European Journal of Logistics, Purchasing and Supply Chain Management
Vol.7 No.4, pp.35-49, December 2019
Published by ***ECRTD UK***
ISSN 2054-0930 (Print), ISSN 2054-0949 (Online)

EMERGING ISSUES OF GREEN LOGISTICS IN MANUFACTURING FIRMS OF CHINA: A LITERATURE REVIEW

Lu Zhang[1*], Jemimah Maina[2]

[1] Viry-Chatillon, France

[2] School of Business and Economics, Kirinyaga University, Kenya

*Correspondence Email: B4044399@outlook.com

ABSTRACT: *With the world's largest population and increased rate of growth, China's economy is faced with a big concern of moving towards more sustainable development initiatives. This paper aimed to evaluate the emerging issues of green logistics in Chinese manufacturing firms. This research used content analysis to review literature from recent journals, magazines and newspapers to draw out secondary data that helped to analyse the drivers of green logistics practices and the challenges faced by Chinese manufacturing firms in implementing them. Material collection, descriptive analysis, category selection and material evaluation steps were used when conducting the analysis. The emerging issues of green logistics in Chinese manufacturing firms were found to be driven by regulatory measures, pressures arising from customers and competitors, and social cultural responsibility. Key barriers to green logistics implementation by these firms were associated with technical factors, organization factors, and financial and human resource constraints. A great deal of potential for green logistics studies is present in China and a proper research funding and infrastructure will aid in the sustainability agenda of this economy. For the Chinese manufacturing companies to cope up with the environmental crises, they need to consider environmental protection issues and integrate these with their operational decisions to create sustainability in their organizations. More co-operations in these firms is also needed with better top managerial support to govern employee's green behaviour and avail technical resources and learning capabilities within the industry. Although few researchers have studied Green Supply Chain Management in China, this paper is unique in that it evaluates emerging issues of Green Logistics in Chinese Manufacturing firms using a literature review approach.*

KEYWORDS: Chinese manufacturing firms, green logistics, green supply chain management, literature review, environment.

INTRODUCTION

A literature review by Zheng & Yu (2015) introduces that Green logistics which was first introduced in the 1990s has no unified definition in the circle of academia. They however expound that it's built on sustainable development and it ensures that logistics transportation and distribution systems are efficient and coordinates with developing the environment. Alternatively, Hsu, Tan,

Zailani, & Jayaraman (2013) argue that there has been a rise in a concern about sustainability, global warming and the environmental impact on packaging of products by customers and environmental groups in the market place. This has triggered a realization to organizations that there exists a massive and rapid environmental risk in their entire SC. According to Sarkis, Zhu, & Lai (2011) non-profit organizations, government agencies and stakeholders are raising pressures to firms to solve the impacts of their operations on the environment as the effects of business operations and competition becomes more evident and problematic globally (Jakhar, 2014). As a counter measure, there has been a goal to balance efforts for cost reduction while maintaining good environmental performance and this has led to the emergence of Green supply chain management (GSCM) approach for balancing these competitive requirements by managers (Raman, 2013).

Green Supply Chain Management (GSCM) has been defined as the different environmental initiatives including green purchasing, eco-design and outbound logistics that aim at reducing or eliminating the hostile impacts of logistics activities through the involvement of vendors and suppliers, contractors and distributors and consumers (Vachon & Klassen, 2006). A literature by Cosimato & Troisi (2015) also define green logistics as an environmental responsible system which not only include processes of raw material acquisition, production, packaging, storage and transportation of end products to the end users and but also take account of reverse logistics which involve recycling of the disposed waste. Seuring (2004) considers that GSCM and green logistics efforts have made organizations to contemplate on closing their SC loops by designing recoverable products and materials to create an environmentally conscious manufacturing and logistics industry.

Moreover, Battini, Bogataj, & Choudhary (2017) expands that Closed-Loop Supply Chains (CLSC) help manufacturing companies and retailers to manage their end of life products through recovering and remanufacturing, disassembly and part reusing them, with an aim of capturing the product value being consumed by the end customer to minimize the environmental impact on the entire SC. This means that managers are faced with a great task of dealing with the increased complexities inherent in CLSC which include managing of inventories, flow of returns and transportation, expected rate of service level planning and coordinating the whole network. Das & Dutta (2013) however exclaim that even though CLSC present significant environmental contributions, managers should consider the regulatory, competitive and economic pressures as they play important roles in its implementation across industries.

