KEY FACTORS AND CONDITIONS FOR IMPLEMENTING THE DROP-SHIPPING METHOD AS AN ALTERNATIVE TO TRADITIONAL SUPPLY CHAIN[*]

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Abstract. The drop-shipping method is an innovative alternative to the traditional supply chain, rooted in the principles of e-commerce. Drop-shipping has gained increasing popularity over the years. The main objective of this research is to identify the key factors and conditions for its implementation as part of the traditional supply chain. An empirical study was conducted among Bulgarian Small and Medium-sized Enterprises (SMEs) from various industries using survey and interview methods to gather the necessary data. Descriptive analysis was employed to examine the characteristics and distribution of the studied variables. Furthermore, regression analysis was conducted to explore the influence of various factors on delivery times and the average number of annual sales. Additionally, a correlation analysis was performed to examine the relationships between suppliers, delivery times, and levels of customer satisfaction when implementing the drop-shipping method. A variation analysis was also carried out to delve into the connections and changes between the two categories of factors – supplier-related and customer-related. The data from this study can serve as guidelines for implementing new innovative delivery methods within SMEs, aiming to provide the necessary factors and conditions for their successful operation.

Keywords: drop-shipping; supply chain; factors and conditions; alternative, e-commerce

1. Introduction

The development of entrepreneurship is deeply influenced by technological advancements and the dynamic changes in the external environment of organizations necessitate the modernization of supply chain management processes. The automation of operations and the widespread use of the Internet in the activities of SMEs create a favourable environment for implementing new business models that enhance traditional ones. Many of these models are based on the principles of e-commerce, digital marketing, network marketing, advertising, drop-shipping, and others. The effective utilization of e-commerce platforms to support enterprises' commercial activities is a prerequisite for the potential elimination of geographical boundaries in an economic context, thereby creating equal business opportunities for entering various markets. In the context of global digitiza-

tion, the supply chain is closely connected to developing and implementing e-commerce in business (Dimitrov & Koprinkova-Noncheva, 2021).

Drop-shipping entails the delivery of goods by sending them directly from the manufacturer or distributor to the end customer without them being held in the merchant's warehouse or store. Its application suits startup businesses, well-established SMEs with a rich history, and sole traders. The popularity and adoption of drop-shipping across various sectors are expanding in tandem with the development of entrepreneurship, e-commerce, and electronic commerce transactions. For SMEs, e-commerce can potentially become a source of competitive advantage. It is a profitable means of accessing customers globally and competes on an equal footing with large enterprises. (Kalakota & Whinston, 1997).

Retailers engaged in drop-shipping act as intermediaries in the supply chain since they are primarily focused on acquiring customers by providing information about prices and terms of service for the physical distribution of goods without performing transportation and delivery functions (Rabinovich et al., 2008). Due to its structure, drop-shipping is a streamlined method within the supply chain that effectively shortens the distribution of goods and services the supplier provides directly to the consumer. This method offers significant benefits to businesses as it reduces the usual operational costs. Drop-shipping is becoming increasingly applied in cases of low stock levels, from logistical perspectives, and for enhancing the delivery system. (Khouja, 2001, Ayanso et al., 2006, Khouja et al., 2009, Ma et al., 2017). Another critical advantage of drop-shipping is that it can be conducted from anywhere in the world, provided there is access to the electronic network (Hawk et al., 2016). The method allows businesses to offer a wide variety of different types of products. Companies are not confined to a single type of product due to limited resources, which brings satisfaction to customers (Waksman, 2016). The method is attractive due to its easy application and minimal storage costs, with the primary focus being on product delivery. In this case, the supply chain does not create dependence among participants and saves time. (Rheude, 2016; Chopra et al., 2007).

It is impossible to precisely identify when drop-shipping evolved into a functional e-commerce business model. However, the negative effects of the crisis on consumption, production, and the sale of new products certainly compel businesses to adapt their strategies to an environment where many households lack economic resources (Vellvé & Burgos, 2018). Particularly, the onset of the global economic crisis in 2008 stimulated the development of this new business model, as it is observed that drop-shipping clearly grows in parallel with the increase in e-commerce transactions (Kaluzhsky, 2011). The current assertion that there is a rapid increase in business interest in building sustainable organizations (Pfeffer, 2010) is directly related to the prospects for enterprises to use modern methods in structuring their operations. Drop-shipping is an evolutionary method within the traditional supply chain based on the principle of direct delivery of goods from the manufacturer to the customer. The retailer is positioned in the middle of the chain between the manufacturer and the customer, who acts as the primary driver of the information flow. Entrepreneurs dealing with physical products utilize drop-shipping services to achieve location independence (Daniel et al., 2014).

The elaboration on the subject of the achieved effects of implementing the method in business requires an examination of the close interrelationship among the key participants in the supply chain (manufacturer/distributor and retailer), within the context of the structure, sequence of actions, and types of products suitable for drop-shipping sales. It is important to emphasize that supply chain management has become an increasingly vital condition for success, both in manufacturing and the service sector. It involves handling the entire production process, information flow, and the distribution of goods and services, from raw material production to the delivery of the end product to the consumer. To fulfil this task, SMEs must establish a network of suppliers as links in the overall chain. The management of this supply chain facilitates the movement of the product or service from the raw material supplier to organizations closely connected to end consumers.

2. Theoretical background

Due to its inherent structure, drop-shipping represents a simplified business model that streamlines the delivery of goods and services to consumers, yielding substantial business advantages by reducing traditional operational costs (Dimitrov & Koprinkova-Noncheva, 2020).

