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Management information systems, incentive mechanism, and agility: Basis for efficiency framework for logistics companies

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Abstract

Under the background of globalization and rapid development of information technology, logistics industry is facing increasingly fierce competition and complex operating environment. In order to maintain a competitive edge in the market, logistics companies need to improve their operational efficiency and agility. This study adopted the descriptive survey method to conduct a questionnaire survey on logistics practitioners in Bozhou area, China, aimed to explore the interrelationship between management information system, incentive mechanism and logistics agility, and then develop an efficient efficiency framework for logistics companies. Through descriptive analysis, correlation analysis, T-test and ANOVA, the results show that: respondents generally agree that the information management system is effectively used in terms of flexibility, security and integration; in terms of motivation, cost-effectiveness and employee productivity, the incentive mechanism has also been effectively applied; when it comes to logistics agility, companies excel in flexibility, responsiveness and collaboration. More importantly, there is a highly significant positive correlation between management information system, incentive mechanism and logistics agility. Based on these findings, this study proposed specific optimization measures, including enhancing the flexibility, security and integration of the information management system; implement effective incentives to improve cost effectiveness and employee productivity; as well as flexibility, responsiveness and collaboration to enhance logistics agility. The integrated application of these strategies is expected to further enhance the operational efficiency and competitiveness of logistics companies.

Keywords: management information system, incentive mechanism, agility, logistics efficiency

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1. Introduction

In the modern logistics industry, logistics management information system, incentive mechanism and logistics agility are the key factors affecting the efficiency of logistics companies. Logistics management information system is the application of information technology in logistics activities, which aims to improve logistics efficiency and service quality. Chen (2022) has pointed out that the logistics management information system can significantly improve the transparency and coordination of logistics operations by integrating the functions of order processing, inventory management, transportation management, warehouse management and customer service. The advanced integration capability of this system makes the logistics flow smoother, thus reducing time delays and costs. Incentive mechanism in logistics companies usually refers to the provision of material and non-material rewards to stimulate employees' work enthusiasm and improve work efficiency. Zhang (2021) shows that effective incentive mechanisms can significantly improve employees' productivity and organizational commitment. In logistics, this includes performance bonuses, career development opportunities, and other employee benefits, which are key factors in enabling employees to better complete their logistics tasks. Logistics agility refers to the response speed and flexibility of the logistics system in the face of changes in market demand. Ye (2021) defines logistics agility as the ability of enterprises to quickly respond to market changes and meet customer needs. Logistics agility involves fast decision-making, adaptive logistics network and strong information system support, which are the indispensable elements in the competition of modern logistics enterprises.

Logistics management information system, incentive mechanism and logistics agility have direct and indirect effects on improving logistics efficiency. The incentive mechanism enhances the efficiency and effectiveness of logistics operation by improving the enthusiasm and investment of employees. In addition, logistics agility enables enterprises to quickly adapt to market changes and customer needs, so as to gain advantages in a highly competitive market environment (Li 2020). The combined effect of these factors not only improves the speed and quality of logistics operation, but also enhances customer satisfaction and the market competitiveness of enterprises.

China's logistics industry has developed rapidly in recent years, but still faces some challenges in information systems, incentive mechanisms and logistics agility. According to the research of Jiang (2019), although more and more Chinese logistics companies have begun to implement advanced management information systems, the integration and data sharing ability of the system is still weak, which affects the operational efficiency. In addition, logistics companies in Bozhou and other places also have problems in the incentive mechanism, such as single incentive measures and lack of long-term career development plan, which leads to high employee turnover rate and affects the stability and service quality of the company (Wang et al., 2022). In terms of logistics agility, some companies are slow to respond to the rapid changes in the market due to the lack of flexible supply chain design and adaptive strategies (Lin, 2023). These problems not only limit the improvement of logistics efficiency, but also hinder the development of enterprises in the fierce market competition.

