RESEARCH ON GREEN LOGISTICS AND BUSINESS PROCESS MANAGEMENT IN THE CIRCULAR ECONOMY CONTEXT

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Abstract:

Purpose: The coordination between green logistics activities and efficient business processes management is an extremely urgent task for the sustainable development of the Vietnamese economy in general as well as the logistics industry particularly. The main aim of this research is to propose an integrated research framework for green logistics (GL) and business process management (BPM) in the context of circular economy (CE) for the Vietnam logistics industry.

Design/methodology/approach: Both qualitative and quantitative methods are used in two stages. A qualitative methodology is used in the first stage to develop a literature review on green logistics business processes and circular economics. In the second stage, the research proposes a conceptual framework of green logistics and business process management in the circular economy context. An evaluation indicator system is also developed based on the proposed framework, including three levels of circular economy and eight indicators of logistics activities that can be applied in the Vietnam industry. The quantitative method is used to evaluate the proposed framework by using the Analytical Hierarchy Process.

Findings: The research contribution is to produce a literacy on green logistics and business processes in the context of circular economy, and then propose a theoretical framework and its evaluation index system for green logistics development in Vietnam. Based on this framework, a future research agenda is outlined to evaluate green logistics practices in Vietnam.

Research limitations: Firstly, the study deals with data access problems primarily in SME case studies in Vietnam. Finally, since the scope of the study is focused on the logistics industry, there may be other Vietnam industry indicators in the Analytical Hierarchy Process (AHP) evaluation system that affect green activities that have been overlooked.

Social implications: The research framework benefits Vietnam's logistics enterprises that can predict future development trends to enable logistics stakeholders for understanding the status quo as well as improving the controlling's efficiency and effectiveness of government departments to reduce the gaps in developed countries. It also contributes to developing consuming behavior in the light of the circular economy context.

Keywords: Analytical Hierarchy Process, Business Process Management, Circular Economy, Green Logistics.

Introduction

Motivation

Vietnam opened its logistics market in 2014 according to its commitments with the World Trade Organization (WTO). The number of Vietnamese companies participating in the logistics industry has grown significantly, and the

professionalism of service providers is more demanding. According to estimates from the Vietnam Logistics Research and Development Institute (VLI), the market currently has more than 3000 companies operating in the logistics field in general and needs more than 200,000 employees by 2030. The ability, however, to meet the needs of the logistics workforce is only about 10% of the demand (Vietnam Logistics Research and Development Institute, 2019).

Speaking during the High-Level Dialogue of the Circular Economy in Emerging Markets Webinar, Minister of Natural Resources and Environment, Tran Hong Ha, said: "The economic transition towards a circular economy, a green economy, and a low-carbon economy is an inevitable trend of the times, with consensus globally and is considered by countries around the world as the green industrial revolution of the 21st century, aiming to develop sustainable development". The Vietnamese government is trying to minimize the impact of economic growth on environmental and social issues. Green and sustainable development strategies and models have begun to receive special attention.

The Vietnam Business Forum estimates that Vietnam's total logistics costs are approximately three times higher than those of the United States and Japan, ranging from 20.9% to 25% of GDP (Figure 1).

Figure 1.   Logistics Cost Comparison

Source: Logistics4VN (2015)

The Prime Minister of Vietnam has also approved the overall strategy for the development of Vietnam's service sector (Decision No. 175/QD/TTG), which makes logistics services a key factor in promoting the development of distribution systems for other services as well as for the circulation of goods and materials. The logistics market is estimated to grow 20-25% per year, and the proportion of outsourced logistics reaches 40%.

Therefore, for the sustainable development of Vietnam's industry in general, as well as the improvement of business processes in particular, green logistics activities are the key driving factors that must be considered. Thus, it can be affirmed that the motivation for the research is focused on interesting areas such as green logistics, business process management, and circular economy.