According to Christmann & Taylor (2001) globalization has enabled organizations in developing countries to embrace the most desirable policies and guidelines pertaining to the environment from their clients and rivals in developed nations. This has been done through adoption of externally-oriented approaches like product stewardships, and CLSC aimed at extending their green SC initiatives beyond the boundaries of their organizations to reduce causes of waste and pollution all the way through the SC (Basiri, Shemshadi, & Tarokh, 2011). China is a developing economy and under pressures from markets and regulatory bodies, Chinese manufacturers have realized the need to improve their environmental image (Zhu, Sarkis, & Geng, 2005). This should do with the fact that China is increasingly becoming an industrialized nation and as part of SCs, developed nations have used China as a point of end of life products disposal. Great environmental burden has been

imposed to this country as there are limited infrastructure and tools available to deal with these end-of-life products.

Based on a review by Zheng & Yu (2015) the Chinese government have stipulated stricter environmental regulations due to scarcity of resources and the increased pressure of "green barriers" to trade. The main measures the government is promoting is the impact assessment of the environment, ISO 14001 certification and recently GSCM. Zhu, Sarkis, Cordeiro, & Lai (2008) illustrate that since China joined WTO in 2001, its economy has grown progressively but this opportunity has availed significant challenges to Chinese enterprises of becoming green to increase their international competitiveness. For instance, IBM and Xerox encouraged their Chinese suppliers to comply with ISO 14001 environmental standards while Ford, GM and Toyota required their Chinese suppliers to be ISO 14001 certified. Likewise, the introduction of the Waste Electrical and Electronic Equipment Regulation in the EU (WEEE) in China has not only created worry in the regulatory environment of overseas customers by Chinese manufacturers but has also enabled the same concerns to suppliers of these manufacturers when conducting business in China. All these have been geared towards improvement of organizational efforts towards recovery of products.

Zheng & Yu (2015) argues that green logistics concept is not popular in China as there are no legal systems to guarantee its development, no vast measures have been made to enhance logistics development which is still backward and there are less logistics management staff within the industry to promote these developments. This means that a logistics development plan should be formulated in China that will ensure that large logistics centres co-operate with regional DCs which will enable quick transfer of information and improve the quality of the products and services rendered. In addition to that, the right tools and infrastructure should be availed, more professionals hired and talents trained, and this calls for better operation management strategies by the logistics enterprises.

Thiell & Zuluaga (2013) believe that the contents of green logistics include green transportation, green warehousing and green value added services. Green transportation involve the use of clean vehicles, reduction of CO2 emissions, sustainable selection of carriers, and optimization & consolidation of freight. Green warehousing on the other hand accounts for the use of clean MHEs, reusing containers & pallets, proper design of the facilities and on-site recycing. Alternatively, Green value added services includes green packaging, and pooling of pallets & containers. The implementation of green logistics leads to better satisfaction of customers, improves stakeholders relations, improve the financial performance of enterprises, creates a good image of the company, reduces social costs in terms of health problems due to minimal environmental impacts and leads to better utilization of resources through the use of green packaging (Kumar & Malegeant, 2016).

The literature presented on green logistics in China is rich. An article by Lin & Ho (2011) stipulate that inspite of the rapid growth of the logistics value which is approximately 26.2% year-on-year, several negative impacts on the environment such as air pollutants, disposal of waste and fuel consumptions have impeded growth in the sector. In their analysis of 322 samples from a survey of 'the factors influencing the adoption of green practices in Chinese logistics industry,' they found out that pressures from regulatory bodies, government and environment support, and human

resource quality have a positive influence on green logistics adoption while uncertainities of the enviroment posed a negative impact on implementation of green logistics in China. Zhang, Thompson, Bao, & Jiang (2014) developed a research framework that revealed the driving factors of green logistics practices in the truck fleet companies to be green storage and packaging, green transportation, fleet management and logistics innovation.

