section 5. The Section 6 describes the key findings and implications for managers, as well as directions for future research. Concluding remarks are presented in the last section.

1. Systematic literature review methodology

As mentioned before, to overcome the gap that relates to the lack of review papers dealing with LSQ, a comprehensive research is realized in this paper. In order to obtain valid research results, we conducted the research methodology based on approaches proposed in the literature (Tranfield *et al.* 2003). In that manner, we conducted the research with several phases: research planning, locating the studies, study assessment and selection, analysis and synthesis of papers, etc.

Research question formulation is crucial for any research (Pilbeam *et al.* 2012). After the identification of the need for this kind of review and the gap identified in the previous section, we set three main research questions (RQ1, RQ2 and RQ3):
- RQ1: what are the most important features of LSQ research focuses?
- RQ 2: which dimensions are the major and the most important for LSQ measuring and improving?
- RQ 3: which approaches and methods are the most appropriate for LSQ measuring?

The first research question deals with research focus. The aim is to identify basic research focuses, to investigate mutual relationship and to analyse the change in time. Different dimensions and attributes of LSQ are used in the literature. However, there is no systematic review of LSQ dimensions and attributes. The second research question relates to the identification of the most investigated dimensions, as well as sectors and industries. It is also important to identify basic directions of dimension usage and change in time. In the third question, it is necessary to investigate the context of approaches and method applications. The sub question is related to the drawbacks and problems of methods and approaches used in the observed cases, and their potential differences during time.

After the completion of the research planning phase, we proceeded to the reviewing phase. As already stated, the most important step is locating the studies (Agatz *et al.* 2008). In order to answer the research questions, a comprehensive review of scientific papers in the field of LSQ was performed. The intention was to cover a wide range of information, in order to reduce bias and ensure the objectivity and validity of the research. It was decided to use only high quality papers. High quality papers must meet the criteria defined in the Table 1: contribution to area, alignment research question, source importance, etc. For peer reviewed papers published in academic journals we used *Ebsco*, *ScienceDirect* and *Emerald* data bases. These bases were identified as the databases with the best coverage of LSQ. The search was limited to papers published until 2018.

In the process of paper selection, several key words were used. In order to find the most relevant papers dealing with quality logistics services in different areas and with different aspects, we used various key words. The base presented the generally accepted phrase LSQ. As additional key words, nine words were used: attributes, dimensions, determinants, analysis, evaluation, measuring, provider, customer, and SC. The independent research was conducted in the abstracts and titles in the mentioned databases, using the search string shown in Figure 1. As the result, 2776 papers were identified.

The previous step aims to find and analyse a large number of papers, so that through their review and analysis authors can obtain a relevant sample for further investigation. In this research step, the goal is to select papers whose analysis and synthesis could answer the re-

search questions. The idea is that, through the analysis and synthesis of the selected papers, some conclusions can be made, which could not be reached only by reading individual papers. The research process is limited to works published in the scientific high quality journals (Denyer, Tranfield 2009). The evaluation and selection of papers was carried out in two-step filter. First, authors read independently abstracts and conclusions of papers. They also did their own assessment of each paper and eliminated duplicates. Based on the joint assessment, 310 papers were identified for further analysis. The reasons for the elimination of a large number of papers in previous phase are numerous. Three independent databases were searched, so a large number of duplicated papers were identified. In addition, a large number of papers were published in sources that did not meet the set criteria (conferences and journals without impact factor). In the next step, all three authors read full papers. Paper analyses were performed according to the defined criteria: contribution to the area, alignment with research questions, the importance of source (journals with impact factor) and language (Table 1).

As a result, in this phase, many papers that were not directly related to the observed problem were identified. Those papers were not analysed further. Each author independently assessed every paper and finally we carried out a joint assessment. This assessment presented the basis for selecting 98 papers, as shown in Figure 1.

The 98 papers are published in 56 peer reviewed journals with time distribution, which is not uniform. From 1989, when the first paper was published, to 2000, 23 papers were published. In the period from 2000 to 2010, the number of published papers was significantly higher with 34 papers. In the last eight years, about 41 papers have been published. This confirms the growing interest in LSQ in the literature.

2. Analysis of published papers

The number of journals confirms the interdisciplinarity of the observed problem. There are two journals with more than five papers (*Journal of Business Logistics* – 10, *International Journal of Physical Distribution* & *Logistics Management* – 9). There are journals with five and four papers (*The International Journal of Logistics Management*, *International Journal of Production Economics*, *Supply Chain Management*, *Total Quality Management* & *Business Excellence*). In the observed sample, thirteen journals published two and three papers. The structure of publishing in journals are presented in and Figure 2.

