

Assessment of Quality in the Supply Chain

Andreea Madalina ALEXANDRU¹

National University of Science and Technology Politehnica Bucharest, Romania

ORCID ID: <https://orcid.org/0009-0000-1725-1621>

Andreea Madalina ALEXANDRU andreea.alexandru98@stud.fiir.upb.ro

Irina SEVERIN²

National University of Science and Technology Politehnica Bucharest, Romania

ORCID ID: <https://orcid.org/0000-0002-0296-4730>

Irina SEVERIN irina.severin@upb.ro

Abstract. This paper explores the assessment of service quality provided by a logistics transport operator in the context of increasing performance expectations in supply chain. The study focuses on aligning operational actions taken in a company's logistics with customer requirements, by using a transport operator as a reference frame. While the specialized literature emphasizes the critical role of service quality in ensuring supply chain efficiency, few studies examine assessments based on real-world Second-party Audit in the transport sector. Thus, Second-party Audit, according to ISO 9001, have the role to verify external parties involved against established requirements, ensuring quality control in external relations. The research applies a methodology based on an audit grid to assess the operator's performance on several dimensions of quality. The analysis compares expected service levels with perceived performance, as reported during an on-site assessment. Data were collected through observation, document analysis, and structured interview. The key research questions address the extent to which the service provider meets contractual and operational standards and continuous improvement. These findings provide practical implications for both logistics service providers and the supply chain, particularly in terms of improving monitoring tools, communication protocols, and responsiveness to customer requirements. The paper contributes to this field by providing a concrete approach to assessing service quality in logistics.

Keywords: Assessment, Carriers, Supply Chain, Quality, Second-Party Audit

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Introduction

In the current context, characterized by increasingly stringent requirements regarding sustainability and competitiveness, companies in the automotive industry must integrate the logistics function into the organizational strategy, in order to achieve the objectives of operational efficiency and compliance. In this regard, the periodic and systematic evaluation of the performance of logistics service providers becomes a necessary condition for ensuring quality throughout the supply chain.

The Second-party Audit is an essential tool for evaluate their performance in relation to the requirements of the client. This paper aims to analyze the performance of the transport operator based on an audit grid structured in 7 thematic chapters: Quality, Maintenance, Driver Training, Operations, Organization, Sustainability and Digitalization.

The goal is to identify strengths, areas for improvement and to propose a concrete action plan to increase efficiency and reduce environmental impact.

Nowadays, in the face of ever-growing competition, the primary objective of each company is to meet and even exceed the requirements of their customers, what allow to build a strong relationship between company and their customers acc. to Alhuwitat et al. (2017).[1]

The research question guiding this study is: To what extent does transport operator meet the operational and sustainability requirements set from a strategic automotive customer, based on a structured assessment process? The study explores two main objectives:

O1: To develop and implement a Second-party Audit checklist to assess a carrier's operational and sustainability performance.

O2: To analyze audit results using a radar chart model, identifying strengths, levels of compliance, and areas for improvement.

Literature review

There is constant pressure from customers to have the high-quality services provided by transport & logistics operators in the industry.[1] The service encounter is described as the time of direct interaction between the customer and the service provider whereby the service provider can be both, a person or a system. Research on service quality also shifted from traditional services to digital services. The service encounter is described as the time of direct interaction between the customer and the service provider whereby the service provider can be both, a person or a system.[2]

In the context of quality management systems, second-party audits represent a key mechanism through which a company evaluates the performance of its carriers including logistics and transport service providers in relation to specific contractual and operational requirements.

According to ISO 9001:2015, organizations are responsible for monitoring and evaluating the performance of external providers to ensure that purchased products and services conform to specified requirements. In this context, second-party audits serve as a practical tool for verifying supplier reliability and identifying improvement opportunities that support operational efficiency and strategic alignment.