This study chose a logistics company in Bozhou, China for investigation because the researcher himself works in logistics research in Bozhou. In addition, Bozhou is the largest logistics center for traditional Chinese medicine in China, and its logistics industry development level and problems encountered are highly representative. With the rapid development of logistics enterprises in this area, they also face the problems of imperfect information system, imperfect incentive mechanism and insufficient logistics agility. Based on system theory and incentive theory, this study aims to explore how the perfection of logistics management information

system, the effectiveness of incentive mechanism and logistics agility work together on logistics efficiency, so as to provide theoretical basis and practical guidance for improving the operational efficiency of logistics enterprises. In addition, as a logistics management teacher at a university in Bozhou, I have been engaged in research on logistics enterprises in Bozhou for a long time. Through my research and research work, I deeply feel the supporting role of management information systems in enterprise data analysis and decision-making, the direct impact of incentive mechanisms on employee work enthusiasm, and the key role of logistics agility in responding to market changes and improving customer satisfaction in enterprises.This professional background not only encourages researchers to choose this research topic, but also provides a more vivid perspective for the practical significance of this research. This study has important implications for logistics company managers, policy makers and academic researchers. Managers can optimize internal management and operational processes according to the research results to improve efficiency; Policy makers can better understand the specific needs and challenges of the logistics industry and formulate more targeted policy support; Academic researchers can deepen their understanding and application of relevant theories in the field of logistics management through this empirical study. These research results will also provide reference for the logistics industry in other regions and countries.

Objectives of the Study - The study aimed to assess the logistics management information system, incentive mechanism, and logistics agility among logistics companies in China, which served as the basis for developing an efficiency framework for logistics companies. Specifically, it: (1) Described the information management system in terms of system flexibility, system security, and system integration; (2) Described the incentive mechanism in terms of motivational impact, cost-effectiveness, and employee productivity; (3) Assessed logistics agility in terms of flexibility, responsiveness, and collaboration; (4) Tested the significant relationship between the management information system, incentive mechanism, and logistics agility; and (5)Developed an efficiency framework for logistics companies.

2. Methods

Research Design - This study aimed to explore the interplay between management Information Systems, incentive mechanisms, logistics agility, and the efficiency of logistics companies, and how these factors can jointly promote value creation in logistics companies. To achieve this goal, this study used a descriptive survey method and used the target group of logistics practitioners in Bozhou, China. The survey collected data through a structured questionnaire, which design includes two main parts: firstly, to collect the personal characteristics, including gender, age, work experience, position and enterprise size; secondly, to investigate the application degree of logistics management information system, the specific form of incentive mechanism, the realization of logistics agility and the specific impact of these factors on the efficiency of logistics companies. The questionnaire focused around the four core variables, including logistics management information system, incentive mechanism, logistics agility and logistics company efficiency, aiming to evaluate how these variables interact and promote the efficiency improvement and value creation of logistics companies. The questionnaire used the Likert scale to assess the level of agreement of various statements, at five levels from "strongly disagree" to "strongly agree". The collected data will be analyzed using statistical software, including descriptive statistics, correlation analysis and variance analysis methods to determine the strength and direction of the relationship between the factors. Furthermore, the study verified the constituent dimensions of the questionnaire through factor analysis, ensuring the validity and reliability of the research tool. Ultimately, the results of this study are expected to provide a practical efficiency improvement framework for logistics companies to help them better understand and implement effective management strategies to promote continued growth and value maximization.

Participants of the Study - There are several reasons for choosing Bozhou, China as the study site. First of all, Bozhou is the largest logistics center for traditional Chinese medicine in China, with a prominent logistics position and an important logistics node connecting the north and south. It has a representative logistics market and development potential. The logistics industry in Bozhou has developed rapidly in recent years, with its

perfect logistics infrastructure and numerous logistics enterprises, which provides rich sample resources for research. In addition, as a logistics management professional teacher at Bozhou University, researchers have a deep understanding and practical experience of the Bozhou logistics business process, management practice and challenges, which helps to explore how logistics management information system, incentive mechanism and logistics agility factors affect the efficiency of logistics companies. This internal perspective makes the research more close to reality and can more effectively identify and analyze the key factors affecting logistics efficiency. From the top 10 logistics enterprises in Bozhou, China, this study used Slovin sampling technology to select 390 logistics employees from a total of 15,602 logistics employees as study participants. Participants in the study include employees of different ages, genders, work experience, job positions and from enterprises of different sizes to ensure that the research data will fully cover the diversity and complexity of Bozhou's logistics industry. To effectively manage the data collection process, the study was conducted through a structured questionnaire containing items about basic personal information and questions related to the use of management Information Systems, satisfaction with the incentive mechanism, and the perception of logistics agility, and company efficiency evaluation. The questionnaire design was based on prior literature review and industry analysis, ensuring that all questions are closely linked to research objectives. Furthermore, the questionnaire answers was quantified using a Likert scale to facilitate subsequent statistical analysis work. Through this method, the research were able to reveal the main factors affecting efficiency in Bozhou logistics company and provide strategic suggestions for improving logistics efficiency.