According to the Pilbeam *et al.* (2012), all papers can be divided into two groups: empirical and analytical. The aforementioned division is also applied in this paper. The first group encloses empirical papers (case studies, statistical sampling, experimental design, etc.), while the second group includes theoretical papers (mathematical, conceptual and statistical methods). The majority of papers are empirical and case study oriented, as shown in Table 2.

Table 1. Research criteria

Criteria	Explanation
Contribution to area	the importance of paper in observed research area
Alignment with research question	the papers must match research questions
Source importance	the importance of journal where the paper was published (journals with impact factor)
Language	only papers written in English

Search in databases – 2776
Search string: Logistics Service Quality AND (attributes OR dimensions OR determinants OR analysis OR evaluation OR measuring OR customer OR provider OR supply chain)

↓

"Filter I" – 310
– independent reading of abstracts;
– eliminating duplicates

↓

"Filter II" – 98
– accordance with defined criteria;
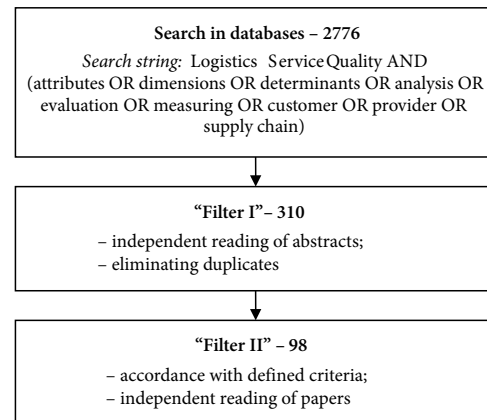– independent reading of papers

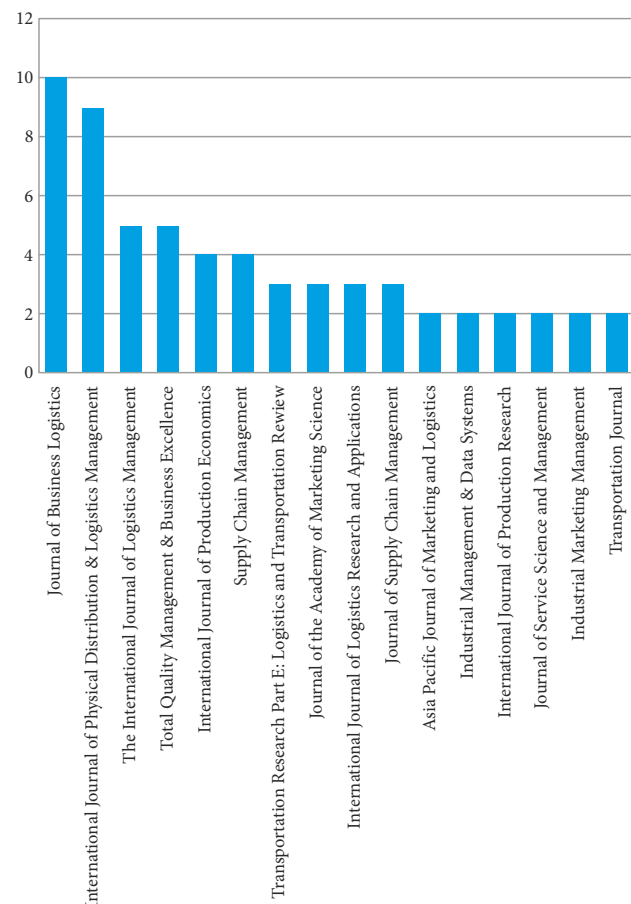Figure 1. Papers selection process

Figure 2. Number of papers in dominant journals

Table 2. Distribution of papers by research approach
and focuses in LSQ context

Research approach	% of publications
Empirical	82
Analytical	18
Aspect of observation	% of publications
Customer focus	72
LSP focus	18
LSQ in SC	10

These papers analysed LSQ on empirical (real) examples (Sadiq Sohail *et al.* 2004, Baki *et al.* 2009, etc.). In the second group (about 18% of observed papers), analytical papers are to be found (Mentzer *et al.* 1989; Rinehart *et al.* 1989, etc.).