By implementing structured Second-party Audit tools such as evaluation grids, scoring systems, and performance reviews, companies can ensure that logistics partners meet internal quality standards and contribute effectively to supply chain resilience and customer satisfaction.[3]

UN/ECE and CEMT (European Council of Ministers of Transport): "Logistics is a process of designing and managing the supply chain in the most general sense. Supply chain can include the supply of raw materials required for production, through materials management at the production site, delivery to warehouses and distribution centers, sorting, handling, packaging and final distribution to the point of consumption. There is a close connection between productivity improvement and logistics progress. For this reason, the analysis of logistics constraints and stakes is taken into account from state institutions in the development of economic, industrial and technical policies. Logistics directly influences: the local environment of the enterprise, regional development, transport infrastructure, the national environment of the enterprise - transport policy, scientific research, technical progress." Transportation is one of the essential components of the logistics chain, it have a direct impact on the efficiency, costs and quality of services provided. Its role is more important as it influences all the other links of the supply chain – from production to final delivery.[4]

Frazzelle defines the supply chain as a network of units (warehouses, production units, terminals, ports, stores, houses), means of transport (planes, trains, trucks, cars) and logistics information systems connected at the level of suppliers and suppliers of suppliers of the company, but also at the level of customers and customers of customers of the company in question. One of the most important tactical decisions made by transportation managers is the selection of carriers. This decision is based on a careful evaluation of existing options and follows the strategic decision regarding the selection of the mode or modes of transportation used.[5]

As the urge to reduce emissions across all sectors and parts of the supply chain is now scientifically undoubted (Gulev et al., 2021), transportation must also contribute its part. Indeed, transportation accounts for 15 % of global GHG emissions (Dhakal et al., 2022), of which about one-third stem from freight transportation (Ritchie and Roser, 2020). Largely, these can be allocated to Scope 3 emissions of industrial companies, who request transportation services to transport raw materials, intermediate, and end products throughout their supply chains (Rodrigue, 2020).[6]

Methodology

The proposed methodology for assessing the capabilities of the transport provider includes a structured interview, conducted in accordance with ISO 9001 requirements for assessing stakeholder satisfaction, as well as good practices related to Second-party Audits. The information collected is integrated into a feedback portfolio, providing an overview of the degree of satisfaction with transport services, without compromising the confidentiality of the operator evaluated DHL.

The customers expect their orders to be delivered on time, in full, and without damage, transportation becomes a key performance area subject to evaluation.[7] The audit grid was therefore designed to assess not only the structural and procedural aspects of transport operations, but also the quality of information used in decision-making. This includes the accuracy of GPS data, the responsiveness of communication systems, and the traceability of shipments through platforms that show a carrier's location in real time, allocated costs, etc. The methodology ensures that carriers are evaluated on their ability to support a flow, minimize risks, and meet customer expectations, essential factors for maintaining competitiveness in modern supply chain.

Second-party Audit Grid Structure

The evaluation of transport service quality should be an objective assessment of the quality based on real parameters. The evaluation results should be a qualification of quality with respect to each quality criteria or set of criteria. Based on transport service quality, it is possible to examine the relation between transport service quality and demand. For the quantification of transport service quality, it is necessary to know quality criteria. Nowadays, there is not any set of quality standard which deals with the service quality in the freight road transport. [8]

The audit grid consists of 24 structured questions grouped into thematic categories. Each question is designed to assess the carrier's level of maturity, conformity, and performance in relation to company's expectations and industry's best practices. The grid allows both qualitative and quantitative evaluation, enabling comparative analysis between different carriers. This analysis may constitute a future line of research in subsequent studies or related publications.

1. Quality:

- Is there an internal person responsible for quality?
- Have you established internal quality objectives?
- Are you aware of the client KPIs?
- Have you set internal quality targets?
- What actions do you put in place to improve your results (KPIs)
- Do you know the supplier portal?
- Has the company obtained a quality label? If yes which one?
- Is there a quality monitoring procedure for subcontractors?

