

THE IMPACT OF DIGITALIZATION ON SUPPLY CHAIN MANAGEMENT AND BRAND PERCEPTION

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ABSTRACT

The development of digital technologies has significantly transformed supply chain management, leading to increased efficiency, transparency, and faster delivery. The implementation of blockchain technology, artificial intelligence, and automated logistics systems has impacted not only internal company operations but also consumer perceptions. A key question is how much digital transparency and delivery optimization contribute to consumer trust and loyalty. This study analyzes the impact of supply chain digitalization on consumers, particularly focusing on blockchain technology and delivery speed. Through a quantitative analysis of consumer attitudes, two main aspects are examined: whether the use of blockchain technology increases consumer trust in brands, and how much optimized delivery contributes to long-term brand loyalty. The research findings can provide valuable insights for companies aiming to improve their supply chain management strategies. Brands that successfully integrate digital technologies not only optimize logistical processes but also enhance consumer trust, gaining a competitive advantage in the market.

Keywords: digitalization, supply chain, blockchain, consumer perception, brand loyalty.

INTRODUCTION

The modern development of digital technologies is fundamentally transforming the way companies manage their supply chains. The introduction of technologies such as blockchain, artificial intelligence, automated logistics systems and advanced analytics has enabled greater efficiency, transparency and speed in delivery. According to contemporary research, digitization does not only impact the operational aspects of business, but it also has a significant effect on consumer perception, especially in terms of trust and loyalty to brands. In this context, the question is increasingly raised as to how digital transparency and delivery optimization shape the attitudes and behaviors of modern consumers. This dynamic requires a more detailed consideration in the literature to understand the connection between technological innovations and the building of long-term customer relationships. The aim of this research is to examine how supply chain digitization affects consumer perceptions of brands. Particular focus is placed on analyzing the impact of blockchain technology on consumer trust, as well as the role of delivery speed in forming brand loyalty. This research seeks to answer questions such as how consumers perceive brands that apply digital technologies to manage their supply chains, whether transparency and the ability to track products increase their trust, and how delivery speed affects their loyalty. The research is based on two key hypotheses: (1) that the use of blockchain technology positively impacts consumer trust due to increased transparency, and (2) that efficient and fast delivery contributes to strengthening brand loyalty.

Supply Chain Management (SCM) encompasses all processes from raw material suppliers to the end consumer and is traditionally considered through three key components: sourcing, storage, and distribution. With the development of technology and globalization, SCM has expanded to include additional processes such as planning, tracking, analytics, and digitization. The introduction of new technologies, such as blockchain, IoT, artificial intelligence, and automation, enables companies to improve efficiency, transparency, and agility, making the supply chain more competitive in the global market (Stajić, 2020). Digitization enables faster information exchange, better resource optimization, and more accurate demand forecasting, which has become crucial for gaining a competitive advantage. According to Stajić (2020), the fourth industrial revolution is bringing radical changes in supply chain management, particularly through the integration of new technologies. This process is not just about the individual implementation of new solutions, but also involves sharing these solutions among partners in the chain to achieve greater efficiency and transparency. Supply chain leaders do not just implement digital solutions within their organizations, but also extend them to their partners in order to create synergies and a higher return on investment.

Advanced technologies, such as blockchain, Big Data, IoT smart systems, and artificial intelligence, enable precise product tracking, better resource planning, and real-time operation optimization. For example, blockchain technology ensures complete product traceability, while IoT networks enable better inventory management and logistics processes (Christopher, 2016). Modern supply chain management increasingly seeks horizontal and vertical integration, which allows for faster and more accurate responses to changes in demand, reduced operational costs, and better coordination between manufacturers and distributors. As Christopher (2016) points out, integrating key business functions such as marketing, production, and logistics enables the creation of synergies that enhance business processes, making the business more flexible and agile. The changes brought by the digitization of the logistics sector are not only technological but also relate to the way business is conducted across the entire industry. The use of digital technologies has led to radical changes in business models and processes, enabling greater efficiency and competitiveness in the sector. As Malagón-Suárez and Castro (2022) point out, Logistics 4.0 represents a significant shift in how supply chains are managed, enabling the improvement of operations and competitiveness in the industry. According to Büyüközkan and Fethullah (2018), Industry 4.0 lays the foundation for fully connected and highly competitive supply chains, where innovations become a common interest for all participants in the chain. Stajić (2020) emphasizes that SCM today is not only strategically important for businesses but is also crucial for creating a competitive advantage, as it enables more efficient management of the expanded ecosystem of processes and relationships among partners. Through horizontal and vertical integration, companies achieve competitive advantages, making supply chains more flexible and better equipped to meet the challenges of the global market. The logistics sector is becoming less dependent on human intervention thanks to the application of new technologies. These technologies significantly impact supply chains, improving collaboration among participants and enabling the achievement of business advantages such as greater efficiency, cost reduction, and increased customer satisfaction. Digital transformation can reduce costs by 7-34% and increase revenue by 22-33%, depending on the industry (Lakić, D., 2023).

