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# The role of information technology in improving organizational performance

# Le rôle des technologies de l'information dans l'amélioration de la performance organisationnelle

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**Abstract**

In today's dynamic business environment, technology is the most powerful tool to sustain in the competitive global marketplace. Companies are striving to improve their reliability, responsiveness, agility, and cost-effectiveness, thus enhancing their competitiveness by adopting new technologies. Integrating information technology into green logistics emerges as a strategic imperative for organizations seeking to enhance overall performance while addressing environmental concerns.

This paper aims to untangle the intricate connections between information technology and its significant impact on organizational performance through the implementation of green logistics management. To conceptualize these connections, a research model is developed to illustrate the relationship between these variables.

The exploration of connections in this study relies on a rigorous methodology. The foundation of this approach is the collection and in-depth examination of data derived from a wide array of scholarly resources. These resources encompass peer-reviewed journals, which uphold rigorous academic standards, conference papers that often present cutting-edge research, and books that contribute to the foundational knowledge in the field. The meticulous treatment and analysis of data from these diverse sources ensure a comprehensive and well-rounded understanding of the subject matter.

**Keywords:**

Information technology; organizational performance; technology solutions; system ; green logistics management.

**Résumé**

Dans l'environnement des affaires dynamique d'aujourd'hui, la technologie est l'outil le plus puissant pour survivre sur le marché mondial concurrentiel. Les entreprises s'efforcent d'améliorer leur fiabilité, leur réactivité, leur agilité et leur rentabilité, renforçant ainsi leur compétitivité en adoptant de nouvelles technologies. L'intégration des technologies de l'information dans la logistique verte apparaît comme un impératif stratégique pour les organisations cherchant à améliorer leurs performances globales tout en répondant aux préoccupations environnementales.

Cet article vise à démêler les liens complexes entre les technologies de l'information et leur impact significatif sur la performance organisationnelle grâce à la mise en œuvre d'une gestion de la logistique verte. Pour conceptualiser ces liens, un modèle de recherche est développé pour illustrer la relation entre ces variables.

L'exploration des liens dans cette étude s'appuie sur une méthodologie rigoureuse. Le fondement de cette approche repose sur la collecte et l'examen approfondi de données provenant d'un large éventail de ressources scientifiques. Ces ressources comprennent des revues à comité de lecture qui respectent des normes académiques rigoureuses, des articles de conférence qui présentent souvent des recherches de pointe et des livres qui contribuent aux connaissances fondamentales dans le domaine. Le traitement méticuleux et l'analyse des données provenant de ces sources diverses garantissent une compréhension complète et approfondie du sujet.

**Mots clés :**

Technologies de l'information ; performance organisationnelle ; solutions technologiques ; système ; gestion de la logistique verte.

## Introduction

The main cause of global warming is the greenhouse effect. The principle behind the greenhouse effect is the emission of carbon dioxide. This is brought on by the excessive use of fossil fuels and the loss of forest resources, mostly caused by global logistics and manufacturing operations. Numerous academics contend that it is not just the manufacturers, but also the actions of suppliers, distributors, and customers that contribute significantly to these environmental problems (Zhu & Sarkis, 2007; Rao, 2019). Going green can help companies improve their reputation, which will help them compete better. Without the use of sophisticated information technology systems, green practices cannot be applied successfully. Different technology solutions and tools have been developed to help adopt and ensure sustainable logistics practices. These systems include enterprise resource planning, radio frequency identification, warehouse management systems, transportation management systems, and electronic data interchange.

Using developed systems that ensure that resources are not wasted, clean fuels are used, and packages and products that can be recycled have the potential to improve the execution of green logistics activities. As a result, operational and reputational performance are enhanced. With the help of information technology, quality is maintained while using little resources, and trash is repurposed for other use, protecting the environment. As a result, sustainability is achieved, and competitive abilities are developed to improve performance.

The main purpose of this paper is to look into the relationships between information technology, green logistics management, and organizational performance. Once more, the paper examines how green logistics management affects organizational performance. The study answers the following questions: What relationships exist between information technology, organizational performance, and green logistics management?