The most of the empirical papers relate to different regions and countries. The majority is oriented towards Europe: Spain – Gil Saura *et al.* (2008b); Serbia – Kilibarda *et al.* (2016); Greece – Politis *et al.* (2014); Romania – Micu *et al.* (2013); Czech Republic – Sramkova *et al.* (2018), etc., and America: Lieb, Randall (1996); Bienstock *et al.* (1997); Millen, Maggard (1997); Mentzer *et al.* (2001), etc. There are also different papers that analyse LSQ in Asia: Korea – So *et al.* (2006); Taiwan – Liang *et al.* (2006), etc. The other countries and regions are investigated in fewer papers: Australia – Millen *et al.* (1999); Romania and Tunisia – Bouzaabia *et al.* (2013); Brazil – Johnston (2015); Malaysia – Sohail, Sohal (2003); Zailani *et al.* (2018), etc.

In order to successfully understand the situation in the literature, it is necessary to analyse and examine the researches and to answer research questions. Each section provides a review of papers according to previously defined research questions.

3. LSQ research focuses

Based on the detailed analyses of the papers and according to the aspect of observation, all papers could be divided into three groups. As observed in Table 2, there are customer-oriented papers, LSP oriented papers, and papers analysing LSQ in the SC. In the first group, there are papers focused on customers (about 72% of the observed papers). They analysed LSQ from the perspective of the customer. This group of papers is dominant, confirming the fact that the majority of researches in the literature and practice pay attention to the user. Studies have mainly focused on the measurement of perception and expectations of users of logistic services in different sectors: customers of third party logistics (3PL) – Dapiran *et al.* (1996); customers of the ocean freight forwarder – Liang *et al.* (2006); customers of the shipping industry – Chen *et al.* (2009); manufacturing companies as customers of LSP – Politis *et al.* (2014); customer in consumer goods industry – Wilding, Juriado (2004); customer of online retailer – Micu *et al.* (2013), etc. The importance of customer service in logistics for other sectors is recognized by Rinehart *et al.* (1989). They stated that customer service is an integrating factor in marketing and logistics. However, the customer oriented papers did not investigate the causes and factors that influence the perception and expectations of customers. LSQ is recognized in Business-to-Business (B2B) context (Flores, Primo 2008; Gil Saura, Ruiz Molina 2011). The mentioned papers emphasized differences between B2B and Business-to-Consumer (B2C) relationship in the LSQ context.

The special aspect of the customer focus is the analysis of customer satisfaction and loyalty. A large number of the papers in this group have a common feature that measures the difference of perception and expectations of LSQ. In the literature, customer satisfaction with different logistics services is investigated (Gil Saura *et al.* 2008b). For customer satisfaction and loyalty, the level of relationships is very important (Juga *et al.* 2010). However, there is a lack of papers that investigate external factors, like geographical aspect on customer satisfaction and loyalty. The only exception is the paper by Bouzaabia *et al.* (2013). They compared perceptions of LSQ in retail among Romanian and Tunisian customers, and determined which dimensions of LSQ had the greatest influence on customer satisfaction and loyalty. Murfield *et al.* (2017) investigated impact on LSQ on customer satisfaction and loyalty in omni-channel retailing. An additional disadvantage of the observed set of papers is that they do not quantify the positive and negative effects of satisfaction and dissatisfaction. Furthermore, there is a lack of papers that examine how services can be adapted to customer requirements.

There are also papers that evaluate LSQ from the perspective of the logistics providers. Papers focused on LSP are much less present than those focused on the customers (about 18% of the observed papers). Two research directions are identified. The first is oriented towards logistics processes (Harding 1998; Mentzer *et al.* 1989; Anderson *et al.* 1998; Mentzer *et al.* 2001, etc.), while the second is oriented towards relationships, partnerships and cooperation (Thai 2008; Liu, Wang 2015; Sharma, Kumar 2015, etc.).

There is not enough research in the context of factors that influence LSQ of LSP. Only Anderson *et al.* (1998) focused on LSP and determined whether there were any causal relationships between quality management factors and logistics outcomes, especially logistics operational performance. The disadvantage of this, as well as the previous group of papers is the insufficient research of factors (technology, management, processes, etc.) that determine LSQ. The LSP focused papers did not investigate the creation process of logistics services and value creation process. In addition, there are not enough papers that simultaneously investigate both aspects.