Miao, Cai, & Xu (2012) after exploring the antecedents logistics social responsibility of Chinese firms found out that business ethics, clan culture, and stakeholders pressures influence policy and managerial decisions in LSR. Kong, Feng, Zhou, & Xue (2016) studied the adoption of green technologies in manufacturing firms in China and they concluded that manufacturers awareness and considerations of energy efficient technologies aided manufacturing companies in their decision making processes of becoming green. Additionally, Lai & Wong (2012) found out that green logistics management affects both the performance of the environment and operations positively in their study of manufacturing exporters in China. Although most authors have focused on green logistics in China, their studies have leaned towards the organizational and environmental aspect of the green practices, with a major focus on logistics and transportation companies. This paper therefore aimed to consider the emerging issues of green logistics with a focus on manufacturing firms.

Due to increased globalizations, organizations and customers are gaining increased awareness of green practices and this has led firms to adopt green strategies to remain competitive. The field of green logistics is still young and has not been fully implemented in emerging markets like China. The study findings will provide managerial and theoretical insights for the manufacturing firms in China focusing on operations through transfer of knowledge and inter-organizational learning to improve their adoption of green logistics practices. Additionally, the Chinese government will get some policy implications from the findings of this study in supporting green logistics practices for the manufacturing and other different industries.

Most importantly, the findings of this study will not only stand as a benchmark for emerging markets in developing countries who wish to emulate green logistics practices but will also be useful for developed nations who wish to invest in China especially in the manufacturing sector as examined in this study. This paper also serves as a useful reference for green logistics researchers and other fields of operations who intend to advance in building and applying this theory. This research sought to answer the following questions. What are the drivers of green logistics practices for Chinese manufacturing firms? What challenges do Chinese manufacturing firms experience when implementing green logistics practices?

LITERATURE REVIEW

Green Logistics and Maturity Models

Green logistics has been defined as a form of logistics responsible for planning and implementing green transport, storage, packaging and product recovery using advanced logistics technology with a purpose of minimizing pollution on the environment in order to create a win-win scenario in developing logistics and conserving the eco-environment (Zhang, Lee, Chan, Choy, & Wu, 2015).

Reverse logistics is a typical field in green logistics where used products goes back to the manufacturer (reverse flow) with an aim of recovering items by reusing or remanufacturing them to avoid environmental waste (Li, 2014).

A study by Llgin & Gupta (2010) present the recent trends in environmentally conscious manufacturing and Product Recovery (ECMPRO) using reverse logistics, disassembly, and product design operations. They concluded that there is a need for organizations to train their employees on environmental regulations and environmental aspects of manufacturing so as to increase the competitive advantange of the organization. Ye, Zhao, Prahinski, & Li (2013) however found out that product recovery positively affected the economic and environmental performance on a firm but product returns affect the economic performance of a firm negatively but has no effect on the performance of the environment. This study involved a survey of 209 Chinese manufacturing firms in an aim of investigating the impact of instituional pressures on top managers in implementing reverse logistics strategies. This paper evaluated the pick up delivery options that manufacturing firms can endorse so as to reduce the environmental impact on reverse logistics in the Chinese context.

Reefke, Ahmed, & Sundaram (2014) support that sustainable SCs involve making decisions at all levels from operational to strategic levels. This forms a cycle of sustainable decisions overtime as illustrated in *Figure 1* below.