For the successful implementation of digital transformation in the supply chain, focus should be placed on four key areas: strategic, organizational, process-methodological, and technological digitization. Strategic digitization involves creating a strategy for supply chain management, organizational digitization focuses on employee development, while process digitization promotes collaboration among partners. Technological digitization, which is most

researched, includes the implementation of technologies such as IoT, blockchain, and Big Data. Technological innovations in logistics, based on digitization, bring radical changes to business models and processes, enabling greater efficiency and competitiveness. The digital transformation of the logistics sector is key to improving the business ecosystem and competitiveness in the global market. Blockchain technology is a distributed database that ensures security and immutability of data by linking blocks in a digital chain. Each block contains information about transactions that are verified and cannot be altered later. As a decentralized system, blockchain allows for transparency and real-time access to data for all participants, thereby eliminating problems with information asymmetry and increasing trust among supply chain partners. This technology is key to improving efficiency, reducing errors and fraud, and creating a more sustainable business ecosystem (Dabić-Miletić, S., 2021).

By combining digital technologies such as blockchain and omni-channel strategies, modern companies can significantly improve the efficiency of their supply chains, providing greater transparency, security, and flexibility in managing inventories and deliveries.

Omni-channel retail uses various channels to interact with customers and fulfill their orders, integrating flows of information, products, and finances. This approach allows for a seamless shopping experience, whether it is online shopping, physical stores, or mobile applications. The use of technologies such as inventory management systems and data analytics enables better optimization of demand and logistics operations. Additionally, the "click and collect" strategy, micro-fulfillment centers, and partnerships with logistics services enable faster delivery and reduced transportation costs. Although implementing omni-channel strategies presents challenges, such as aligning different channels and tracking inventory in real-time, in the long term, it provides competitive advantages in terms of efficiency and customer experience (Chopra, S., 2019).

Digital transformation has become crucial for improving business processes and creating competitive advantages. In omni-channel retail, which combines online and offline channels, digitization improves efficiency, reduces costs, and optimizes the supply chain. Zimonjić points out that digitization enables businesses to connect different sales channels, leading to better inventory management and improved customer experience. Also, digital tools such as data analytics, inventory tracking, and transport optimization allow businesses to quickly adapt to market changes. Personalization, enabled by analyzing customer data, is also key to increasing loyalty and sales. According to research by Alogistics (2025), the implementation of the Internet of Things (IoT) has increased the efficiency of shipment tracking by more than 30%, reducing logistics errors, while Big Data analysis reduces warehouse inventories by 25%, improving route optimization and demand forecasting.

METHODOLOGICAL FRAMEWORK OF THE RESEARCH

In order to analyze the impact of digitization on supply chain management and brand perception, a survey was conducted. The research was conducted in an online format, using the Google Forms platform, which enabled easy distribution and efficient collection of responses. An invitation to participate in the research was sent to a wide range of respondents, including individuals connected to the supply chain, brand management, and digitization, members of the academic community, as well as citizens, to encompass diverse opinions and perceptions on the research topic. The survey was distributed via email, social media, and business applications. A total of 83 questionnaires were distributed, with 61 respondents completing the survey, resulting in a response rate of 73.5%. This high response rate allows for an adequate

analysis of the collected data and provides insights into the attitudes of relevant stakeholders regarding the research topic.

A structured questionnaire was used for data collection, carefully designed to cover the key aspects of the research. The questionnaire consisted of several segments, including socio-demographic characteristics of the respondents, frequency of online shopping, the importance of tracking and transparency of shipments, perception of digital tools in the supply chain, and attitudes toward the importance of digitization for the future development of supply chain management. It was composed of 8 closed-ended questions, including a Likert scale (from 1 to 5), which allowed for the precise expression of respondents' attitudes, thereby facilitating standardized analysis of responses and interpretation of results. After the survey was completed, all data were retrieved from the Google Forms platform and consolidated into a single dataset. To ensure the accuracy of the results, the responses were reviewed, and the data were cleaned, which involved removing incomplete and inconsistent responses. The sample of respondents was formed using the random sampling method, including respondents with different socio-demographic characteristics, without prior selection based on specific experiences or knowledge. This approach allowed for the collection of data from a broad spectrum of participants, whose responses can provide a comprehensive insight into the research topic.

