

Article

Investigation of the Effectiveness of the Introduction of the Quality Management System According to the ISO 9001 Standard in Transport Companies: Slovakia Case Study

Renáta Czödörövä¹ and Jozef Gnap^{2,*} 

¹ Faculty of Operation and Economics of Transport and Communications, University of Žilina, Slovakia and Ministry of Transport of the Slovak Republic, 01026 Zilina, Slovakia

² Department of Road and Urban Transport, Faculty of Operation and Economics of Transport and Communications, University of Žilina, 01026 Zilina, Slovakia

* Correspondence: jozef.gnap@fpedas.uniza.sk; Tel.: +421-41-513-3500

Abstract: The ISO 9001 standard is the most widespread standard in the world that sets requirements for a quality management system. Thousands of companies around the world have implemented the quality management system according to ISO 9001, and there are many reasons why they decided to implement this management system in their companies. The main goal of this paper is to determine the impact of the introduction of a quality management system according to the ISO 9001 standard on the performance of a selected sample of transport companies after its successful implementation as a strategic step to achieve better competitiveness. The impact of the introduction of the quality management system on the performance of a selected sample of 17 transport companies was investigated through the use of financial analysis, regression, and correlation analysis tools. The first significant finding was that the selected investigated indicators, such as profitability of assets, profitability of sales, size of the transport company, and age of the transport company in the selected transport companies, showed a significant positive difference in their average values in the period after obtaining ISO 9001 certification when compared to the period without certification. Further investigation of the financial situation in transport companies that already had a quality management system in place according to the ISO 9001 standard revealed that all the values of the selected indicators acquired positive values in 2020 during the COVID-19 pandemic, which could also be due to the fact that transport companies kept their customers.

Keywords: quality management; ISO 9001; transport companies; correlation analysis; COVID-19



check for updates

Citation: Czödörövä, R.; Gnap, J. Investigation of the Effectiveness of the Introduction of the Quality Management System According to the ISO 9001 Standard in Transport Companies: Slovakia Case Study. *Sustainability* **2023**, *15*, 2401. <https://doi.org/10.3390/su15032401>

Academic Editors: Evangelos Grigoroudis, Konstantinos P. Tsagarakis, Ioannis Nikolaou and António Abreu

Received: 23 October 2022
Revised: 13 January 2023
Accepted: 26 January 2023
Published: 29 January 2023



Copyright: © 2023 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

The countries of the European Union apply a regulated market economy in which competition is an important element. Competition can be at the level of a company, a sector, or between countries. In recent years, there has been a constant increase in pressure on companies operating in various business spheres to increase their competitive advantage and focus on continuous improvement [1,2].

With the gradual preponderance of supply over demand on the market for products and services, companies began to realize that they must create a competitive advantage over other companies that will guarantee that their products and services will be in constant demand among customers. Companies stopped focusing only on short-term economic prosperity, but became increasingly aware of the need to improve the quality of delivered products and services. It was necessary to focus on permanent growth, the efficient functioning of business processes, product quality, cost reduction through the automation of some activities, and many other aspects. One of the tools to achieve this desired state is the implementation of a quality management system according to the ISO 9001 standard. Introducing a quality management system in the company gives its customers a clear signal

about the company's intention to constantly improve in relation to their requirements, to make the improvements permanent, and to deal transparently.

There are many reasons why companies are motivated to undergo the process of introducing a management system in their companies and thus obtain a quality management system certificate. These motives can generally be described as internal and external, depending on whether they affect the company from the inside or from the outside. It can be the pressure of the state through legislation, or adaptation to the competition. It can be the customer's requirements, but also come from the internal motivation to improve the company to create something better, more valuable, of higher quality, and that satisfies the end customer with its actions.

The theory of business management has been reworked for a long time, and many starting points, points of view, and approaches to how to turn an ordinary business into a long-term successful and, therefore, financially healthy and efficient business have been created [3]. One of the research goals of the authors towards this contribution is to develop this theory and verify it with regard to real data on transport companies in the Slovak Republic that are engaged in road freight transport.

The main research question was to find out how the introduction of the quality management system according to the ISO 9001 standard affected the efficiency of companies engaged in international road freight transport. The results of this study can be of help to the owners of transport companies or their management in making a strategic decision as to whether it is effective to build or continue to maintain a quality management system according to the ISO 9001 standard.

2. Literature Review

Many authors of studies, understandably and especially accreditation companies or the ISO organization itself, highlight a number of benefits, which are usually divided into two groups: those that are financial and non-financial in nature [4]. Some of them are obtained almost automatically from the simple possession of a certificate. Possession of the ISO 9001 certificate and its impact on the non-financial performance of companies are proven in studies [5–7].

However, there is less effort to find evidence, a causal relationship, regarding the impact on the financial side of the company's performance due to the adoption of the decision to introduce a management system according to the ISO 9001 standard. Nenadal points to this fact, and Wahid and Corner state that most studies on this topic only focus on the certification process itself, on overcoming barriers and challenges during the implementation process, or on benefits of a non-financial nature [8,9]. The same authors also criticize the fact that most studies do not deal with what actually happened in the company after the introduction of the quality management system over a longer period of time.

Is it worth implementing a quality management system according to the ISO 9001 standard? How will the introduction of the management system be reflected in the financial statements, and how is it possible to measure this impact? These are some of the most discussed topics in the field of implementing a management system according to the ISO 9001 standard. However, most studies assume that the introduction of a management system according to the ISO 9001 standard can affect financial performance in a positive way for the benefit of the organization. If the focus of the organization is the customer, it should definitely consider their needs and requirements in order to maintain a competitive advantage and survive in the market by satisfying them [9]. However, in today's oversaturated markets, it is necessary to offer the customer quality production, which, according to Mandersová and de Vries, should be signaled by the possession of the ISO 9001 standard certificate [10]. Consequently, if the certificate increases customer confidence and makes them buy goods or services, companies with an ISO 9001 quality management system in place are expected to increase their customer base, their market share, and, ultimately, their sales. These acquired benefits are referred to as external benefits.

According to Manders and de Vries, the successful implementation of a quality management system according to the ISO 9001 standard should be reflected in the improvement of the efficiency of internal processes, which will contribute to the improvement of the financial perspective through internal benefits, such as, for example, by increasing work productivity [10]. Better production and possession of the certificate should lead to higher sales, which will also be reflected positively in the financial perspective, which will be measured by the return on assets (ROA) indicator. From this, it can be concluded that a company that decided to make a strategic decision and implemented a quality management system according to the ISO 9001 standard should achieve better financial results than in the years when it did not have the standard through internal and external benefits obtained, or through both benefits at the same time [11].

