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ANALYSIS OF THE APPLICATION OF ENTERPRISE INFORMATION SYSTEMS FOR SUPPLY CHAIN MANAGEMENT IN TRADE IN BULGARIA

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Abstract: This paper examines the nature, specific relationships, and interdependencies between Supply Chain Management (SCM) in trade and Enterprise Information Systems (EIS). The main objective is to investigate the current state and trends in the adoption of EIS for SCM in trading enterprises in Bulgaria and, on this basis, to identify the major influencing factors. Particular emphasis is placed on the application of Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM) systems. The study is based on publicly available data from the National Statistical Institute (NSI) and the findings of a questionnaire survey. The research thesis is that enterprise size has a significant influence on the choice of EIS. To examine the relationship between the number of employees and the implementation of ERP systems, one-way analysis of variance, the chi-square test, and regression analysis were employed. The research findings indicate a high level of Internet access among enterprises, relative stability in the implementation of ERP systems, and a decline in the use of CRM solutions.

Key words: supply chain management; Enterprise Resource Planning (ERP); Customer Relationship Management (CRM).

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Introduction

The digitalization of commercial activities facilitates the exchange and processing of large volumes of information among business partners. In an electronic environment, participants in commercial transactions act both as sources of data and as users of processed information. Through the use of Enterprise Information Systems (EIS) for the integration and analysis of these large datasets, economic processes can be optimized and accelerated. EIS are applied in one of the most critical processes in the economy, namely Supply Chain Management (SCM). SCM has evolved as a logical extension and improvement of logistics. This form of management emerged during the second half of the twentieth century, when economic entities began to specialize in the performance of specific business activities. Prior to this period, supply-related activities were studied primarily as part of inventory management.

The global technological progress and the increasingly rapid adoption of information technologies have shaped the development of business processes across the economy as a whole. SCM is among the processes affected by these transformations. It has become a key component in achieving flexibility, process continuity, and enhanced competitiveness of enterprises. Under contemporary conditions of globalization and dynamic consumer demand, effective coordination among suppliers, warehouses, transport providers, retail outlets, and end customers is of paramount importance for ensuring reliable and flexible supply chains. Supply chains encompass all processes, from planning and procurement, through inventory management and logistics, to sales and after-sales services. Optimizing these core processes leads to cost reduction, improved service quality, and higher customer satisfaction.

This study examines the nature, specific relationships, and interdependdencies between digital readiness and the systems used in SCM within micro, small, medium-sized, and large enterprises operating in Bulgaria.

The primary objective of the study is to investigate the current state and trends in the adoption of EIS for SCM in Bulgarian trading enterprises and, on this basis, to identify the key factors influencing their implementation.

The research thesis is that enterprise size (measured by the number of employees) has a significant impact on the selection of EIS.

Null hypothesis (H0): Enterprise size does not influence the type of information system used.

Alternative hypothesis (H1): There is a statistically significant relationship between enterprise size and the choice of EIS. Large enterprises tend to implement Enterprise Resource Planning (ERP) systems, whereas micro-, small-, and medium-sized enterprises are more likely to use other business solutions, such as sales and inventory management software and/or MS Excel.

To achieve the research objective, data obtained from the National Statistical Institute (NSI) were analysed. In addition, a questionnaire survey was conducted, focusing on the following aspects:

First, identifying the technologies used and the level of digitalization of enterprises in Bulgaria.

Second, analysing operational processes in SCM.

Third, determining the relative importance of various factors influencing the implementation of EIS.

1. Theoretical Aspects of Enterprise Information Systems for Supply Chain Management in Bulgaria

The flexible and seamless execution of trading operations is ensured through uninterrupted supply chains. Business processes within enterprises are influenced by both internal and external factors. The former include organizational structure, capital and human resources, technologies and innovations, marketing, and SCM. External factors encompass market conditions, technological progress, the regulatory framework, international agreements, economic crises, and infrastructure.

The execution of commercial transactions is closely associated with the delivery of goods. This process is accompanied by a range of services that collectively ensure efficient distribution (Iliychovski, 2013). Supply chains are among the most sensitive systems due to the wide variety of activities they encompass. In recent years, significant disruptions have been observed in both short and long supply chains. The COVID-19 pandemic led to delays and, in some cases, complete interruptions in deliveries. At the same time, it accelerated changes in traditional business models and encouraged the adoption of new approaches focused on sustainability and digitalization. The implementation of an omnichannel approach enabled retailers to reach new customers while maintaining relationships with existing ones.

The concept of SCM has been interpreted by a number of authors in the economic literature. SCM can be viewed as a complex system comprising multiple subsystems that are uniquely integrated and configured to meet the needs of enterprises. Participants in a supply chain may include retailers, customers, wholesalers, distributors, manufacturers, and suppliers of resources such as raw materials and components (Chopra & Meindl, 2013). The primary objective of SCM is to organize, plan, control, and manage the movement of material flows from the design stage through production and distribution to end consumers, while meeting market requirements and achieving the desired economic efficiency of the entire supply chain (Krylatkov & Prilutsiya, 2018;

Sergeev, 2004, pp. 13–15). According to the Council of Supply Chain Management Professionals (CSCMP), SCM encompasses the planning and control of all processes related to sourcing, procurement, conversion, and logistics management activities. It also includes coordination and collaboration with channel partners, such as suppliers, intermediaries, third-party service providers, and customers. In essence, SCM integrates supply and demand management both within and across enterprises (CSCMP, 2024). The organization of SCM can be associated with the following three principles: place utility, time utility, and possession utility (Koraliev & Perkov, 2014). In her study, S. Petrova draws a distinction between logistics carried out within the boundaries of a single enterprise and supply chains, which consist of multiple companies. These companies are interconnected and coordinate their activities in order to deliver products to the market (Petrova & Perkov, 2022, p. 9). In this way, SCM creates an "integration of supply and demand" and is oriented towards "increasing the value generated", i.e., improving the profitability of supply chains (Mentzer et al., 2001; Petrova & Perkov, 2022, p. 10).