For data processing and analysis, SPSS (Statistical Package for the Social Sciences) was used. Demographic data were coded with numerical values for easier analysis, while attitude questions, which were rated using the Likert scale (from 1 to 5), retained their original values. The first step in the analysis involved descriptive statistics of the demographic data of the respondents to gain insights into the sample structure and basic characteristics of the respondents. The analysis included calculating frequencies and percentages for key demographic variables, such as gender, age, education level, and monthly income. The following is the table:

Table 1. Descriptive Statistics of the Socio-Demographic Structure of Respondents

	Category	Frequency	Percentage
Gender:	Male	23	62%
	Female	38	38%
Age:	Under 20 years	8	13%
	21 to 30 years	28	46%
	31 to 40 years	19	31%
	41 to 50 years	6	10%
Years of Work Experience:	Less than 5 years	14	27%
	5 to 10 years	14	27%
	11 to 20 years	14	27%
	More than 20 years	10	20%
Education Level:	High school	25	41%
	Bachelor's degree	22	36%
	Master's degree	11	18%
	Doctorate degree	3	5%
Income:	Less than 500 eur	12	20%
	500 - 1000 eur	32	52%
	1000 - 2000 eur	15	25%
	More than 2000 eur	2	3%

Source: Author

The research sample consisted of 61 respondents with varied demographic and socio-economic characteristics. The majority belonged to the 21–30 age group, and a higher proportion were male. Respondents differed in terms of work experience, educational attainment, and monthly income, ensuring a heterogeneous sample. These contextual factors are relevant for interpreting consumer attitudes toward delivery speed, the frequency of online purchases, and the relationship between income levels and brand perception.

Although the research provided useful insights into consumers' perceptions of brands and their supply chains, certain limitations should be considered when interpreting the results. To assess the relevance of the sample in this research, a sample of 61 respondents was taken, consisting of different socio-demographic groups, including users with experience in online shopping, as well as citizens with varying views on the importance of digitalization in supply chains. Although the sample is not representative of the entire consumer population in Montenegro, it is statistically significant for the group covered by the study. This sample provides insights into the views and perceptions of key actors regarding factors such as transparency in supply chains, delivery speed, and the use of digital tools. Although the sample size limits the generalizability of the findings, the demographic distribution provides relevant insights for the target population. The online survey method may have introduced a degree of sampling bias, with urban respondents and individuals more interested in digitalization being overrepresented. Despite these limitations, the applied methodology - based on a quantitative approach and SPSS data analysis - ensured valid and reliable insights into consumer perceptions of supply chain digitalization. The findings offer a valuable foundation for future research on this topic in the Montenegrin context.

RESULTS AND DISCUSSION – THE IMPACT OF DIGITALIZATION ON BRAND PERCEPTION

The research results present the key findings derived from the analysis of respondents' answers to the questions in the questionnaire. The analysis focused on consumer attitudes regarding the impact of digitalization on supply chain management, brand perception, and the factors that shape their loyalty. The results indicate a significant connection between supply chain transparency, delivery speed, and brand trust, with a particular emphasis on digital technologies as factors influencing consumer decisions. The following subsections will present the results of questions related to the frequency of online shopping, attitudes toward digital transparency, and delivery speed, along with the interpretation of statistical indicators that enable a deeper understanding of consumer behavior and preferences.

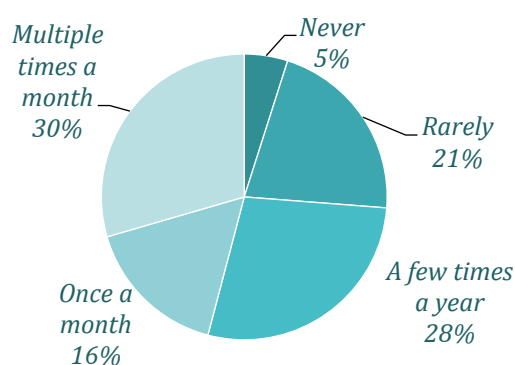


Chart 1. Frequency of Online Shopping
Source: Author

Chart 1 indicates that online shopping is increasingly common, with 30% of respondents purchasing online multiple times a month, indicating the growing popularity of online shopping. 28% of respondents shop a few times a year, while 21% shop rarely, and 16% shop once a month. Only 5% of respondents never shop online. These data suggest that online shopping is becoming an increasingly common way of shopping, with a particularly noticeable trend of frequent online shopping among a significant number of respondents. This behavior pattern may be the result of the convenience and simplicity that online shopping offers, as well as the broader range of products available.