Heras et al. conducted a comparative study that analyzed the relationship between the profitability of the company and the obtained ISO 9001 certificate, based on the comparison of two equally represented samples of companies from the Basque Country. The samples were divided into companies that owned the ISO 9001 certificate and those that did business without it, and their data was processed for a period of five years. Using statistical methods, the authors of the work found that there is a significant positive difference between individual companies in the ROA indicator in favor of companies that had an established quality management systems according to the ISO 9001 standard [12].

Another investigation by Corbett et al. found that companies that implemented a quality management system showed an increase in financial performance, which was expressed by several indicators, such as ROA, return on sales (ROS), and turnover growth, when compared to other similar companies that did not possess the ISO 9001 certificate [13].

Starke et al. analyzed the impact of ISO 9001 certification on a sample of Brazilian companies from 1995 to 2006. The results indicated a positive impact on financial performance that was measured by percentage growth in sales and return on sales (ROS) [14]. Fatima, on the other hand, based on a sample of 58 companies listed on the stock exchange in Karachi, demonstrated that the established quality management system according to the ISO 9001 standard had an overall favorable effect on the financial performance of the companies. However, this influence was not significant for the smaller companies represented in the selected sample of organizations [15]. On the other hand, Kafetzopoulos et al., after researching a sample of 287 Greek companies, came to the conclusion that the introduction of a management system according to the ISO 9001 standard did not have a direct impact on the company's performance, including the financial one. However, in their research, they discovered an indirect effect through improved operational performance and an overall increase in production quality [16].

Benner and Veloso investigated the relationship between the quality management system represented by the ISO 9001 certificate and the financial performance of companies in the American car dealer market in their study [17]. This study included a sample of 75 companies from the industry that were investigated over a period of 10 years. Their work was one of the first to focus on a particular specific industry over a relatively long period of time covering an entire business cycle. Benner and Veloso used several indicators to measure the financial performance of companies—two traditional indicators (return on assets (ROA) and return on sales ROS) and one indicator of long-term industry profitability and profit based on market values (Tobin's Q). The results of the work led both authors to the conclusion that if the majority of companies within the industry already have a quality management system in place according to the ISO 9001 standard, companies that obtain the ISO 9001 certificate later will not achieve such a permanent growth in financial indicators [17].

The performed analyses showed that companies that decided to implement a quality management system according to the ISO 9001 standard showed an improvement in financial performance in most of the following years.

Bhat and Veber et al. highlighted quality management as one of the most important factors in determining success in today's highly competitive and global market [18,19].

Constant development and progress in knowledge enable high product quality standards to be achieved, and quality management is the cornerstone of companies' competitive strategies. Weber et al. also talk about the strong competitive environment and the search for survival tools in the fight for the customer [19]. In the introduction of a quality management system, in an environment where supply exceeds demand and which is strongly influenced by deepening globalization due to market liberalization, they see a way out of how the company can cope with competitive pressures. If the company is not able to succeed in this fight, it risks losing its position in the market.

If an organization decides to implement a quality management system according to ISO 9001, it has several expectations associated with the implementation of the system [20,21].

Companies that are thinking about introducing a quality management system must also take into account its complexity, especially time- and finance-wise [21]. Organizations will spend financial resources on the introduction, certification, and, subsequently, also on the maintenance of the quality management system [22]. The introduction of the system alone will not bring immediate success and an immediate increase in profit [23,24]. The success of these processes is mainly ensured by workers, authorized persons, communication, and the precise approach of the management to its employees. There are many factors in the system that cause the subsequent profitability of the organization. It goes without saying that the costs of quality management can also be reflected in the prices of products or services that the given organization sells.

The introduction of a quality management system according to the ISO 9001 standard can bring many benefits, but, nevertheless, the organization does not have to show higher financial performance immediately after obtaining the certificate. Increased process control, quality, productivity, and efficiency can improve customer satisfaction and, thus, provide some external benefits. Manders et al., argue that the ISO 9001 certificate itself can provide benefits by signaling quality and by providing firms with access to new markets and new customer segments [25].

The connection between the obtained benefits of a non-financial nature and the ISO 9001 certificate is proven by a whole range of studies and research. For example, in his work, Abdalsalam examined the motivation of 300 Malaysian manufacturing companies to obtain ISO 9001 certification. The results of his work revealed that the sample of companies he investigated implemented a quality management system according to the ISO 9001 standard due to external pressure from customers. Due to the fact that companies were "forced" to take this step, to which they were not very committed and had no other motivation for complying with the requirements of the ISO 9001 standard, he showed that they received much less benefits. It is thus necessary to state that the motive for obtaining certification is an important prerequisite for performance [26].

In a study by the Australian Manufacturing Council, it was found that certified companies, especially export-oriented companies, reported that, after implementing a quality management system, they experienced an increased perception of product quality by customers [27]. This signaling benefit is important, both for existing customer segments and for maintaining their trust, and it is also important for attracting new customers and penetrating new markets. The study concluded that the implementation of a quality management system led to an improvement in both the perceived and actual value of the products, as well as an improvement in the overall performance of the organization among the surveyed firms. Similar conclusions were reached by Luís Lourenço et al., who highlighted in their research the results that spoke of the distinct advantages stemming from the introduction of a quality management system according to the ISO 9000 standard. The companies assessed by them stated, as the main motivation for obtaining the ISO certificate, that it was either as a requirement to improve their image or done out of pressure from the environment, when strategic partners required a certificate or the competition already possessed a certificate, or new customers demanded it, etc. [28].

One of the most discussed topics in the field of ISO 9001 certification is how the adoption of the standard will be reflected in financial statements and how this impact can

be measured [29]. It is assumed that the introduction of a management system according to the ISO 9001 standard can affect the financial performance of the company either directly or indirectly through the obtained internal or external benefits. Performance measurement is a process that tells whether the planned and implemented operations were effective and purposeful [5].

Indicators, such as return on assets (ROA), return on sales (ROS), or return on equity (ROE), are most often used to measure performance [29].

The impact of the introduction of a management system according to the ISO 9001 standard on financial performance was manifested in many studies primarily by influencing sales and profitability, which is expected by all companies that have implemented the system or are only considering implementing it [30]. This statement is also supported by Häversjö, who, based on a comparison of two equally sized groups of companies (companies with and without the introduction of a management system), discovered a big difference precisely in the increase in sales in favor of companies possessing the ISO 9001 certificate [31,32]. However, the effectiveness of possessing the ISO 9001 standard certificate on the performance of transport companies after the successful implementation of the standard as a strategic step to achieve better competitiveness is questionable [33]. If the main interest of the transport company is the customer, the company should certainly consider their needs and requirements in order to maintain a competitive advantage and survive in the market by satisfying them. However, in oversaturated markets, it is necessary to offer the customer a high-quality product or service, which should be signaled by the possession of the ISO 9001 standard certificate. Consequently, if the certificate increases customer confidence and drives them to buy, companies with an ISO 9001 management system in place are expected to increase their customer base, their market share, and, ultimately, their sales. Based on this consideration, the hypothesis was verified in the article as to whether transport companies, after obtaining the certificate, showed an improvement in the area of sales as measured by the return on sales (ROS) indicator.