Instruments of the Study - The main research tool used in this study is the questionnaire, which is a structured data collection method designed to comprehensively evaluate the views and experiences of logistics practitioners in Bozhou. The questionnaire was designed in two parts, ensuring an exhaustive collection of background information about practitioners and their knowledge and evaluation of logistics management practices.

Table 1
Test of Reliability Result

Variable	Cronbach's Alpha	Remarks
Logistics Information Management System		
System Flexibility	0.927	Excellent
System Security	0.927	Excellent
System Integration	0.948	Excellent
Incentive Mechanism		
Motivational Impact	0.934	Excellent
Employee Productivity	0.921	Excellent
Cost Effectiveness	0.932	Excellent
Logistics Agility		
Flexibility	0.938	Excellent
Responsiveness	0.924	Excellent
Collaboration	0.928	Excellent

Legend: *George and Mallery (2003) provided the ff rule of thumb: ≥0.90 = Excellent; ≥0.80 = Good; ≥0.70 = Acceptable; ≥0.60 = Questionable; ≥0.50 = Poor; <0.50 = Unacceptable*

The first part of the questionnaire focused on collecting information on personal characteristics of participants, including age, gender, work experience, job position and business size. This information is essential to exploring possible view differences of different groups in subsequent data analyses. Age and work experience can help researchers understand the influence of knowledge and experience on logistics practice perception; gender and job data can help to analyze how professional role and gender influence the attitude and experience towards logistics operation; and the information of the enterprise size concerns the company resources and management complexity, which may affect the operation and efficiency of logistics system.

The second part of the questionnaire focuses on evaluating the operation situation of logistics companies, specifically covering the four core aspects of logistics management information system, incentive mechanism, logistics agility and the efficiency of logistics companies. This section will use the Likert scale (Likert scale) to quantify the degree of agreement that participants have with the various statements, with five levels from

"strongly disagree" to "strongly agree". This section aimed to identify how existing management systems affect logistics efficiency, the effectiveness of incentive mechanisms, and how the actual performance of logistics agility helps companies cope with market changes. Through these problems, the study hopes to reveal the key factors that affect the efficiency of logistics companies, and provide strategic suggestions for logistics companies to improve their efficiency and responsiveness. Such tool design ensures that the research is systematic and scientific, and can effectively reflect the actual situation and needs of logistics practitioners in Bozhou.

The questionnaire of this study had been verified and tested for reliability. Cronbach's Alpha was 0.991, which was greater than 0.9. Therefore, the questionnaire of this study was extremely credible. Cronbach's Alpha of other variables in the questionnaire of this study is shown in Table 1, all of which were greater than 0.9, indicating excellent reliability.

Data Gathering Procedure - In the initial phase of data collection, the research team first conducted a questionnaire design to ensure that the questionnaire content covered all aspects of the study needs, including information on personal characteristics and detailed questions about the operation of the logistics company. These issues provided a structured assessment of management Information Systems, incentive mechanisms, logistics agility, and logistics efficiency. The questionnaire was designed using a closed question, mainly using a five-point Likert scale, to quantify participants' responses. After completing the questionnaire design, the research team conducted a pretest to test its validity and understanding, ensure the clarity of the questions, and adjust the content of the questionnaire according to the feedback. Random sampling method was used to select 150 logistics practitioners in Bozhou area. This process will provide access to a broad database of participants through the support of cooperative logistics companies or industry associations. Random sampling will ensure the representativeness of the sample, enabling a wider applicability of the findings. The selection of participants followed privacy protection principles and ethical research standards, ensuring that all participants understand the voluntariness and anonymity of the survey and obtain their prior consent.