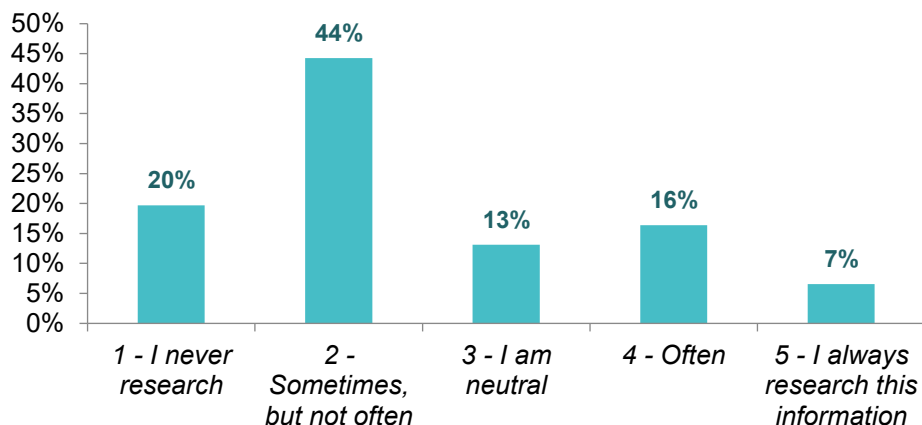


Diagram 1. Frequency of Supply Chain Research Before Purchase
Source: Author

The research shown in Diagram 1 illustrates the growing frequency of supply chain research before making a purchase, indicating the increasing attention consumers are giving to the ethics, sustainability, and transparency of products. This diagram demonstrates how often consumers research various aspects of the supply chain, such as product sources, production conditions, and other relevant information before making a purchasing decision.

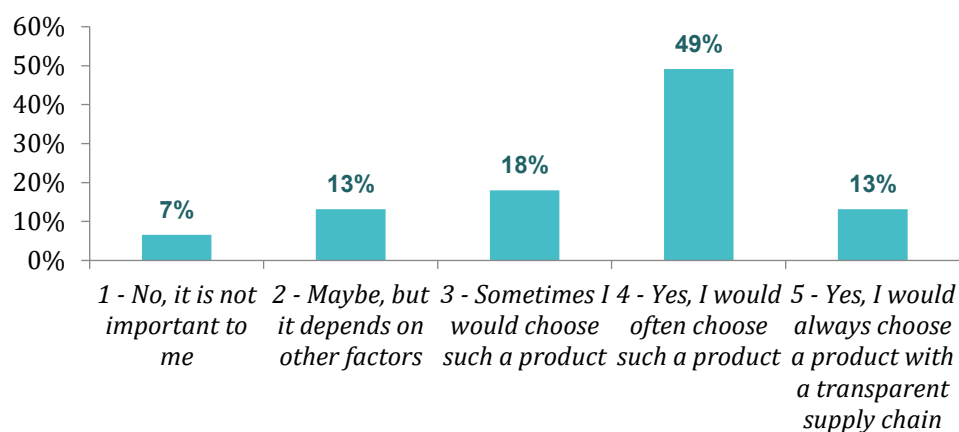


Diagram 2. Impact of Supply Chain Transparency on Purchasing Decision
Source: Author

Diagram 2 shows a clear consumer preference for products with transparent supply chains, with the majority of respondents often or always choosing such products. This trend suggests an increased awareness and interest among consumers regarding the ethical and environmental aspects of products, which could influence business strategies and the increase transparency in the industry.

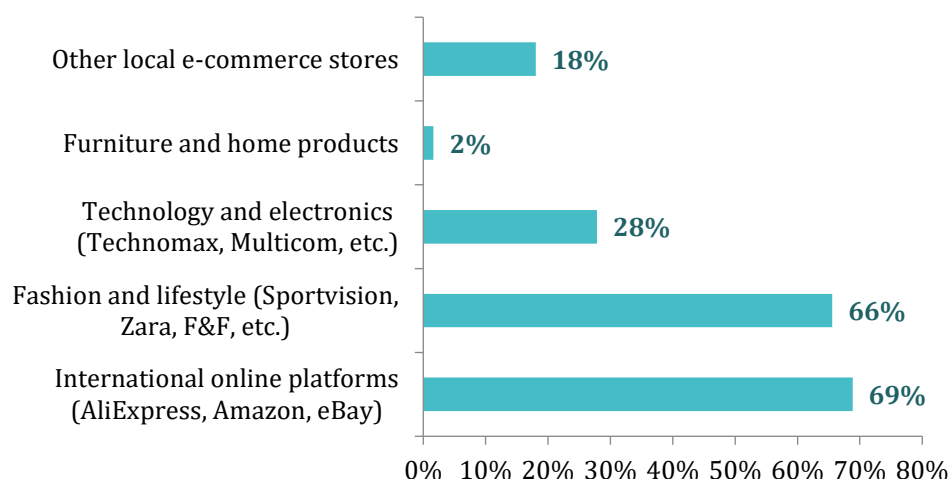


Diagram 3. Most Commonly Chosen Online Platforms and Brands for Shopping

Source: Author

The research results show that respondents most frequently order from international online platforms such as AliExpress, Amazon, and eBay (69%), suggesting that these platforms are the most popular choice for online shopping due to their wide selection and competitive prices. The next most popular are fashion and lifestyle brands such as Sportvision, Zara, and F&F (66%). Technology and electronics, although popular, occupy a smaller share of 28%, while furniture and home products are almost negligible at only 2%. Additionally, 18% of respondents use local e-commerce platforms, indicating a lesser preference for domestic platforms compared to international ones. These data highlight the strong influence of global online platforms on the market, while local brands and products have a smaller share.