Corporate sustainability and its investigation using the latest versions of the three main BEM models were examined through the analysis of their criteria, core values, and the overall approach of these models [34].

The COVID-19 pandemic affected both the provision of transport services and its quality [35]. Also, the quality and safety of the provided transport services has been influenced by the quality and permeability of the transport infrastructure [36].

It is already necessary to investigate the causal link between total quality management (TQM), established management procedures, and environmental sustainability through the performance of the organization [37].

Freight transport was selected for investigation, considering that it was also significantly affected by the impact of the COVID-19 pandemic, especially during the lockdowns, which also affected the production, sales of products, and, thus, the drop in demand for transport. Also, based on the authors' available information, there were no published articles on whether the established quality management system according to the ISO 9001 standard contributed to maintaining the performance of road freight transport companies, even during the COVID-19 pandemic.

The impact of the introduction of the quality management system on the performance of transport companies was investigated through the use of several tools of financial, regression, and correlation analysis, and this is original compared to the contributions published so far, which, moreover, did not deal with transport companies.

As part of the research carried out at transport companies, four research questions were formulated:

- **Research question 1:**

Do the observed variables (ROA, ROS, labor productivity, size of the transport company, and age of the transport company) show a significant positive difference in their average values in the period after the introduction of the management system according to the ISO 9001 standard when compared to the period without this management system?

- **Research question 2:**

Is there a significant relationship between the established ISO 9001 management system and the ROA, and is this relationship positive?

- **Research question 3:**

Is there a positive relationship between the ROA and all independent variables (ROS, labor productivity, size of the transport company, and age of the transport company)?

- **Research question 4:**

What values did the selected financial indicators achieve in the investigated transport companies in 2020 during the COVID-19 pandemic?

3. Material and Methods

The data on transport companies that were analyzed in this work were obtained from the register of carriers kept in the Unified Information System in Road Transport (JISCD) and from the Register of Accounts of the Slovak Republic (RUZ).

The JISCD database provided all information on whether the given transport company has been issued a permit to operate as a road freight transport operator, whether it carries out international freight transport, and whether it has been issued a community license and for how many vehicles.

One of the important factors that must be taken into account when talking about the implementation of ISO 9001 is the time factor [38]. It is not possible to implement the entire system in one day, and the organization must take into account that the implementation itself will not be a momentary matter. The total duration of the implementation of the quality management system depends on the company's readiness [39]. The very process of introducing the management system is no longer time-consuming, and the organization can obtain it, depending on the number of employees, complexity of certified activities, and number of branches, in anywhere from 8 to 16 months. The time of introduction of the quality management system for road freight transport was determined based on the long-term practical experience of one of the authors of the paper.

The ISO 9001 certificate can only be issued by the relevant certification body that certifies quality management systems. In Slovakia, 35 accredited entities are registered by the Slovak National Accreditation Service for the implementation of the above certification according to ISO 9001, which can perform the certification of quality management systems according to ISO 9001 within the scope of accredited activities [40]. For the introduction of the management system according to the ISO 9001 standard in transport companies, it is necessary that, in the scope of accreditation, code 31 NACE 49 be indicated in the activities.

The statistical classification of economic activities (hereinafter referred to as "SK-NACE") is intended for the categorization of data related to an economic entity as a statistical unit. The SK-NACE classification of economic activities is based on the standard classification of economic activities of the European Union NACE. One of the industries of this classification is transport and storage, which is listed in section H. This section includes the transport of people and goods in regular as well as irregular transport, rail, pipeline, road, water, air, and ancillary activities in transport, such as, e.g., activities in station and parking facilities, cargo handling, storage, etc. This section also includes the rental of the means of transport with a driver or attendant, and the activities of the post office and other postal companies (courier services) are also included here. Transport companies are included in division SK-NACE 49—Land transport and pipeline transport. Specifically, SK-NACE 49.3, "Other passenger land transport", is included in the sections. This group includes all activities related to passenger land transport, except rail transport. However, rail transport carried out as passenger transport by urban and suburban transport systems is also included in this group. Group SK-NACE 49.3 contains three classes:

- 49.31: Urban or suburban passenger land transport;
- 49.32: Taxi service;

- 49.39: Other passenger land transport.

Division 49 also includes group SK-NACE 49.4—"Freight road transport and removal services"—and contains two classes:

- 49.41: Freight road transport;
- 49.42: Removal services.

Class 49. 41 includes all types of goods transportation on roads:

- Transportation of goods, including wood;
- Supply;
- Transportation by refrigerated means of transport;
- Transportation of heavy loads;
- Transportation of excessive goods and transportation in tank vehicles, including collection of milk from farms;
- Transportation of means of transport;
- Transportation of waste and waste material, without waste collection or disposal;
- Rental of heavy vehicles with a driver;
- Transportation of goods by vehicles pulled by humans or animals.

In the Register of Financial Statements of the Slovak Republic (RUZ), there was a clear list of companies that were classified in the SK-NACE category 49.4—"Freight road transport and removal services"—and data on their financial statements was kept for these companies. In the next step, it was determined whether the given company from the required SK-NACE 49.4 category has an ISO 9001 certificate through the carriers' websites.

The investigated sample of companies was created on the basis of the following requirements:

- the transport company introduced a quality management system according to ISO 9001 in the monitored period from 2013 to 2014;
- the availability of financial statements consisting of the balance sheet, profit and loss statement for the financial statements for the monitored period from 2009 to 2020;
- the ability to examine selected indicators before and after the introduction of the quality management system according to ISO 9001;
- the transport company was included in the SK-NACE category 49.4—"Freight road transport and removal services";
- the transport company was issued a permit to exercise the profession of road freight transport operator;
- the transport company had a community license issued;
- the transport company had its registered office on the territory of the Slovak Republic.

Based on the above requirements and, for an objective assessment of the impact of the introduction of a quality management system according to ISO 9001 on financial performance, only those transport companies that had a quality management system in place during a certain specified period were selected. Thus, the main criterion for choosing a suitable transport company for examining the financial situation was the introduction of a quality management system according to ISO 9001 in 2013 and 2014 that was already in place for existing companies operating in the transport sector. For that reason, only 17 suitable transport companies based in Slovakia were selected for evaluation; their business activity was related to the performance of road freight transport operator activities, and they had been issued community licenses. Twelve transport companies from this sample obtained the ISO 9001 certificate in 2014, and five companies obtained the certificate in 2013. Information about the companies analyzed in this paper was obtained from the RUZ database. Ten companies were selected, which were categorized as small enterprises with the number of employees ranging from 9 to 49 employees, of which 698 were registered in Slovakia as of 31/12/2021, and seven companies that were categorized as medium-sized enterprises, with the number of employees ranging from 50 to 99 employees, were selected, of which, there were 87 registered in Slovakia as of 31/12/2021 according to the register of financial statements.