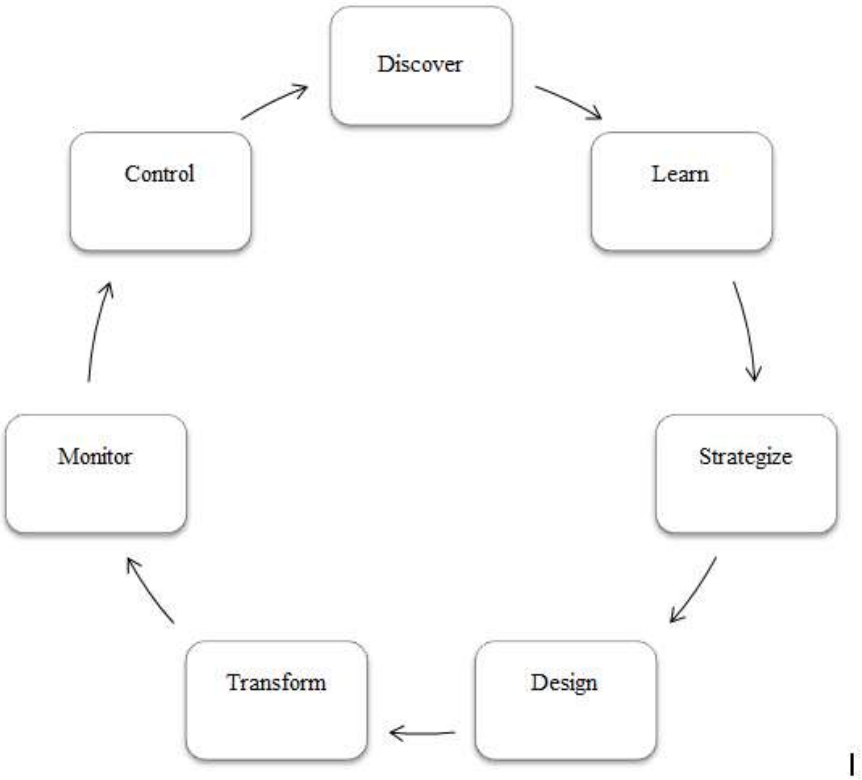

Figure 1 SSCs Decision Making Cycle (Reefke, Ahmed, & Sundaram, 2014)

The process involve discovering the areas of sustainability, Learning win-win practices of sustainability, Strategizing which include introducing and implementing practices of sustainability, Designing people, processes and systems to make them more sustainable, Transformation which involve implementing the SSC design, Monitoring information and assessing sustainable practices and finally Control that involve coming up with proactive and corrective measures that help govern sustainability of logistics and SC processes. This decision-making cycle leads to a maturity model for sustainability as illustrated in Figure 2 below. Once employed by the Chinese manufacturing companies, their operations will be more sustainable.

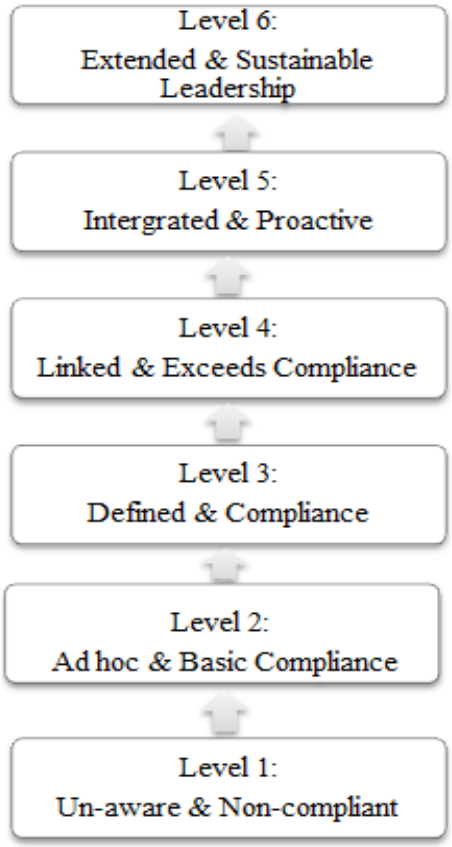

Figure 2 SSCs Maturity Models (Reefke, Ahmed, & Sundaram, 2014)

The above maturity model suggests that supply chains can become more mature and sustainable by continuously developing their operations and interactions. At maturity level 1, creating awareness in sustainability enables organizations to comply with sustainability rules and requirements set by the government and other corporate agencies. Level 2 is aimed at providing consistency and ensuring basic compliance of the set sustainability rules. This is furthered up by level 3 which include setting up the sustainability rules to be part of the strategic goals and vision of the organization. Level 4 involves setting up a system dynamics approach where KPI's are set up as a means of measuring sustainability performance. When the system further support proactive

measurement of the predefined KPI's through benchmarking them with the best practices of organizations within the same industry, maturity level 5 is attained. Maturity level 6 is attained when the whole system supports continuous operations and innovations of the entire SC process which is geared towards sustainability leadership (Reefke, Ahmed, & Sundaram, 2014).