The primary research objective is to identify the fundamental factors and conditions for implementing drop-shipping as an alternative method to the traditional supply chain. The central thesis of this research is rooted in the assertion that drop-shipping constitutes an alternative approach to the conventional supply chain. Key factors influencing its preference and adoption include the ability to offer lower prices and enhance logistical flexibility. Within this context, the study primarily focuses on analyzing these factors and their correlation with the competitiveness and efficiency of the supply chain.

The concept of introducing drop-shipping as an alternative method to the traditional supply chain emerged in connection with its increasing use as an innovative model based on internet technologies. Particularly after 2010, discussions regarding the existing alternative for SMEs began to take shape, focusing on whether to continue using the familiar classical delivery model or to modify the entire sales and distribution process. An idea was also developed to combine drop-shipping with the traditional supply chain model in cases where it was applicable. Business models in online retail underwent significant evolution with the emergence of various supply chain strategies, relying to varying degrees on vertical integration concerning inventory supply and product delivery (Boyer & Hult, 2005).

Different viewpoints exist based on developed mathematical models, simulations, and the interpretation of various scenarios. However, there is no unified, clearly formulated set of factors and conditions under which the evolutionary model is more appropriate. Following the development of their (Q, R) model in e-commerce through drop-shipping, based on two scenarios - inventory shortage with a short delivery time and missed sales, Moutaz and Stylianou maintain the thesis that the introduction of drop-shipping as a delivery system is more suitable in cases where the method can be implemented in deliveries with a more extended execution period (Moutaz & Stylianou, 2008). On the other hand, in the context of e-commerce, due to their economic power and various other influences, many retailers cannot provide a high level of logistic and distribution services, which limits the size of their sales. With the help of the drop-shipping method, the supplier of goods can leverage its economies of scale to reduce the unit selling price of the product and cut distribution costs. Compared to retailers, suppliers can offer high-quality logistic and distribution services, thereby improving the overall quality of the trading process and leading to increased sales (Lu, 2017).

The issue of choosing a supply chain when there is one supplier and several retailers has also been investigated. From this perspective, the traditional supply chain and the drop-shipping method are popular. Still, the decision-making regarding inventory management, risk allocation for inventory, and profit distribution among the supply chain members will differ. In terms of efficiency, the adoption of a hybrid strategy has been accepted. In the hybrid strategy, the traditional model is the primary supply mode, while drop-shipping is used as a backup delivery method (Netessine et al., Rudi, 2006). From the information presented so far, it becomes clear that the main factors for using the drop-shipping method as an alternative to the traditional supply chain are, firstly, the ability to offer a lower unit price for a product directly from the manufacturer, and secondly, the higher-quality and more flexible logistic service compared to that offered by retailers using the classical chain. As a condition for application, we identify the probability that, in some cases, the order may have a longer execution period. However, e-commerce retailers offering drop-shipping can actually lower end prices for consumers, making them willing to accept delayed delivery times (Chen, 2001).

Another perspective regarding the traditional supply chain and the new model emphasizes that drop-shipping benefits both suppliers and retailers. Suppliers can expand their sales, gather more information about consumers, and promptly identify market trends through its implementation. At the same time, retailers can minimize inventory holding costs and instead invest in product sales and marketing methods. Based on the supplier selection index in the traditional supply chain, combined with the characteristics of the drop-shipping model, the

authors propose a set of criteria for selecting drop-shipping suppliers - profit margin, quality, delivery, speed, and technological environment (Fitraharizki & Rahayu, 2023; Yao et al., 2008; Li & Xie, 2012).

A technological-organizational and ecological framework has been developed, which identifies three aspects of the organization's essence that influence the adoption of technological innovation: technological essence, organizational essence, and ecological essence. The technological context consists of both existing technologies and the technology that needs to be implemented in the business operations. T, e primary focus of the technological context is on how technological characteristics can impact adoption. The organizational context describes the organization's specific characteristics that either constrain or facilitate the adoption of technological innovations. The external ecological aspect is the external environment in which a firm operates, such as the industry it belongs to, its competitors, regulations, access to resources provided by others, and interactions with governments (Tornatzky & Fleischer, 2001).

The question of introducing drop-shipping as an alternative method to the traditional supply chain has also been examined from a different perspective. Khouja emphasizes that drop-shipping is applied in combination with the traditional model of goods delivery. Therefore, combining drop-shipping with the traditional supply chain, based on maintaining inventory, can be the optimal solution for e-commerce (Khouja, 2001). Retailers commonly tend to develop and use a dual channel to serve their end customers. This means synchronizing and using drop-shipping in combination with the traditional supply chain. The increased use of the Internet and drop-shipping enhances awareness not only among customers but also among retailers. In this sense, the focus is on creating a supply chain where drop-shipping collaborates with the traditional one. In cases where the quantity of orders from the retailer reaches a decentralized level, the profit of the supply chain will be increased (Zhao et al., 2013). The best perspective for online stores is adopting a hybrid inventory management strategy, which means achieving synergy between retailers engaged in drop-shipping and warehouses (manufacturers) (Agatz et al., 2006).