2. Maintenance and equipment:

- Is there a maintenance program for equipment?
- What procedures do you have in place in case of failures?
- Where do you generally store your trailers (empty or full)?

3. Driver training:

- What training plans do you have for drivers (including subcontractors)?
- What instructions do you provide regarding punctuality?
- What instructions do you give to your drivers in order to secure the goods ?
- What communication system do you use with your drivers (subcontractor included)?

4. Organization

- How do you manage and use a characteristic sheet for an international flow, for example Romania-Spain?
- How do you communicate factory closures and openings?
- What follow-ups do you make on traffic bans?
- Are you able to provide information on filling rates?

The characteristic sheet that includes the flow details and its schedule is consulted, but is not always communicated to the driver. Communication regarding factory closures is done through weekly planning. An efficient organization ensures that customer requirements are met and delays are avoided.

5. Sustainability

- Do you have a detailed environmental policy?
- Do you optimize fleet efficiency by reducing fuel consumption?
- Do you calculate your CO2 emissions?
- Eco-driving
- Are you able to offer multimodal (Train/Ferry/Maritime) ?

Each domain includes a set of questions. For each question, a grade from 1 to 5 is given, where: 1 = unsatisfactory; 3 = acceptable; 5 = excellent

Purpose of the Second-Party Audit

The purpose of this evaluation is to assess how well the selected carrier aligns with the company's operational expectations and strategic direction. The process supports the identification of best practices and provides a reference point for future assessments of other transport service providers.

Data Collection Methods

On-site data collection provided direct access to operational realities, allowing for observation of practices in their natural context and validation of consistency between interview responses and existing procedures..

To ensure a comprehensive and objective evaluation of the carriers' performance, a mixed-method approach was used for data collection. The following methods were applied:

I. Structured Interview

The interview was conducted with key personnel within the transport companies. The interview followed the audit grid and allowed for clarification of responses, identification of undocumented practices, and collection of qualitative insights.

Document Analysis

Carriers were asked to provide supporting documentation, including:

- iii. Quality certifications (ISO 9001, ISO 14001)
- iiiii. Driver training plans and safety protocols
- iiiii. Environmental policies and CO₂ reports
- iiiv. Internal procedures related to punctuality, communication, and subcontractor management

This documentation was used to validate the answers provided during interviews and to assess compliance with company's standards.

Performance Data Review

Quantitative data was collected from internal systems and digital platforms such as:

- For punctuality, event tracking, and GPS quality.
- TMS (for route planning, resource allocation, and flow monitoring)

These data points were used to measure actual performance against expected targets and to identify trends or recurring issues. This data was analyzed using key performance indicators (KPIs), which offer an objective basis for evaluation. In the context of logistics auditing, the most relevant KPIs include:

- Punctuality in collection and delivery
- Rate of incidents and non-conformities
- CO₂ emissions and fuel consumption

The integration of digital platforms like TMS ensures that these KPIs are not only measurable but also traceable and reliable, supporting continuous improvement and strategic alignment with client expectations

Results and further discussions

This case study illustrates the application of a structured audit grid designed to assess the operational maturity and compliance of a logistics carrier.

The Second-Party Audit grid was developed in accordance with the company's requirements and the principles of the ISO 19011:2018 standard. It includes thematic chapters covering quality, maintenance, driver training, organizational processes and sustainability. Each question is rated from 1 (non-compliant) to 5 (fully compliant), based on interview, document analysis. The evaluation was carried out by a team consisting of: carrier quality supervisor, parts logistics planner, coordinator within the transport support team in accordance with the principles of the ISO 19011:2018 and ISO 9001:2015. Dedicated people from the quality, sustainability/environment, transport support, and subcontractor supervisor departments participated in the evaluation. This paper is based mainly on information obtained through verbal interviews and direct on-site observation, but also on the analysis of documents available at that time, subsequently supplemented by observations.