With the help of statistical analysis of these data, the significant characteristics of business management, which were associated with financial results, were investigated and interpreted. One of the basic requirements for the selection of transport companies in the researched sample was the operation of companies in the same industry in order to avoid data distortion due to other conditions in different sectors of the economy. From this procedure, a sample of 17 transport companies was subsequently created. The data obtained for the purpose of research can be identified as panel data. An example of data processing of transport company no. 9 and the calculation of selected variables is given in Table S1.

Regression and correlation analysis and statistical hypothesis testing were used to determine the impact of the introduction of a quality management system according to the ISO 9001 standard on the financial performance in selected transport companies. It was necessary to consider the existence of a large number of variables that could affect the financial performance of the monitored transport company, and, therefore, it was important to define a group of variables that must reflect the impact of the implementation of the quality management system according to the ISO 9001 standard on the company's financial performance [12]. The dependent variable that was included in this research within the regression model was the return on assets indicator (ROA). The independent variables were mainly the return on sales indicator (ROS), labor productivity, the size of the transport company, the age of the transport company, and the fact of whether the company in the monitored data held the ISO 9001 standard certificate.

MS Excel and the data Analysis tool were used for graphical data processing, as well as correlation and regression analysis.

4. Results

4.1. Evaluation of the Impact of the Introduction of a Quality Management System According to the ISO 9001 Standard in Selected Transport Companies on their Financial Performance

In the following text, descriptive statistics of data from an accumulated sample of 17 transport companies classified according to the SK-NACE 49410 classification are elaborated. All companies from this sample obtained the ISO 9001 certificate for the observed period of 2009 to 2020.

From Table 1, which summarizes the resulting values of selected indicators of individual variables, it is possible to read, for example, the maximum and minimum values. For ROA, which was established as a key indicator for measuring the impact of the implementation of the ISO 9001 standard, it takes a minimum value of -1 . The ROS indicator also shows another minimal negative value. These negative values (ROA, ROS and PP) occurred in the first two monitored years 2009 and 2010, which could be due to the impact of the economic crisis at the time. Another negative value was recorded for one firm in its first year of business, and other negative values were recorded in the penultimate monitored year 2019, which could be due to the fact that 2019 was one of the worst years in transport, which was also confirmed by the association of road carriers in the Slovak Republic, known as ČESMAD, in Slovakia [41].

Table 1. Resulting values of selected indicators for the period 2009 to 2020 for all 17 transport companies.

Variable	ROA (EBIT)	ROS	PP	AGE	SIZE
Before certification	0.0173	0.0239	3.1881	0.6360	5.7555
After certification	0.0917	0.0497	2.8833	1.0023	6.3432
Minimum	-1.0000	-0.1594	-2.0468	0.0000	0.0000
Maximum	0.7766	0.4268	6.9209	1.5798	7.0131
Mean value	0.0692	0.0407	2.7823	0.8734	6.1293
Standard deviation	0.1486	0.0557	1.3085	0.3511	0.6402

4.1.1. Verification of Research Question 1

The first of the established research questions is the assumption as to whether the monitored variables show a significant positive difference between the averages in the period before and after obtaining the ISO 9001 certification. To test this hypothesis and find a significant difference between the means, a two-tailed paired t-test was performed at a significance level of 5%.

The observed variables (ROA, ROS, size of the transport company, and age of the transport company) showed a significant positive difference in their average values in the period after obtaining ISO 9001 certification when compared to the period without certification.

The results of individual t-tests are listed in Table 2, and the total values of p is given in the last column of Table 2, which represents the probability of hypothesis H1—whether the observed variables (ROA, ROS, AGE and SIZE) show a significant positive difference in their average values in the period after obtaining ISO 9001 certification when compared to the period without certification. Since the p value is lower than 0.05 for four variables, it means that there was a statistically significant difference between the means before and after certification. For the variables SIZE and AGE, the p value was lower than 0.01, which indicated a statistically highly significant difference.

Table 2. Two-sided paired t-test at the significance level of 5%.

Variable/ Average for the Entire Monitored Period	Before Certification	After Certification	P (T<=t) (2)
ROA (EBIT)	0.0173	0.0917	0.0269
ROS	0.0239	0.0497	0.0458
PP	3.1881	2.8833	0.3456
AGE	0.6360	1.0023	0.0000003
SIZE	5.7555	6.3432	0.0000015

In the first part of the investigation, a statistically significant impact of the ISO 9001 standard in the monitored companies on the monitored variables was demonstrated. Using the t-test, a significant difference in the values of ROA, ROS, labor productivity, and the size of the transport company was demonstrated in the periods when the companies did not have the certificate and vice versa. With this evidence, we do not reject the first hypothesis, and we can therefore claim that the ISO 9001 standard positively influenced the development of the monitored transport companies. However, this test does not take into account other external influences apart from the aforementioned introduction of the ISO 9001 standard. The result of this investigation coincides with the results of similar studies. For example, Kiplagat, who in her work compared the impact of ISO 9001 implementation in government organizations, also found significant differences in ROA and ROS metrics and their average values before and after certification [42]. The aforementioned Heras et al. and Corbett et al. also worked towards a positive result [12,13].

4.1.2. Verification of Research Questions 2 a 3

Another of the set research goals was to examine the relationships between ROA, ROS indicators, labor productivity, and possession of the ISO 9001 certificate. In order to find out which variables were in a positive relationship and which were in a negative relationship, it was necessary to proceed to the compilation of a correlation matrix.

In Table 3, it can be seen that the strongest correlation was between return on assets and return on sales. The weakest relationship can then be seen between the ISO variable and labor productivity. It is a very significant and positive fact that the ROA indicator and the status of the ISO 9001 standard had a positive correlation.

Table 3. Correlation matrix.

	ROA (EBIT)	ROS	PP	AGE	SIZE	ISO
ROA (EBIT)	1					
ROS	0.72165	1				
PP	0.38498	0.30695	1			
AGE	0.16732	0.11311	0.04316	1		
SIZE	0.24112	0.15661	0.22096	0.50428	1	
ISO	0.22154	0.23266	0.08539	0.49893	0.440730	1

The construction of the correlation matrix also enabled verification as to whether there was multicollinearity between the independent variables, which is considered a defect in econometrics that could jeopardize the construction of the regression model. According to Koop, a problem with multicollinearity can become apparent if the absolute correlation figure between two variables is greater than 0.9 [43]. In addition, Carmines and Zeller reported that correlation data with an absolute value of less than 0.85 did not indicate any problem with multicollinearity, which speaks in favor of the matrix constructed above [44].