Data collection was conducted through an online survey method, which not only facilitates the management and expands the coverage of the survey, but also helped to improve the efficiency of data collection and reduce costs. The researcher sent the questionnaire links to the participants via email and SMS, and the questionnaire was sent on the questionnaire star professional platform to ensure the security and reliability of the data. To increase the response rate, the researcher provided small incentives such as gift cards or small gifts to encourage participants to complete the questionnaire. After the data collection phase, the researcher conducted data cleaning and preliminary analysis to exclude invalid or incomplete questionnaires. Data was imported into the SPSS statistical software for a deeper quantitative analysis. This includes descriptive statistical analysis, correlation analysis and regression analysis to assess the relationship and influence among variables. In addition, the researcher cross-verified the data to ensure the accuracy and reliability of the study. Finally, the findings were compiled into detailed study reports that included study findings, discussion, and recommended strategies. This report not only provided suggestions for improvement for logistics enterprises in Bozhou, but also provided valuable reference for academia and industry.

Data Analysis - This study used four statistical methods, descriptive analysis, correlation analysis, and variance analysis, to analyze the data to ensure a comprehensive and deep understanding of the relationship between logistics management information system, incentive mechanism, logistics agility and efficiency of logistics companies. Weighted mean and rank were used to determine the information management system as to system flexibility, system security and system integration; to describe the incentive mechanism in terms of motivational impact, cost effectiveness and employee productivity; and to assess the logistics agility in terms of flexibility, responsiveness and collaboration. The result of Shapiro-Wilk Test showed that p-values of all variables were less than 0.05 which means that the data set was not normally distributed. Therefore, Spearman rho was used as part of the non-parametric tests to determine the significant relationship. All analyses were performed using SPSS version 28.

Descriptive analysis is a statistical method used to summarize or describe the main features of a data set, usually displayed by central trends (e. g., mean, median), dispersion (standard deviation, coefficient of variation), and distribution patterns (skewness and kurtosis). In this study, descriptive analysis will be used to initially understand the basic characteristics of logistics practitioners (age, work experience), the enterprise size of logistics companies, and participants' basic attitudes and evaluations of all aspects of management Information Systems, incentive mechanisms, logistics agility and logistics efficiency. This helped the researcher summarize the general situation and main trends of the sample, laying the foundation for further in-depth analysis.

Correlation analysis is a statistical method used to measure the strength and direction of the relationship between two or more variables. Commonly used correlation analysis indicators include the Pearson correlation coefficient, which is suitable to measure the linear relationship between two continuous variables. In this study, the correlation analysis will be used to explore the intercorrelation between the use degree of the logistics management information system, the satisfaction of the incentive mechanism, the perception of the logistics agility, and the efficiency of the logistics companies. Through this analysis, the researchers can identify which factors have a significant positive or negative correlation between them, which is crucial to understand how the various factors interact to improve logistics efficiency.

Analysis of variance (ANOVA) is a statistical method used to analyse significant differences between the means of more than three groups. It can help researchers determine whether there are significant differences statistically between multiple sample groups. In this study, ANOVA will be applied to evaluate the performance differences of logistics companies of different business sizes in the utilization of management information systems, the effects of incentive mechanisms, and in logistics agility practices. This helps to reveal the possible impact of company size on logistics efficiency, thus providing customized improvement suggestions for large, small and medium-sized enterprises.

Ethical Considerations **-** Strict adherence to ethical principles when conducting this study is crucial, especially considering that the study involved human participants. First, to ensure that the participation of all participants is voluntary, their informed consent must be obtained before any data is collected. This included explaining to participants the purpose of the study, their role, how their data would be used during the study, and their right to withdraw their participation at any time without any consequences. Furthermore, guaranteeing the anonymity and privacy of the participants is another important aspect of this study. All collected data were desensitized and no possible individual identifying information will be revealed in the study results. Data protection regulations will also be followed during the study to ensure data security for all participants, are used for study purposes only, and are properly stored in a protected electronic format, inaccessible to any unauthorized personnel. Furthermore, the handling and reporting of the findings will be impartial and avoiding any possible bias or misunderstanding. For any ethical issues that may arise, the research team will establish an independent ethical review committee to monitor the conduct of the study and address related issues.