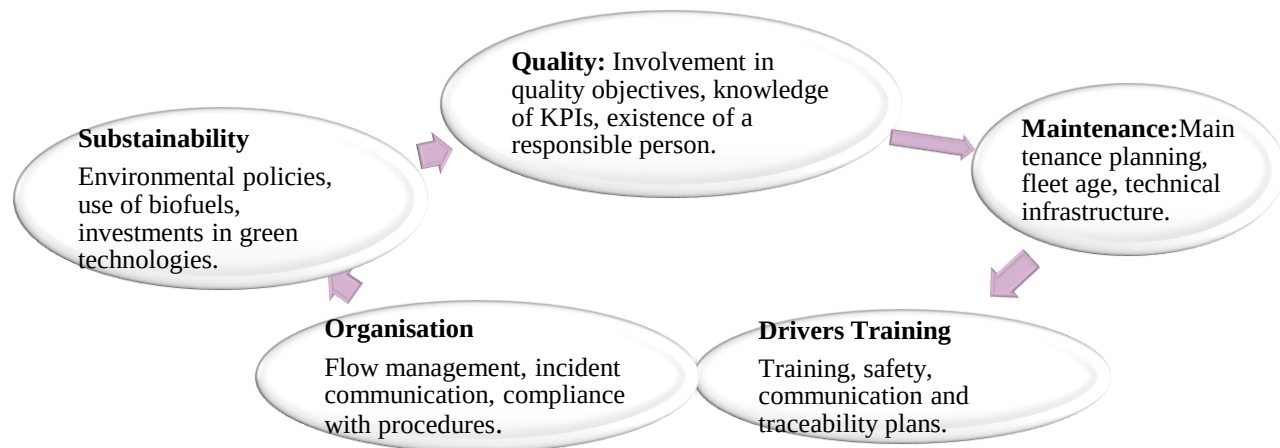


Figure 1: Logistics Second-Party Audit Gril

Source: Author's own contribution

To respect the confidentiality of the audited operator, only the questions that received a score of 1 – unsatisfactory are presented in this paper, along with the proposed corrective measures. These reflect the areas where major non-conformities were identified and provide directions for improvement. These results are marked in the Table 1.

Table 1. Punctual comments for questions with a score of 1

Domain	Question	Score	Punctual comments
Maintenance and equipment	Is there a maintenance program for equipment?	1.No schedule 2. There is a maintenance schedule but no follow-up. 3.A schedule exists which guarantees the availability of resources. Cleaning and checking are done on a regular basis. 4. Monitoring of maintenance costs and associated action plans. 5.In addition to cost monitoring there is an own technician on the operating site	Currently, there is no proactive maintenance program, only documentary checks. In the event of malfunctions, an internal protocol is applied that ensures permanent assistance (24/7). The reliability of the equipment directly influences the punctuality and safety of transport. Supporting documents were not presented. The organization does not have its own fleet.
Driver training	What training plans do you have for drivers (including subcontractors)?	1.No Training 2. Training information is simply made available for the driver 3.An internal training plan exists with a dedicated trainer 4. Indicators and skills assessments are in place 5. The training plan is updated periodically based on the assessments.	There is no training, there is an information code between DHL and carriers - the check is done at the annual audit, contract signing + code of conduct before signing the contract.
Driver training	What instructions do you give to your drivers in order to secure the goods ?	1. No instructions formalized 2. Training at the start of the driver but without instructions by writing 3. Training given with instructions and parking secured sites 4. A check is given on the instructions 5. KPI et animation per driver	Drivers take regular defensive driving tests and obtain mandatory professional certifications. They are also required to be present during the loading process to observe how goods are handled and secured. However, there is no specific direct training program on securing goods, and the instructions are not formalized in writing.
Organization	Are you able to	1.No following	The carrier does not have an active