From the information presented above, it can be concluded that *SCM in trade encompasses the coordination and monitoring of all processes in real time by analysing the degree of deviation between forecasted and actual values. On this basis, it is assessed whether the identified deviations fall within acceptable limits. Timely and well-founded managerial decision-making is essential for maintaining and gaining competitive advantage. A well-developed and consistently implemented business strategy creates the conditions for the effective management of information, material, financial, and marketing flows between the different organizational units*.

SCM represents a complex system composed of numerous interconnected software solutions that improve the performance of management processes. A team of researchers led by M. Cooper emphasizes that SCM results from the integration of various business processes, including order fulfilment, procurement, manufacturing flow management, customer relationship management, demand management, and product development and commercialization (Cooper, Lambert, & Pagh, 1997). The coordination of these functional areas forms an integrated network in which different technologies are combined through software integration to support the entire supply chain process. This ensures the efficient, rapid, and reliable storage, analysis, and control of large volumes of data, thereby supporting enterprises in making optimal managerial decisions (Valcheva, 2024, p. 62). In contemporary SCM, some of the most important EIS, also referred to as business solutions, include:

- Enterprise Resource Planning (ERP) – an enterprise resource planning system. It is an integrated system whose role is of critical importance for SCM in trade, particularly with regard to improving the efficiency of processes within

the enterprise itself. It supports inventory tracking and order fulfilment, planning and coordinating orders, optimizing costs by reducing technical errors, improving connectivity among business entities, and facilitating decision-making based on real-time data.

- Customer Relationship Management (CRM) – a customer relationship management system. It is designed to manage customer-related data associated with orders, marketing campaigns, sales, customer service, technical support, and customer records. The system can also be used to forecast customer demand. It encompasses the collection and management of databases containing information on both current and potential customers (Midova, 2007). The purpose of collecting this information is to summarize customer data and provide tailored offers that are expected to have the greatest impact on individual consumers (Midova, 2007b, pp. 125–126). Competition in both goods and services markets requires trading enterprises to establish flexible relationships with customers and suppliers. They seek to retain customers through various measures, including price reductions, improvements in product quality, expansion of the product assortment, and the provision of additional services and customer incentives (Filipova, 2013, pp. 95–96).

Enterprise Resource Planning (ERP) systems are a fundamental tool for improving organizational efficiency by integrating various business functions into a unified environment. In the context of digital transformation, ERP systems support the optimization of SCM as well as the coordination of inventory and financial processes (Jawad & János, 2025). These systems play a significant role in enabling enterprises to adapt to the knowledge-based economy by improving decision-making processes and enhancing business agility (Zhao & Tu, 2021). At their core, ERP systems are regarded as a fundamental concept in SCM, and their implementation "improves efficiency and effecttiveness in supply chains" (Petrova & Perkov, 2022, p. 17).

By applying data-driven analytics, EIS contribute to more accurate forecasting, enhanced interactive planning of enterprise processes, and real-time decision-making (Bagheri, Kusters, & Trienekens, 2019; Kim & Im, 2025; Villányi & Jawad, 2024). These capabilities are particularly important in today's volatile and highly competitive market environment, where forecasting accuracy is crucial for maintaining the competitiveness of enterprises (Younis, Sundarakani, & Alsharairi, 2021). According to S. Petrova, the digital development of the economy has brought about significant changes in SCM by increasingly orienting it towards meeting customer requirements. The accelerated adoption of digital technologies has transformed supply chains into key and dynamic participants in an economy increasingly dominated by digital tools (Petrova & Perkov, 2022, p. 26).

In this context, the implementation of EIS plays a strategic role. ERP systems are designed to support enterprise resource planning by providing centralized management of core business processes related to inventory, procurement, sales, accounting, and capital management. Through data automation and synchronization, ERP systems facilitate informed managerial decision-making and enhance transparency throughout the supply chain (Davenport, 2000).

These software solutions enable the collection, analysis, and management of information on customer behaviour, preferences, and purchase history. The integration of ERP systems creates a unified information flow that connects internal business processes with market realities. This enables trading enterprises to respond more rapidly to changes in demand, personalize their offerings, and build long-term customer relationships (Swift, 2002, pp. 248–252).

Based on the literature review, it can be further concluded that SCM in trade is a complex system supported by the interaction of numerous digital technologies. In this context, EIS are not merely software solutions but have become fundamental strategic tools for business operations.

2. Research methodology

This study proposes a research methodology comprising four stages. The sequence of these stages is illustrated in Figure 1.

Stage One. *Information Support. Identification of Indicators.* During this stage, the research is aimed at establishing a reliable information base through the examination of databases published by the National Statistical Institute (NSI). Key indicators are identified to characterize SCM in trading enterprises in Bulgaria over the selected period 2013–2025. By systematizing and comparing the available information, the analysis takes into account the basic indicators required for examining supply chains in the Bulgarian trade sector during the study period.

In accordance with the objective of the study, the following indicators were selected for analysing the application of EIS for SCM at the enterprise level:

• Indicator "Enterprise Internet Access" – used as a contextual infrastructure indicator. It reflects the level of technological readiness of enterprises and serves as the basis for the descriptive and graphical analysis of the overall digital environment during the study period.

• Indicator "Enterprise Resource Planning (ERP) System" – its selection is determined by its direct relationship with the enterprise's internal managerial and operational processes, including resource planning and control, logistics, procurement, and financial flows. It can serve as a key tool for improving

efficiency, coordination, and transparency within the internal organizational environment of trading activities.

• Indicator "Customer Relationship Management (CRM) System" – reflects the enterprise's external orientation towards the market and customers by supporting customer relationship management, marketing, and the processes related to the sale of goods and services. CRM enables the monitoring of customer behaviour and communication channels, which is of essential importance in the digital economy.