3. Result and Discussion

Table 2
Summary Table on Information Management System

Key Result Areas	Composite Mean	VI	Rank
System Flexibility	3.25	Agree	1
System Security	3.22	agree	3
System Integration	3.24	Agree	2
Grand Composite Mean	3.24	Agree	

Legend:3.50-4.00=Strongly Agree;2.50-3.49=Agree;1.50-2.49=Disagree;1.00-1.49=Strongly Disagree

Table 2 shows that the overall composite mean (Grand Composite Mean) of the information management system is 3.24 and is in the "agree" range (2.50-3.49). This means that respondents generally endorse the performance of information management systems in various key outcome areas, including system flexibility, system security, and system integration. While the overall review was positive, "strongly agree" was not met,

indicating that the system still has room for improvement and needs to be further optimized to meet higher user expectations and business needs. The key outcome area ranked first was System Flexibility, with a composite average of 3.25. Respondents gave a high evaluation of the flexibility of the system and concluded that the information management system performed well in adapting to business needs, supporting process changes and providing user custom functions. This shows that the system has some flexibility to meet the needs of enterprises in the changing market environment and improve the efficiency and response speed of business operations. The high score reflects the effectiveness of the system in meeting the diverse needs of users and supporting enterprise agility.

In second place was System Integration, with a composite mean of 3.24. Respondents recognized the systems ability to integrate with other enterprise application systems as effective in enabling data sharing and business process collaboration. Good system integration helps to eliminate information islands, improve data consistency and business process coherence, and thus improve the overall operational efficiency. This score shows that the system has played a positive role in supporting enterprise informatization and digital transformation, but there is still room for improvement to achieve a higher level of integration. The third-ranked key outcome area was System Security, with a composite average of 3.22. Although slightly lower than the previous two items, it are still within the "agree" range. The interviewees believe that the performance of the system in security is ok, with certain security protection measures, such as multi-level security protection mechanism, data encryption and authority management. However, the lower scores may reflect higher user expectations for system security, especially in the face of increasingly complex network security threats, and the system needs to further strengthen security performance and protection measures.

Table 3
Summary Table on Incentive Mechanism

Key Result Areas	Composite Mean	VI	Rank
Motivational Impact	3.26	Agree	1.5
Cost Effectiveness	3.26	Agree	1.5
Employee Productivity	3.17	Agree	3
Grand Composite Mean	3.23	Agree	

Legend:3.50-4.00=Strongly Agree;2.50-3.49=Agree;1.50-2.49=Disagree;1.00-1.49=Strongly Disagree

Table 3 is a summary table on incentive mechanism. The key outcome area ranked first was Motivational Impact, with a composite average of 3.26. The interviewees gave a high evaluation of the incentive mechanism in stimulating the enthusiasm of the employees, believing that it has effectively improved the employees participation, creativity and attitude towards the organization. This indicates that incentives successfully guide employee behavior, promote the achievement of target behavior, and reduce employee turnover rate. The high score reflects the effectiveness of the incentive mechanism in enhancing the internal motivation and enthusiasm of employees, and has a positive impact on the improvement of corporate culture and working environment.

Also on top was Cost Effectiveness, with a composite average of 3.26. Respondents recognized the performance of the incentive mechanism in terms of cost-effectiveness, and believed that the incentive measures had brought about significant performance improvement with reasonable input. Specifically, the cost of the incentive plan is relatively low, but it has a great positive impact on employee behavior and enterprise performance, reflecting the efficient cost input and benefits. While controlling the cost, the enterprise has successfully improved the enthusiasm and production efficiency of the employees, and enhanced the market competitiveness.

The third-ranked key outcome area was Employee Productivity, with a composite mean of 3.17. Although slightly lower than the previous two items, it are still within the "agree" range. Respondents saw incentives played a positive role in improving employee productivity, including improving productivity, promoting innovation and achieving work goals. However, the relatively low scores may reflect that the effect of incentives in some aspects has not been fully demonstrated, especially in reducing staff absenteeism and attrition. Companies may need to further optimize incentives to be targeted to improve employee productivity.

Based on the above data, it can be seen that the incentive mechanism is outstanding in terms of incentive impact and cost-effectiveness, and the respondents gave a high evaluation. This suggests that incentives successfully motivate employees and achieved performance improvements at a reasonable cost. However, the score was relatively low, although positive overall, in improving employee productivity. This suggests that enterprises need to invest more energy in the design and implementation of incentive mechanisms, especially focusing on how to improve employee productivity and reduce absenteeism more effectively. The incentive mechanism has achieved remarkable results in stimulating employees and achieving high cost effectiveness, but there is still room for improvement in improving employee productivity. Continuous optimization of incentive measures will help to comprehensively improve employee performance, and promote the long-term development and competitiveness of the enterprise.