Despite the different starting points of proponents of the dual-component supply chain idea, we find that a necessary factor for using drop-shipping is achieving coordination in the delivery of goods, and good synchronization between the manufacturer and the retailer is a condition for successful collaboration between the parties. Drop-shipping is an advanced method built on the fundamental principles of the classic supply chain. The main factors for adopting the method as an alternative are:

- Minimal investment requirement: Drop-shipping does not require significant investments to start a business. Retailers need to create an online store and establish connections with various suppliers.
- Wide product variety: Drop-shipping offers a wide selection of products since retailers are not limited by physical inventories.
- Good communication with suppliers: To ensure the quality fulfillment of orders, retailers should maintain good communication with suppliers and establish clear procedures for order placement.
- Precise supplier selection: Retailers must choose suppliers that can guarantee fast and reliable delivery of orders and high-quality products.
- Need for an efficient order management system: To avoid errors in order processing, retailers must have an effective order management system.
- Achieving flexibility and coordination in deliveries.
- Quality control of products: Retailers need to control the quality of the products sent by suppliers to avoid potential issues with dissatisfied customers.
- Margin realization in the selling price through the online channel.
- Marketing and advertising: Retailers must develop effective marketing and advertising strategies to attract customers to their online stores.
- Internationalization of the products being sold.

The conditions for successful drop-shipping applications are related to providing a favorable external environment, and good organizational and technical infrastructure.

3. Research objective and methodology

The research objective and methodology of the study are based on conducted descriptive, regression, correlation, and variation analyses, related to the identification of key factors and conditions for the implementation of the drop-shipping delivery method as an alternative to the traditional supply chain. The application of statistical methods was carried out based on a survey, which involved the completion of a questionnaire consisting of 32 questions divided into three sections: general characteristics of the enterprises, the extent of e-commerce applicability, and the application of the drop-shipping delivery method. 372 SMEs from various sectors completed the questionnaire, and individual interviews were conducted with all respondents to gather additional information.

The use of descriptive analysis in this study aims to conduct an in-depth analysis of aspects related to the potential application of the drop-shipping delivery method in SMEs in Bulgaria. Specifically, it involves analyzing the following key areas:
- Price Analysis: Comparing delivery prices offered by different providers to determine the most economically advantageous option.
- Delivery Time Analysis: Measuring the delivery times of various products to establish the average delivery time.
- Order Volume Analysis: Quantifying the number of orders over a specific time period to assess the efficiency of the drop-shipping delivery method.
- Product Quality Analysis: Assessing the level of satisfaction with products delivered through the drop-shipping delivery method, considering both satisfaction levels and the number of products.

In the course of applying regression analysis, the strength and statistical significance of relationships between variables are examined. In multiple regression analysis, it is essential to investigate the strength and statistical significance of the relationships between independent and dependent variables through the analysis of correlation coefficients and the significance of parameters.

The parameters of the regression function demonstrate how the dependent variable changes when independent variables change. It is important to examine both the sign and the statistical significance of the parameters to understand their significance for the results. Additionally, an assessment of the model's significance should be conducted. Some independent variables may be more important than others in explaining the dependent variable. In this context, it is essential to explore which independent variables are significant and the strength of their relationship with the dependent variable. For the application of regression analysis in the research framework related to determining the influence of factors on product sales, the following variables (Table 1) and (Table 2) are defined:

Table 1. Determining the Factors Influencing Product Sales through the Application of the Drop-shipping Method

Dependent variable	Independent variables
Sales of a selected product	Product price
	Marketing expenses

Table 2. Investigating Factors Influencing Delivery Time in the Drop-shipping Method for SMEs:

Dependent variable	Independent variables
Delivery time, measured in days or hours	The distance between the supplier's warehouse and the recipient's address
	Order volume
	Seasonality (the number of orders may increase during holidays or weekends)
	Standard order processing and preparation time for shipping

Analyzing the factors influencing delivery times in the drop-shipping method for SMEs can provide valuable insights for optimizing delivery processes in drop-shipping businesses. This optimization may include route optimization, improving warehouse efficiency, or providing additional training for staff handling orders.

When multiple independent variables are used to predict a single dependent variable, the regression analysis is referred to as multiple regression analysis. In multiple regression analysis, it is essential to consider the interactions between independent variables because they can collectively influence the dependent variable. This means that interactions between product price and marketing expenses, for example, may impact sales. Therefore, when using multiple regression analysis, it is crucial to account for interactions among independent variables. Often, it is possible to predict the values of the dependent variable based on the values of the independent variables.

The application of correlation analysis as a research method allows us to describe the strength and direction of relationships between the variable quantities defined by the questionnaire data concerning the conditions and factors affecting the adoption of drop-shipping as part of the supply chain. The distribution of these dependencies provides a comprehensive overview of potential scenarios of relationships between factors such as company size, location, the average price of offered products and services, types of products sold, and the degree of applicability of e-commerce in business within the context of the adoption of a non-traditional delivery model. The obtained results can be interpreted depending on the distribution of the presented values, as follows: Value 0 - no dependency; Value up to 0.3 - weak dependency; Value from 0.3 to 0.5 - moderate dependency; Value from 0.5 to 0.7 - significant dependency; Value from 0.7 to 0.9 - strong dependency; Value above 0.9 - very strong dependency; Value 1 - functional dependency.

Analysis of variance is a statistical method used to examine the differences between the average values of three or more groups. The goal of the analysis of variance is to determine whether the average values of different groups are statistically significantly different or not. Analysis of variance can be very useful for investigating the effects of different factors on outcomes and can help make better decisions in various fields. The formulas used in conducting the analysis of variance are related to calculating the sums of squares, degrees of freedom, and means. One of the most commonly used formulas in the analysis of variance is the formula for the total sum of squares (SST), which is calculated as the sum of the squares of the deviations of each data point from their overall mean value.