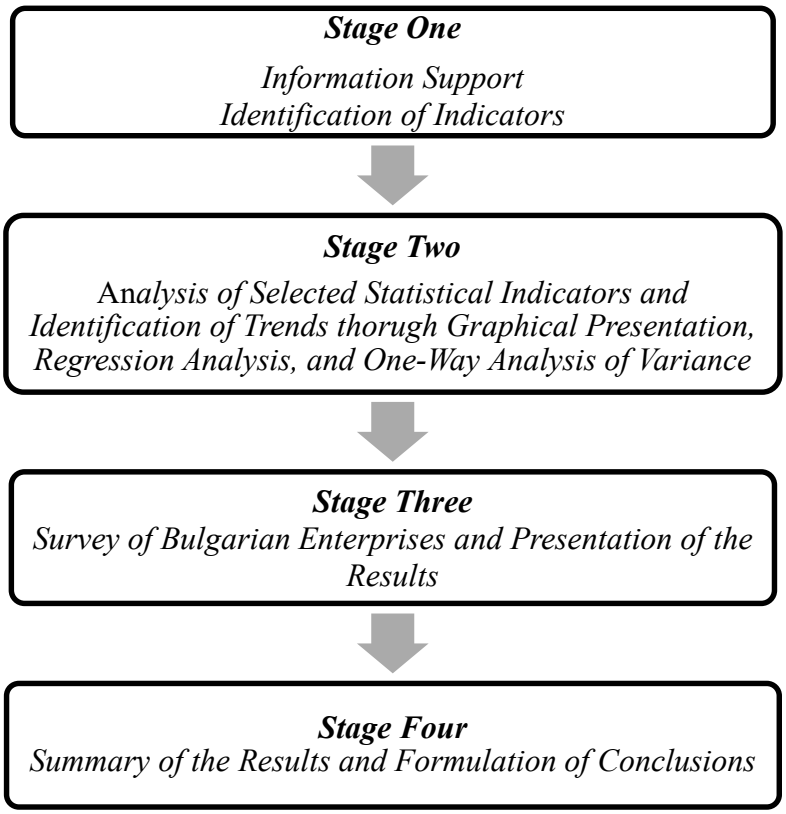

Figure 1. ***Stages of the methodology for analysing the application of EIS for SCM in Bulgaria***

Stage Two. *Analysis of Selected Statistical Indicators and Identification of Trends for the Study Period through Graphical Presentation, Regression Analysis, and One-Way Analysis of Variance*. This stage includes the presentation of figures and tables illustrating the status and dynamics of the analysed indicators. Descriptive statistics, including the mean (%), minimum (%), maximum (%), and standard deviation, were analysed for the selected indicators: "Enterprise Internet Access", "Enterprise Resource Planning (ERP) System",

and "Customer Relationship Management (CRM) System" over the period 2013–2025. The obtained results indicate that the minimum values of the analysed indicators reflect a lower level of integration of digital solutions, whereas the highest values represent enterprises' capacity for innovation, implementation, and development. This makes it possible to determine the level of digital transformation maturity in SCM within enterprises.

Next, data obtained from the National Statistical Institute (NSI) were used to examine the influence of enterprise size on the degree of application of EIS for SCM. A one-way analysis of variance was applied. This method makes it possible to determine whether statistically significant differences exist between the mean values of more than two independent groups. In the present study, the indicator "Enterprise Size" was defined as the independent variable, while the indicators "Enterprise Resource Planning (ERP) System" and "Customer Relationship Management (CRM) System" were treated as the dependent variables. The statistical analysis was performed using Microsoft Excel and IBM SPSS Statistics.

The purpose of the analysis of variance was to determine whether enterprise size influences the use of ERP and CRM systems.

The following hypotheses were formulated:

Null hypothesis (H_0): There is no statistically significant difference in the mean values among enterprise groups according to their size: ($\gamma_1 = \gamma_2 = \gamma_3$).

Alternative hypothesis (H_1): There is a statistically significant difference in the mean values between at least two enterprise size groups ($\overline{\gamma_1} \neq \overline{\gamma_2} \neq \overline{\gamma_3}$).

For the purposes of the study, a significance level of $\alpha = 0{,}05$ was adopted, corresponding to a 5% risk of committing a Type I error (rejecting the null hypothesis when it is, in fact, true).

To achieve greater analytical precision and clarity of interpretation, two separate one-way analyses of variance were conducted, respectively for the "Enterprise Resource Planning (ERP) System" indicator and the "Customer Relationship Management (CRM) System" indicator.

Stage Three. *Survey of Bulgarian Enterprises and Presentation of the Results.* The survey was conducted among registered Bulgarian enterprises and focused on the EIS applied by them in SCM. It was carried out using a sampling without replacement across the regions of Veliko Tarnovo and Pleven. The questionnaire collected data on the profile of the enterprises, their financial characteristics, the level of digitalization achieved, and the software solutions used, including ERP, CRM, and other systems. Using a Likert scale, respondents evaluated the critical factors influencing the development of supply chains within their organizations. The assessment covered the organizational structure

of the workforce, technological readiness, and the impact of automation on customer relationships and cybersecurity. The survey also examined the inventory planning methods applied and the efficiency of logistics processes in trading enterprises in Bulgaria.

Stage Four. *Summary of the Results and Formulation of Conclusions.* Based on the empirical research conducted and the results obtained, the main findings and conclusions regarding the degree of application of EIS for SCM in Bulgarian enterprises during the period 2013–2025 were formulated.

The proposed methodological framework aims to provide a systematic approach to the analysis and evaluation of the data collected and processed in relation to the research topic. By implementing the four-stage sequence, the framework facilitates the achievement of more substantial research findings concerning the application of EIS for SCM in trading enterprises in Bulgaria.