In the next part of the study, respondents were asked questions with statements they rated using the Likert scale. This scale allows for the quantification of their attitudes, ranging from complete disagreement to complete agreement. The analysis of the results provides deeper insight into the online shopping habits of respondents, which can have a significant impact on understanding consumer preferences in Montenegro. The results and their interpretation are presented below.

Table 2. Descriptive Analysis of Attitudes

Perception/Attitude from the Questionnaire	Mean Value	Standard Deviation
1. How often do you purchase products online?	3.15	0.93
2. Is it important for you to know the origin and journey of a product before purchasing it?	3.2	1.25
3. Would you trust a brand more if it used blockchain to track the product?	3.79	1.13
4. Would you choose a product with a transparent supply chain?	3.49	1.09
5. How important is delivery speed when purchasing products online?	3.75	0.99
6. Would you pay more for faster and more efficient delivery?	3.21	1.11
7. How often do you research how brands manage their supply chains?	2.46	1.18

Source: Author

Respondents show moderate interest in transparency and technologies such as blockchain, and delivery speed is also an important factor when shopping online. However, the majority of respondents do not frequently research how brands manage their supply chain, suggesting that interest in this information is still relatively low. There is high variation in the responses to most questions, indicating that consumers have different priorities and attitudes when it comes to online shopping. To address the research problem and effectively fulfill the objectives of this study, the following testing was carried out using inferential statistics. Inferential statistics allows researchers to make conclusions about a broader data set or population based on a sample of data, testing predefined hypotheses or answering specific research questions. Depending on the formulation of the questions or hypotheses, different statistical tests are used. Additionally, the choice of statistical tests also depends on the population size and the normality of data distribution.

H1: Consumers trust a brand more that uses blockchain to track products, as it increases the transparency of the supply chain.

To test hypothesis H1, normality of data distribution was assessed using the Shapiro-Wilk and Kolmogorov-Smirnov tests for two key variables: the importance of product traceability and trust in brands using blockchain. Both tests showed significant deviations from normality ($p = 0.000$), indicating the need for non-parametric methods such as the Spearman correlation or Kruskal-Wallis test in further analysis.

A regression analysis was conducted with trust in brands using blockchain as a predictor. The correlation coefficient ($R = 0.587$) indicates a moderately positive relationship, while the coefficient of determination ($R^2 = 0.344$) shows that 34.4% of the variance of the dependent variable is explained by the model. The adjusted R^2 (0.333) confirms the appropriateness of the model without overfitting. However, the standard error of the estimate (1.020) indicates limited predictive accuracy. Overall, the analysis confirms a statistically significant but moderate relationship, suggesting that additional factors are likely to influence the dependent variable. The conclusion from the regression analysis indicates a moderate relationship between trust in the blockchain brand and the dependent variable, but R^2 suggests that only 34.4% of the variance can be explained by this single predictor. Although there is a statistically significant correlation, the model is not perfect, and other factors may have a greater impact on the dependent variable. Additionally, the high standard error indicates that the model's predictions are not completely accurate.

The Spearman correlation between the importance of knowing the origin of a product and trust in brands that use blockchain resulted in a coefficient of 0.601, which indicates a moderate to strong positive correlation. The correlation is statistically significant ($p = 0.000$) and confirms that a higher interest in the traceability of products is associated with greater trust in blockchain-based transparency ($N = 61$).

Table 3. Spearman's Correlation H1

Measure P-value (Sig.)	Measure P-value (Sig.)
Correlation Coefficient (Spearman's rho)	0.601
P-value (Sig. 2-tailed)	0.000
N (Number of Respondents)	61

Source: Author

Spearman's correlation shows that there is a moderate and statistically significant relationship between the interest in knowing the origin and journey of a product and trust in a brand that uses blockchain for tracking products. This suggests that consumers who consider the origin of a product important are also more likely to trust a brand that uses blockchain technology to ensure transparency.

ANOVA: The model is statistically significant and suggests that trust in a brand that uses blockchain for tracking products impacts how important consumers consider knowing the origin and journey of a product. Therefore, hypothesis H1 - that consumers trust brands using blockchain because it enhances supply chain transparency - is confirmed.

H2: Faster and more efficient delivery increases consumer loyalty to the brand.

To test hypothesis H2, the Shapiro-Wilk and Kolmogorov-Smirnov tests confirmed that data on the importance of delivery speed and willingness to pay more for faster delivery were not normally distributed ($p = 0.000$). As a result, non-parametric methods, such as Kruskal-Wallis or Spearman's correlation, were applied for further analysis. In the regression model, willingness to pay more for faster delivery served as the predictor. The analysis revealed a moderate to strong positive correlation ($R = 0.621$) between willingness to pay more and the importance placed on delivery speed. The model explained 38.5% of the variance ($R^2 = 0.385$; Adjusted $R^2 = 0.375$), indicating reasonable predictive power, though there is potential for further refinement. The standard error (0.786) suggests relatively accurate, yet not perfect, predictions.

