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Application of Management Information System to Supply Chain Management at BAC Ninh Industrial Park Enterprises, Vietnam

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Abstract:
This article focuses on analyzing the role and benefits of management information systems in supply chain management in industrial park enterprises, and at the same time assesses the current application status in some typical enterprises. On that basis, the article proposes orientations and solutions to optimize the implementation of management information systems, contributing to improving the efficiency of supply chain management, promoting sustainable development and increasing the competitive value of businesses in the current economic environment.
Keywords: *Management information system, supply chain management, industrial park, BAC Ninh, Vietnam*

1. Introduction

In the context of the rapid development of the global economy and deep integration, industrial park enterprises are facing many opportunities as well as great challenges in improving competitiveness and optimizing production and business activities. Supply chain – one of the key factors determining the efficiency and sustainable development of businesses – plays an increasingly important role in managing resources, minimizing costs, improving product quality and responding to customer needs in a timely manner. However, traditional supply chain management using manual methods or discrete systems often fails to meet the complex and diverse requirements of the modern market, leading to unreasonable inventory, delayed delivery, inflated costs, and limited ability to respond flexibly to market fluctuations.

In that context, the application of Management Information Systems (MIS) to supply chain management has become an inevitable trend to support industrial park businesses to improve operational efficiency, enhance coordination between stages in the supply chain, etc and optimize the strategic decision-making process. The management information system helps collect, process and analyzes data related to supply activities quickly and accurately, facilitating effective production progress tracking, inventory management, demand forecasting, and distribution planning. Thereby, businesses can reduce risks, improve service quality and better meet customer requirements in a volatile and fiercely competitive business environment. However, the implementation and application of management information systems in supply chain management in industrial park enterprises still face many difficulties, from the lack of synchronous technology systems, limitations in highly qualified human resources to problems with investment costs, etc overlap in management and the level of acceptance of change from managers and employees. Therefore, it is extremely necessary to study and evaluate the current status of

the application of management information systems in supply chain management in industrial park enterprises, in order to propose appropriate solutions, promote the digital transformation process, improve management capacity and competitiveness of enterprises. The structure of the article is in addition to the introduction, literature review, assessment of the current state of application in some enterprises, solutions to optimize the implementation of management information systems and conclusions.

2. Literature review

2.1. Concept and role of management information system (MIS)

A Management Information System (MIS) is a system designed to collect, process, store, and provide information to support decision-making, administration, and control within an organization. MIS is not just a technology, but also a set of closely linked components including people, software, hardware, and workflows to create valuable information for effective management. In the modern business environment, especially industrial park enterprises with large production scale, product diversity and complex supply networks, MIS plays an extremely important role in optimizing management activities. MIS helps businesses manage a large amount of data from many different sources such as suppliers, customers, warehouses, orders, production, finance, etc. and turn this data into useful information, helping managers have an overall and accurate view of the operation situation and make timely and correct strategic decisions. An effective MIS system will support businesses to improve labor productivity, minimize operational errors, and create flexibility in adapting to market fluctuations and customer requirements. MIS also helps businesses strengthen coordination and information exchange between departments, partners and customers, thereby forming a smarter and more synchronous supply chain.

2.2. Supply Chain Management

Supply Chain is understood as a system of organizations, people, activities, information, and resources involved in the transfer of products or services from suppliers to end customers. Supply Chain Management (SCM) involves planning, implementing, and controlling activities related to procurement, production, inventory, transportation, and distribution to optimize the efficiency of the entire supply chain. Supply chain management plays an important role in helping businesses gain a competitive advantage by reducing costs, improving product quality, shortening delivery times, and improving customer service. Especially in industrial park enterprises, where there are many suppliers, transport partners and large and small customers, effective supply chain management will contribute to ensuring continuity in production, minimizing risks in raw materials and optimizing the use of resources. In addition, in the context of the digital economy and globalization, supply chains are becoming increasingly complex, requiring businesses to be able to manage information accurately and quickly to respond promptly to external fluctuations such as fluctuations in raw material prices, etc changes in customer needs or transportation risks.