Problem statement

It can be affirmed that the Vietnam government has seen the role of sustainable and green development and has made efforts to establish general strategies and approaches. However, the policies and implementation mechanisms in Vietnam are not yet clear, and there are still many limitations in the implementation process. Currently, the Vietnam logistics industry is still using old and outdated technology that consumes a lot of energy, so it is a great challenge to use high-tech applications and modern business process management to adopt the context of the circular economy. Awareness and understanding of a circular economy in Vietnam are still a challenge, it is necessary to continue conducting research and spreading knowledge widely among policymakers, businessmen, and people. To implement Vietnamese logistics and business processes with a 'green and sustainable' mindset in the context of a circular economy, the following should be noted: (1) transformation of new technology and strengthens business process management; (2) construction of synchronous infrastructure; and (3) development of government policies, legal and standards, as well as an education and training plan to change thinking, behavior and operations of organizations in a green and sustainable mindset.

There is a need for a better understanding of the integrated framework of GL and BPM in the CE context, aiming to satisfy multiple objectives of society, economy, and environment. The study topic, namely, 'Research on green logistics and business process management in the context of the circular economy for the Vietnam logistics industry'. Based on this, the study has developed the following set of questions (RQs):

RQ1.   What GL, CE, and BPM are?

RQ2.   Why has green logistics become a mandatory trend in the world?

RQ3.   How to develop an integration of GL and BPM in the CE framework?

Research objectives

The main aim of the research is to propose an integrated framework for green logistics (GL) and business process management (BPM) in the context of a circular economy (CE).

In the light of a green and sustainable mindset applied to Vietnam's logistics sector, the research details the following objectives (ROs):

RO1. Develop literacy for GL, BPM, and CE.

RO2.   Propose an integrated research framework and an evaluation indicator system for GL & BPM in the CE context.

RO3.   Outlines future research agenda by using the AHP technique.

Literature review

Literature review process

To develop this section, some keywords are used such as 'CE', 'GL', 'BPM', 'sustainability + GL', 'AHP + GL', etc. Some of the Q1 or Q2 articles are downloaded from high-quality journals selected from Google Scholar and Web of Science, including Resources, Conservation & Recycling; Business: Theory and Practice; Annals of Operations Research; Journal of Business Research; International Journal of Organizational Analysis; and Journal of Cleaner production; etc.

The keyword search led to a set of 168 articles, after removing 103 articles due to title, language, duplicates, publication years, and considering on SJR of Q1 or Q2, 65 articles are selected and continued for abstract review, and acceptance of 24 articles is made, the cross-reference resources contributed more 05 articles. This research is referred to a total of 29 articles.

Related materials

Jouni Korhonen, Honkasalo, and Seppälä (2018) contributed to the scientific research on CE. Recently, the Ellen McArthur Foundation argued that CE as an industrial ecosystem to utilize production-consumption systems based on the principles of reduce-reuse-recycle (3Rs) to balance the three pillars of sustainability such as economic, social and environmental perspectives. (Macarthur, 2020; Patwa *et al.*, 2021). That same year, Piero Morseletto (2020) developed a 10R framework to elaborate on the selected circular economy targets. One year later, Nitin Patwa *et al.* (2021) investigated the adoption of CE principles among emerging economies in three aspects such as enterprise, consumer, and government in line with CE principles.

There are many studies on the relationship between BPM, CE, GL, and sustainability (Chen, Jiang, and Wang, 2011; Nowak, Leymann, and Schumm, 2011; Moreno *et al.*, 2016; Geissdoerfer *et al.*, 2017; Karaman, Kilic, and Uyar, 2020; Islam *et al.*, 2021), such as Abdullah S. Karaman *et al.* (2020) proved the closed relationships between green logistics performance with the number of sustainability reports within logistics field. Geissdoerfer *et al.* (2017) provided the relationships of circular economy and sustainability by synthesizing the similarities, differences, and relationships between them. In addition, Oksana Seroka-Stolka and Agnieszka Ociepa-Kubicka (2019) examined the concept and relationship of green logistics in