Spearman's correlation between the importance of delivery speed and the willingness to pay more for faster delivery yielded a coefficient of 0.618, indicating a moderately strong positive correlation. This suggests that as consumers value delivery speed more, they are increasingly willing to pay for faster delivery. The correlation is statistically significant ($p = 0.000$), confirming a meaningful relationship between the two variables ($N = 61$).

Table 4. Spearman's Correlation H2

Variables	Correlation (Spearman's rho)	P-value (Sig.)
How important is delivery speed when purchasing products? Would you pay more for a product if you know it will be delivered faster?	1	-
How important is delivery speed when purchasing products? Would you pay more for a product if you know it will be delivered faster?	0.618	0.000

Source: Author

The correlation between the importance of delivery speed and the willingness to pay more for faster delivery is moderate and statistically significant, indicating a positive relationship between these two variables.

Kruskal-Wallis: Since the p-value is greater than 0.05, we conclude that there is no statistically significant difference between different income levels and the willingness to pay more for faster delivery. In other words, income does not significantly affect consumers' willingness to pay more for faster delivery.

Table 5. Kruskal-Wallis Test H2

	6. Would you pay more for a product if you knew it would be delivered faster and more efficiently?
Kruskal-Wallis H	4.858
df	3
Asymp. Sig.	0.183
<i>a. Kruskal Wallis Test</i>	
<i>b. Grouping Variable: Incomes</i>	

Source: Author

Based on the results of the conducted analyses, we can conclude that hypothesis H2 (Faster and more efficient delivery increases consumer loyalty to the brand) can be partially confirmed.

IMPLICATIONS OF THE RESEARCH

The research confirms the significant impact of digitalization on supply chain management, brand perception, and consumer loyalty. The findings underscore the need for further exploration of digital transparency and delivery speed's influence on consumer trust, particularly in the context of Montenegro. This study reveals a significant correlation between consumer trust in brands using blockchain for product tracking and the perceived importance of supply chain transparency. Additionally, it suggests that delivery speed positively influences consumers' willingness to pay more for faster service. These results align with prior research, confirming that blockchain enhances brand trust and that delivery speed plays a crucial role in maintaining consumer loyalty.

One key finding is the positive correlation between trust in blockchain-enabled brands and the perception of supply chain transparency. While the explained variance is moderate ($R^2 = 0.344$), it highlights that blockchain can boost trust, though other factors also contribute to shaping this perception. This finding supports Christidis and Devetsikiotis (2016), who argue that blockchain enhances transparency and trust, but its effectiveness depends on consumer understanding. The study also confirms that trust in blockchain varies with consumer awareness, as suggested by Eslami et al. (2020). Consumers who value transparency in supply chains tend to trust blockchain-enabled brands more, while skeptics are less likely to do so. This emphasizes the need for educating consumers to foster greater acceptance and trust in blockchain technology.

Additionally, delivery speed significantly influences consumer decisions. The correlation between perceived delivery speed and the willingness to pay more ($\rho = 0.618$, $p = 0.000$, $R^2 = 0.385$) mirrors findings by Joerss et al. (2016), who noted that 25% of consumers are willing to pay extra for fast delivery, especially for same-day services. The study also reveals that consumers are more willing to pay extra for fast delivery of products like food compared to items like clothing. This supports previous research showing that delivery speed impacts loyalty, with willingness to pay more often depending on the product type. Fisher et al. (2019) found that new customers are more responsive to delivery speed than long-term customers, suggesting that new experiences and frequency of online shopping shape perceptions of delivery speed. Thus, delivery speed is one factor among many influencing consumer decisions, with price and reliability also playing key roles.

Lastly, the Kruskal-Wallis test indicated significant differences in the perception of blockchain technology efficiency, in line with Ravi and Shankar (2018), who argue that successful adoption of new technologies like blockchain depends on minimizing implementation challenges. Consumers who recognize fewer barriers tend to rate blockchain's efficiency more highly, while skeptics are less inclined to believe in its effectiveness.

POTENTIALS FOR IMPROVING THE DIGITALIZED SUPPLY CHAIN IN MONTENEGRO

E-commerce in Montenegro has seen significant growth in recent years, driven by global trends in digitalization and changes in consumer habits. The development of the internet, expansion of mobile technologies, and improved digital infrastructure have enabled the growth of online shopping, with increasing interest from both consumers and entrepreneurs. Although the market is still not on the level of developed countries, a clear growth trend is visible, despite challenges related to rural area coverage and technological accessibility. Technological infrastructure, such as better internet access and the growth of mobile technologies, is crucial for the further development of e-commerce, while digital payments increasingly use debit and credit cards as well as e-wallets. However, cash still dominates during product delivery, indicating a need for greater trust in online transactions. Additionally, while Montenegro has regulations related to e-commerce, obstacles such as complex administrative procedures and high operational costs slow the growth of domestic platforms. Although consumers are increasingly using the internet for research and shopping, they still show mistrust towards transaction security and product quality, preferring to shop through international platforms.