3. Empirical Analysis of the Impact of Enterprise Digitalization in Bulgaria on Supply Chain Management

In accordance with the adopted methodology, statistical data for the selected indicators covering the period 2013–2025 were analysed. The information is presented according to enterprise size based on the number of employees: up to 49 employees, from 50 to 249 employees, and 250 or more employees (see Table 1).

The data presented in Table 1 reveal a clear relationship between enterprise size and the level of digitalization. Throughout the entire study period, enterprises with more than 250 employees maintained the highest levels of Internet access, reaching full (100%) coverage after 2017. The other two groups of enterprises—small and medium-sized—also exhibited a steady upward trend in Internet access. As a result, the differences between the enterprise groups with respect to Internet access gradually narrowed, demonstrating a process of increasing digital readiness. The gradual convergence in Internet usage has enhanced enterprises' capacity to adopt digital technologies.

With regard to ERP systems, the data indicate a pronounced increase in the number of enterprises using this type of software. Large enterprises with more than 250 employees recorded the highest values. The use of ERP systems increased steadily, reaching over 70% by the end of the study period. Small and medium-sized enterprises also exhibited a positive trend, although the rate of growth was slower. This slower growth may be explained by the higher costs associated with ERP implementation and maintenance, as well as the shortage of specialized personnel.

Table 1

Share of Enterprises with Internet Access and Use of ERP and CRM Systems, by Enterprise Size (Number of Employees), 2013–2025 (%)

	Share of Enterprises with Internet Access				Share of Enterprises Using Enterprise Resource Planning (ERP) Software				Share of Enterprises Using Customer Relationship Management (CRM) Software			
Year	Up to 49	50 - 249	250+	Total	Up to 49	50 - 249	250+	Total	Up to 49	50 - 249	250+	Total
2013	87,4	95,8	99,1	89,1	16,8	29,7	46,9	19,7	13,8	19,6	26,4	15,1
2015	89,8	98	99,7	91,3	20,7	41,4	60,8	24,9	15,6	22,8	33,6	17,2
2017	93,7	98,5	100	94,6	20	35,5	59,2	23,3	16,9	25,7	32,9	18,6
2019	92,5	98,8	100	93,7	19,2	40,1	60,7	23,4	15,3	24,9	34,1	17,2
2021	95,4	99,3	100	96,1	17,1	40,1	65,2	21,8	14,3	27,9	34,8	16,9
2023	95,6	99,3	100	96,3	17,4	37,4	68,1	21,7	7,5	23,5	30,5	10,5
2025	95,7	99,4	100	96,3	22,5	41,9	73,7	26,6	10,4	16,7	33,1	11,9

Source: NSI

The data on CRM systems indicate that their use remains more limited across all enterprise groups. Enterprises with more than 250 employees also demonstrated a positive upward trend in this indicator, although the rate of growth was relatively modest. The differences between the enterprise groups are substantial, with large enterprises implementing CRM systems approximately twice as often as small and medium-sized enterprises. This may be attributed to a number of factors, including financial constraints, shortages of qualified personnel, and other limitations. In response, management teams are increasingly focusing on improving customer relationship management, analysing customer behaviour, and enhancing competitiveness.

Figure 2 illustrates the dynamics of the indicators "Enterprise Internet Access", "Enterprise Resource Planning (ERP) System", and "Customer Relationship Management (CRM) System" among Bulgarian enterprises over the period 2013–2025, expressed as percentages.

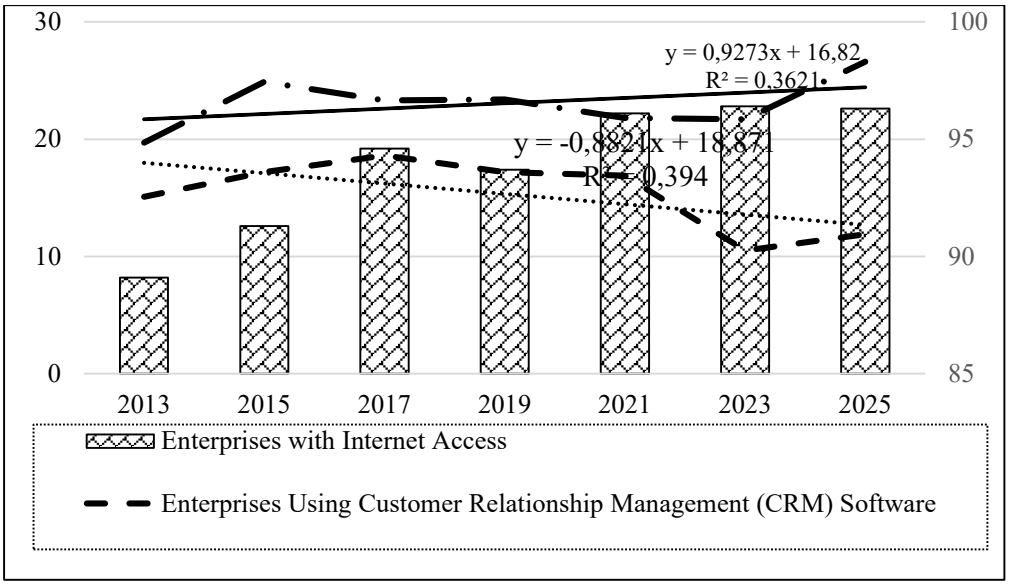

Figure 2. ***Dynamics of the Indicators "Enterprise Internet Access", "Enterprise Resource Planning (ERP) System", and "Customer Relationship Management (CRM) System" among Bulgarian Enterprises, 2013–2025 (%)***

Source: Adapted from NSI data

To ensure the comparability of the chart, it is presented using two axes. The left axis represents the indicators "Share of Enterprises Using Customer Relationship Management (CRM) Software" and "Share of Enterprises Using Enterprise Resource Planning (ERP) Software", while the right axis represents the indicator "Enterprise Internet Access." The chart shows that the share of enterprises with Internet access increased steadily, reaching more than 96% coverage by the end of the study period. In contrast, the implementation of business solutions that could improve SCM and enhance competitiveness indicates that insufficient investment has been made. The presented data provide a basis for interpreting the trends in the use of information systems by enterprises. The analysis shows that the implementation of ERP systems follows a relatively stable upward trend, as confirmed by the moderate value of the coefficient of determination ($R^2 \approx 0.3621$). The use of CRM systems is characterized by more fluctuating dynamics and a lower explanatory power of the linear model ($R^2 \approx 0.394$). Internet access among the surveyed enterprises exhibits signs of saturation, which explains the absence of a clearly pronounced linear relationship.