In the next part of the research, a regression and correlation analysis were developed to verify the impact of the ISO 9001 standard on the financial efficiency of the company. This was verified by the correlation matrix. ROS indicators, labor productivity, the age of the transport company, and the size of the transport company also showed a positive correlation between each other. This fact leads to not rejecting the second hypothesis (whether there is a significant correlation relationship between ISO 9001 certification and ROA and whether this relationship is positive) and the third hypothesis (whether there is a positive correlation relationship between ROA and all independent variables—ROS, labor productivity, the size of the transport company, and the age of the transport company), which is how we aim to fulfill the goal of this research. Failure to reject these research question leads to the conclusion that the implementation of the ISO 9001 standard was an excellent strategic decision for the selected transport companies and had a positive impact on their performance. Moreover, the mutual positive correlation between all variables leads to the conclusion that there was no effect during the implementation, when the implementation would negatively affect one variable at the expense of the other.

The introduction of a quality management system according to the ISO 9001 standard had a significant and positive impact on ROA in a selected sample of transport companies, but also on a significant indicator of the financial performance of the ROS.

4.2. Evaluation of the Financial Performance of Selected Transport Companies in Connection with the COVID-19 Pandemic

The global crisis caused by the COVID-19 pandemic has significantly affected the activities of almost all sectors of the national economy. Transport companies were forced to carry out their activities under extremely difficult conditions due to the suspension or significant reduction of deliveries in most sectors of industrial production, especially in the first months of the pandemic, as well as due to various transport restrictions and control restrictions at border crossings. Freight transport around the world has been affected by the pandemic since December 2019, when the first case of the virus was identified in Wuhan, China, followed by a gradual spread of the infection around the world, resulting in an ongoing pandemic. In the Slovak Republic, the first cases of the disease were confirmed on the 6 March 2020. The state already took the first measures in the fight against the spread of the disease on the 6th of March. As of the 16th of March, schools were closed and a state of emergency began. The first easing of measures related to international transport only took place from June 2020. The performance of normal activities was significantly limited from mid-March to mid-June. After the summer relaxation, measures against the pandemic and the subsequent drop in transport demand were again introduced in the fall. All these restrictions caused by the spread of the coronavirus significantly

affected transport in 2020, despite the fact that freight carriers were not greatly restricted by the measures issued by the state. As part of the effort to prevent the spread of the coronavirus, the production of some goods was slowed down or completely suspended, which meant a large decrease in transport for road freight transport. Food transport is especially important in international road freight transport. The transportation of food goods across the border was very problematic during the crisis, primarily because of the established border controls. States imposed strict measures as part of the state of emergency, and inspections of trucks and their drivers were too time-consuming, which was especially a big problem for trucks transporting perishable food. The delay at the border meant for the carriers that all contracted transports were not carried out according to plan. The biggest impact on international road freight transport was mainly the slowdown or complete suspension of production in the automotive sector in the Slovak Republic, as well as throughout Europe. It was a big problem for a transport company focusing primarily on this sector, as shutdowns were announced day after day and, subsequently, the transports started to be cancelled. At one time, carriers had no work for their vehicles, which had to be shut down or temporarily decommissioned.

A total of 10 % less goods were transported by road freight transport by Slovak carriers in 2020 than in 2019, when there was no COVID-19 pandemic in Slovakia. Performance in freight transport in 2020 reached almost 31,500 mil. ton kilometers (tkm), which was roughly 7% less than compared to 2019 [45].

Verification of Research Question 4

The way in which the COVID-19 pandemic affected transport companies that had an established quality management system according to ISO 9001 in the selected researched sample is shown through the indicators of profitability of assets, sales, labor productivity, and size in Table 4.

Table 4. Development of the values of selected indicators in the investigated 17 transport companies in the years 2018 to 2020.

Indicator	2020	2019	2018
ROA EBIT	0.0633	0.0232	0.0677
ROS	0.0453	0.0196	0.0436
PP	2.2437	2.4573	2.3760
SIZE	6.2711	6.2879	6.3261

All the values of the selected indicators acquired positive values in 2020 during the COVID-19 pandemic, which could also be due to the fact that the companies had an established quality management system according to ISO 9001 and had stable customers of their provided services. As was already mentioned, 2019 was one of the most challenging years for transport, which was also reflected in the decline of almost all indicators. Figure 1 shows the most monitored financial performance indicator, the ROS revenue profitability indicator, which reached positive values in 2020 for 16 transport companies from the selected analyzed sample, and, in only one company, (transport company no. 4) its value reached a negative value.

The mentioned decrease in the given company could be mainly due to the fact that the company only deals with the provision of fuel transportation services for the network of gas stations and asphalt transportation, and, due to limited economic activity and reduced mobility, the demand for fuel in transportation had significantly decreased. Gasoline demand in 2020 fell by 9% and diesel demand fell by around 6% [46]. In five companies, despite the COVID-19 pandemic, the ROS financial performance indicators in 2020 reached their historical highs and their highest values since the companies in question were established.

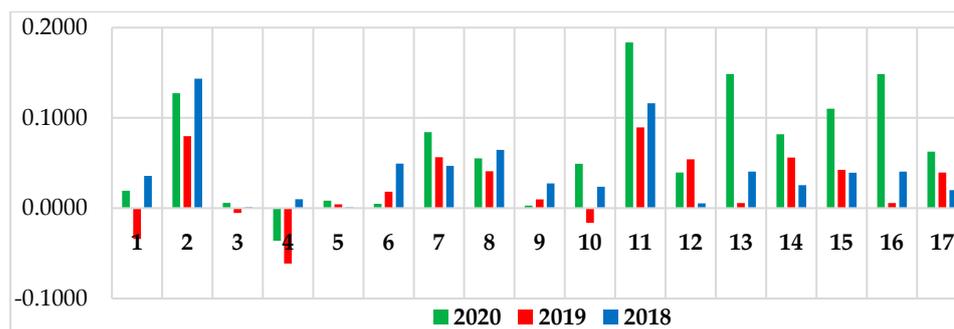


Figure 1. Financial performance of the investigated transport companies in the years 2018 to 2020.

5. Discussion and Conclusions

The quality of a product or service is considered one of the most important factors for success in a competitive environment. For this reason, companies try to obtain a quality certificate and then keep it. There are many publications and discussions about whether or not there is any causal relationship between having an ISO 9001 certificate, which sets out the requirements for quality management. Although this standard is associated with obtaining benefits, there are also many critics of this standard. Already at the beginning of this century, the standard was criticized for its vagueness and excessive emphasis on quality control instead of its creation. However, the latest revision of the standard from 2015 is even more general [47]. This is probably the result of striving for the greatest possible universality with the aim of wide diffusion and sale. This commercialization trend is also a target of criticism in this area and, according to many, it is another driving force leading to further devaluation of the ISO 9001 standard. Therefore, companies try to acquire other standards, which are more strict and more specialized for their field, in order to stand out from their competition in the field. The current trend in Europe with the number of certificates is trending rather downward, and it would be interesting to find out why.