SST measures the total variability in the data. In the analysis of variance, this total variability is partitioned into different components to assess the variability between groups and within groups, allowing you to determine whether there are significant differences among the group means. In this study, two main categories of factors were used: supplier factors and customer factors.
Supplier Factors:
- Source of Products: whether the products are directly sourced from the manufacturer or through a distributor.
- Level of Automation in the Production Process: whether the production process is fully automated or requires manual labor.
- Product Availability: whether the products are in stock or are produced on demand.
- Payment Method: whether customers can pay with a credit card or only through bank transfer.
- Return Conditions: whether customers can return products and under what conditions.
- Advertising and Marketing: whether the company uses advertising campaigns and their impact on sales.
- Customer Service: whether the company provides quality customer service and its impact on customer satisfaction.
- Competition: the level of competition in the market and how it can affect sales and expenses.
- Technological Innovations: what new technologies can be used to optimize delivery and their impact on the efficiency of the drop-shipping delivery model.
Customer Factors:
- Customer Location: whether customers are located in different geographic areas or all in one place. If customer location is identified as an important factor, a strategy for expanding the network of local suppliers may be chosen to reduce delivery time and costs.
- Order Size: whether orders are small or large in quantity.

– Delivery Time: whether delivery is fast or slower.
– Product Quality: whether the products are of high or low quality.
– Product Price: whether the products are priced high or low.

Once the possible factors have been identified, their significance on overall costs and delivery time can be determined to find the optimal strategy for improving the efficiency of the method. The methodology for conducting a variation analysis in the context of its application in studying the possibilities of applying the drop-shipping delivery method follows these described steps:

– Selection of metrics for evaluating the efficiency of the drop-shipping delivery method. These could include the company's overall costs, delivery periods, the number of returned products, and more.
– Identification of the factors that may influence the chosen metrics - supplier factors and customer factors.
– Selection of a statistical method for studying the impact of factors on the chosen metrics. One of the most widely used methods for this purpose is Analysis of Variance (ANOVA), which can be applied to assess the significance of factors.
– Conducting an experiment to allow the investigation of the impact of factors on the chosen metrics.
– Drawing conclusions from the studies and determining the best strategies for achieving greater efficiency in the drop-shipping delivery model.

4. Results and discussion

4.1. Analysis of the results of the descriptive analysis

In the contemporary world of business, where competition is ever-increasing and customer demands are on the rise, it is essential to conduct regular data analyses related to the respective business processes. This study focuses on one of the most critical elements of the online sales process - product delivery. Specifically, the goal is to examine and analyze data regarding delivery time, delivery cost, and product quality in the context of two different delivery models: drop-shipping and a traditional supply chain. In this context, the present study employs descriptive analysis, providing fundamental statistical data on the examined parameters to investigate their characteristics and distribution. Descriptive analysis has been applied to the average delivery time and delivery cost, utilizing data obtained from real online stores. Additionally, customer feedback has been collected and analyzed to assess product quality.

The findings derived from the descriptive analysis are of particular importance for achieving improved efficiency and effectiveness in the delivery process. They can serve as a basis for proposals to optimize business processes and enhance customer satisfaction. Figure 1 presents the results of the descriptive analysis for the average delivery time using the drop-shipping method, measured in days.

Average drop-shipping delivery time (in number of days)	
Mean	4,354014599
Standard Error	0,087496774
Median	4
Mode	3
Standard Deviation	1,448329319
Sample Variance	2,097657817
Kurtosis	1,031370458
Skewness	0,960290908
Range	8
Minimum	2
Maximum	10
Sum	1193
Count	274
Average	4,355

Figure 1. Average Delivery Time via the Drop-shipping Method in Days

The average delivery time through the drop-shipping method is 4.354 days, indicating that, on average, respondents receive their orders approximately 4-5 days after payment. The standard deviation is 1.448 days, illustrating the degree of variation in delivery times expected among respondents. A lower standard deviation typically suggests that the data is more concentrated around the mean value. The median delivery time is 4 days, meaning that half of the respondents receive their orders within 4 days or less. The mode of delivery times is 3 days, indicating that the most frequently occurring delivery time is 3 days. The range of delivery times spans 8 days, representing the difference between the shortest (2 days) and longest (10 days) delivery times.

Regarding the distribution curve, where Kurtosis is greater than 0, it indicates the presence of more than one mode, signifying that several delivery times occur frequently. Conversely, positive Skewness and the mean value's proximity to the median suggest a relatively symmetric distribution curve, where most delivery times are close to the mean.

The conclusion that can be drawn from the descriptive analysis is that, on average, respondents receive their orders approximately 4-5 days after payment, with the most frequently occurring delivery time being 3 days. The range is 8 days, indicating significant variability in delivery times. The distribution curve is relatively symmetrical, with more than one mode, suggesting that several delivery times occur frequently. From these data, conclusions can be drawn, and decisions can be made regarding the optimization of the delivery process, with a focus on increasing the number of orders delivered in the shortest possible time.

Figure 2 presents the results of the descriptive analysis for the average delivery time in days using the classical delivery chain. An average delivery time of 4.33 days can be used as a measure of the efficiency of the delivery chain. This means that deliveries within the chain are made in a relatively short period, which can lead to higher customer satisfaction and greater competitiveness for the SMEs.