2.3. Relationship between management information systems and supply chain management

Supply chain management and management information systems have a close and reciprocal relationship, in which MIS is considered as a technology platform and an effective support tool for SCM. The integration of MIS into supply chain management helps businesses:

- Collect and process accurate, complete data from all stages of the supply chain.
- Closely monitor production progress, inventory status, delivery schedules, helping to minimize excess inventory and waiting time.

- Analyze and forecast market demand based on actual and historical data, thereby making reasonable production and purchasing plans.
- Enhance coordination and information exchange between departments, supply partners and customers, helping to minimize delays and information errors.
- Support fast and accurate decision-making, especially in emergency situations or market fluctuations.

In particular, in industrial park enterprises, the application of MIS to SCM also helps optimize available resources, improve operational processes, thereby improving labor productivity and minimizing operating costs.

2.4. Key components of a management information system in supply chain management

An effective management information system in supply chain management typically includes the following key components:

- **Supply chain management software:** Includes applications for warehouse management, order management, shipping management, production planning, purchasing management, etc. help automate processes and ensure a seamless flow of information.
- **Database:** Gathering big data from various sources such as product information, suppliers, customers, inventory, orders, etc. are systematically stored and managed, making it easy to access and analyze.
- **Hardware and networking:** Computer equipment, servers, terminals, intranet systems, and the internet help ensure fast, stable, and secure information transmission.
- **People:** Technical staff, managers, and related departments play a role in operating, analyzing data, and making decisions based on the information provided by the system.
- **Processes and policies:** Include regulations, standards, and operational guidelines to ensure synchronous coordination between components in the system and between departments in the enterprise.

2.5. Benefits of applying management information systems in supply chain management at industrial park enterprises

The application of management information systems to supply chain management brings many practical benefits to industrial park enterprises, including:

- **Enhance management efficiency:** The system helps businesses strictly control activities in the supply chain, from raw material import, production to distribution, minimizing errors and losses.
- **Reduce inventory costs:** By accurately monitoring inventory and forecasting demand, businesses can maintain optimal inventory levels, avoiding excess inventory or shortages affecting production.
- **Improve responsiveness:** Businesses can quickly grasp fluctuations in the supply chain and adjust plans accordingly, helping to minimize risks and maintain continuity in production.
- **Improve customer service quality:** Accurate information about inventory and delivery progress helps businesses better meet customer requirements, improve credibility and satisfaction.
- **Strategic decision-making support:** MIS provides reports, analysis, and forecasts to help managers make more accurate long-term decisions, thereby improving the competitiveness of businesses in the market.

2.6. Challenges in applying management information systems to supply chain management in industrial park enterprises

Despite bringing many benefits, the application of management information systems in supply chain management also faces many challenges, especially for industrial park enterprises with large scale and scope of operation:

- **High initial investment costs:** The implementation of an MIS system requires large capital for software, hardware, and personnel training, which puts financial pressure on businesses.
- **Difficulties in system integration:** Businesses often use many different software and systems that are not synchronized, making it difficult to integrate data and overall management.
- **Lack of qualified human resources: The staff** does not have enough skills in information technology and supply chain management, which will affect the efficiency of system operation.
- **Resistance to change:** Some parts of the business may not be familiar with or ready to adopt new technology, hindering the implementation process.
- **Information security and security:** The management of large amounts of critical data places high requirements on security, avoiding the risk of information loss or leakage.

3. Results of analysis of current situation

In the context of deep economic integration and the strong development of the industrial revolution 4.0, industrial park enterprises are increasingly aware of the key role of management information systems (MIS) in improving management efficiency, especially supply chain management. However, in fact, the implementation of management information systems in industrial park enterprises today still has many limitations and inadequacies. Many businesses have started to invest in building basic management software systems to digitize data, manage warehouses, and track orders, but the scope and level of integration between departments is still limited. Some businesses only apply single software, and have not yet formed an overall management system throughout the entire supply chain. This leads to data being scattered, difficult to control and synchronize, directly affecting the ability to make timely and accurate decisions.