Escanciano concludes in his study that implementing a quality management system costs the organization an unnecessary amount of time and money [48]. Some other authors describe the introduction of the system as an investment with a short payback period. Even if these spent funds will be viewed as investments, their return in the form of some benefits promised by the adoption of the standard cannot be so easily quantified financially. According to Dick's empirical research, the costs associated with investment in obtaining a certificate are associated with diminishing returns [49]. Based on its results, the recognized, albeit expensive, implementation of a quality management system ensures quality improvement, but does not always lead to an increase in company performance. According to Heras et al., obtaining a quality certificate according to ISO 9001 is not a bad investment, but the management's expectations regarding the benefits obtained must not be exaggerated [12]. As already mentioned, by introducing ISO 9000 series standards, the organization does not automatically obtain all the benefits arising from it. Many certification bodies deal purely with the fulfillment of the standard and are not concerned with the effectiveness of their processes as such.

Currently, there are 35 certification bodies of quality systems in Slovakia. Despite the fact that the requirements for the introduction of a quality management system are the same, the approach of some certification companies differs many times in practice, which leads to a certain devaluation [49]. By providing this service, various entities pursue their own goals and achieve their own profit, and thus strive for the greatest possible diffusion of these standards.

However, if the ISO 9001 standard were not linked to the benefits of future internal or external benefits, which, in sum, outweigh its shortcomings, it can be assumed that no entity would have voluntarily taken such an irrational decision to introduce it. Despite this, this standard cannot be criticized for the fact that it is a basic building block for a sustainable quality management system that will ensure quality production and customer satisfaction.

After that, it only depends on the company itself, which path of quality improvement it takes, and which concept or model it chooses.

Transport was selected for research due to the fact that it was significantly affected by the impact of the COVID-19 pandemic, especially at the time of lockdowns, which also affected the production and sale of products and, thus, the drop in demand for transport. The second reason was that, based on the authors' available information, contributions were not published as to whether the established quality management system according to the ISO 9001 standard contributed to maintaining the performance of road freight transport companies even during the COVID-19 pandemic. The impact of the introduction of the quality management system on the performance of the assessed sample of transport companies in the Slovak Republic was investigated through the use of several tools of financial, regression, and correlation analysis, and this is original compared to the contributions published so far, which also did not deal with transport companies.

By examining the data and considering the non-rejection of the research questions, it can be claimed that the significant positive impact of the established quality management system according to ISO 9001 on the performance of the selected sample of 17 transport companies after its successful implementation as a strategic step to achieve better competitiveness was demonstrated for the selected transport companies. This positive result can be helpful for owners of transport companies when deciding whether to implement the ISO 9001 standard or when deciding whether to keep the certificate. Also, this result can be used when setting minimum quality requirements for carriers. However, it should be noted that this positive impact was confirmed on a relatively small sample of transport companies that are registered in the territory of the Slovak Republic, but, nevertheless, it is possible to state that if the transport company decides to introduce it, it will be a strategically important step towards a future linked to financial and non-financial benefits. After that, it only depends on the company itself, which path of quality improvement it takes, and which concept or model of the quality management system it chooses. Even so, this result can be helpful to the owners or management of transport companies when deciding whether to accept or maintain the certificate. The quality of a product or service is considered one of the most important factors for success in a competitive environment, and, for that reason, companies try to obtain and maintain this certification. Increasing the level of customer satisfaction must be one of the main goals of any organization, and the future of a given company depends on customer behavior. The quality management system had no negative impact on the selected sample of transport companies, and its implementation was not financially demanding for the companies, as the companies were able to cover the costs of implementing the quality management system according to the ISO 9001 standard and its subsequent maintenance from their financial resources for profit. The introduction of a quality management system according to the ISO 9001 standard has a demonstrably positive effect on the quality of the transport company's activities, and the introduction of a legislative obligation to introduce a quality management system according to the ISO 9001 standard, or by establishing legislative standards, such as in the case of public passenger transport, for operators of road freight transport, would be one of the effective measures to improve the quality of the activities of carriers in the Slovak Republic, as well as by increasing the competitiveness of Slovak carriers on the international market. Also, in the strategic plan for the development of transport of the Slovak Republic until 2030, a strategic global goal has been set in the form of increasing the competitiveness of transport modes in passenger and freight transport by setting the corresponding operational, organizational, and infrastructural parameters that lead to an effective integrated multimedia transport system that supports the economic and social needs of the Slovak Republic. The legislative regulation of the obligation for operators of road freight transport above a certain number of vehicles to have an established quality management system according to the ISO 9001 standard could also help to achieve this goal. Without this obligation, however, very few transport companies decide to introduce the standard voluntarily, even though they know that it is necessary to pay attention to quality. Unfortunately, the carriers do not have their

own initiative to introduce this system, and there are only a very small number of transport companies in Slovakia that have a quality management system in place, which was found when selecting suitable companies for the sample for analysis.

The size of the sample of investigated transport companies in the Slovak Republic was influenced by the requirements for their selection, which included the following: the transport company introduced a quality management system according to ISO 9001 in the monitored period from 2013 to 2014; the availability of financial statements consisting of the balance sheet, as well as profit and loss statements for the monitored period from 2009 to 2020, to be able to examine selected indicators before and after the implementation of the quality management system according to ISO 9001; the transport company was included in the SK-NACE category 49.4 “Freight road transport and removal services”; the transport company had a community license (EU license) issued; and the transport company had its registered office in the territory of the Slovak Republic. Many road freight transport companies implemented a quality management system in the years 2002–2008, that is, before and after the entry of the Slovak Republic into the European Union (1 May 2004), and they are not included in this sample. But if we were to include data from the period before the entry of the Slovak Republic into the European Union and the adoption of the Euro (1 January 2009) into the study of the selected indicators, this would affect the results of the research according to the authors of the paper.

The decisive factor for the introduction of a quality management system according to ISO 9001 into the activities of road freight transport companies in the countries of the European Union is the requirements of customers. In some state contracts in the Slovak Republic, in addition to the price, there are also requirements for an established and certified quality management system according to the ISO 9001. In further research, it would be possible to examine which transport companies (according to the number of vehicles and type of transport services (e.g., transport of dangerous goods, foodstuffs, etc.)) have the most established quality management system and the highest percentage share of transporters according to their headquarters in the EU member states and beyond.

The condition of possessing the ISO 9001 certificate could be further introduced as another essential criterion for the redistribution of CEMT permits.