Table 4

Summary Table on Logistics Agility

Key Result Areas	Composite Mean	VI	Rank
Flexibility	3.26	Agree	1
Responsiveness	3.20	Agree	3
Collaboration	3.22	Agree	2
Grand Composite Mean	3.23	Agree	

Legend:3.50-4.00=Strongly Agree;2.50-3.49=Agree;1.50-2.49=Disagree;1.00-1.49=Strongly Disagree

Table 4 shows that the overall composite mean (Grand Composite Mean) of logistics agility is 3.23 and is in the "agree" range (2.50-3.49). This shows that respondents generally recognize the performance of logistics systems in terms of flexibility, responsiveness and collaboration, and believe that logistics companies have certain agility to adapt to market changes and improve operational efficiency. However, the lack of a "strongly agree" score indicates that there is still room for improvement in logistics agility and that it needs to be further optimized to meet higher customer expectations and market demand. The key outcome area ranked first was Flexibility, with a composite average of 3.26. The Respondents gave a high evaluation of the flexibility of the logistics system, believing that enterprises could effectively adapt to changes in market and customer needs, including adjusting operational strategies, introducing new technologies and optimizing warehouse management. The high score reflects the strong adaptability to uncertainty and changes to maintain competitive advantage. However, the lack of a "strong agreement" score indicates that there is still room for improvement in flexibility, such as further improving the flexibility of supply chains and flexibility in resource allocation In second place was Collaboration, with a composite mean of 3.22. Respondents recognized the company's ability to cooperate between internal departments and supply chain partners. This shows that enterprises have achieved some results in information sharing, joint decision-making and collaborative work, which helps to improve the efficiency of logistics operation and response speed. The high score reflects the important role of collaboration in improving logistics agility. However, scoring slightly below flexibility suggests that there is still room for improvement in deepening internal collaboration and strengthening collaboration with supply chain partners to achieve more efficient collaboration.

The third-ranked key outcome area was Responsiveness (3.20). respondents believed that the logistics system performed well in response to customer demand and market changes, but had slightly lower scores compared to the previous two items. This may reflect room for improvement in terms of performance speed, on-time delivery rates and customer satisfaction. To improve responsiveness, enterprises need to optimize logistics processes, enhance the efficiency of inventory management and transportation scheduling, and make full use of information technology to improve decision-making speed and accuracy to meet the growing expectations of customers.

Table 5 shows the relationship between different aspects of an Information Management System — system flexibility, security, and integration — and the incentive mechanisms in place, measured by their impact on motivation, cost-effectiveness, and employee productivity. The high correlation coefficients (rho values) ranging from 0.894 to 0.916, all significant at the 0.01 level, suggest strong positive relationships between the IMS components and the incentive mechanism outcomes. Specifically, system flexibility, security, and integration are

all highly correlated with motivational impact, cost-effectiveness, and employee productivity.

Table 5
Relationship Between Information Management System and Incentive Mechanism

Variables	rho	p-value	Interpretation
System Flexibility			
Motivational Impact	0.910	<.001	Highly Significant
Cost Effectiveness	0.908	<.001	Highly Significant
Employee Productivity	0.898	<.001	Highly Significant
System Security			
Motivational Impact	0.901	<.001	Highly Significant
Cost Effectiveness	0.906	<.001	Highly Significant
Employee Productivity	0.894	<.001	Highly Significant
System Integration			
Motivational Impact	0.916	<.001	Highly Significant
Cost Effectiveness	0.899	<.001	Highly Significant
Employee Productivity	0.905	<.001	Highly Significant

Correlation is significant at the 0.01 level

Table 6
Relationship Between Information Management System and Logistics Agility

Variables	rho	p-value	Interpretation
System Flexibility			
Flexibility	0.904	<.001	Highly Significant
Responsiveness	0.912	<.001	Highly Significant
Collaboration	0.906	<.001	Highly Significant
System Security			
Flexibility	0.909	<.001	Highly Significant
Responsiveness	0.904	<.001	Highly Significant
Collaboration	0.902	<.001	Highly Significant
System Integration			
Flexibility	0.906	<.001	Highly Significant
Responsiveness	0.905	<.001	Highly Significant
Collaboration	0.913	<.001	Highly Significant