Does green logistics management serve as an intermediary factor between information technology and organizational performance?

The methodology employed to investigate these significant correlations includes a meticulous collection and analysis of data gathered from various academic sources such as conference papers, peer-reviewed journals, and books.

The paper begins with an introduction, followed by a section covering a literature review, succeeded by the formulation of hypotheses and the presentation of the research framework. Finally, the paper concludes with recommendations.

## 1. Literature Review

### 1.1. Organizational Performance

Performance of a firm is one of the key indicators of how well a firm operates in a given environment. According to Daft (2000), organizational performance is characterized by the organization's capacity to achieve its objectives through the efficient and effective utilization of resources. Aligning with Daft's perspective, Richardo (2001) also articulated organizational performance as the organization's prowess in realizing its goals and objectives. Performance is a measure for assessing the degree of a corporation's objective attainment (Pandya Amit & Mavani Pratik, 2012). In management research, organizational performance has assumed a central role as the primary focus for scholars. As a result of changing business environments that are characterized by competition revolving around customers, resources, and capital, it has become imperative for organizations to gauge their performance meticulously. This practice is crucial for organizations to remain aligned with their objectives and steadfast in achieving and retaining a competitive advantage. Assessing performance is vital for practitioners examining the detailed actions of organizations and managers, that continuously benchmark themselves against competitors. Performance holds significant power in its ability to measure, making it a primary variable of interest. Despite the considerable focus on organizational performance, its definition remains inconsistent, posing an ongoing question with only a few researchers and scholars using similar definitions as well as measures (Kirby, 2005). Consequently, many researchers choose specialized metrics tailored to their fields when deciding how to measure performance (Chenhall & Langfield-Smith, 2007). As a result, organisational performance applications and measurements continue expanding, encompassing quantitative and qualitative measurement approaches. This underscores the idea that performance metrics hinge on an organization's specific goals and objectives.

### 1.2. Green Logistics Management

Green logistics management or eco-friendly logistics, focuses on reducing the ecological impact of logistics activities. It involves integrating environmentally friendly practices into transportation, warehousing, distribution, and other logistical processes. Green logistics aims to minimize negative externalities to establish a sustainable balance among environmental, economic, and social goals (Ballou, 1997); (Ping, 2009); (Seroka-Stolka, 2014). According to (Bai & Sarkis, 2010); (Sarkis, et al., 2011) green logistics practices encompass internal and external organizational activities that incorporate environmental considerations into the supply

chain. (Guirong, et al., 2010) Identified eight components of green logistics, including intensified resources, green storage, green transportation, green loading and unloading, green packaging, green information collection and management, green distribution processing, and waste recycling. In light of the intricate nature and growing demand for logistics activities in recent years, practitioners are increasingly focusing on its impact on environmental pollution, escalating resource and energy consumption. There is a heightened awareness of the need to manage logistics to ensure environmental and social sustainability while enhancing financial performance (Pagell, et al., 2010); (Bom, et al., 2019); (Beske, et al., 2014). Numerous green practices have been incorporated into logistics operations, including purchasing, product design, distribution, warehousing, transportation, and packaging, to enhance social and environmental sustainability (Khan, et al., 2020) and to leverage a competitive advantage to drive improved financial performance. (Engelage, et al., 2016) categorized 112 green logistic logistical practices from the existing literature. Among these, 85 were developed by private enterprises, 24 by governmental entities, and three by consumers. The researchers devised a taxonomy encompassing various environmental dimensions, integral to green logistics, to serve as a framework for classifying the identified practices. These dimensions include green transportation, green design, green packaging, green loading and unloading, green purchasing, green production, green storage, reverse logistics, and green marketing. Additionally, a general field was incorporated for green logistics practices classified simultaneously across multiple taxonomy components. (Dey, et al., 2011); (Lai, et al., 2012); (Dekker, et al., 2012), and (Marques & Grande, 2015), identify various strategies associated with comprehensive solutions. These encompass actionable steps that businesses can take to align with this concept, including but not limited to: minimizing carbon dioxide emissions, remanufacturing, encouraging reuse and recycling initiatives, implementing effective inventory control measures, prioritizing ecological purchasing practices, managing scrap, consolidating loads for optimized transportation, adopting environmentally friendly packaging solutions, improving and diversifying transportation methods, making informed choices regarding fuel and equipment, strategically planning transportation routes. These practices collectively form a framework for businesses aiming to integrate sustainability into their operations and contribute comprehensive solutions to environmental challenges.