The last group encloses the SC oriented papers (about 10% of the observed papers). The quality area in SC is very broad with different aspects. The SC quality could be the subject of a new paper. Namely, in this paper, we analyse LSQ in the SC context. These papers analyse LSQ in the SC in different contexts (supplier, retailer, manufacturer,

3PL, customer, etc.). The most of the papers in this group are based on measuring. In that manner, Seth *et al.* (2006) proposed the service quality model in the SC and defined a conceptual framework for assessing the LSQ in the SC. The importance of LSQ in Logistic Service Supply Chains (LSSC) is very important for all entities in the SC (Liu, Wang 2015). Du and Han (2018) investigated service quality guarantee problem of a LSSC consider fairness concern behaviour. The papers in this group insufficiently investigated the following: the impact of the LSQ of one participant to other participants in the chain; the influence of logistics services on operational results (turnover, profit, etc.); the influence of Supply Chain Management (SCM) on LSQ and vice versa; LSQ changes along the entire chain, etc. Based on the above, it can be concluded that there are significant differences in the identified focuses. In order to measure and improve LSQ in an appropriate way, regardless of industry, it is necessary to integrate and observe them together.

4. Dimensions of LSQ measuring and improving

While measuring and analysing LSQ, it is very important to define appropriate dimensions that describe level of quality in certain cases. Different authors use a large scale of dimensions of LSQ. The list depends on the used approaches and methods. The review used in the literature is depicted in Table 3. The first group incorporates the most frequently used dimension – time dimension. The time delays are often a cause of poor quality and unsatisfied customers. In the literature, there are different indicators of time dimension. The most frequently used is timeliness (Gil Saura *et al.* 2008b; Feng *et al.* 2007; Tian *et al.* 2010, etc.). Delivery on time is recognized in the literature as a very important indicator of LSQ (Millen *et al.* 1999; Gotzamani *et al.* 2010, etc.). Important but less used indicators of time dimension of LSQ are order processing time (Mentzer *et al.* 1989) and lead-time (Rafele 2004).

The papers that precede the LSQ scale offer the basis to this tool. Mentzer *et al.* (1999) defined a new LSQ model (scale) with dimensions, which are mainly oriented to logistics processes: personnel contact quality, order release quantities, information quality, ordering procedures, order accuracy, order condition, order quality, order discrepancy handling, etc. In addition to basic LSQ elements, some authors used the convenience as an additional element (Feng *et al.* 2007). In addition, corporate image and customer quality are used as an addition to basic LSQ elements (Thai 2013). Juga *et al.* (2010) suggested the integrated LSQ elements: operational service quality, personal service quality, and technical service quality. The reduced list of dimensions is also used: tangible components, ways of fulfilment, and information actions (Rafele 2004). Zailani *et al.* (2018) adopted LSQ scale for measuring halal LSQ.

The following group includes papers that emphasize the importance of value observed by customers. The value delivered to customers is a prerequisite for customer satisfaction and loyalty. The importance of perceived value for customer satisfaction is emphasized (Lan *et al.* 2016). Except of the work of Vural and Tuna (2016) there is a lack of papers analysing the effects of service quality on customer value.

Failures in logistics processes are one of the basic problems in the LSQ literature. Sohal *et al.* (1999) emphasized the error free transaction as the most important dimension in LSQ context. Some authors suggested that errors are additional and a differentiating factor (Xu, Cao 2008). However, the common for all papers in this group is the lack of research of failures causes and failures overcoming.

Flexibility and elasticity are next dimensions recognized in the LSQ literature. Following different examples of researches, flexibility, elasticity and reliability have a positive impact on LSQ (Fung, Wong 1998; Hartmann, De Grahl 2011; Liu, Xie 2013). The significant influence of reliability to LSQ and customer loyalty is proved by Davis and Mentzer (2006). However, the prerequisites of reliability are insufficiently investigated in literature.

Some authors in the literature observed the LSQ as the two-dimensional construct. They distinguished the operational and relational LSQ (Bouzaabia *et al.* 2013). According to the results in the observed papers, it may be concluded that operational and relational LSQ greatly affect customer satisfaction and loyalty.

The last dimension frequently used in the literature is empathy. Regardless of the branch of industry, customers prefer a high level of empathy. In logistics, empathy is also recognized as a very important dimension, affecting customer expectation of LSQ (Baki *et al.* 2009; Taşkin, Durmaz 2010, etc.).