a circular economy system. Nowak *et al.* (2011) investigated and identified the differences in green BPM compared to conventional BPM. Some years later, David Tucek (2015) described the main reasons for BPM implementation in Czech companies. Chen *et al.* (2011) analyzed the business process functions of green logistics. While Pravin Kumar *et al.* (2021), through reviews of the literature and expert opinion, identified key criteria and barriers that have been solved to meet sustainable goals. It develops an integrated strategy that promotes sustainable practices through circular economics and industry 4.0 applications.

Related methods

The next discussion will focus on the development of mathematical models and techniques for the challenges in logistics operations, especially the focus on high-tech applications for GL, BPM, and CE. Mathematical programming and heuristic approaches using multiobjective optimization were proposed to deal with GL, BPM problems in the CE context. For example, Alperen Bal & Badurdeen (2020) presented an MCDM facility location to achieve efficiency by implementing CE. The Internet of Things (IoT) and blockchain technologies are widely applied by many researchers (Lopes de Sousa Jabbour *et al.*, 2018; Jabbour *et al.*, 2019; Dubey *et al.*, 2019; Manavalan and Jayakrishna, 2019; Saberi *et al.*, 2019; Bag and Pretorius, 2020; Kouhizadeh, Zhu, and Sarkis, 2020; Tan *et al.*, 2020; Kumar, Singh, and Kumar, 2021), such as Mahtab Kouhizadeh et al., (2020) examined the transformation and realization of a circular economy using blockchain technology. In addition, Alkahtani *et al.* (2018) proved that energy exhaustion minimization reduces environmental impact by adopting high-tech applications in the logistics industry for green operations and living. Nowak *et al.* (2011) proposed using a set of green business process patterns for describing appropriate solutions for the ecological optimization of business processes. In recent years, Yao *et al.* (2020) used a popular machine learning method, namely, FunHDDC, to evaluate the green efficiency of the logistics industry.

The AHP technique is also widely used. For example, Syed Abdul Rehman Khan and Yu Zhang (2021) used the theory of the analytical hierarchy process and comprehensive fuzzy evaluation to construct, quantify and evaluate the development of China's regional green logistics. While Chonmapat Torasa and Witthaya Mekhum (2020) examined the impact of green logistics activities on the circular economy indicators of ASEAN.

Research Methodology

Modern logistics management is the integration of scattered global resources to meet the expanding consumer market and sustainability requirements. The latest trends in logistics operations focus on green and sustainable thinking using

technology-based and IT-based management to minimize environmental impact and optimize operations. A green and sustainable logistics perspective becomes essential for business processes, such as green sourcing of quality raw materials; efficient and green production processing; and effective reverse logistics of reducing, reusing, and recovering cycles. Green logistics is a key factor in the sustainable development of the global economy and the circulation of material flows, namely the adoption of the circular economy.

The research methodology uses both qualitative and quantitative methods in two stages, in which a qualitative methodology is used in the first stage producing a literature review on GL, BPM, and CE models. In the second stage of the research, a conceptual framework is proposed that can be applied in the Vietnam logistics industry. Then an evaluation indicator system is also developed using the AHP technique. A future research agenda is outlined. Quantitative methods are used in future work to quantify and evaluate Vietnam's integration of GL and BPM in the CE context. Data collection for evaluation focuses on surveys, questionnaires, observations, and interviews.

Business process

BPM is defined as the methodology for the evaluation, analysis and improvement of the efficiency and effectiveness of key business processes within an enterprise. The role of researchers or businessmen is to choose what are their key business processes and then to visualize them to easily control and measure the business performance. As can be seen in Figure 1, the research assumes a business process with an upstream stakeholder, namely the marketer and the sellers, and its downstream stakeholders can be defined as customers. Therefore, there are two key business processes:

1. Making or buying
2. Distribution.

Green logistics process

After receiving a purchase order, the sellers will arrange third-party logistics (3PL) to deliver goods to customers. The process includes some forward stakeholders, namely suppliers, distribution centers, retailers; and reverse stakeholders, such as collectors. In the forward and reverse logistics process, stakeholders need to collaborate and coordinate together to optimize their activities and operations and to realize green logistics in the CE context.