The β coefficient in the linear regression equation indicates the direction and intensity of the influence of the independent variable (time) on the dependent variables, namely the enterprise systems examined in the study. For the ERP systems, the β coefficient has a positive value, indicating an upward trend, whereby each successive year is associated with an average increase in the share of enterprises using this type of software. The CRM systems exhibit a lower β coefficient, indicating a weaker and less consistent trend in their implementation over the study period.

Table 2 presents the main descriptive statistics on the dynamics of "Enterprise Internet Access" and the implementation of ERP and CRM systems by enterprises in Bulgaria over the period 2013–2025, expressed as percentages.

Table 2

Main Descriptive Statistics of the Trends in the Use of ERP and CRM Systems and Enterprise Internet Access in Bulgaria, 2013–2025 (%)

Indicator	Mean	Median	Min.	Max.	Range	Standard Deviation
Enterprise Internet Access	93,94	94,60	89,10	96,30	7,20	2,79
ERP systems	23,06	23,30	19,70	26,60	6,90	2,27
CRM systems	15,34	16,90	10,50	18,60	8,10	3,04

Source: Author's calculations based on NSI data.

The comprehensive analysis of the minimum, maximum, mean values, and standard deviation provides information on the level, dynamics, and stability of the digital indicators and establishes a basis for a more in-depth investigation of the factors influencing the implementation of EIS.

Table 2 presents the main descriptive statistics outlining the overall characteristics of the indicators "Enterprise Internet Access", "ERP System", and "CRM System" for the period 2013–2025. The mean values reflect the overall level of development of each indicator and serve as a basis for subsequent comparative analysis. The mean value of the "Enterprise Internet Access" is 93.94%, indicating relatively low variability and demonstrating stability as well as widespread coverage. This provides favourable conditions for the introduction of digital tools into business operations and the management of business processes.

The comparative analysis shows that the other two indicators, measuring the application of ERP and CRM systems, have considerably lower values, indicating their more limited use. From the beginning of the study period, a gradual increase in the implementation of digital solutions within supply chains can be observed. The mean value for ERP systems is 23.06%, representing a

low to moderate level of adoption. The range is 6.90%, while the standard deviation is 2.27%, indicating low variability and a relatively stable level of ERP system use.

The indicator for the use of CRM systems has a mean value of 15.34% and low variability, indicating a moderate and relatively stable pattern of use. In 2023, the minimum value for CRM systems was 10.50%, suggesting that, towards the end of the study period, enterprises restructured their use of CRM systems and shifted to other business solutions for managing customer relationships.

The analysis continues with an examination of the relationship between enterprise size and the use of ERP and CRM systems. For this purpose, two separate one-way analyses of variance were performed for the respective indicators.

For the first indicator, concerning ERP systems, the following hypotheses were formulated:

Null hypothesis (H_0): There is no statistically significant difference in the mean level of ERP system use among enterprises of different sizes.

Alternative hypothesis (H_1): There is a statistically significant difference in the mean level of ERP system use between at least two enterprise size groups.

Tables 3 and 4 present the results of the one-way analysis of variance conducted to examine the implementation of ERP systems according to enterprise size.

Table 3

Comparative Analysis of ERP System Implementation by Enterprise Size

Enterprise size (Number of employees)	Number (n)	Mean	Variance
Small enterprises	7	19,10	4,52
Medium-sized enterprises	7	38,014	18,52
Large enterprises	7	62,09	70,55

Source: Author's calculations based on data from the National Statistical Institute (NSI).

Table 4 presents the results of the one-way analysis of variance (ANOVA), illustrating the distribution of the examined enterprise groups.

Table 4

Results of the One-Way Analysis of Variance (ANOVA)

Source of variation	SS	df	MS	F	P-value	F crit
Between groups	6498,23	2	3249,12	104,16	***0,0000***	***3,56***
Within groups	561,48	18	31,19			
Total	7059,71	20				

Source: Author's calculations based on data from the NSI.

The statistical analysis of the data presented in the two tables provides grounds for the following findings:

• The results demonstrate statistical significance, as evidenced by the F-statistic (104.16). There is a statistically significant difference in the use of EIS among enterprises according to their size. The p-value indicates that the probability of these differences occurring by chance is negligible.

• The variance for small enterprises is the lowest (4.52), indicating relatively limited variation in ERP system implementation. As enterprise size increases, the variance also increases, suggesting that enterprise size has a direct influence on the implementation of ERP systems.

• The between-group variance (6,498.23) is substantially greater than the within-group variance (561.48), indicating that the differences among enterprise size categories are more pronounced than the differences within each category.

Based on these results, it can be concluded that enterprise size is a key determinant of the implementation of EIS for SCM in Bulgaria. The acceptance of the alternative hypothesis confirms the need for greater support aimed at improving digitalisation among small and medium-sized enterprises that intend to implement such systems but face both financial and organisation-specific barriers that large enterprises have largely overcome.

For the second dimension—CRM systems—the hypotheses are formulated as follows:

Null hypothesis (H_0): There is no statistically significant difference in the use of CRM systems among enterprises of different sizes.

***Alternative hypothesis (H_1)*:** There is a statistically significant difference in the use of CRM systems among enterprises according to their size.

Table 5

Comparative Analysis of CRM System Implementation by Enterprise Size

Groups (Size)	Number (n)	Mean	Variance
Small	7	13,40	10,91
Medium-sized	7	23,01	14,41
Large	7	32,20	8,36

Source: Author's calculations based on data from the NSI.