Although e-commerce in Montenegro is experiencing gradual growth, there are still significant challenges to its development. According to data from MONSTAT in 2015, 23.9% of respondents had purchased goods or ordered services online, an increase of 4.1% compared to the previous year. However, a high percentage of citizens (76.1%) had never used the internet for shopping, indicating a need for greater education and promotion of digital commerce. Among the most popular products bought online are clothing and sports equipment (82.9%), while other categories such as travel services and pharmaceuticals are significantly less represented. The data also shows that 60.4% of purchases come from merchants outside the European Union, while purchases from domestic merchants are less represented, accounting for only 24.6%, highlighting a significant opportunity for the growth of domestic e-commerce. Furthermore, only 24.3% of businesses with a website receive orders online, suggesting insufficient utilization of the digital market in the business sector.

Despite the challenges, there is significant potential for further development of e-commerce in Montenegro. Key challenges include logistical issues, slower delivery processes compared to more developed markets, and limited product offerings on domestic platforms. However, opportunities for growth include improving logistics systems, introducing new technologies such as blockchain for product tracking, and educating consumers about the benefits of online shopping. Increased integration of social media into e-commerce processes can facilitate the promotion of local brands and interaction with consumers. However, challenges such as low consumer trust in transaction security and a lack of comprehensive market data still exist. Further research, collaboration with MONSTAT, and the application of new legal frameworks are needed to facilitate the better development of the e-commerce sector and strengthen domestic competitiveness.

According to Eurostat data (2023), Montenegro is a leader in the region for online clothing purchases. In the three-month period in 2023, as many as 77% of Montenegrins purchased

clothing online, which is almost at the level of Bulgaria (78%) and Romania (80%). Although Montenegro leads, it is followed by Croatia (72%), Serbia (70%), Slovenia (66%), and Bosnia and Herzegovina (59%), which shows the increasing presence of online shopping in the region. Return policies play a significant role in purchasing decisions. According to research by ICSC, 82% of consumers believe that return policies affect their decision to buy certain products. When comparing product returns between physical stores and online shopping, the differences are significant. Only 6.2% of customers who bought products in physical stores decide to return them, while about one-third of online shoppers return the products they purchased, indicating a higher return rate in online shopping.

Furthermore, the research showed that return costs have a significant impact on consumer behavior. If there were costs for returning products purchased online, 77% of consumers would be more likely to shop in physical stores, while 80% would prefer to return products to physical stores. Also, many consumers order additional products with the intention of returning them if they are not satisfied. According to the research, 87% of respondents admit to ordering products they want to try, counting on returning them if they are not satisfied. Finally, the return policy also plays a key role in customer satisfaction. About 60% of respondents stated that retailers allowed a full refund and kept products they tried, confirming the importance of flexible return policies for online retailers.

These data clearly show how the digitalization of shopping and return policies affect consumer behavior and also reveal the challenges faced by merchants in digital commerce, particularly concerning logistics, product returns, and purchasing habits. Opportunities for improving the e-commerce sector in Montenegro can be viewed through several key areas that will enable faster development and create a more favorable environment for all market participants, both merchants and consumers. Increasing digital literacy is the first step toward improvement. The basic prerequisite for wider use of e-commerce is educating citizens about online transaction security and the advantages of online shopping. Promoting security, using digital platforms, and increasing consumer trust will reduce skepticism many still have towards online payments. Educational programs should focus on raising awareness about privacy protection and data security, which would allow consumers easier and safer online shopping. Improving online payment security is essential. Introducing certified and secure payment systems, such as SSL encryption and two-factor authentication, can increase consumer trust in e-commerce. Education about privacy protection is also crucial for enabling safer online transactions.

Support for small and medium-sized enterprises (SMEs) is an important area for the development of local e-commerce. These companies often have not fully utilized the potential of e-commerce. Assistance through education, financial incentives, and support with technological and logistical resources can significantly improve their operations and expand their market reach. Additionally, motivating merchants to use global e-commerce platforms, such as Amazon or eBay, contributes to expanding the market and increasing sales outside the borders of Montenegro. Infrastructure improvements and logistics systems are key to the development of e-commerce. Investment in modernizing delivery systems and optimizing international shipments will improve efficiency and competitiveness for merchants. Additionally, simplifying the product return process will make shopping safer and more attractive to consumers.

Technological progress also plays an important role. Automation, advanced data analysis technologies, and product personalization can significantly improve the customer experience. Personalization algorithms can increase sales and better meet customer needs. The use of

digital marketing, including SEO optimization, social media, influencer marketing, and email targeting, can increase merchants' visibility and competitiveness in the market.

Collaboration with governmental and international institutions is the foundation for the long-term development of e-commerce. Introducing clear regulations and standards that protect both merchants and consumers brings security to all market participants. Easing access to international markets by reducing customs and administrative barriers will open new opportunities for local merchants. Additionally, encouraging start-up initiatives and innovations in the e-commerce sector, through incubators and support for new entrepreneurs, can contribute to creating a competitive market and innovative business models. By combining all these strategies, Montenegro can lay the foundation for the long-term development of the digital economy, enabling better competitiveness and satisfaction for both consumers and entrepreneurs in the e-commerce market.