	provide information on filling rates?	2. The carrier is able to perform an analysis at the request of the client 3. There is a follow-up and can respond over the last 4 weeks within 5 days 4. Summary can be provided during the day 5. Summary can be provided within the hour	system for monitoring or reporting the load level. The lack of a continuous tracking mechanism limits the ability to optimize logistics flows and adapt to customer requirements. In the absence of a standardized procedure, information on the fill level cannot be provided systematically or within a relevant time frame.
Sustainability	Do you optimize fleet efficiency by reducing fuel consumption?	1. No truck equipped; no following 2. Following done , without telematics tool per driver, of fuel consumption . 3. Digital monitoring of fuel consumption by driver 4. Able to present a monthly consumption 5. Targeted training (excessive braking, too long speed shift, etc.) to targeted staff	The carrier does not have active equipment or technologies to optimize fuel consumption. Although there is a sustainability strategy with an implementation horizon of 2030, it is at an early stage, with no concrete measures currently applied. The lack of immediate action limits operational efficiency and the ability to reduce the carbon footprint.
Sustainability	Eco-driving	1. No eco driving training 2. Eco driving training 3. Training, animation of drivers on eco driving 5. Animation of drivers on eco driving and subcontractors are trained and driven	The organization does not have an eco-driving training program and access to relevant data on driving behavior is limited. The lack of its own fleet and the exclusive collaboration with subcontractors restrict the possibility of direct monitoring. The available information is general and does not allow for individual assessment of drivers. According to the contractual terms, there is only a conventional procedure on the environment and energy, without practical applicability in eco-training.

Source: Authors' own research

In the assessment, the question with a score of 1 indicated a non-compliance or absence of an essential practice. Questions that received this score reflect critical points in the carrier's activity, with potential impact on operational efficiency, safety and sustainability. A concrete action plan, formulated based on industry best practices, can help to remedy the identified deficiencies. The purpose of the table below is to provide a clear and actionable view of the steps needed to create performance in the areas with the lowest level of compliance. While this analysis has been improved and materialized through specific action plans, respect for the confidentiality of data.

Table 2. Action plans

Domain	Audit Question	Improvement Plan
Maintenance and equipment	Is there a maintenance program for equipment?	Implement a proactive maintenance program with scheduled inspections and digital tracking to reduce downtime and improve reliability. An action plan to avoid incidents due to technical malfunctions of the trucks.
Driver training	What training plans do you have for drivers (including subcontractors)?	Develop and implement a structured driver training program, including onboarding, defensive driving, and cargo handling procedures. Or develop a program to track trainings already conducted
Driver training	What instructions do you give to your drivers in order to secure the	Introduce direct training sessions for drivers on securing goods, including loading plans and safety protocols.

	goods ?	
Organization	Are you able to provide information on filling rates?	Establish a standardized procedure for tracking and reporting filling rates, using digital tools to ensure timely and accurate data availability.
Sustainability	Fleet optimization to reduce fuel consumption?	Initiate short-term measures such as eco-driving training and telematics to monitor fuel consumption, while progressing with long-term fleet electrification.
Sustainability	Eco-driving	Collaborate with subcontractors to implement eco-driving practices and monitor environmental impact through shared data platforms.

Source: Authors' own research

The averages obtained for each area assessed in the assessment are presented below in the Table 3. The calculation of the average scores for each domain was performed by adding the scores awarded to each question within that domain, followed by dividing the total by the number of questions related to that domain. This analysis allows for a global understanding of the operator's level of compliance and performance, highlighting both strengths and critical areas that require improvement. The individual scores given to the 24 questions were grouped by thematic areas, and the arithmetic mean was calculated for each area.