Average delivery time (in number of days) using the traditional supply chain	
Mean	4,332116788
Standard Error	0,082472145
Median	4
Mode	4
Standard Deviation	1,365156906
Sample Variance	1,863653378
Kurtosis	-0,099694154
Skewness	0,652716186
Range	7
Minimum	2
Maximum	9
Sum	1187
Count	274
Average	4,33

Figure 2. Average Delivery Time – Using the Classical Delivery Chain in Days

The conclusion that can be drawn from the descriptive analysis is that, on average, respondents receive their orders approximately 4-5 days after payment, with the most frequently occurring delivery time being 3 days. The range is 8 days, indicating significant variability in delivery times within the chain. The distribution curve of deliveries is relatively symmetrical, with a kurtosis slightly deviating from the normal distribution, indicated by a Kurtosis value of -0.0996. The positive Skewness value of 0.652 suggests a slight rightward skewness in the data. These values can be used to assess the normality of the delivery distribution and identify possible anomalies that may impact the efficiency of the delivery chain.

Possible delivery values range from 2 to 9 days, with both the median and mode of the measured data being 4 days. This can be used as a reference point to assess the efficiency of the delivery chain and for comparisons with others. The results obtained provide a basis for the conclusion that, at this stage, there are no significant differences in the duration of product deliveries between the drop-shipping and classical delivery chain meth-

ods. It takes around 4 days on average to deliver ordered products, including order processing, confirmation, picking, and shipping to the end consumer.

The data for the average delivery cost in drop-shipping services are presented in Figure 3. The average delivery cost in drop-shipping is 8.24 BGN, which can serve as a reference point for future projects in the drop-shipping field. The standard deviation of the average delivery cost is 5.19, indicating that delivery cost values are dispersed around the mean. The median of delivery costs is 6, meaning that half of the delivery costs are below 6 BGN. The mode of delivery costs is also 6 BGN, representing the most frequently occurring delivery cost. The Skewness coefficient is 2.77, indicating a right-skewed distribution of delivery costs. The Kurtosis coefficient is 8.13, signifying a high distribution of delivery costs. The range of delivery costs varies from 5 BGN to 32 BGN.

There are 227 cases where delivery costs exceed 10 BGN, indicating a significant number of higher delivery costs (Figure 3). This data can be used to explore the possibility of optimizing delivery costs in drop-shipping, as well as to examine the factors that may lead to differences in delivery costs.

Average drop-shipping delivery cost	
Mean	8,237226277
Standard Error	0,313326638
Median	6
Mode	6
Standard Deviation	5,18647872
Sample Variance	26,89956151
Kurtosis	8,131554561
Skewness	2,765220058
Range	27
Minimum	5
Maximum	32
Sum	2257
Count	274
Average	8,237226277
upper bin	Frequency
10	227
15	28
20	9
25	5
More	5

Figure 3. Average Delivery Cost in Drop-shipping Services

In the perspective of a drop-shipping merchant, the majority of SMEs often can not exert control over the quality of the products shipped from manufacturers to the end customers. Frequently, merchants only become acquainted with the products they offer during initial negotiations with manufacturers before entering into a collaborative agreement. Subsequently, the process is managed automatically and electronically. This poses potential risks of customer dissatisfaction due to the possibility of receiving low-quality products that have not been inspected by the merchant. Quite often, the merchant bears full responsibility for customer dissatisfaction and potential claims, even without having seen the product subject to the order. This process should be regulated to specify the method.

To measure the quality of products offered through drop-shipping, we have created a rating scale based on feedback received from end customers, ranging from 1 to 3, where 1 represents a low degree (highly dissatisfied), 2 indicates a moderate degree (partly satisfied), and 3 is the highest possible degree (very satisfied). Since this method is an innovation in the Bulgarian market, 85% (233) of the study participants (only those participants who implement the drop-shipping method – 274 participants) seek subsequent feedback from their customers through several possible channels: phone calls, Viber messages, emails, allowing customers to rate both the products and the drop-shipping service on the 1 to 3 scale.

Based on the feedback collected from the merchants, a descriptive analysis was conducted, revealing that the average value of 2.61 indicates that the overall assessment of the service is slightly above average. The median and mode are both 3 (high quality), implying that the majority of study participants have rated the service with the highest score (Figure 4). The standard error of 0.04 provides information that the collected data can be considered sufficiently representative of the entire population of drop-shipping service customers. The standard deviation of 0.65 shows that quality ratings are dispersed around the mean value, with the data ranging from 1 to 3. A skewness coefficient of -1.41 indicates that the data slightly skews toward having ratings below the mean value. The total number of participants in the survey is 233, demonstrating that data has been collected from a sufficiently large number of participants to obtain representative results.

Analysis of the quality of products offered through drop-shipping and an overall evaluation of the service	
Mean	2,605150215
Standard Error	0,042940648
Median	3
Mode	3
Standard Deviation	0,655460551
Sample Variance	0,429628533
Kurtosis	0,709817106
Skewness	-1,414018607
Range	2
Minimum	1
Maximum	3
Sum	607
Count	233

Figure 4. Analysis of Product Quality Based on Feedback from End Customers

4.2. Analysis of the results of the regression analysis

The regression analysis conducted aims to study the influence of various factors on the delivery time and the average number of product sales annually. In the context of examining the influence of different factors on delivery time, the dependent variable is taken as the delivery time measured in days. The independent variables include the distance between the supplier's warehouse and the recipient's address (Independent Variable 1 - IV1), order volume (Independent Variable 2 - IV2), standard order processing time (Independent Variable 3 - IV3), and preparation for shipment (Independent Variable 4 - IV4) (Table 3). This type of regression analysis can be beneficial for retail companies looking to optimize their order delivery processes. The analysis can provide insights into which factor has the greatest impact on delivery time, allowing the company to focus its efforts on improving that specific factor. This, in turn, can lead to better customer service and increased customer satisfaction.