The introduction of a quality management system according to ISO 9001 can have a positive effect on the financial performance of transport companies, even in unexpected cases or unfavorable periods, such as the COVID-19 pandemic. The research found that the most monitored indicator of financial performance, the ROS revenue profitability indicator, in the worst pandemic year of 2020, reached positive values in 16 out of 17 transport companies that had implemented a quality management system according to ISO 9001, and, in five transport companies, the given indicator reached, in 2020, its historical maximums and highest values since the establishment of the companies in question. The stated positive results during such an unfavorable business period could also be caused by the benefits that flow from the established quality management system according to ISO 9001, such as a competitive advantage, the credibility of foreign clientele, or the image of a good, reliable company.

Based on the results of the research on the research questions, it is possible to recommend the introduction of a quality management system according to ISO 9001 to the road freight transport industry.

Due to the increasing demands of customers on sustainability, a number of transport companies are introducing the requirements of the ISO 14001 Environmental Management System into their processes.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/su15032401/s1>.

Author Contributions: Conceptualization, R.C. and J.G.; methodology R.C. and J.G.; software, R.C.; validation R.C. and J.G.; formal analysis, J.G. and R.C.; resources, R.C. and J.G.; data curation, R.C. and J.G.; writing—original draft preparation, J.G.; writing—review and editing, J.G.; visualization,

R.C.; supervision, J.G.; project administration, J.G.; funding acquisition, J.G. All authors have read and agreed to the published version of the manuscript.

Funding: This research was created thanks to support from the Operational Program Integrated Infrastructure for the project, which is titled: Identification and possibilities of implementation of new technological measures in transport to achieve safe mobility during a pandemic caused by COVID-19 (ITMS code: 313011AUX5). The research was co-financed by the European Regional Development Fund.

Conflicts of Interest: The authors declare no conflict of interest.

References

- Zhu, F.; Wu, X.; Gao, Y. Analysis of the decoupling of freight transport from economic growth in China. *Transp. Res. Part D Transp. Environ.* **2020**, *78*, 102201. [CrossRef]
- Gokpinar, E.; Tansle, Y.; Yurdakul, M. Analysis of Performance Improvement Brought by the Application of an ISO 9001 Quality Management System with TOPSIS Approach. *Int. J. Knowl. Based Organ.* **2019**, *9*, 1–13. [CrossRef]
- Mazzarol, T.; Reboud, S. *Small Business Management: Theory and Practice*; Springer: Berlin/Heidelberg, Germany, 2020. [CrossRef]
- Veltri, S. The Relationship between Financial and Non-financial Risk. In *Mandatory Non-financial Risk-Related Disclosure*; Springer: Berlin/Heidelberg, Germany, 2020. [CrossRef]
- Mahmood, C.; Yunos, R.; Aris, A. *ISO 9001 Certification and Financial Performance*; ISO: Geneva, Switzerland, 2014.
- Cândido, C.; Coelho, L.; Peixinho, R. The financial impact of a withdrawn ISO 9001 certificate. *Int. J. Oper. Prod. Manag.* **2016**, *36*, 23–41. [CrossRef]
- Kusumah, L.H.; Herliani, L.; Fabianto, Y.S. The differences in the financial performance of manufacturing companies in Indonesia before and after ISO 9000 implementation. *Total Qual. Manag. Bus. Excell.* **2018**, *29*, 941–957. [CrossRef]
- Nenadál, J. *Quality Management Systems: What, Why and How to Measure?* Management Press: Prague, Czech Republic, 2016; 224p, ISBN 9788072614264.
- Ab Wahid, R.; Corner, J.L. Critical Success Factors and Improvements in ISO 9000 Maintenance. *Bus. Manag. Q. Rev.* **2011**, *2*, 1–13.
- Basak, M.; de Vries, H.J.; Blind, K. ISO 9001 and product innovation: A literature review and research framework. *Technovation* **2016**, *48–49*, 41–55. [CrossRef]
- Hudec, J.; Šarkan, B.; Czôdřová, R.; Caban, J. The Influence of Quality Management System on the Operation of Periodical Technical Inspection Stations. *Appl. Sci.* **2021**, *11*, 4854. [CrossRef]
- Heras, I.; Casadesús, M.; Dick, G. ISO 9000 certification and the bottom line: A comparative study of the profitability of Basque region companies. *Manag. Audit. J.* **2002**, *17*, 72–78. [CrossRef]
- Corbett, C.J.; Montes-Sancho, M.J.; Kirsch, D.A. The financial impact of ISO 9000 certification in the United States: An empirical analysis. *Manag. Sci.* **2005**, *51*, 1046–1059. [CrossRef]
- Starke, F.; Eunni, R.; Fouto, N.; Angelo, C. Impact of ISO 9000 certification on firm performance: Evidence from Brazil. *Manag. Res. Rev.* **2012**, *35*, 974–997. [CrossRef]
- Fatima, M. Impact of ISO 9000 on business performance in Pakistan: Implications for quality in developing countries. *Qual. Manag. J.* **2014**, *21*, 16–24. [CrossRef]
- Kafetzopoulos, D.P.; Psomas, E.; Gotzamani, K.D. The impact of quality management systems on the performance of manufacturing firms. *Int. J. Qual. Reliab. Manag.* **2015**, *32*, 381–399. [CrossRef]
- Benner, M.; Veloso, F. ISO 9000 practices and financial performance: A technology coherence perspective. *J. Oper. Manag.* **2007**, *26*, 611–629. [CrossRef]
- Bhat, S.K. *Total Quality Management*; Himalaya Publishing House: Mumbai, India, 2010.
- Veber, J.; Plášková, A.; Hůlová, M. *Management of Quality, Environment and Occupational Safety: Legislation, Systems, Methods, Practice 2, Updated*. Management Press: Prague, Czech Republic, 2010; ISBN 978-80-7261-210-9.
- Andres-Jimenez, J.; Medina-Merodio, J.-A.; Fernandez-Sanz, L.; Martinez-Herraiz, J.-J.; Ruiz-Pardo, E. An Intelligent Framework for the Evaluation of Compliance with the Requirements of ISO 9001:2015. *Sustainability* **2020**, *12*, 5471. [CrossRef]
- Drenovac, A.; Drenovac, B.; Drenovac, D. Implementation of the ISO 9001 quality management system: Process, impact and benefits. *Vojnotehnicki Glasnik* **2013**, *61*, 248–267. [CrossRef]
- Lourenço, L.; Fonseca, L.; Mendes, L. ISO 9001 Certification: Motivations, Benefits and Impact on Organizational Performance. In Proceedings of the 3rd Annual European Decision Sciences Institute Conference, Istanbul, Turkey, 24–27 June 2012; Available online: https://www.researchgate.net/publication/234130380_ISO_9001_Certification_Mot (accessed on 30 June 2012).
- Evangelos, L.P. The effectiveness of the ISO 9001 quality management system in service companies. *Total Qual. Manag. Bus. Excell.* **2013**, *24*, 769–781. [CrossRef]
- Ionascu, M.; Ionascu, I.; Săcărin, M.; Minu, M. Exploring the impact Of ISO 9001, ISO 14001 and OHSAS 18001 certification on financial performance: The case of companies listed on the Bucharest Stock Exchange. *Amfiteatru Econ.* **2017**, *19*, 166–180.
- Manders, B.; de Vries, H.; Blind, K. The Relationship between ISO 9001 and Financial Performance: A Meta-analysis. *Acad. Manag. Proc.* **2013**, *2013*, 12255. [CrossRef]