Table 3. Average scores by domain

Domain	Number of questions	Total Score	Avarege
Quality	8	32	4
Maintenance and equipment	3	9	3
Driver training	4	11	2.75
Organization	4	12	3
Sustainability	5	17	3.4

After presenting the average scores, it is observed that the "Driver training" domain registers the lowest average, indicating an unsatisfactory level in terms of driver training and preparation. Comparatively, the "Quality" domain ranks best, with an average of 4, which reflects superior compliance and performance in this sector. This represents a major priority, given the direct impact on safety and quality of services. For a clear and uniform interpretation of the results, the average scores obtained for each domain were classified into performance categories, as follows in the Table 4:

Table 4. Performance descriptions

Average score range	Evaluation coefficient	Performance description	Domain classification
3.5 – 5.0	Acceptable(3)	Good performance, satisfactory compliance. Includes supporting documents on site or sent later for evaluation completion.	Quality. ISO deadlines have been revised ISO 9001, ISO 14001 AEO certificate only for a department that deals strictly with customs ISO 50001- Energy Management System
2.5 – 3.49	Needs improvement(2)	There are deficiencies that need to be corrected. Not all supporting documents/KPIs/applications are checked, but they must meet the deadline for providing these details, such as a maximum of 1 month.	Driver training- Driver training plans and safety protocols were not presented on site, but will be monitored and analyzed. Sustainability- Environmental policies and CO ₂ reports - public report available on the internet, sustainability implementation strategy, early phase, approach taken into consideration

			Organization There is collaboration with the National Meteorological Administration the transport exchange regarding the organization of transport, transport bans, but it is not a standard procedure. Maintenance and equipment-Internal procedures regarding punctuality, communication and subcontractor management presented theoretically, without supporting documents, examples provided on site.
1.0 – 2.49	Unsatisfactory(1)	Significant problems, urgent interventions	

Coefficient – indicates the strategic importance of the field within the logistics chain in terms of transport organization, transport quality, transport sustainability, safety of goods received by the customer and its punctuality, compliance with delivery deadlines. The values of the coefficients were established through internal consultation with representatives from the quality, transport, and sustainability departments, based on operational priorities. The final score for each question was determined based on a combination of the interview conducted, the analysis of the documents provided, and direct observations on site. In cases where verbal responses were not supported by documentary evidence or consistent observations, the score was adjusted accordingly.

The findings align with previous studies such as Knopa (2019), which emphasized the importance of structured audits in identifying service quality gaps in pharmaceutical logistics. Similarly, Šimková et al. (2015) demonstrated that performance indicators like punctuality and CO₂ emissions are essential for evaluating transport service quality.

Further directions

Given the low score and the lack of its own fleet can improve this area through:

Table 2. Further directions

Further directions	
To establish minimum maintenance requirements for all subcontractors, through standardized procedures and checks.	Regular technical evaluations to assess the condition of vehicles and prevent breakdowns.
Digitalization with a platform where partners can upload documents and receive automatic alerts.	To ensure training with subcontractors, including through clear contractual clauses.

Source: Authors' own research

Also, this research can be significantly expanded in future studies, highlighting directions such as: rigorous tracking of key performance indicators (KPIs), such as punctuality, fuel consumption, CO₂ emissions, each assessed response being supported by verifiable and traceable documentation, comparative analyses between subcontractors with and without their own fleets, to assess the impact of ownership on performance and sustainability outcomes.

Conclusion

The case study, which presents a methodology consisting of a structured questionnaire, provided a comprehensive assessment of the carrier's performance in five key areas: quality, maintenance, driver training, organization and sustainability. The results revealed a moderate level of compliance with company standards, with notable strengths in quality, and critical weaknesses in maintenance and driver training. By systematically analyzing processes and compliance with requirements, the Second-party Audit allowed for a proactive approach to risks, rather than a reactive one. It proved to be more than a simple verification tool - it becomes a strategic mechanism for control and continuous improvement. The Quality domain falls into the "Acceptable" category, demonstrating a satisfactory level of compliance and the existence of supporting documents, even if some certifications are applicable only to specific departments. In contrast, domains such as Driver Training, Sustainability, Organization and Maintenance

were classified as “Needs Improvement”, reflecting the lack of clear evidence, incomplete procedures or their limited applicability. None of the domains reached the “Unsatisfactory”, but the presence of questions with minimum scores (1) signals real operational risks, which can negatively affect the overall performance of the operator. This analysis provides a solid basis for immediate corrective actions.

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