### 1.3. Information Technology

Information Technology refers to the use of computer systems, networks, hardware, software, and other technology-driven tools to create, process, store, secure, retrieve, transmit, and manage data. It encompasses various technologies, applications, and methodologies that enable individuals and organizations to manipulate and utilize information effectively and efficiently. It encompasses the tools and processes that firms leverage to streamline planning, organizing, directing, and controlling their activities and processes, ultimately improving their overall performance. Turek (2013) defines it as the integrated systems enabling firms to manage logistics processes and activities like warehousing, transportation, and inventory, as well as manage manufacturing processes, suppliers, and customer relations. Without relying on advanced information technology, it would be impossible for companies to set up and effectively oversee their current complex global operations instantaneously.

## 2. Hypothesis development and research framework

In order to explain the variables, the study applies both the firm's natural resource-based view (NRBV) and the stakeholder theory. According to the firm's resource-based view (RBV), a firm is just a collection of specific assets combined into capabilities and integrated into organizational practices (Dierickx & Cool, 1989; Peteraf, 1993). Access to rare, priceless, difficult-to-imitate, and non-substitutable resources and competencies gives an organization a competitive advantage (Barney, 1991; Conner, 1991; Barney, 1996). The NRBV was developed by Hart (1995) by extending the RBV to consider the natural environment as a previously neglected but significant source of resources and capabilities. According to authors that support the stakeholder theory, stakeholders face external challenges as a result of firm's operations, and they frequently respond by putting pressure on the companies to mitigate the negative impacts (Delmas & Toffel, 2004); (Sarkis, et al., 2011). The development and reconfiguration of business capacities in response to stakeholder demand is a key factor in social legitimacy and firm performance (Chiu & Sharfman, 2011); (Parmigiani, et al., 2011). Freeman (1984) agrees that each business has several "stakeholders" interested in it. According to him, a stakeholder is any group or individual who may influence or is influenced by achieving the firm's objectives. Stakeholder theory is essentially about how a firm should run its business while considering the interests of its numerous stakeholders. Furthermore, the stakeholder theory has the strength of evaluating not just commercial elements or ethical concerns in isolation, but also provides a method of analyzing various aspects in a more holistic approach.

There are several types of stakeholders; according to Fassin (2009) there are three sorts of stakeholders: stakewatchers (pressure groups), stakekeepers (regulators), and stakeholders (interacting with the focus company). (Kirchoff, et al., 2011) distinguish between major stakeholders (for example, investors, consumers, and workers) and secondary stakeholders (for example, suppliers and regulatory authorities). (Freeman, et al., 2010), categorize stakeholders into primary and secondary groups. The primary stakeholders include financiers, communities, consumers, suppliers, and employees, while the secondary stakeholders include government, special interest groups, media, consumer advocate groups, and competitors.