26. Abdalsalam, M.A.G. The Motives for ISO 9000 Certification in the Malaysian Manufacturing Companies. Universiti Putra Malaysia. 2004. Available online: <https://www.semanticscholar.org/paper/The-Motives-for-ISO-9000-Certification-in-the-Gader-Mohamed/d1218a4cac797aeb5829b525cddadb42197ec21d> (accessed on 1 February 2004).
27. Australian Manufacturing Council. *Leading the Way: A Study of Best Manufacturing Practices in Australia and New Zealand*; Australian Manufacturing Council: Melbourne, Australia, 1994; pp. 59–63.
28. Lourenço, L.; Lourenço, F.; Luis, L.; Luis, M. ISO 9001 Certification: Motivations, Benefits and Impact on Organizational Performance. 2012. Available online: https://www.researchgate.net/publication/234130380_ISO_9001_Certification_Motivations_Benefits_and_Impact_on_Organizational_Performance (accessed on 15 June 2012).
29. Sulistiyowati, D.; Syafariah, A. Nilai Perusahaan: Dampak dari Return on Asset (ROA), Return on Equity (ROE) dan Corporate Social Responsibility (CSR). *JEMPER J. Econ. Manag. Peranakan* **2019**, *1*, 49. [[CrossRef](#)]
30. Khan, J.; Haleem, A.; Asif, A.; Syed, A. Effectiveness of ISO 9001 Standard Clauses and Sub Clauses in Indian Auto Component Manufacturing SMEs. *Int. J. Oper. Manag. Serv.* **2014**, *4*, 1–16. Available online: https://www.ripublication.com/joms/jomsv4n1_01.pdf (accessed on 30 June 2014).
31. Häversjö, T. The financial effects of ISO 9000 registration for Danish companies. *Manag. Audit. J.* **2000**, *15*, 47–52. [[CrossRef](#)]
32. Kawthar, M.; Vinesh, S.R. The Impact of ISO 9000 Certification on Sales: A Case Study of Mauritius. TIPS Small Grant Scheme Research Paper Series. 2011. Available online: http://www.tips.org.za/files/u65/tips_-_iso_9000_and_sales1nov_2011-mv_clean_mauritius.pdf (accessed on 18 September 2022).
33. Medic, S.; Karlovic, B.; Cindric, Z. New Standard ISO 9001:2015 and its Effect on Organizations. *Interdiscip. Descr. Complex Syst.* **2016**, *14*, 188–193. [[CrossRef](#)]
34. Politis, Y.; Grigoroudis, E. Incorporating the Sustainability Concept in the Major Business Excellence Models. *Sustainability* **2022**, *14*, 8175. [[CrossRef](#)]
35. Konečný, V.; Brádziková, M.; Senko, Š. Impact of COVID-19 and Anti-Pandemic Measures on the Sustainability of Demand in Suburban Bus Transport. The Case of the Slovak Republic. *Sustainability* **2021**, *13*, 4967. [[CrossRef](#)]
36. Dedík, M.; Mašek, J.; Gašparík, J.; Lupták, V. Assessment of the Perspective Ratios in Rail Crossings as an Important Evaluation Factor of Rail Crossings. *Appl. Sci.* **2022**, *12*, 7489. [[CrossRef](#)]
37. Khalil, M.K.; Muneenam, U. Total Quality Management Practices and Corporate Green Performance: Does Organizational Culture Matter? *Sustainability* **2021**, *13*, 11021. [[CrossRef](#)]
38. Sanchez-Lizarraga, M.; Limon, J.; Tlapa, D.; Báez, Y.; Puente, C.; Puerta, L.; Ontiveros, S. ISO 9001 Standard: Developing and Validating a Survey Instrument. *IEEE Access* **2020**, *8*, 190677–190688. [[CrossRef](#)]
39. Abu, F.; Fahmi, A.; Abu Al-Rub, F.; Shibhab, P. *Quality Management Systems (ISO 9001:2015)*; GAVIN eBooks: Lisle, IL, USA, 2020; ISBN 978-1-951814-01-4. Available online: https://www.researchgate.net/publication/342182999_Quality_Management_Systems_ISO_90012015 (accessed on 2 September 2022).
40. List of Entities According to Areas of Accreditation, Slovak National Accreditation Service. Available online: <https://ais.snas.sk/ais/#/WebReports/12/list.accredited.subject.search.byfield/AccreditedSubjectsByFields> (accessed on 3 September 2022).
41. Why 2019 Has Been the Worst Year for Trucking Operators. Available online: <https://www.freightwaves.com/news/why-2019-has-been-the-worst-year-for-trucking-operators> (accessed on 31 August 2019).
42. Kiplagat, R.J. Impact of ISO 9001 Certification on Financial Performance of Commercial State Corporations in Kenya. University of Nairobi. 2010. Available online: <http://erepository.uonbi.ac.ke/bitstream/handle/11295/59407/Impact%20Of%20Iso%209001%20Certification%20On%20Financial%20Performance%20Of%20Commercial%20State%20Corporations%20In%20Kenya.pdf?sequence=3> (accessed on 15 May 2022).
43. Koop, G. *Introduction to Econometrics*; John Willey & Sons Ltd.: Chichester, UK, 2008.
44. Carmines, E.G.; Zeller, R.A. *Reliability and Validity Assessment*; Sage: Thousand Oaks, CA, USA, 1979; Volume 17. [[CrossRef](#)]
45. Yearbook of Transport, Post and Telecommunications, Statistical Office of the Slovak Republic, 117, Publication Code: 52521. 2021. Available online: <https://slovak.statistics.sk/> (accessed on 3 December 2021).
46. Report Extract Transport, Internation Energy Agency. Available online: <https://www.iea.org/reports/the-covid-19-crisis-and-clean-energy-progress/transport> (accessed on 22 September 2022).
47. Ersoz, F.; Merdin, D.; Ersoz, T. An Evaluation of ISO 9001:2008 and ISO 9001:2015 Standard Changes in Quality Management System. *Int. J. Econ. Manag. Eng.* **2017**, *11*, 2009–2015.
48. Escanciano La Empresa Española y su opinión sobre el ISO 9000. Análisis de los resultados de un estudio Empírico. *Econ. Ind.* **2001**, *341*, 151–159.
49. Dick, G.P.M. ISO 9000 certification benefits reality or myth? *TQM Mag.* **2000**, *12*, 365–371. [[CrossRef](#)]

Disclaimer/Publisher’s Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.