From the data presented in Table 3, Multiple R (1) is the correlation coefficient indicating the strength of the relationship between the dependent variable (delivery time) and the independent variables (distance between the supplier's warehouse and the recipient's address, order volume, seasonality, and standard order processing time). Since R Square and Adjusted R Square are both 1, this means that based on these variables, we can explain 100% of the variation in the dependent variable, which is the delivery time. The Standard Error shows the predictive error of the model, which in this case is very small - 8.278. The F statistic indicates that the model is statistically significant because the p-value is 0.

The data presented in the Coefficients table shows the values of the regression equation coefficients that we can use to predict delivery time based on the values of the independent variables. Specifically, the coefficient for distance is negative, meaning that a greater distance between the supplier's warehouse and the recipient's address leads to longer delivery times.

Table 3. Regression Analysis - Impact of Various Factors on Delivery Times of Products through the Drop-shipping

Regression Statistics					
Multiple R	1				
R Square	1				
Adjusted R Square	1				
Standard Error	8.2786E-17				
Observations	273				
	df	SS	MS	F	Significance F
Regression	4	99,06227106	24,76556777	3,61352E+33	0
Residual	268	1.83676E-30	6.85358E-33		
Total	272	99,06227106			
	Coeff.	SE	tStot	P-value	Lower 95%	Upper 95% /
Intercept	1	2.50789E-17	3,98742E+16	0	1	1
Distance between the supplier's warehouse and the recipient's address - IV1	-1.3784E-18	1Д0924E-19	-12,42656737	2,65217E-28	-1.5968E-18	-1,16001E-18
Order volume -IV 2	-5Д051E-19	1.06763E-19	-5,062715376	7.69359E-O7	-7.0714E-19	-3,30311E-19
Standard order processing time - IV3	-3,4979E-18	5.2219E-18	-0,669845626	0,503532925	-1.3779E-17	6.7833E-18
Preparing and sending a shipment - IV 4	1	1.36445E-17	7.32897E+16	0	1	1

Additionally, the coefficient for order volume is insignificant, indicating that order volume does not significantly influence delivery times. Based on the provided results of the regression analysis, it appears that all independent variables affect the dependent variable (delivery time). This can be observed from the regression coefficients, where all four independent variables have different coefficients, signifying that they influence the dependent variable to varying degrees. Furthermore, the F-test value is significant (Significance F = 0), indicating that the regression as a whole is significant and that the independent variables contribute to explaining the variation in the dependent variable.

Table 4. Regression Analysis - Influence of Various Factors on the Average Annual Sales Volume through the Drop-shipping Method

Regression Statistics					
Multiple R	0,130441571				
R Square	0,017015004				
Adjusted R Square	0,006052346				
Standard Error	35664,04442				
Observations	273				
	df	SS	MS	F	Significance F
Regression	3	5922412022	1974137341	1,552087421	0,201409813
Residual	269	3,42148E+11	1271924064		
Total	272	3,4807E+11			
	Coeff.	SE	tStat	P-value	Lower 95%	Upper 95%
Intercept	12518,41227	10563,34829	1,18507995	0,237031726	-8278,939962	33315,7645
Product price-IV 1	-67,78997502	45,27824703	-1,49718639	0,135517189	-156,9347827	21,35483268
Marketing expenses - IV 2	-411,3276749	1147,340667	-0,35850527	0,720246416	-2670,237192	1847,581842
Market competitiveness - IV 3	13825,99449	11447,06616	1,20781992	0,228177362	-8711,240902	36363,22988

The results of the regression analysis, aimed at studying the relationship between the average annual sales volume of products as the dependent variable and the product price (independent variable 1 - IV 1), marketing expenses (independent variable 2 - IV 2), and market competitiveness (independent variable 3 - IV 3) as independent variables (Table 4), show that the relationship between these variables is weak. The coefficient of multiple correlation is 0.13, indicating that the independent variables have a weak relationship with the dependent variable (Table 4).

The coefficient of determination is 0.02, which means that only 2% of the variation in average sales volume can be explained by the variables used in the analysis. The correction coefficient is very low, only 0.006, and does not explain the variation in the dependent variable. The result of the F-statistic is 1.55, with a p-value of 0.2014, indicating that the model is not statistically significant, and the null hypothesis that there is no relationship between the independent and dependent variables cannot be rejected.

The regression coefficients show that an increase in product price leads to a decrease in the average sales volume, with a coefficient of -67.79 for the first independent variable. The coefficient of the second independent variable is not statistically significant, and the coefficient of the third independent variable is 13825.99, indicating that higher market competitiveness leads to an increase in the average annual sales volume. The conclusion that can be drawn from the conducted study is that the independent variables (average annual sales volume, product price, marketing expenses, market competitiveness) do not have a statistically significant impact on the dependent variable (Average sales volume). This can be observed from the low value of the multiple correlation (Multiple R) of 0.130, as well as the low value of the coefficient of determination (R Square) of 0.017. Additionally, the analysis of variance shows that there are no statistically significant relationships between the group of independent variables and the dependent variable, as evidenced by the low value of the F-test coefficient (1.552) and low statistical significance (0.201).

4.3. Analysis of the results of the correlation analysis

A correlation analysis was conducted between suppliers, delivery time, and the level of customer satisfaction when using the drop-shipping delivery method. The purpose of this analysis is to study the relationship between suppliers, delivery time, and customer satisfaction level in the context of the modern business environment. The analysis allows us to understand how drop-shipping can impact customer satisfaction levels, with a particular focus on the key factors that may influence these relationships. The results of the correlation analysis between suppliers, delivery time, and customer satisfaction level are presented in Table 5.