### 2.1. Hypotheses Development

#### 2.1.1. Information Technology and Green Logistics Management

Going green in logistics entails managing logistical processes, including storage, shipping, handling of goods, sourcing, packaging, and inventory management to decrease waste, energy use, and the environmental effect of pollution. This demonstrates that a green supply chain management component includes green logistics management. According to Gonzalez-Benito (2006), green logistics methods, such as eco-friendly and returnable packaging, effective procedures, and CO2-efficient transportation, are used to minimize environmental impact. According to several academics (Gruchmann 2018; Diabat & Govindan 2011), green logistics management strategies include sustainable transportation, warehousing, packaging, reverse logistics, and purchasing. Information technology has served as the foundation for green logistics management. Innovative systems have been developed to oversee logistical processes, aiming to minimize environmental impact by reducing waste, producing sustainable products, implementing product recycling practices, and reducing energy consumption. Advanced technologies are employed to provide ecologically acceptable fuels for transportation, such as hydrogen, liquefied natural gas, and electricity (Najjar 2013). (Ahvenniemi, et al., 2017) and (Gruchman, 2018) propose in their studies that advancing green transportation technologies and systems like enterprise resource planning and electronic data interchange can aid businesses in managing waste disposal orders. This, in turn, leads to reduced energy consumption to ensure sustainability. This demonstrates how information technology affects the management of green logistics.

Therefore, we formulate hypothesis H1: Information Technology has a positive effect on green logistics management.

### 2.1.2. Information Technology and Organizational Performance

Information technology study has already been done, and the findings on how it affects organizational performance are varied. According to Cron & Sobol (1983), businesses that heavily rely on computers perform insignificantly. Information technology is a key factor influencing organizational effectiveness (Basheer, et al., 2019). Information technology capabilities significantly improve supply chain performance, claims Basheer (2019). (Basheer, et al., 2019) state that information technology reduces costs and increases operational agility. This further demonstrates the improvement in businesses overall performance. (Dehning, et al., 2005) show that information technology and market success are positively correlated.

Therefore, we conclude that H2: Information Technology positively influences the organization's performance.

### 2.1.3. Green Logistics Management and Organizational Performance

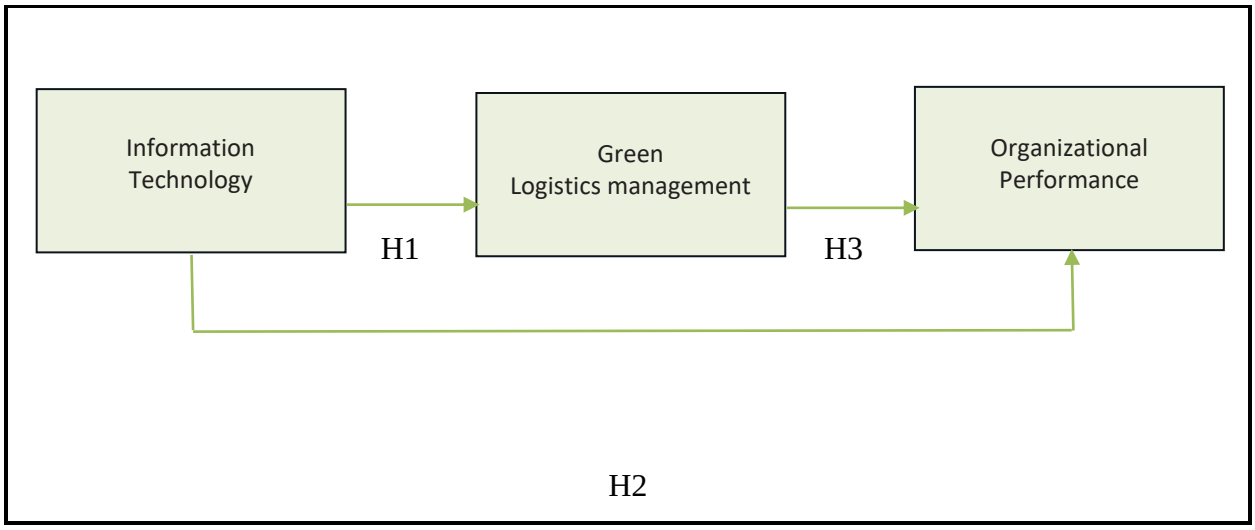
The environmental and reputational performance of a company is impacted by green logistics management. Implementing efficient resource utilization to minimize waste enables businesses employing green logistics practices to meet consumer quality expectations. Consequently, these businesses enhance their ability to develop low-cost competitive advantages, ultimately improving organizational performance. According to several academics, green logistics practices improve environmental performance (Rao & Holt, 2005); (Zhu,et al., 2013). Rao (2019) asserts that since customers are attracted by green initiatives, green sourcing is today a key factor in economic performance. Additionally, according to him, greening outbound logistics increases the possibility of attaining environmental and economic success. An organization's economic performance, in particular has a significant role in the adoption of green initiatives (Rao, 2002).