Table 6

Results of the One-Way Analysis of Variance

Source of variation	SS	df	MS	F	P-value	F crit
Between groups	1237,25	2	618,63	***55,10***	***0,0000***	***3,55***
Within groups	202,09	18	11,23			
Total	1439,34	20				

Source: Author's calculations based on data from the NSI.

Based on the data presented in Tables 5 and 6, the following findings can be drawn:

• The calculated F-statistic (55.10) is substantially higher than the critical value (3.55). Moreover, the p-value is negligibly small, indicating that the observed differences are not due to random variation.

• The variance across all three enterprise groups is relatively low, ranging from 8.36 to 14.41. These results suggest that the surveyed enterprises follow broadly similar approaches to the implementation of CRM systems. The findings also indicate a relatively low but stable demand for the analysed systems.

• The mean value for enterprises employing more than 250 people is 32.20. This indicates that nearly one-third of the surveyed enterprises manage their established supply chains using CRM systems. Furthermore, the results suggest that large enterprises in Bulgaria also rely on alternative modules for customer database management.

The above findings confirm that enterprise size has a direct and systematic influence on the level of CRM system implementation. It can therefore be concluded that the digitalisation of these systems in Bulgaria is predictable and closely associated with enterprise size.

To achieve the main research objective of the present study, a questionnaire survey was conducted between February and April 2026. Invitations to participate in the online survey were sent to 129 enterprises operating in the

Veliko Tarnovo and Pleven districts. A total of 32 completed questionnaires were returned, representing a 25% response rate. The surveyed enterprises comprised retail enterprises (47%), wholesale enterprises (44%), and manufacturing enterprises (9%). The distribution of the surveyed enterprises by size is presented in Table 7.

Table 7

Distribution of the Surveyed Enterprises by Size

Average Number of Employees	number
Up to 9 employees	6
Between 10 and 49 employees	15
Between 50 and 249 employees	7
Over 250 employees	4
Total	**32**

Source: Author's questionnaire survey.

The next survey question concerned whether employees had access to the Internet at their workplace. Figure 3 presents the obtained results.

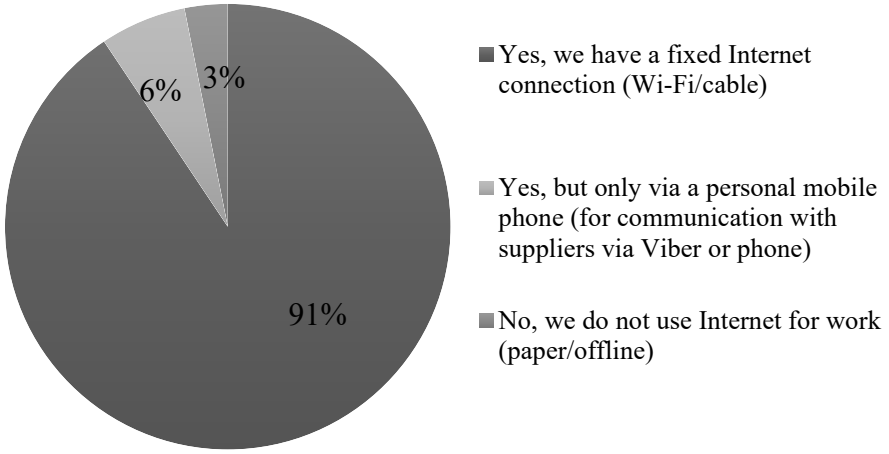

Figure 3. *Internet Access for Employees in the Surveyed Enterprises*
Source: Author's questionnaire survey.

As shown in Figure 3, which illustrates the level of digital infrastructure in the surveyed enterprises, 91% of the respondents reported having a fixed Internet connection, while 6% indicated that they relied on Internet access solely through a personal mobile phone. The remaining 3% reported having no Internet connection. Overall, it can be concluded that the surveyed enterprises possess a well-developed digital infrastructure.

The questionnaire also collected information on the delivery methods used by the participating enterprises. The question allowed respondents to select more than one option, reflecting market practices and individual contractual arrangements. The responses obtained are presented in Figure 4.

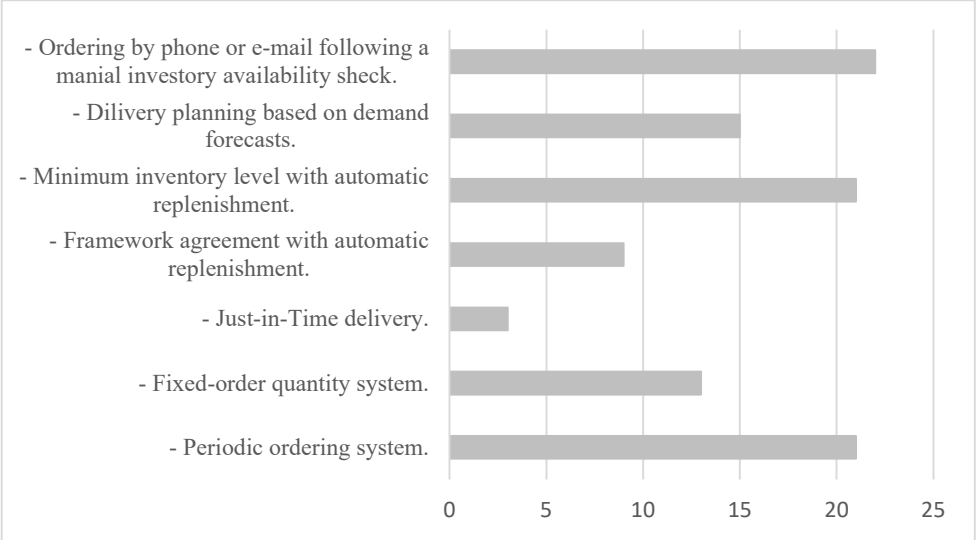

Figure 4. ***Distribution of Respondents by the Methods Used for Supply and Inventory Management***
Source: Author's questionnaire survey.