RESEARCH METHODOLOGY

This research used content analysis to review literature from recent journals, magazines and newspapers to draw out secondary data that helped to analyse the drivers of green logistics practices and the challenges faced by Chinese manufacturing firms in implementing them. Walliman (2011) maintains that content analysis, whose roots are in quantitative research, produces categories and specific rules of quantitative data accounts. He insists that objectivity and systematic description is needed in analysing the content. Additionally, content analysis is useful in identifying key ideas and unveiling new trends (Schreier, 2012). Material collection, descriptive analysis, category selection and material evaluation steps as suggested by (Seuring, Gold, & Beske, 2010) were used to conduct content analysis for this research so as to ensure reliability. After using key words of 'Green Logistics" "Practices" "Drivers" "Issues" "Trends" "Challenges" and screening to find only peer-reviewed journals in China, thirty journals were found which were all reviewed to draw viable conclusions of the objectives under study.

RESULTS AND FINDINGS

4.1 The Drivers of Green Logistics for Manufacturing Industries in China.

After reviewing literature on Green Logistics in China from thirty journals, the author summarized the drivers of green logistics in the following Table 1.

Table 1 Drivers of Green Logistics in Chinese Manufacturing Firms

Drivers	**References**
Regulatory Measures	(Zheng & Yu, 2015); (Zhu, Sarkis, & Geng, 2005); (Zhang, Thompson, Bao, & Jiang, 2014); (Hsu, Tan, Zailani, & Jayaraman, 2013); (Kong, Feng, Zhou, & Xue, 2016); (Lai & Wong, 2012); (Lin & Ho, 2011); (Zhang, Peng, Ma, & Shen, 2017); (Zhang, Wang, & Da, 2014); (Wu, Song, & Yang, 2015).
Competitors Pressures	(Zhu, Sarkis, Cordeiro, & Lai, 2008); (Tian, Chang, Tanikawa, Shi, & Imura, 2013); (Cai & Zhou, 2014); (Branzei, Ursacki-Bryant, Vertinksy, & Zhang, 2004); (Mallidis, Dekker, & Vlachos, 2010).

Customer Pressures	(Zhao, Yin, & Zhao, 2015); (Wang, Wei, & Huang, 2016); (Cai & Zhou, 2014); (Christmann & Taylor, 2001); (Chan & Lau, 2001); (Lo & Leung, 2000).
Social-Cultural Responsibility	(Wu & Zhou, 2015); (Zhang & Da, 2015); (Tian, Chang, Tanikawa, Shi, & Imura, 2013); (Zhang & Hao, 2015); (Zhu & Sarkis, 2004); (Ploberger, 2011)

DISCUSSION

The regulatory measures arise from the mechanisms taking the form of official standards, procedures, laws and incentives to help firms become more responsible in taking care of the environment. The Chinese government for instance coercively influence organizations actions by posing fines and penalties and imposing trade barriers. These measures are crucial in driving green logistics practices such as product recovery and reverse logistics as they improve awareness of the environment. The Chinese government impose strict regulations as a way of emulating green practices from developed countries and this has not only exceeded expectations locally but it has also surpassed global requirements thus having a positive impact on business performance. Competitive pressures for manufacturing firms in China are influenced by large firms in the industry who are scrutinized by competitors and other environmental activists to adopt green logistics practices that will make them gain a competitive edge.

Combating competition through take back is being adopted by successful manufacturing firms in China. They can refurbish used products to gain an additional income. Recovery of their used products also reduces impact on the environment by controlling product disposal actions. Successful firms have also developed sustainable strategies that aim at preventing pollution as a way of protecting the environment. What is more, Chinese manufacturing firms are experiencing stiff environmental pressure from competitors and this has made them to self-regulate their activities. The big firms in China work with leading firms of developed nations and they have forced them to become environmentally ISO certified and to evaluate their suppliers. They must comply with bans of specific materials and design requirements now to serve these markets successfully as consumers in developed countries prefer buying green products so firms are forced to co-operatively work with their suppliers to win a bigger market share.

Today's customers are sophisticated and this is putting a lot of pressures for Chinese manufacturing firms to adopt green logistics practices. A question that consumers are raising is the effect the goods they buy have on the environment. This creates expectations for firms to pursue a minimal green standard during the design of the product. Given that China exports a big portion of its products to developed nations, it is the customers in these countries who create indirect pressure for Chinese manufacturers to design their processes in an environmental conscious way to produce products that meet green packaging requirements and that also enable

recycling and reuse. Having a closed-loop SC would help Chinese manufacturing firms deal with the waste disposal nightmare that up to now remains a challenge due to lack of a proper infrastructure and legislation to deal with unregulated means of disposing waste in the country.