As in Figure 1, the key green logistics activities in the integrated framework include eight activities:

1. Green information (green IT)

2. Green procurement
3. Green manufacturing
4. Green transportation
5. Green packaging
6. Green storage
7. Green consumption
8. Reverse logistics (the 5Rs)
    a. Repair
    b. Reuse
    c. Remanufacturing
    d. Recycling
    e. Residual waste and renewable resources.

Circular economy capabilities

As in the discussion in previous sections, the research focuses on three aspects in a circular economy context that influence Vietnam's logistics industry and business process:

1. Government aspects: policies, legal, and standards.
2. Enterprise aspects: business process and green logistics model.
3. Customer & Society aspects: training & behavior factors.

It is desired that the result of the research be outlined in the next section.

Research Results

Proposed research framework

In summary, from the investigation of the literature review and the research methodology, a research framework is proposed. The proposed framework integrates at least two key business processes into eight green logistics operations in the light of the CE context of three aspects including government, enterprise and customers that impact the Vietnam logistics industry along with the mindset of green and sustainable development.

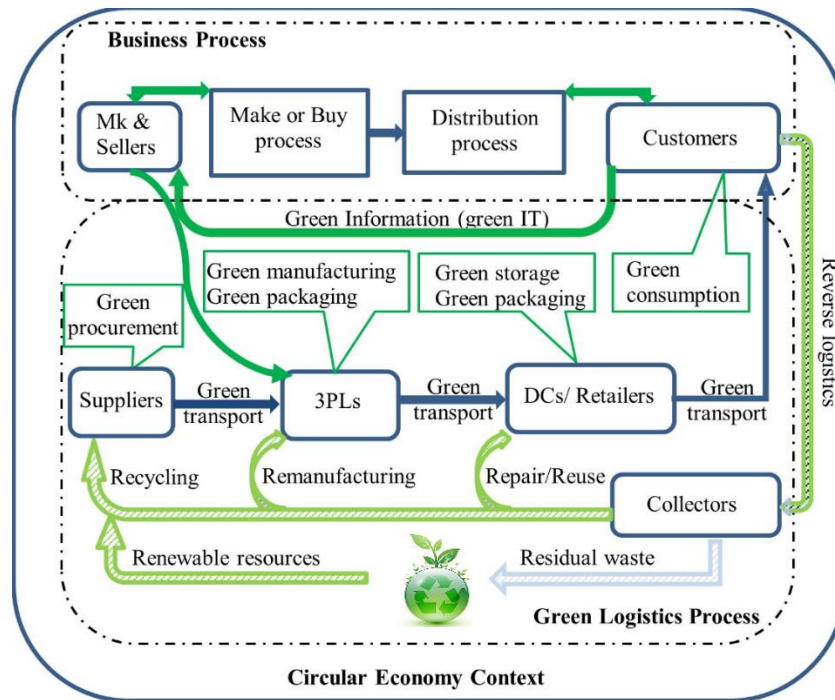The integrated research framework is described in Figure 2.

Figure 2. The integrated research framework of GL & BPM in the CE context

Source: own research

Evaluation system for the proposed framework

The evaluation activity is a goal-driven activity based on the AHP technique developed by Thomas L. Saaty (1980). It uses pairwise comparisons, computes the weighting factors, and makes evaluations. The research also suggests an evaluation matrix that uses the above framework.

The overall level describes the integration framework of GL and BPM in the CE model. The middle level of the hierarchy describes three aspects from the government, enterprise, and customer levels. The low level of the decision hierarchy shows the indicator systems. The proposed indicator systems improve the overall greenness of logistics and BPM integration in the context of CE.