In addition, the application of new technologies such as artificial intelligence, big data analysis (Big Data), cloud computing, etc. access to the management information system in industrial park enterprises is still quite limited, mainly due to barriers in investment capital, human resource capacity as well as risk aversion in the digital transformation process.The supply chain at industrial park enterprises is often very complicated, including many stages: raw material procurement, production, warehousing, transportation, distribution and after-sales service. Due to the characteristics of large-scale production, a variety of products and a wide network of partners, effective supply chain management requires a synchronous and flexible management information system.In fact, in many industrial park enterprises, supply chain management mainly relies on manual processes or the use of simple software tools, lacking linkage between departments. This causes many difficulties such as inaccurate inventory figures, delays in order processing, difficulties in tracking shipping progress, as well as difficulties in forecasting demand and planning production.

Some businesses have invested in the application of ERP (Enterprise Resource Planning) or SCM (Supply Chain Management) systems, but the efficiency is not high because they have not fully exploited the features or are not suitable for the specific characteristics of the business. In addition, the training of system operators has not been focused, leading to ineffective software use, lack of synchronization and waste of resources. One of the biggest weaknesses in the current state of supply chain management of industrial park enterprises is the problem of data and information exchange. Businesses often encounter data fragmentation, not being updated in a timely manner or distorted due to manual data entry. The lack of synchronization of information between departments, suppliers and customers reduces coordination efficiency, causing problems such as excess or shortage inventory, delays in delivery, increased operating costs, and reduced customer service quality. In addition, the ability to forecast and make strategic decisions is also limited due to the lack of aggregated information and in-depth analysis.

In particular, in industrial park enterprises with many different partners and suppliers, the lack of a linkage information system makes it more difficult to control the schedule, quality of raw materials and factors affecting the production process. This significantly affects the productivity and operational efficiency of the entire supply

chain. An important factor determining the effectiveness of the application of management information systems is technological infrastructure and human resource capacity. In industrial park enterprises, although there has been investment in technology, not all enterprises own modern, secure and stable technical infrastructure.

Many businesses also use old, inup-to-date software that is not compatible with new technologies such as cloud computing, big data analysis or process automation. This limits the ability to expand and integrate information systems throughout the supply chain.

In terms of human resources, although the management and technical teams have been more interested in training, there is still a shortage of highly qualified experts in information technology combined with supply chain management knowledge. Operators are not proficient in management software, lack data analysis skills, and have not fully promoted the capabilities of information systems.

In addition, maintaining and upgrading the system is also difficult due to high costs and lack of commitment from business leaders. This leads to an ineffective operation management information system, not meeting the increasingly complex requirements of the supply chain in a timely manner.In addition to the positive aspects, the implementation and operation of management information systems in supply chain management at industrial park enterprises also face many major challenges. The first is the complexity **and large scale** of the supply chain, making the integration of information systems difficult and expensive.Next is the issue of initial investment costs for software and hardware, as well as the cost of maintaining and maintaining the system, causing many businesses to consider carefully before applying new technology solutions. Some businesses are also afraid of changing traditional operating methods, leading to delays in the digital transformation process.

In addition, the lack of synchronization between departments and external partners is also a major barrier. When the parties do not use a unified information system or lack close coordination, the data is not fully and accurately updated, negatively affecting the decision-making process.Another challenge is the issue of information security and safety. With large amounts of data and the sensitivity of supply chain management, businesses face the risk of information leaks, cyberattacks, and data loss. Many businesses have not yet built a comprehensive security system and strict data management policies.Finally, the issue of highly qualified human resources in information technology and supply chain management is a clear limitation. Employee training and awareness of technology application are essential but have not been given due attention in many businesses.

Despite many difficulties, some industrial park enterprises have recorded positive results from the application of management information systems to supply chain management. These businesses often have a methodical investment strategy, choose technological solutions suitable for the scale and characteristics of production, and focus on training and improving human resource capacity. The application of ERP or SCM systems has helped them improve data accuracy, reduce order processing time, optimize inventory, and improve coordination between departments and partners. Thereby, businesses strengthen competitiveness, improve customer service quality and minimize risks in the supply chain. From the above situation, an important lesson can be learned that businesses need to clearly define the goals of applying information technology in supply chain management, develop a detailed implementation plan and have an appropriate digital transformation roadmap. At the same time, it is necessary to focus on developing human resources, raising awareness of the role of technology and creating consensus throughout the system.