Table 5. Correlation Analysis between Suppliers, Delivery Time, and Customer Satisfaction Level Using the Drop-shipping Delivery Method

	Suppliers	*Delivery time, excluding order processing time*	*Customer satisfaction level*
Suppliers	1		
Delivery time	-0,050410023	1	
Customer satisfaction level	0,090421227	0,849328485	1

From the obtained data, it appears that there is a weak negative correlation (-0.05) between suppliers and delivery time, indicating that faster deliveries are not associated with specific suppliers. This means that all suppliers offer similar delivery times.

There is a strong positive correlation (0.849) between delivery time and customer satisfaction level, indicating that customers are more satisfied when their products are delivered more quickly. This can be valuable information for improving the business by focusing on optimizing delivery times. Furthermore, there is a weak positive correlation (0.09) between suppliers and customer satisfaction level. This may suggest that some suppliers may provide better service and higher customer satisfaction than others, but the choice of supplier is not a critical factor in determining customer satisfaction.

The main conclusion from these results is that delivery time significantly influences customer satisfaction, while the choice of supplier is not a critical factor. Therefore, when optimizing the delivery process, the focus should be on improving delivery times rather than selecting a specific supplier.

4.4. Analysis of the results of the Analysis of Variance
During the application of the variance analysis, the dependent variable considered was the average annual sales, aggregated by categories in Table 6. A total of 12 categories were adopted, corresponding to an average number of sales ranging from 1,000 to 40,000 units.

Table 6. Classification of the Average Annual Sales

Classification of average annual sales volume
Up to 1000 items
Up to 2000 items
Up to 3000 items
Up to 5000 items
Up to 7000 items
Up to 10000 items
Up to 15000 items
Up to 20000 items
Up to 25000 items
Up to 30000 items
Up to 40000 items
Up to 40000 items

In the course of applying the multifactorial variation analysis, the following data for the factors and the dependent variable were used: Factor 1 – the source of products - directly from the manufacturer (1); through a distributor (2); Factor 2 – degree of automation of production - fully automated (1); requires manual labor (2); Factor 3 – product availability - in stock (1); on demand (2). Dependent variable - the average value of sales on an annual basis through the drop-shipping method.

Null hypothesis – there is no significant relationship between the average value of annual sales through the drop-shipping method and the different values of the source of products, the degree of automation of production, and product availability. The alternative hypothesis – there is a significant relationship between the average value of annual sales through the drop-shipping method and at least two of the values of the source of products, the degree of automation of production, and product availability.

Using the data from the variation analysis, we can perform a statistical analysis of the influence of the three factors (source of products, degree of automation of production, and product availability) on the average value of annual sales through the drop-shipping method. According to the obtained data (Figure 5), the value of the F-statistic for Factor 1 (source of products) is 1.237, indicating that there is a small but statistically significant relationship between the source of products and the average value of sales through the drop-shipping method. Therefore, we can assume that the source of products has some effect on sales.

Furthermore, the value of the F-statistic for Factor 2 (degree of automation of production) is 1.449, showing that there is a moderately large effect of the degree of automation of production on the average value of sales. This can be explained by higher production costs, which may reduce the company's profits and, consequently, the average sales value.

Finally, the value of the F-statistic for Factor 3 (product availability) is 1.106, indicating that there is a small but statistically significant effect of product availability on the average sales value (Figure 5).

Therefore, we can conclude that product availability, the source of products, and the degree of automation of production have an impact on the average value of sales through the drop-shipping method. Based on the data obtained from the variation analysis, there are statistically significant effects of the source of products, the degree of automation of production, and product availability on the average value of sales through the drop-shipping method. Therefore, we can reject the null hypothesis and accept that there is a significant relationship between the average value of annual sales through the drop-shipping method and at least two of the values of the source of products, the degree of automation of production, and product availability.

Source of products	274	339	1,237226277	0,18161279			
Degree of automation in the production process	274	397	1,448905109	0,2482955			
Product availability	274	303	1,105839416	0,09498409			
ANOVA							
Source of Variation	SS	*df*	*MS*	*F*	*P-value*	*Fcrit*	
Rows	73,7141119	273	0,270015062	2,11878453	7,0197E-14	1,18506031	
Columns	16,4184915	2	8,209245742	64,417232	7,6338E-26	3,01222921	
Total	159,714112	821					

Figure 5. Influence of the factors - the source of products, degree of automation of production, and product availability on the dependent variable, the average value of annual sales through the drop-shipping method

Table 7. Classification of Factors in Relation to the Dependent Variable - Average Annual Sales via the Drop-shipping

Payment method	
With a credit/debit card	1
By bank transfer	2
Return conditions	
The products can be returned	1
The products cannot be returned	2
Advertising and marketing	
Advertising campaigns are used	1
No advertising campaigns are used	2
Market competition	
The products being sold face high competition	1
The products being sold do not face high competition	2

These factors include Factor 1 - payment method; Factor 2 - return policies; Factor 3 - advertising and marketing; Factor 4 - market competition.

The null hypothesis states that there is no relationship between the average number of sales and the different factors. The alternative hypothesis suggests that at least one factor has an impact on the average sales values. To analyze these data, ANOVA (Analysis of Variance) was used. The results indicate a statistically significant relationship between the dependent variable and the factors. The p-value of the F-test for the factors is 2.177, which is significant at a 0.05 level of significance. Therefore, we reject the null hypothesis and accept that at least one of the factors influences the average sales values (Figure 6).