The indicator systems at the low level in the hierarchy were formed from three middle levels in which the enterprise level includes green manufacturing; green procurement; green packaging; green storage, and reverse logistics. The customer level represents green consumption. And the government level represents the green policies and logistics infrastructure, including green transportation and green IT.

The evaluation results will be presented in future research to identify potential green logistics activities and improve them in the CE context to improve the Vietnam logistics industry and the Vietnam economy in general (Figure 3).
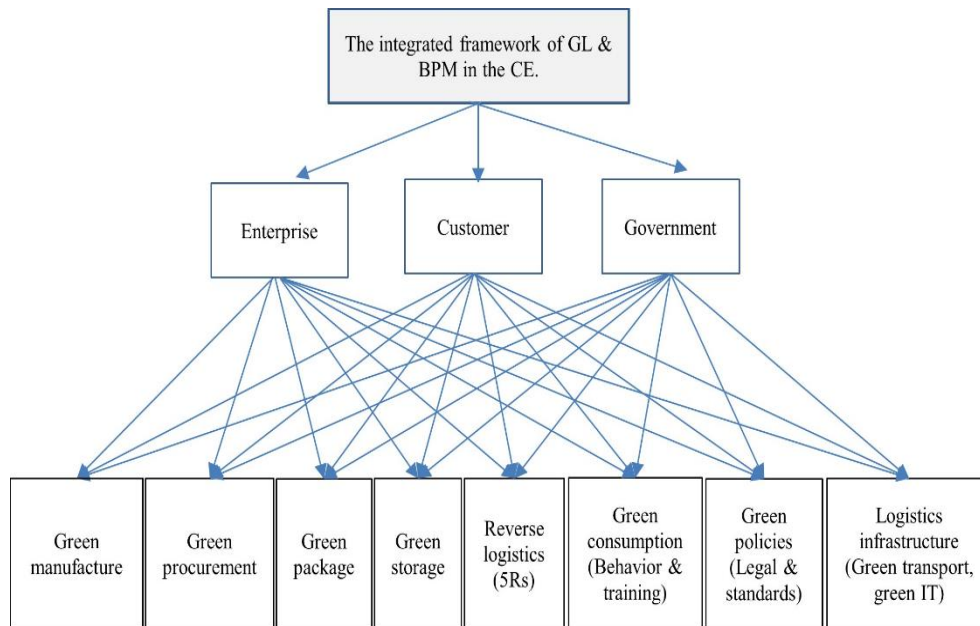
Figure 3.   The evaluation index system for the proposed framework

Source: own research

Discussion

Theoretical implications

The contribution of the research is to propose a theoretical framework of GL & BPM in the context of CE that adopts the Vietnam logistics industry (Fig. 2). Based on this proposed framework, it extends a future research agenda for evaluation by using the AHP technique (Fig. 3).

Practical implications

The research framework benefits Vietnam's logistics enterprise that can predict future development trends to allow relevant stakeholders to grasp the status quo as well as improve the efficiency and effectiveness of government departments to reduce gaps in developed countries. It also contributes to developing consuming behavior in the light of the CE context.

Limitations

Firstly, the study is coped with problems in data accessing of SME case studies in Vietnam. Finally, since the scope of the study is focused on the logistics industry, there may be other indicators of the Vietnam industry that may affect green activities that have been overlooked.

Conclusions

This study produces a literature review and proposes an integrated research framework of GL & BPM in the CE context. This proposed framework is also investigated at the hierarchy level with three main factors, including government, enterprise, and customer level. It also elaborates on the eight-indicators evaluation system, which includes green manufacturing, green procurement, green packaging, green storage, reverse logistics, logistics infrastructure, green consumption, and green policies.