CONCLUSION

Based on the conclusions from hypothesis testing, the research confirms the significant impact of digitalization on supply chain management, brand perception, and consumer loyalty, particularly in e-commerce in Montenegro. Although the Montenegrin market is still in a developmental phase compared to more developed countries, there are clear indications that digitalization can play a key role in improving the e-commerce sector, considering global trends and changes in consumer behavior.

One of the key findings of the research is the importance of blockchain technology in increasing consumer trust in brands that use it for product tracking. The transparency in the supply chain enabled by blockchain encourages consumers to trust brands more, while also providing a competitive advantage. However, further consumer education on this technology is necessary to reduce doubt and insecurity, thereby increasing the acceptance of blockchain. The speed of product delivery also emerged as one of the key factors in consumer decision-making, with a pronounced effect on consumer loyalty. The research results indicate that a significant number of consumers are willing to pay more for faster delivery, particularly for products such as food items. These findings confirm the importance of optimizing logistics systems, as delivery speed not only consumer satisfaction but also loyalty.

Considering the challenges Montenegro faces, such as low consumer trust in the security of online transactions and underdeveloped domestic e-commerce platforms, it is essential to work on improving infrastructure and digital payments. Increasing digital literacy and educating consumers about online transaction security, as well as improving return policies, will help reduce skepticism toward online shopping. Recommendations for improving the e-commerce sector in Montenegro cover several key areas. Efforts should be directed toward strengthening digital infrastructure, educating consumers and merchants, as well as developing secure payment systems and modernizing logistics systems. Additionally, supporting small and medium-sized enterprises through financial incentives and training, as well as assisting in accessing global e-commerce platforms, can significantly contribute to the expansion of domestic e-commerce.

In the context of technological advancement, the application of advanced technologies such as automation, data analytics, and offer personalization can contribute to improving the customer experience and increasing merchant competitiveness. Furthermore, greater integration of social media and digital marketing into e-commerce strategies would enable better interaction with

consumers, thereby increasing product visibility and sales. Finally, collaboration with government and international institutions and the implementation of clear regulations for the protection of both consumers and merchants can create a stable and secure business environment. Easing access to international markets and reducing administrative barriers contributes to the development of the e-commerce sector and opens up new opportunities for market expansion.

In summary, through the integration of digital technologies, improvement of education, optimization of logistics and payment systems, and collaboration with institutions, Montenegro can significantly improve e-commerce and lay the foundation for the long-term growth and development of the digital economy.

References

1. Büyüközkan, G., & Fethullah, G., (2018) "Digital Supply Chain: Literature Review and a Proposed Framework," *Industrial Engineering Department*, Galatasaray University, 34349, Ortakoy, Turkey.
2. Christidis, K., & Devetsikiotis, M., (2016) "Blockchains and Smart Contracts for the Internet of Things," *IEEE Access*, vol. 4, pp. 2292-2303.
3. Chopra, S., & Meindl, P., (2019) *Supply Chain Management: Strategy, Planning and Operation*, Pearson, pp. 13-29.
4. Christopher, M., (2016) *Logistics & Supply Chain Management* (5th ed.), Pearson Education Limited, London.
5. Dabić-Miletić, S., (2021) "Primena blockchain tehnologije u upravljanju lancima snabdevanja u međunarodnom poštanskom saobraćaju," *XXXIX Simpozijum o novim tehnologijama u poštanskom i telekomunikacionom saobraćaju – PosTel*.
6. Fisher, M. L., Gallino, S., & Xu, J. J., (2019) "The Value of Rapid Delivery in Omnichannel Retailing," *Journal of Marketing*.
7. Joerss, B. M., Neuhaus, F., & Schroder, J., (2016) "How Customer Demands Are Reshaping Last-Mile Delivery," *McKinsey Quarterly*.
8. Lakić, D., (2023) "Upravljanje lancima snabdevanja 4.0: Osnovne teorijske postavke," *Zbornik radova Fakulteta tehničkih nauka*, Novi Sad.
9. Malagón-Suárez, C., & Castro, J., (2022) "Challenges and Trends in Logistics 4.0," *Ingeniería*.
10. Pixsell, (2023) "Statistika o navikama online kupovine u Evropi," Eurostat.
11. Stajić, N., (2020) "Industrija 4.0 u kontekstu upravljanja odnosima u lancu snabdevanja," *Ekonomске ideje i praksa*, Ekonomski fakultet, Univerzitet u Beogradu.
12. Zimonjić, M., (2024) "Uticaj digitalne transformacije na konkurentsku prednost preduzeća," *Megatrend Review*, 24(1), 13-30.
13. Monstat, (2023) Zavod za statistiku Crne Gore.