As already mentioned, LSQ is evaluated in different industries and contexts. Empirical studies are characterized by the use of a large number of dimensions in order to provide a better insight into the LSQ. There are differences in dimensions used in various industries. In the ocean, freight industries, the dominant are SERVQUAL dimensions: reliability, assurance, tangibles, empathy, and responsiveness (Liang *et al.* 2006; Lin, Liang 2011; Jang *et al.* 2013). This can be explained by the fact that the observed researches are mainly oriented towards customers. The LSQ dimensions in the Australian beef processing industry are oriented to information indicators, like information quality, information sharing, etc. (Ding *et al.* 2014). This can be explained by the fact that, in this sector, communication is the most important and delay are not desirable. In the manufacturing industry, dimensions of delivery are dominant: on-time delivery, error free delivery, lead-time, etc. (Kisperska-Moroń 2005; Gotzamani *et al.* 2010). Manufacturing industry is very conditioned on the supplier delivery performances. LSQ dimensions in the motor carrier industry relate to human performance with special emphasize on human failures (Johnston 2015). Delimitation of the difference in LSQ dimensions in specific sectors demonstrates the diversity and importance of research topic.

Table 3. Review of dimensions for the measuring of LSQ

End of Table 3

Dimensions	Publication
Time dimensions (timeliness, on time delivery, order processing time, lead-time, etc.)	Mentzer *et al.* (1989); Bienstock *et al.* (1997); Mentzer *et al.* (1997); Millen, Maggard (1997); Mentzer *et al.* (1999); Sohal *et al.* (1999); Millen *et al.* (1999); Wilding, Juriado (2004); Rafele (2004); Rahman (2006); Davis & Mentzer (2006); Feng *et al.* (2007); Rafiq, Jaafar (2007); Rahman (2008); Xu, Cao (2008); Gil Saura *et al.* (2008b); Gotzamani *et al.* (2010); Tian *et al.* (2010); Thai (2013); Politis *et al.* (2014); Esmaeili *et al.* (2015); Kilibarda *et al.* (2016) Sharma, Kumar (2015); Sohn *et al.* (2017); Murfield *et al.* (2017)
Dimension relates to processes (information quality, ordering procedures, order release quantities, order accuracy, order quality, order condition, order discrepancy handling and personal contact quality)	Mentzer *et al.* (1989); Mentzer *et al.* (1997); Mentzer *et al.* (1999); Mentzer *et al.* (2001); Feng *et al.* (2007); Rafiq, Jaafar (2007); Bienstock *et al.* (2008); Xu, Cao (2008); Juga *et al.* (2010); Thai (2013); Meng *et al.* (2015); Zailani *et al.* (2018)
Value (delivered to customer)	Mentzer *et al.* (1997); Lai, Cheng (2003); Neo *et al.* (2004) Stank *et al.* (2003) Panayides, So (2005); Tian *et al.* (2010); Taşkin, Durmaz (2010); Vural, Tuna (2016); Lan *et al.* (2016)
Failures	Sohal *et al.* (1999); Wilding, Juriado (2004); Xu, Cao (2008); Flores, Primo (2008); Oflaç *et al.* (2012); Kilibarda *et al.* (2012); Johnston (2015)
Flexibility	Fung, Wong (1998); Millen *et al.* (1999); Franceschini, Rafele (2000); Wilding, Juriado (2004); Hartmann, De Grahl (2011); Liu, Xie (2013)

Dimensions	Publication
Reliability	Mentzer *et al.* (1989); Neo *et al.* (2004); Davis, Mentzer (2006); Thai (2008); Taşkin, Durmaz (2010); Bouzaabia *et al.* (2013)
Operational and relational quality	Anderson *et al.* (1998); Stank *et al.* (1999); Panayides, So (2005); Bouzaabia *et al.* (2013); Jang *et al.* (2013); Leuschner *et al.* (2013); Micu *et al.* (2013)
Empathy	Durvasula *et al.* (1999); Neo *et al.* (2004); Panayides, So (2005); Baki *et al.* (2009); Taşkin, Durmaz (2010); Kadłubek, Grabara (2015)

Therefore, it can be concluded that there is the use of a large number of dimensions in different industries and regions. However, there are frequently used dimensions crucial for LSQ measuring, including: timeliness, reliability, information quality, customer value, failures, etc. These dimensions should be used as a standard (basic) dimensions for analysing and measuring the LSQ.

5. Approaches and methods for measuring of LSQ

In the literature, different approaches for logistics service measuring are used. Table 4 shows the structure of approaches and methods used in the literature. Seven main categories are identified: SERVQUAL, SERVPERF, LSQ, Kano model, Statistical approaches, standards and other approaches. The most frequently used approach for the research and measuring the quality of the logistics service is based on the SERVQUAL model (Parasuraman *et al.* 1988). This model is designed and oriented towards customers of logistics services. It analyses the difference between the user's perception and expectations (Zinn, Parasuraman 1997; Davis, Mentzer 2006; Neo *et al.* 2004; Chen *et al.* 2009, etc.). However, several authors emphasized the shortcomings of the SERVQUAL model (Bienstock *et al.* 1997). The five dimensions are not separate (it is possible to obtain similar results using fewer dimensions). The dimensions cannot be applied universally across business sectors, raising questions about the scale's reliability as a measure. One dimension, reliability, is dominant (Durvasula *et al.* 1999). The gap in the observed area refers to insufficient solving and overcoming problems in the logistics sector. In order to overcome the mentioned shortcomings, there have been several attempts to combine this approach with other methods: Kano model – Franceschini and Rafele (2000); MANOVA – Chen *et al.* (2009).