Generally, multinational corporations are known to carry out processes that benefit the general society as they feel the need to have a voluntary responsibility to the society as a way of creating harmony with societal expectations, norms and values that dictate acceptable behaviour for businesses. Therefore, as a way of creating a good image which is consistent to the societal values, many Chinese manufacturing firms are adopting green practices. As part of China's business ethics of producing goods that cater for the people's well-being, most manufacturers are producing products that are environmentally friendly. A firm's moral obligation to produce goods that do not harm citizens is forcing organizations to source raw materials from green suppliers and to produce products with minimal energy requirements and institute channels for product return for reuse and remanufacturing.

4.2 Barriers of Green Logistics Implementation of Chinese Manufacturing Firms

The following Table 2 illustrate the challenges that manufacturing firms in China face when implementing green logistics practices. This was an analysis of the literature in newspapers and recent journals covering the topic of study.

Table 2 Barriers of Green Logistics Implementation in Chinese Manufacturing Firms

Barrier	**References**
Challenges of Green Logistics Implementation in Chinese Firms	(Lin & Ho, 2011); (Matus, Xiao, & Zimmerman, 2012); (Miao, Cai, & Xu, 2012); (Zhang, Platten, & Shen, 2011); (Zhang, Thompson, Bao, & Jiang, 2014); (Kim & Choi, 2013); (Zheng & Yu, 2015);

Discussion

Technological factors were found out to be a major barrier of green logistics adoption in China. This was due to the relative advantage which is the considerations manufacturing firms make to weigh out if the performance achieved in investment in the capital of the technology required outweighs the perceived idea of becoming green. Other technical considerations include compatibility to the company's operational system, and complexity which influence innovation adoption. Potential benefits that would occur through green practices adoption are reduced consumption of energy and natural resources, lowered rates of emissions from waste and other pollutants, better performance of the environment and financial resources and improved societal expectations of the environment conservation.

However, the achievement of these benefits is limited to the complexity to learn and use the tactic and explicit knowledge of green logistics which involve identifying pollution sources and quickly responding to their sources and implementing preventive solutions in time. The necessary tools for solving the conflict between economic growth, environment and a systematic implementation road for green logistics remain a challenging process for green logistics implementation for Chinese manufacturing firms. Other than that, the financial limitation in investing in the right tools is limited despite the external funding as many companies deal with low value manufacturing which results to low profit margins.

Organizational factors created challenges in adopting green logistics practices too in that employees need to feel motivated and this calls for an improved organizational support for development and implementation of environmental practices. The willingness of the top management to coordinate and co-operate other divisions is key in adopting green behaviour in the organizations. This is highly influenced by their level of training in which is limited as most manufacturing firms have few/none green champions to take lead in green development programs. Many Chinese people misunderstand the meaning of green logistics as it's a barely new concept and merely take it as a theory rather than a tangible practice.

Other competition agendas like the local forces remains a challenge as the enforcement and monitoring of green standards is not rigorous as manufacturing firms are faced with a great deal of manipulation from these forces as the level of poverty in most Chinese provinces remains a concern. The lack of a clear regulatory floor needed to provide regulatory incentives for Chinese manufacturing firms remains a challenge as there are no broad green logistics implementation policies in place despite the major funding by the Chinese government to support R&D projects. Lack of coordination of logistics companies too remain a challenge as they fail to share information on green logistics development and implementation.

Summary of the Research Findings

The main purpose of this study was to identify the emerging issues affecting Chinese manufacturing firms and this involved integrating the operations theory with green logistics studies in order to enhance sustainability of the firms. The main drivers of green logistics in Chinese manufacturing companies were found out to be regulatory measures, customer's pressures, competitor's pressures and social-cultural responsibility. The Chinese government is putting more pressure for firms to observe the environmental rules and regulations stipulated, failure to which fines and penalties are instilled. Due to globalization, stiff competition from bigger industries is forcing other firms within the same industries to comply with environmental ISO certification programs to go green. Customers are forcing firms to adopt green logistics initiatives as they are interested in buying from companies whose operational activities are geared towards conserving the environment. This creates immense pressure for Chinese manufacturing firms as environmental conditions are dictated to them mostly by international customers especially those in the western world. Finally, an important motivational factor for companies to go green is to improve their image as perceived by the society as part of the societal norms and culture.