Payment method	274	313	1,14233577	0,12252346			
Return policy	274	291	1,0620438	0,05840753			
Advertising and marketing	274	315	1,14963504	0,12771049			
Market competition	274	413	1,50729927	0,25086228			
ANOVA							
Source of Variation	*ss*	*df*	*MS*	*F*	*P-value*	*Fcrit*	
Rows	68,1824818	273	0,24975268	2,41890375	8,7804E-22	1,17228502	
Columns	32,4379562	3	10,8126521	104,722659	2Д779E-57	2,6157742	
Total	185,182482	1095					

Figure 6. Influence of Payment Method, Return Policies, Advertising and Marketing, Market Competition on the Dependent Variable - Average Annual Sales

If the analysis of variance (ANOVA) is applied to the dependent variable, average annual sales through the drop-shipping method, and the factors that could potentially influence the dependent variable (Table 8) - the factors being order size, delivery time, product quality, product price, and customer location - the following hypotheses can be defined: The null hypothesis states that there is no significant relationship between the factors of order size, delivery time, product quality, product price, customer location, and the dependent variable - average annual sales through the drop-shipping method. The alternative hypothesis can be formulated as

follows: there is a significant relationship between the factors of order size, delivery time, product quality, product price, customer location, and the dependent variable - average annual sales through the drop-shipping method.

Table 8. Classification of Factors - Order Size, Delivery Time, Product Quality, Product Price and Customer Location

Order size	
Small quantities	1
Large quantities	2
Delivery time	
Fast delivery	1
Slow delivery	2
Product quality	
High product quality	1
Medium product quality	2
Product prices	
High prices	1
Low prices	2
Customer's location	
In different geographical regions	1
In a single geographical region	2

The p-value for the rows is 0.999, which is greater than 0.05. Therefore, there is not enough evidence to reject the null hypothesis. This means that there is no statistically significant relationship between the average number of sales among the groups defined by the independent factors. On the other hand, the p-value for the columns is significantly smaller than 0.05, allowing us to reject the null hypothesis. This indicates that the independent factors (order size, delivery time, product quality, product price, and customer location) have a statistically significant effect on the average number of sales (Figure 7).

Order size	274	489	1,78467153	0,16958103		
Delivery time	274	286	1,04379562	0,04203096		
Product quality	274	274	1	0		
Product price	274	460	1,67883212	0,21881768		
Customer's location	274	305	1,11313869	0,10070586		
ANOVA						
Source of Variation	*S3*	*df*	*MS*	*F*	*P-value*	*Fcrit*
Rows	20,5051095	273	0,07511029	0,65882574	0,99998384	1,16568359
Columns	155,105109	4	38,7762774	340,123958	4,228E-190	2,38007985
Total	300,105109	1369				

Figure 7. Influence of the factors order size, delivery time, product quality, product price, and customer location on the dependent variable, the average number of sales on an annual basis

Therefore, the alternative hypothesis is valid, meaning that the independent factors have a significant influence on the dependent variable, the average number of sales on an annual basis through the drop-shipping method.

Conclusions

The drop-shipping delivery method is an effective way for small and medium-sized enterprises (SMEs) to expand their e-commerce business and increase their sales not only in Bulgaria but also internationally. The research results show that e-commerce in Bulgaria has good development potential and can be used as a sales channel for goods using the drop-shipping method. The use of social media and digital marketing strategies will increase the number of potential customers and contribute to the success of drop-shipping businesses in Bulgaria.

The descriptive analysis of the average delivery time shows that respondents receive their orders in about 4-5 days after payment, with the most common delivery time being 3 days. The range is 8 days, indicating significant variation in delivery times. The descriptive analysis for the average delivery time in days through the traditional supply chain yields an average time of 4.33 days, which can be used as a measure of supply chain efficiency. This means that deliveries within the supply chain are made in a relatively short period, which can lead to higher customer satisfaction and better competitiveness for SMEs. There are no significant differences between the drop-shipping delivery method and the classical supply chain in terms of delivery times. Drop-shipping can offer an efficient alternative for delivering goods, which can be competitive with the classical supply chain. Furthermore, the analysis of delivery prices shows that prices are lower when using the drop-shipping method, which can contribute to better profitability for SMEs.

All the independent variables used, including the distance between the supplier's warehouse and the recipient's address, order volume, standard order processing time, and preparation for shipment, have a statistically significant impact on the dependent variable - delivery time. However, the relationship between the average number of product sales on an annual basis and product price, marketing expenses, and market competitiveness is weak and statistically insignificant. Therefore, it can be concluded that these independent variables do not have a statistically significant impact on the dependent variable - the average number of sales.

The goal of the conducted correlation analysis, focusing on the relationship between suppliers, delivery time, and customer satisfaction in the context of using the drop-shipping delivery method, is to examine the influence of these factors on customer satisfaction. The results show that delivery time significantly affects the level of customer satisfaction. However, the choice of supplier is not a critical factor in determining customer satisfaction. This means that when optimizing the delivery process, the focus should be on improving delivery times rather than selecting a supplier. These findings are crucial for modern businesses, as customer satisfaction plays a key role in a company's success.

Based on the conducted analysis of variance, it can be concluded that there are several key factors that are important in determining the average annual sales value when using the drop-shipping method. The source of the products, the degree of automation in production, and product availability are statistically significant and emphasize the importance of proper production planning, product availability, and selecting the right product source. Order size, delivery time, product quality, product price, and customer location also significantly impact the average sales value and can be used to optimize sales and increase revenue.

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