Table 4. Approaches and methods for the measuring of LSQ

Approach/method	Publication
SERVQUAL	Bienstock *et al.* (1997); Franceschini, Rafele (2000); Neo *et al.* (2004); Rafele (2004); Davis, Mentzer (2006); Seth *et al.* (2006); Gil Saura *et al.* (2008b); Thai (2008); Baki *et al.* (2009); Chen *et al.* (2009); Taşkin, Durmaz (2010); Zhang (2011); Meng *et al.* (2015); Kadłubek, Grabara (2015)
SERVPERF	Chen *et al.* (2009); Durvasula *et al.* (1999); Juga *et al.* (2010)
LSQ scale	Mentzer *et al.* (1999); Mentzer *et al.* (2001); Feng *et al.* (2007); Rafiq, Jaafar (2007); Richey *et al.* (2007); Gil Saura, Ruiz Molina (2011); Bouzaabia *et al.* (2013); Yu *et al.* (2017); Zailani *et al.* (2018)
Kano model	Huiskonen, Pirttilä (1998); Franceschini, Rafele (2000); Baki *et al.* (2009); Meng *et al.* (2011); Meng *et al.* (2015); Sohn *et al.* (2017)
Statistical analysis (ANOVA, CFA, MANOVA, Factor analysis, Principal component analysis, etc.)	Millen *et al.* (1999); Lai (2004); Seth *et al.* (2006); Kannan, Tan (2007); Martínez Caro, Martínez García (2007); Gil Saura *et al.* (2008b); Chen *et al.* (2009); Liu *et al.* (2010); Lin, Liang (2011); Bouzaabia *et al.* (2013) Micu *et al.* (2013); Thai (2013); Thai *et al.* (2014)
Standards (ISO, QMS, etc.)	Anderson *et al.* (1998); Lai *et al.* (2004); Kisperska-Moroñ (2005); Li *et al.* (2011); Thai *et al.* (2014)

After the introduction of the SERVPERF instrument by Cronin and Taylor (1994), this instrument has found the place in logistics. Chen *et al.* (2009) also confirmed the convenience of applying this instrument in sea transport. However, there are not enough papers that investigate and compare the advantages and disadvantages between SERVQUAL and SERVPERF model. The exception is the research by Durvasula *et al.* (1999). They investigated the mentioned models in the area of logistic services in the sea freight transport. They also showed that the results of the SERVPERF analysis in comparison to the results of the SERVQUAL analysis were more convenient in the area of sea freight transport.

As already mentioned, Mentzer *et al.* (1999) developed the LSQ scale for measuring the LSQ. This scale is focused on processes. There are several disadvantages of LSQ scale, which are highlighted in the literature (Rafiq, Jaafar 2007; Feng *et al.* 2007). The LSQ scale was developed for the USA market, and there are problems with its application in other markets. Two constructs of the original LSQ scale were defined with only two items in the original instrument. A minimum of three items per scale are required for the identification, unless the scale is correlated with another construct. The original LSQ scale employs a 5-point Likert scale and limits the range of responses; therefore, a 7-point Likert scale is recommended for use in future research. The original LSQ scale is based on one focal organization with an in-house logistics function providing logistics services to internal customers. This is a very specific context and less common than the situation where logistics services are provided by an external supplier. As in previous case, there is a lack of papers that deal with the mentioned problems.

The majority of previous models focused on one-dimensional and direct dependence of the attributes of service and customer satisfaction. However, not all attributes have the same importance to customer satisfaction. In that sense, the Kano model was created. According to the Kano model, there are several attributes of LSQ: attractive attributes, one-dimensional attributes and must-be attributes. Kano model is used in logistics in different contexts (Meng *et al.* 2011). Indicator aging is also very important for measuring LSQ (Franceschini, Rafele 2000). Kano model is a useful tool for logistics service planning (Huiskonen, Pirttilä 1998). In order to overcome the lack of the individual approach, it is necessary to combine several approaches. The integration of the SERVQUAL, the Kano model and the QFD approaches for LSQ measuring proved to be suitable (Baki *et al.* 2009). This paper is one of the exceptions that combined three different methods, introducing a hybrid method. As mentioned before, there is a lack of papers that combine several methods into a hybrid approach.