As a result, a future research agenda is also proposed to use the AHP technique to evaluate the integrated research framework in the light of CE capabilities that impact the Vietnam logistics industry along with the mindset of green and sustainable development.

Therefore, the assessment of the management of the green logistics business process based on the circular economy context can be adopted in Vietnam. The Analytical Hierarchy Process is used. Quantitative analysis of the evaluation indicator system for the development of green logistics will help all sectors to have a comprehensive understanding of green logistics activities and thus promote the efficiency and effectiveness of green logistics in Vietnam.

Acknowledgment

References

1. Alkahtani, M. S. *et al.* (2018) 'Trends in Industrial Engineering and the Saudi Vision 2030', *IISE Annual Conference and Expo 2018* (May), pp. 1783–1788.
2. Bag, S. and Pretorius, J. H. C. (2020) 'Relationships between industry 4.0, sustainable manufacturing and circular economy: proposal of a research framework', *International Journal of Organizational Analysis*. doi: 10.1108/IJOA-04-2020-2120.
3. Chen, X., Jiang, L., and Wang, C. (2011) 'Business process analysis and implementation strategies of greening logistics in appliances retail industry', *Energy Procedia*, 5, pp. 332–336. doi: 10.1016/j.egypro.2011.03.056.
4. Cherenkov, V. I. *et al.* (2020) 'A conceptual framework of logistics infrastructure for implementing the circular economy model in the Russian Arctic', *IOP Conference Series: Earth and Environmental Science*, 539(1). doi: 10.1088/1755-1315/539/1/012077.
5. Dubey, R. *et al.* (2019) 'Big Data and Predictive Analytics and Manufacturing Performance: Integrating Institutional Theory, Resource-Based View and Big Data Culture', *British Journal of Management*, 30(2), pp. 341–361. doi: 10.1111/1467-8551.12355.
6. Geissdoerfer, M. *et al.* (2017) 'The Circular Economy – A new sustainability paradigm?', *Journal of Cleaner Production*, 143, pp. 757–768. doi: 10.1016/j.jclepro.2016.12.048.

7. Islam, M. S. *et al.* (2021) 'A literature review on environmental concerns in logistics: trends and future challenges', *International Journal of Logistics Research and Applications*, 24(2), pp. 126–151. doi: 10.1080/13675567.2020.1732313.

8. Jabbour, C. J. C. *et al.* (2019) 'Unlocking the circular economy through new business models based on large-scale data: An integrative framework and research agenda', *Technological Forecasting and Social Change*, 144(June), pp. 546–552. doi: 10.1016/j.techfore.2017.09.010.

9. Karaman, A. S., Kilic, M., and Uyar, A. (2020) 'Green logistics performance and sustainability reporting practices in the logistics sector: The moderating effect of corporate governance', *Journal of Cleaner Production*, 258, p. 120718. doi: 10.1016/j.jclepro.2020.120718.

10. Khan, S. A. R. and Zhang, Y. (2021) 'Development of Green Logistics and Circular Economy Theory', 516(Iserss 2020), pp. 121–127. doi: 10.2991/assehr.k.210120.024.

11. Korhonen, J., Honkasalo, A., and Seppälä, J. (2018) 'Circular Economy: The Concept and its Limitations', *Ecological Economics*, 143, pp. 37–46. doi: 10.1016/j.ecolecon.2017.06.041.

12. Kouhizadeh, M., Zhu, Q. and Sarkis, J. (2020) 'Blockchain and the circular economy: potential tensions and critical reflections from practice', *Production Planning and Control*, 31(11–12), pp. 950–966. doi: 10.1080/09537287.2019.1695925.

13. Kumar, P., Singh, R. K. and Kumar, V. (2021) 'Managing supply chains for sustainable operations in the era of industry 4.0 and circular economy: Analysis of barriers', *Resources, Conservation and Recycling*, 164(October 2020), p. 105215. doi: 10.1016/j.resconrec.2020.105215.