4. Propose solutions

The first is multi-storey investment:

The investment in modern technology infrastructure is the key foundation to build an effective management information system (MIS), meeting the increasingly complex and large-scale supply chain management requirements of industrial park enterprises. Businesses need to focus on upgrading hardware, software, network systems, and related technologies such as cloud computing, Internet of Things (IoT), and artificial intelligence (AI) to optimize data collection, processing, and analysis. At the same time, it is necessary to build an open and flexible system to easily integrate with other management software and systems of partners and suppliers to ensure linkage and synchronization in the entire supply chain. The investment needs to be carried out according to a methodical plan, with strict evaluation and control to ensure cost and technical efficiency.

The second is the development of information technology human resources and supply chain management

Human resources are the determining factor for the success of the application of management information systems. Industrial park enterprises need to focus on training and improving professional qualifications and information technology skills for officials and employees, especially departments directly related to supply chain management.Building a high-quality workforce not only helps to operate the system efficiently but also supports the process of data analysis, making strategic decisions based on accurate and timely information. In addition, businesses need to build a continuous training program and update new technology to help employees quickly adapt to the development of technology and the market.

The third is to improve the process and coordination mechanism in the supply chain

The management information system promotes maximum effectiveness when applied in a clear, scientific and synchronous working process between departments and departments in the enterprise and external partners. Therefore, businesses need to review, adjust and complete supply chain management processes in the direction of standardization, automation and transparency.At the same time, build a mechanism for close coordination and timely sharing of information data between stakeholders to ensure seamlessness, minimize errors and enhance comprehensive control of the supply chain. The application of information technology in process management also helps to create a digital working environment, promoting transparency and accountability throughout the system.

The fourth is to strengthen information security and safety in the management system

In the context of data becoming a valuable asset, ensuring information safety and security in the supply chain management system is a top priority. Industrial park enterprises need to establish a multi-layered security system, including technical solutions such as data encryption, firewalls, intrusion prevention systems, network monitoring, and access control. In addition, develop a strict security policy, train to raise awareness for employees about information security, prevent acts that cause data insecurity. Data protection not only helps prevent potential risks but also builds trust for customers and partners and improves the reputation of businesses in the market.

The fifth is the application of advanced technology and intelligent data analysis

The integration of advanced technologies such as artificial intelligence (AI), machine learning, and big data analytics into the management information system helps industrial park businesses improve their ability to forecast demand, optimize inventory, manage risks and make more accurate strategic decisions.

Data analytics technology also helps detect new trends, improve processes, and automate repetitive tasks, minimizing human errors. Businesses need to build a centralized data platform, and at the same time develop reporting and data visualization tools to support managers in monitoring and evaluating supply chain efficiency comprehensively.

The sixth is to build a culture of digital transformation and innovation in businesses

In order for the management information system to maximize its effectiveness, industrial park enterprises need to build a culture of digital transformation, encourage innovation and initiative in applying technology to management and production and business. This requires a strong commitment from the management, as well as the consensus and active participation of all employees.The Board of Directors needs to create a conducive working environment, encourage creative ideas, and establish appropriate reward and incentive mechanisms to promote innovation. Digital transformation culture helps businesses quickly adapt to technological and market changes, improve competitiveness and sustainable development.

The seventh is to promote cooperation with technology partners and stakeholders

Industrial park enterprises need to proactively build close cooperation with technology solution providers, consultants and partners in the supply chain to maximize the effectiveness of the management information system. The cooperation helps businesses quickly update new technologies, receive in-depth technical support, and optimize operational processes.Moreover, the cooperation also helps to promote linkages in the supply chain, improve the ability to share information, coordinate and synchronize activities, contributing to improving overall management efficiency.