As in other areas, different statistical tools and approaches are also used in logistics for the measuring of service quality (Thai 2013; Thai *et al.* 2014; Seth *et al.* 2006, etc.). Kannan and Tan (2007) applied the regression analysis to identify relationships between the firm's internal and external operational quality practices. Thai *et al.* (2014) used the Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) to measure LSQ in Singapore. There are different examples of ANOVA and linear regression application for LSQ measuring (Millen

et al. 1999; Bouzaabia *et al.* 2013). As already known, different types of surveys are common for statistical tools. In that manner, questioners (Dapiran *et al.* 1996; Millen *et al.* 1999; Sohal *et al.* 1999; Rao *et al.* 2011, etc.), in-depth interviews (Feng *et al.* 2007), personal and telephone surveys (Wilding, Juriado 2004), as well as cross sectional surveys (Lai, Cheng 2003) are applied.

In the literature, other approaches occur less frequently. A new approach for measuring quality of the offered logistics services based on the multi-attribute decision-making is proposed in the literature (Kilibarda *et al.* 2012). Some authors applied the TAM for assessing the logistics information technology (Bienstock *et al.* 2008). So *et al.* (2006) measured the quality of the logistic provider's service by using the analytic hierarchy process (AHP) method. The Gray correlation method for the measuring of LSQ is also used (Xu, Cao 2008). The means-end value hierarchy model for measuring the logistics service value is successfully applied (Mentzer *et al.* 1997). Sramkova *et al.* (2018) used Delphi method for measuring of quality factors in freight forwarding services. Tian *et al.* (2010) used the conceptual model for the investigation of the relationship between 3PL provider, the customer orientation and the logistics improvement in the customer's firm. Approaches based on the game theory are dominantly used in SC context and evaluate LSQ in two-entity relationship, with conflict goals (Liu, Xie 2013). The number of dimension is less than in other approaches and two dimensions are commonly used.

Subjectivity, uncertainty and imprecision in LSQ context is usually solved by using the fuzzy approach (Liang *et al.* 2006; Florez-Lopez, Ramon-Jeronimo 2012; Thai 2013; Liao, Kao 2014; Esmaeili *et al.* 2015; Vural, Tuna 2016; Lan *et al.* 2016; Yu 2017). It is commonly combined with other approaches. Combining different methods and the development of hybrid models is only a solution for successful measurement of logistics service in various sectors and geographical areas.

6. Discussion and future research directions

Based on the review of papers and the information from logistics systems, certain conclusions are deduced. The directions of future research are described in more details.

First, the majority of the papers referred to empirical research related to the measuring of LSQ in different markets and systems (Lieb, Randall 1996; Liang *et al.* 2006; Politis *et al.* 2014). The results indicated a low level of LSQ. Nevertheless, a few papers investigated the causes of poor quality, which is very important for improving the logistics service. Causes of poor quality could be in technology, informatics, organization, location, customer relationship, human factor, etc. (Mentzer *et al.* 1997; Wilding, Juriado 2004; Leuschner *et al.* 2013). Furthermore, a low level of LSQ may be a result of the lack of management support, lack of human and financial resources, and competition in the market (Sohal *et al.* 1999). Corporate culture and the level of education and staff competence are often em-

phasized as key factors in improving the LSQ (Rahman 2006). Special emphasis in the future research should be placed on the analysis of possible causes and their effects on service quality. It is important to develop procedures for failure detection, and procedures for the identification of factors that affect failure and logistics service (Flores, Primo 2008; Oflaç *et al.* 2012; Johnston 2015). Detailed analysis of causes and failures is very important for defining the corrective and preventive action.

Second, reviewed papers are mainly concerned with the analysis of the quality of realized logistics service. In future research, it is important to measure the quality of offered services. Logistics providers have to analyse the customer requirements and create the offer that will satisfy customers' expectations. Therefore, it is important to develop a methodology to measure LSQ in the phase of preparing an offer. In that manner, the company will be able to assess the extent to which the offered quality meets customer requirements better (Kilibarda *et al.* 2012). This would prevent customer dissatisfaction.