The chart presents data on the supply management methods used by the surveyed enterprises. It shows that, despite having a well-developed digital infrastructure, a large proportion of the respondents continue to apply more traditional and/or hybrid methods of SCM. The observed fragmentation indicates a relatively low level of automation and ERP system integration in inventory management and goods distribution. The use of methods such as periodic ordering and minimum inventory levels indicates the application of software with basic inventory management functions designed for specific business activities.

The results obtained lead to the conclusion that the implementation of EIS is a complex process influenced by multiple factors. This necessitated the inclusion of a specific question in the questionnaire concerning the extent to which respondents take into account various factors affecting their business activities. The results obtained are presented in Figure 5.

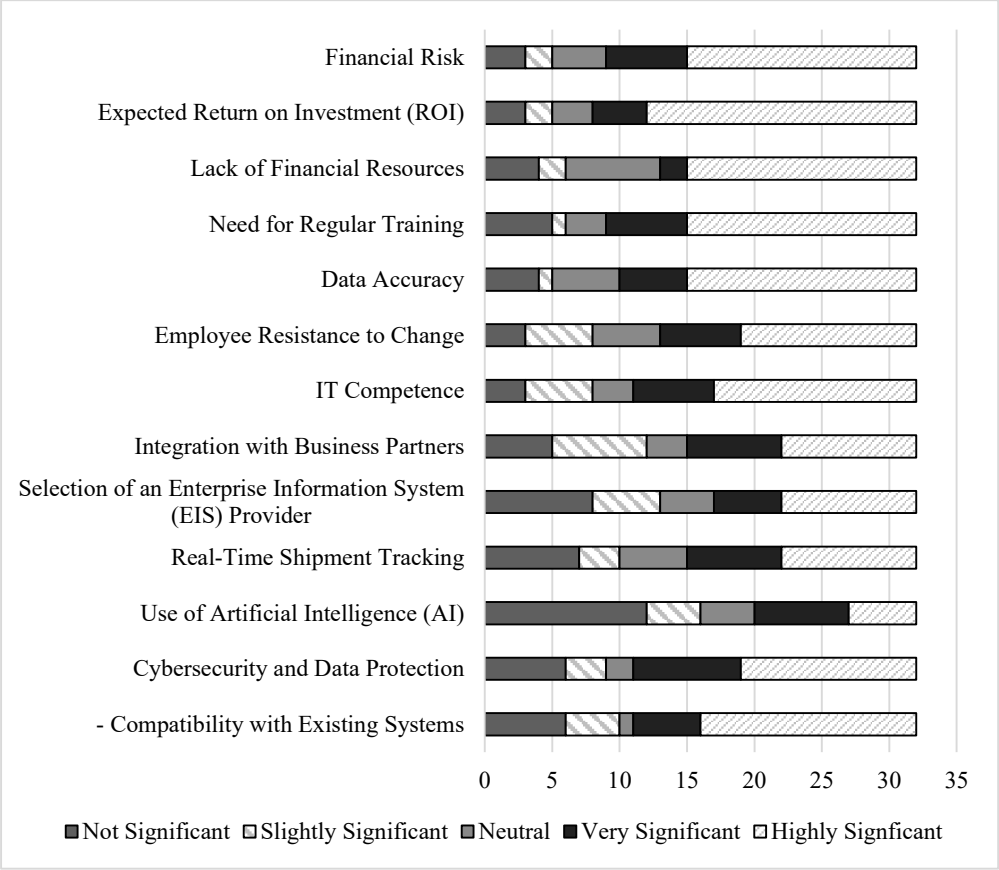

Figure 5. ***Significance of the Factors Influencing the Development of EIS for SCM in the Surveyed Enterprises***
Source: Author's questionnaire survey.

The infographic presented in Figure 5 illustrates the significance of thirteen key factors assessed using a Likert scale. The analysed variables encompass financial, organisational, technical, and internal factors. The respondents identified the group of financial determinants as the most significant, namely expected return on investment (ROI), lack of financial resources, and financial risk. For the surveyed enterprises, economic viability is a fundamental criterion in the selection and implementation of EIS for SCM. Uncertainty and the expected long payback period of the investment are the reasons why these factors are regarded as the most important.

The respondents ranked employee resistance to change, together with labour shortages and employee turnover, as well as the need for regular training, as the next most significant factors. The implementation of new systems is

directly related to the financial capacity of the surveyed enterprises and to the organisation and competencies of the personnel involved.

Another significant factor included in the survey is data accuracy. The surveyed enterprises adopt a critical perspective on the reliability of information in the process of using EIS for SCM.

The respondents' answers indicate a relatively low level of artificial intelligence (AI) adoption. This provides grounds for concluding that the surveyed enterprises have not yet integrated AI into their business operations and that there are still untapped opportunities to improve software systems for SCM in this area.

The results regarding the significance of the identified factors confirm their combined influence on the selection of EIS for SCM. A lack of financial resources and investment risk constitute the principal barriers, followed by the need for well-trained personnel. The surveyed enterprises should adopt an integrated approach that considers these influencing factors as key elements for improving the business environment.

The information collected on the EIS implemented by the surveyed enterprises is presented in Figure 6. It illustrates the main solutions used, including ERP systems, Microsoft Excel, and sales and inventory management software, such as Micro.bg, IncoPOS, Plus Minus, Detelina, Apteka+, Yanak Soft, Microinvest Sklad/Pro, and others.