Correlation is significant at the 0.01 level

Table 6 displays the relationship between information management system and logistics agility . It highlights the strong relationships between different aspects of the Information Management System— system flexibility, security, and integration — and logistics agility, measured by flexibility, responsiveness, and collaboration. The high correlation coefficients (rho values) ranging from 0.902 to 0.913, all statistically significant at the 0.01 level, indicate a highly significant positive correlation. This means that improvements in the flexibility, security, and integration of the IMS are closely associated with enhanced logistics agility in terms of adaptability, the speed of response, and collaboration among logistics partners.

Table 7
Relationship Between Incentive Mechanism and Logistics Agility

Variables	rho	p-value	Interpretation
Motivational Impact			
Flexibility	0.908	<.001	Highly Significant
Responsiveness	0.913	<.001	Highly Significant
Collaboration	0.914	<.001	Highly Significant
Cost Effectiveness			
Flexibility	0.908	<.001	Highly Significant
Responsiveness	0.918	<.001	Highly Significant
Collaboration	0.899	<.001	Highly Significant
Employee Productivity			
Flexibility	0.902	<.001	Highly Significant
Responsiveness	0.912	<.001	Highly Significant
Collaboration	0.899	<.001	Highly Significant

Correlation is significant at the 0.01 level

Table 7 presents the relationship between various dimensions of the incentive mechanism motivational

impact, cost effectiveness, employee productivity and logistics agility, measured through flexibility, responsiveness, and collaboration. The correlation coefficients (rho values) range from 0.899 to 0.918, all of which are statistically significant at the 0.01 level. These high correlations suggest a strong positive relationship between the incentive mechanisms and logistics agility. Specifically, improvements in motivational impact, cost-effectiveness, and employee productivity are strongly associated with enhanced logistics flexibility, faster responsiveness, and better collaboration.

In order to improve the overall efficiency and competitiveness of logistics companies, this study has developed a comprehensive efficiency framework covering three key areas: information management system, incentive mechanism and logistics agility. In information management systems, we ensure that technology can support rapid changes in business requirements by improving system flexibility, security, and integration. Incentive mechanism aims to motivate employees, improve cost-effectiveness and employee productivity, and build an efficient team. Logistics agility focuses on enhancing flexibility, responsiveness and collaboration, and improving the response speed and adaptability of the supply chain. The framework details specific measures, executors, implementation time and evaluation indicators to ensure the effectiveness and measurement of implementation.