Third, logistics service is often analysed from the customer perspective. However, it is a very complex phenomenon, which needs to be observed from the perspectives of LSPs and wider community (Lu 2003; Thai 2013; Martínez Caro, Martínez García 2007). From the perspective of a logistics company, it is important to make a detailed analysis of logistics and business processes, which create logistics service. From the perspective of the wider community, it would be important to explore the connection between the LSQ and living and working environment.

Fourth, there are not enough papers that deal with LSQ in the context of new technology and trends like 3D printing, digital logistics, internet of things, e-business, smart technologies, etc. (Bienstock *et al.* 2008; Gil Saura *et al.* 2008a; Micu *et al.* 2013, etc.). The aforementioned trends directly affect the realization of logistics services and customer expectations. Future researches should investigate the new dimensions of LSQ and customer satisfaction. The special emphasis in the mentioned trend is a time component in creating a demand and realizing the service.

The fifth direction relates to new business models in logistics. Logistics outsourcing, partnerships, collaboration, contract logistics and new models of logistics service provisions affect LSQ, customer's satisfaction and loyalty (Lemmink *et al.* 1996; Lu 2003; Flores, Primo 2008; Juga *et al.* 2010). There is a lack of papers in the literature that investigate the mentioned problems further. Measuring the quality from different perspectives in the complex relationships of contract logistics requires the use of new methods and tools. Future researches should investigate the demands and expectations of customers in new business models. Special attention should be attributed to the asymmetry of partnership relations in the logistics and its impact on LSQ.

Finally, but not least important, there is LSQ in the SC. This aspect is recognized in the literature, though it is insufficiently investigated (Fung, Wong 1998; Lai, Cheng

2003; Seth *et al.* 2006; Kannan, Tan 2007). The LSQ is the result of numerous logistics processes that are realized in the SC. There are different aspects of LSQ in the horizontal, vertical and network structure of the SC. New methods and approaches should be applied in this context. In addition to the existing ISO standards that are used in the literature, new standards in the contexts of quality in logistics should be investigated in future research.

Conclusions

The LSQ is very important and recognized in literature and practice. There are an increasing number of papers exploring this area. Different approaches and methods are used to measure different dimensions of LSQ. The wide interest for this area is confirmed by 98 papers published in 56 journals. An increasing number of studies demonstrate that the quality of logistics services is not satisfactory. Therefore, it is necessary to work intensively on research, measurement and improvement of the LSQ. Corrective and preventive actions are very important for quality improvement, and they are the result of models and methods used for quality measuring. Based on the conducted research it was concluded that the most frequently used approaches are SERVQUAL and LSQ scale. The dominant dimensions are time dimensions: timeliness, on time delivery, order processing time, lead-time, etc. Typical research in this area is empirical from the perspective of customers of LSPs based on SERVQUAL model or LSQ scale.

The observed problem is a very complex and it requires a systemic approach, new methodologies and different methods and models. The existing models have restrictions in application. Insufficient number of papers combines two or more different approaches in some kinds of hybrid models. There are not enough papers in the literature that try to make hybrid models. Hybrid models can overcome high subjectivity, vagueness and imprecision in LSQ measuring. By comparing and combining different methods and techniques, a real picture about advantages and disadvantages of certain approaches, as well as potential implementations, could be made. It is also desirable to test papers with empirical examples. From geographical aspect, it should be concluded that there is not enough papers comparing LSQ in different countries and regions. This analysis could trigger researches for the existing gap to be overcome. In addition, useful information about different factors (geographical, cultural, etc.) that affect LSQ need to be identified.

Finally, there are recommendations from real systems. The experience from practice suggests the evident need for simple and easily applicable models that provide fast and qualitative results. Likewise, the experience from practice has confirmed the gap in the literature related to the insufficient investigation of certain logistics processes and activities. Namely, there is a need in logistics systems for measuring the quality of particular logistics processes,

activities and different logistics services. The results presented in this paper give a significant scientific and practical contribution to the problem of research and improvement of the LSQ. This paper provides a systematic and comprehensive review of researches that analyse LSQ and systematize the existing, rather inconsistent and disorganized literature. This would create the conditions for a more successful understanding and use of existing knowledge, analysing and improving diverse approaches and methods from this field. On the one side, the paper provides a good basis for researchers to identify the gaps for future researches, while on the other side, for practitioner it is some kind of manual and instruction for practical measurement of the LSQ.

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Author contributions

The first author Milorad Kilibarda participated in methodology development and papers collection.

The second and corresponding author Milan Andrejić participated in methodology development, papers collection, data interpretation and paper writing.

The third author Vlado Popović contributed in research realization.

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