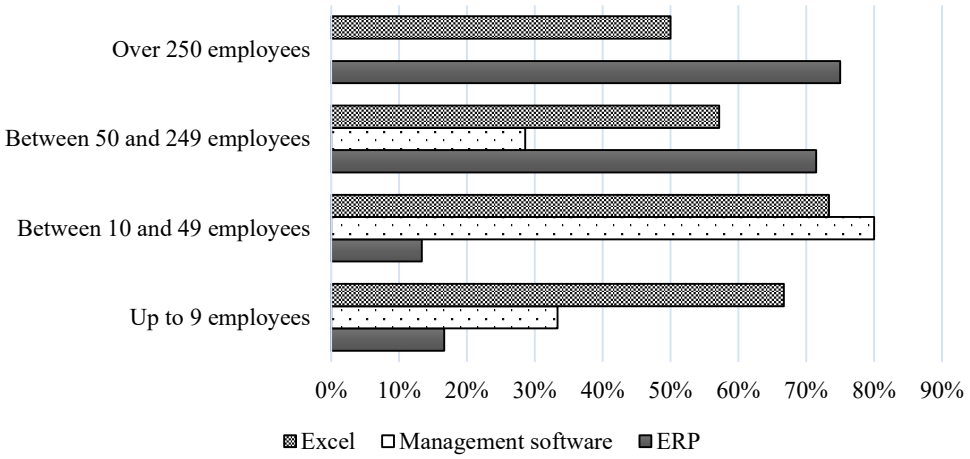

Figure 6. ***EIS Used for SCM in the Surveyed Enterprises by Enterprise Size (%)***
Source: Author's questionnaire survey.

According to the data presented in Figure 6, enterprises employing more than 250 employees report the highest proportion of ERP system usage (75%). Furthermore, 50% of the respondents indicate that they also use Microsoft Excel in their SCM activities. Among enterprises employing 50 to 249 people, 71% report having implemented ERP systems, while 57% also use Microsoft Excel in their operations. In addition, 29% use sales and inventory management software. Among respondents employing 10 to 49 people, the implementation of ERP systems amounts to 13%. These enterprises predominantly use sales and inventory management software (80%) and Microsoft Excel (73%). The surveyed micro-enterprises identify Microsoft Excel as the most frequently used tool, followed by specialised software and ERP systems.

Based on the information obtained from the questionnaires, a chi-square (χ^2) test was performed. The results are presented in Table 8.

Table 8

Results of the Chi-Square Test Examining the Relationship Between the Number of Employees and the Implementation of ERP Systems in the Surveyed Enterprises

Indicator	Value
Pearson Chi-Square (Sig.)	0,012
Fisher-Freeman-Halton Exact Test	0,010
Cramer's V	0,585

Source: Author's questionnaire survey.

The value of Pearson Chi-Square (Sig.) is 0,012, while the Fisher–Freeman–Halton Exact Test yields a value of 0,010. As both values are below 0.05, it can be concluded that the relationship is statistically significant and that the number of employees influences business decisions regarding the implementation of ERP systems. As part of the chi-square (χ^2) test, Cramer's V was also calculated, yielding a value of 0,585. This indicates a strong relationship and dependence between the two variables.

Key Findings

First, while ERP systems provide the operational discipline and transparency required for managing internal resources, CRM systems complete the business cycle by integrating market realities and customer behaviour into business operations.

Second, substantial differences exist among Bulgarian enterprises regarding the level of Internet access and the degree of ERP and CRM system implementation. During the 2013–2025 period, these indicators exhibited certain variations. The level of digital readiness mediates enterprises' decisions concerning the adoption of these systems.

Third, considerable differences are observed among enterprises of different sizes in the use of Enterprise Resource Planning (ERP) systems compared with Customer Relationship Management (CRM) systems.

Fourth, the degree of adoption of both ERP and CRM systems is largely determined by enterprise size. This relationship is influenced by structural differences in digital readiness and the implementation of EIS for SCM.

Fifth, enterprises employing more than 250 people demonstrate the highest level of ERP system adoption. A considerably smaller proportion of these enterprises use CRM systems, as reflected by the lower variance observed within this group.

Sixth, the conducted analysis of variance supports the conclusion that enterprise size has a direct and systematic influence on the level of EIS adoption in SCM. Similar findings were obtained from the Chi-square test examining the relationship between the number of employees and the implementation of ERP systems in the surveyed enterprises.

Seventh, the findings demonstrate the need for an integrated approach that considers the combined influence of the factors affecting the selection of EIS for SCM. Limited financial resources and investment risk represent the primary barriers, followed by the need for well-trained personnel. The surveyed enterprises also exhibit untapped potential regarding the application of artificial intelligence (AI) in business

Conclusion

Digitalisation and technological advancement are key factors directly influencing commercial processes. SCM constitutes a fundamental component of modern commerce. The ERP and CRM systems examined in this study are widely applied in SCM and make a substantial contribution to improving and accelerating the operations of trading enterprises.

The successful implementation of EIS for SCM aims to reduce costs, increase process efficiency, and improve productivity. Effective and reliable SCM optimises relationships among supply chain participants, including suppliers, manufacturers, distributors, wholesalers, retailers, and final consumers. As a result, the competitiveness of trading enterprises is strengthened while ensuring continuity in the supply of goods to meet customer demand.

The findings reveal notable differences among Bulgarian enterprises in the adoption of ERP and CRM systems as essential components of EIS for SCM. These variations are largely determined by enterprise size. The increasing adoption of ERP systems, which automate inventory and resource management, contributes to better process organisation and more effective cost and inventory

control. These systems can be regarded as the internal operational hub of an enterprise. By contrast, CRM systems provide connectivity with the external business environment. They are customer-oriented and focus on customer retention while supporting the acquisition of new customers.

In conclusion, the development of the Internet environment constitutes a crucial prerequisite for the integration of EIS for SCM in trading enterprises. This digital environment enables informed managerial decision-making aimed at optimising resources, improving operational efficiency, and building more sustainable customer relationships. Consequently, the implementation of ERP and CRM systems can be regarded as a strategic instrument for creating competitive advantages and enhancing the adaptability of Bulgarian trading enterprises to the conditions and challenges of the digital economy.

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