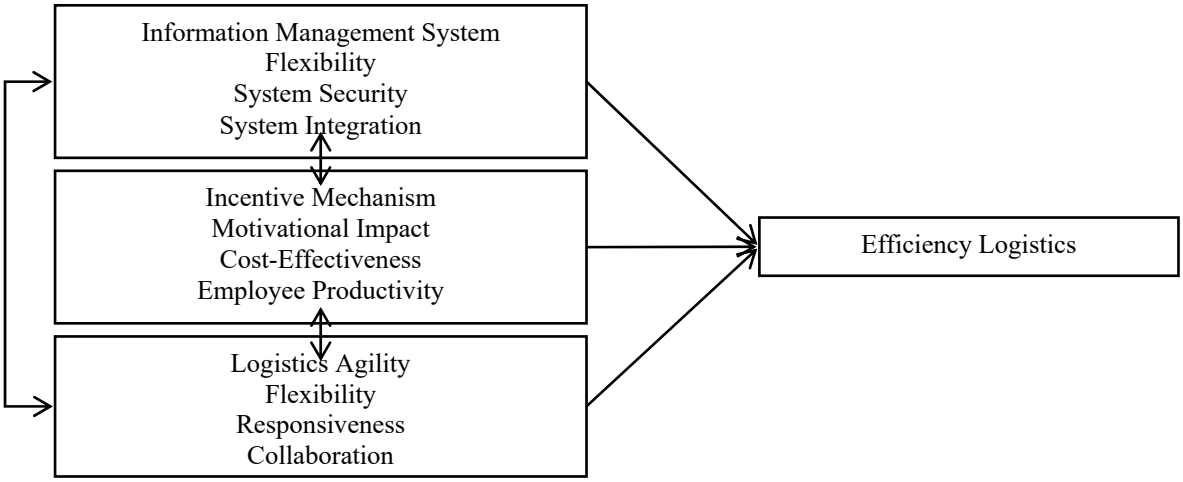

Figure 1 Efficiency Framework for Logistics Companies

In the context of logistics company efficiency, the Information Management System plays a critical role in ensuring operational flexibility, security, and integration. The system's flexibility is enhanced by introducing a configurable user interface, allowing users to customize workflows and reports, which can improve user satisfaction and facilitate easier system usage. A further aspect of flexibility is achieved through the integration of an open API interface, enabling seamless third-party application integration, which enhances data exchange efficiency. Additionally, scalability is a key consideration, with efforts made to optimize the system architecture to handle increasing data loads and user demands. Regarding system security, multiple levels of protection are implemented to prevent unauthorized access, with encryption technologies protecting sensitive data during transmission and storage. Regular security audits and vulnerability assessments help identify and rectify any potential risks, ensuring the security and integrity of company information. Lastly, system integration aims to seamlessly connect the company's core business systems to facilitate real-time data synchronization and accurate data exchange, ultimately increasing operational efficiency.

The excitation mechanism (or incentive mechanism) within a logistics company is designed to enhance employee engagement and improve productivity. It includes several strategies such as designing performance-linked incentive programs that directly correlate employee engagement to measurable targets. Regular employee recognition and reward programs motivate staff by fostering enthusiasm and a positive work

environment. Moreover, training and development opportunities are frequently organized to promote career growth, enabling employees to acquire new skills and further engage with the company's goals. The cost-effectiveness of incentive programs is constantly evaluated by assessing the return on investment (ROI), ensuring that the cost of incentives is justified by the resulting improvements in performance. Non-material incentives, such as honor-based recognition, are also encouraged to lower costs. Optimizing resource allocation helps maximize the impact of incentives without unnecessary expenditure. To track employee productivity, clear performance goals are set to inspire employees to work more efficiently. Establishing a feedback mechanism also allows for timely recognition and correction of behaviors, contributing to ongoing improvement.

Logistics agility, the third key component of the framework, is centered on adaptability, responsiveness, and collaboration. Flexibility in logistics involves the development of production and distribution plans that can rapidly respond to shifting customer demands, minimizing delays. Technologies such as automated storage systems are introduced to improve efficiency and adaptability in the supply chain. By establishing a diversified network of suppliers, companies can enhance the flexibility of their supply chains, reducing the impact of potential supply interruptions. Responsiveness is a vital characteristic, as optimizing order processing and reducing order fulfillment times ensures faster delivery to customers. Strengthening inventory management further mitigates stock shortages, while transportation scheduling efficiency ensures on-time deliveries. Lastly, collaboration within the company and with external partners promotes greater coordination across departments and the supply chain. Regular cross-departmental communication and the establishment of an information-sharing platform facilitate more effective cooperation. Emergency response plans are also developed to ensure the company can quickly respond to operational disruptions, thus maintaining efficiency and continuity.

4. Conclusion and recommendations

Respondents moderately agreed that the information management system of logistics enterprises has a good performance in terms of flexibility, security and integration. Respondents moderately agreed that the incentive mechanism of logistics enterprises has a good performance in terms of motivation, cost effectiveness and employee productivity. Respondents moderately agreed that the logistics agility of logistics enterprises has a good performance in terms of flexibility, responsiveness and collaboration. Tested the significant relationship among management information system, incentive mechanism and logistics agility. Logistics enterprises may give priority to strengthening the security protection measures of information management system. Logistics companies may optimize the design of incentive mechanism and pay attention to the accurate allocation of incentive resources. Logistics enterprises may strengthen the construction of supply chain cooperation mechanism. Logistics companies may adopt the proposed framework to enhance the market competitiveness of enterprises. Based on the content and theme of this study, it is suggested that future researchers may consider introducing other variables, including supply chain management, customer relationship management, technological innovation and market dynamics, to expand the understanding of factors affecting the efficiency of logistics companies when conducting similar studies.

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