5. Conclusion

The application of the management information system (MIS) helps industrial park enterprises optimize the supply chain operation process, from raw material procurement, production management, inventory control to product transportation and distribution. MIS provides accurate and timely data to help businesses minimize errors, enhance forecasting, reduce excess inventory, and improve the speed of reaction to market fluctuations.

Through digitization and automation of processes, the system helps to minimize manual processing time, reduce operating costs, and increase flexibility in resource coordination. This is especially important in the context of an increasingly volatile market and requires flexible response from businesses.A management information system creates a common platform where departments in the business and external partners can share data, information, and plans quickly and transparently. This promotes close coordination, minimizing the risk of information loss or misunderstanding, thereby increasing the efficiency of the entire supply chain.

The data linkage between departments also helps businesses be more proactive in detecting bottlenecks, adjusting production and supply plans in a timely manner, and improving competitiveness in the market.With the rapid development of information technology, industrial park businesses have the opportunity to apply modern solutions such as artificial intelligence (AI), big data analysis (Big Data), Internet of Things (IoT), cloud computing (Cloud Computing)... into the supply chain management system. These technologies not only help optimize processes, improve accuracy in forecasting and management, but also assist businesses in detecting market trends, analyzing customer behavior, and making strategic decisions based on actual data. Thereby, businesses improve their competitiveness, quickly adapt to changes and develop sustainably.

The application of MIS in supply chain management is an important stepping stone for businesses to carry out comprehensive digital transformation. MIS is not only a management tool but also a platform to support

businesses to deploy smart management models, automate and connect digitalization of all production and business activities.

Digital transformation helps industrial park businesses improve their ability to make fast and accurate decisions, reduce risks and optimize resources, and expand collaboration and connectivity in the global supply chain network.The implementation of a modern management information system requires industrial park enterprises to invest significantly in software, hardware, technological infrastructure and the cost of maintaining and maintaining the system. Many businesses, especially small and medium-sized enterprises, still have limited financial resources, so it is difficult to implement comprehensive technology solutions.

Large investment costs also increase financial risk, especially during the testing phase or when the system is not immediately effective. This puts great pressure on business leaders to weigh between long-term benefits and short-term costs.Another major challenge is the shortage of highly qualified human resources in information technology and supply chain management. Operators are not fully trained or proficient in using the system, leading to inefficient system exploitation, data not being updated accurately and timely.

In addition, business management lacks in-depth knowledge of digital transformation and information technology application, affecting the development of appropriate system strategies and orientations. Training, raising awareness and building a team of quality personnel is an urgent problem but has not been completely solved.The supply chain consists of many stages, many partners with different management systems. Integrating the internal management information system with the systems of partners, suppliers, and customers is not an easy task due to differences in technology, data formats and management standards.

This lack of synchronization makes it difficult to share data, coordinate work, and control supply chain progress, reducing the efficiency of the entire management system. In particular, as businesses expand their partner networks and markets, the challenge of system integration becomes even more serious.Information in supply chain management often includes sensitive data about production, raw materials, customers, and partners. The application of modern management information systems also entails the risk of information security risks, including cyber attacks, data loss, and internal information leaks.

Many industrial park enterprises have not built a comprehensive security system and strict data management policies, making the system vulnerable and affecting production and business activities. This requires serious investment in cyber security infrastructure and raising the awareness of all officials and employees about information security.The application of management information systems requires businesses to change traditional workflows, and at the same time build a culture of digitalization and data-driven management. However, in many industrial park enterprises, this transformation encounters resistance from officials and employees due to old working habits and fear of change.

The lack of consensus and commitment from the entire organization leads to delays in the implementation of the management information system or does not achieve the desired efficiency. Business leaders need to play a strong leading role and develop support and training policies to change perceptions and promote change throughout the system.Supply chain management in the context of international economic integration and the rapid development of information technology is becoming a determining factor for the success and competitiveness of industrial park enterprises. Through the research process on the application of management information systems (MIS) to supply chain management, it can be affirmed that building and operating an effective management information system not only helps optimize operations but also contributes to improving forecasting, manage risk, reduce costs, and add value to the entire supply chain.

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