14. Logistics4VN. (2015). Chi Phí Logistics Của Việt Nam Chưa Thể Giảm Ngay? Retrieved from https://logistics4vn.com/chi-phi-logistics-cua-viet-nam-chua-giam-ngay

15. Lopes de Sousa Jabbour, A. B. et al. (2018) 'Industry 4.0 and the circular economy: a proposed research agenda and original roadmap for sustainable operations', *Annals of Operations Research*, 270(1–2), pp. 273–286. doi: 10.1007/s10479-018-2772-8.

16. Macarthur, E. (2020) 'Towards the circular economy - Economic and Business Rationale for an Accelerated transition', *Ellen Macarthur foundation rethink the future*, p. 100.

17. Manavalan E. and Jayakrishna K. (2019) 'A review of Internet of Things (IoT) embedded sustainable supply chain for industry 4.0 requirements', *Computers and Industrial Engineering*, 127, pp. 925–953. doi: 10.1016/j.cie.2018.11.030.

18. Moreno, M. *et al.* (2016) 'A conceptual framework for circular design', *Sustainability (Switzerland)*, 8(9). doi: 10.3390/su8090937.

19. Morseletto, P. (2020) 'Targets for a circular economy', *Resources, Conservation and Recycling*, 153(October 2018), p. 104553. doi: 10.1016/j.resconrec.2019.104553.

20. Nowak, A. *et al.* (2011) 'Green business process patterns', *ACM International Conference Proceeding Series*. doi: 10.1145/2578903.2579144.

21. Nowak, A., Leymann, F., and Schumm, D. (2011) 'The Differences and Commonalities between Green and Conventional Business Process Management Institute of Architecture of Application Systems', *Institute of Architecture of Application Systems*.

22. Nwaiwu, F. *et al.* (2020) 'Industry 4.0 concepts within the Czech SME manufacturing sector: An empirical assessment of critical success factors', *Business: Theory and Practice*, 21(1), pp. 58–70. doi: 10.3846/btp.2020.10712.

23. Patwa, N. *et al.* (2021) 'Towards a circular economy: An emerging economies context', *Journal of Business Research*, 122(May), pp. 725–735. doi: 10.1016/j.jbusres.2020.05.015.

24. Saberi, S. *et al.* (2019) 'Blockchain technology and its relationship to sustainable supply chain management', *International Journal of Production Research*, 57(7), pp. 2117–2135. doi: 10.1080/00207543.2018.1533261.

25. Seroka-Stolka O. and Ociepa-Kubicka A. (2019) 'Green logistics and circular economy', *Transportation Research Procedia*, 39(2018), pp. 471–479. doi: 10.1016/j.trpro.2019.06.049.

26. Tan, B. Q. *et al.* (2020) 'A blockchain-based framework for green logistics in supply chains', *Sustainability (Switzerland)*, 12(11). doi: 10.3390/su12114656.

27. Torasa C. and Mekhum, W. (2020) 'Impact of green logistics activities on circular economy: Panel data evidence from ASEAN', *International Journal of Supply Chain Management*, 9(1), pp. 239–245.

28. Tucek, D. (2015) 'The Main Reasons for Implementing BPM in Czech Companies', *Journal of Competitiveness*, 7(3), pp. 126–142. doi: 10.7441/joc.2015.03.09.

29. Vietnam Logistics Research and Development Institute. (2019). Logistics 2019-2020. Retrieved from https://vli.edu.vn/495-2/

30. Yadav, G. et al. (2020) 'A framework to overcome sustainable supply chain challenges through solution measures of industry 4.0 and circular economy: An automotive case', *Journal of Cleaner Production*, 254, p. 120112. doi: 10.1016/j.jclepro.2020.120112.

31. Yao, X. *et al.* (2020) 'Green efficiency performance analysis of the logistics industry in China: based on a kind of machine learning methods', *Annals of Operations Research*, (0123456789). doi: 10.1007/s10479-020-03763-w.