As a result, we formulate hypothesis H3: Green Logistics Management positively affects organizational performance.

## 2.2. Research Framework

The conceptual model illustrates the connections between exogenous and endogenous variables, with the arrows linking these constructs representing their interrelationships.

**Figure N°1: Research framework**




## Conclusion

In conclusion, integrating information technology into green logistics management emerges as a strategic imperative for organizations aiming to enhance their overall performance while concurrently addressing environmental concerns. The symbiotic relationship between information technology and green logistics fosters sustainability and efficiency throughout the supply chain.

By leveraging advanced information technology tools, organizations can optimize their logistical operations, reducing waste generation and energy consumption. The implementation of systems designed for green logistics facilitates the development and promotion of eco-friendly products, fostering a more environmentally responsible approach to production and distribution. Furthermore, adopting information technology in green logistics contributes to enhanced tracking and monitoring capabilities, allowing organizations to make data-driven decisions for continuous improvement.

The positive impact of green logistics on organizational performance extends beyond environmental responsibility; it also creates opportunities for cost savings, increased customer satisfaction, and improved brand reputation. Organizations that prioritize sustainable practices through the integration of information technology contribute to the planet's well-being and position themselves as leaders in socially responsible business practices. The synergy between information technology, green logistics management, and organizational performance is a

critical nexus that demands business attention in an era where environmental sustainability is a growing global concern. As we navigate the complexities of a rapidly changing business environment, it becomes evident that the responsible use of technology in logistics is not just a competitive advantage but a fundamental component of long-term success. By embracing green logistics and leveraging information technology, organizations can forge a path toward a more sustainable and prosperous future. Here are some suggestions to strengthen the alignment of information technology with green logistics management in order to improve overall organizational performance:

- Invest in integrated information technology solutions: Organizations should invest in comprehensive information technology solutions that seamlessly integrate with logistics processes. This integration allows for real-time data tracking, analysis, and decision-making, enabling proactive adjustments to optimize efficiency and reduce environmental impact.
- Adopt emerging technologies: Explore emerging technologies like internet of things, artificial intelligence, and blockchain to streamline logistics operations. These technologies offer enhanced visibility, predictive analytics, and transparency across the supply chain, aiding in efficient resource allocation and waste reduction.
- Employee training and engagement: Provide continuous training to employees on utilizing of information technology tools and systems implemented in green logistics. Foster a culture of sustainability and technological proficiency to ensure that these tools are utilized effectively throughout the organization.
- Renewable energy integration: Embrace IT solutions that promote the integration of renewable energy sources within logistics operations, such as electric or hybrid vehicles powered by renewable energy.
- Collaborate for Innovation: Foster collaboration with suppliers, partners, and industry peers to innovate sustainable logistics solutions. Joint initiatives can lead to shared resources, best practices, and technological advancements that benefit the entire supply chain while reducing environmental impact.
- Monitor and benchmark performance: Implement robust metrics and Key Performance Indicators to measure the impact of green logistics initiatives driven by information technology integration. Regularly monitor performance against benchmarks and adapt strategies to improve efficiency and sustainability continuously.

- Strategic government partnerships: Engage with governmental bodies and regulatory agencies to align with policies and initiatives promoting green practices. This collaboration can lead to incentives, subsidies, or supportive frameworks that encourage and facilitate the adoption of eco-friendly logistics technologies.

By implementing these recommendations, organizations can create a robust framework that leverages information technology to drive sustainable and efficient green logistics practices. This holistic approach benefits the environment and contributes to improved performance and resilience in a constantly evolving business ecosystem.

This theoretical research, synthesizing various theoretical frameworks and insights derived from an extensive literature review, has significantly contributed to the formulation of hypotheses and the development of a conceptual model. This model serves as a basis for potential empirical research initiatives.

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