The major challenges faced by green logistics implementation by Chinese companies are technological constraints, organization barriers, poor law enforcement and lack of coordination of logistics companies. Manufacturing firms in China are yet to identify the right tools that are compatible to their companies' operations and this is accelerated by the limited infrastructure and limited financial resources inherent in these companies. Lack of top management support in implementing the green logistics agenda is also prevalent and it is greatly influenced by the limited training opportunities of employees on green logistics. Due to the high levels of poverty in some provinces, the law enforcers are prone to be corrupt and this free companies from paying fines and penalties for non-compliant of green laws. Additionally, the unhealthy competition amongst logistics companies makes them fail to make unified efforts that would aid in implementing green logistics initiatives within the industry.

CONCLUSIONS AND IMPLICATIONS

With an aim of pursuing sustainable development, issues concerning the environment have received greater attention worldwide. China is a global manufacturing base and for this reason, it is affected by intense degradation of the environment. Majority of Chinese companies are being pressurized constantly to develop operations that are environmentally friendly. Companies are obliged to provide warehousing, transportation, inventory management, order processing and packaging services to their customers and these operations not only consume vast amounts of energy but also cause serious environmental hazards associated with disposal of wastes. Research findings of this study reveal that regulatory measures, customers and competitor's pressures, and social cultural responsibility have a great influence on green logistics adoption for Chinese manufacturing companies. The major barriers for green logistics implementation in China however arise from competing priorities between protecting the environment and developing the economy. Technical challenges are seen to be consistent while a lack of an experienced and trained professional base is prevailing in the industry.

Despite the environmental challenges present in developing economies like China, there is a great deal of potential for the development and implementation of green logistics initiatives in manufacturing companies of these economies. The Chinese government need to support these practices through proper funding and development of an appropriate infrastructure. More research and training is required to create awareness about the importance and aid in fuelling the implementation of green practices in manufacturing companies. For the Chinese manufacturing companies to cope up with the environmental crises, they need to consider environmental protection issues and integrate these with their operational decisions to create sustainability in their organizations. More co-operations of manufacturing companies is also needed with better top managerial support to govern employee's green behaviour and avail technical resources and learning capabilities within the industry. The research focuses on green logistics initiatives in manufacturing companies and future work will be needed for the service industries too to make a comparison for its implementation in the two sectors. The study focuses on a literature review and a survey on this topic would be essential in validating the results.

References

[1] Basiri, A. H., Shemshadi, A., & Tarokh, M. J. (2011). A Closed-Loop Logistics Model for Green Supply Chain Management. *International Journal of Applied Logistics*, 15.

[2] Battini, D., Bogataj, M., & Choudhary, A. (2017). Closed Loop Supply Chain (CLSC): Economics, Modelling, Management and Control. *International Journal of Production Economics*, 319-321.

[3] Branzei, O., Ursacki-Bryant, T. J., Vertinksy, I., & Zhang, W. (2004). The formation of green strategies in Chinese firms: matching corporate environmental responses and individual principles. *Strategic Management Journal* , 1075-1095.

[4] Cai, W. G., & Zhou, X. L. (2014). On the drivers of eco-innovation: empirical evidence from China. *Journal of Clean Production*, 239-246.

[5] Chan, R. Y., & Lau, L. B. (2001). Explaining green purchasing behaviour: a cross-cultural study on American and Chinese consumers. *Journal of International Consumer Marketing*, 9-41.

[6] Christmann, P., & Taylor, G. (2001). Globalization and the environment: determinants of firm self-regulation in China. *Journal of International Business Studies*, 439-458.

[7] Cosimato, S., & Troisi, O. (2015). Green supply chain management: Practices and tools for logistics competitiveness and sustainability. The DHL case study. *TQM Journal*, 256-276.

[8] Das, D., & Dutta, P. (2013). A system dynamics framework for integrated reverse supply chain with three way recovery and product exchange policy . *Computers & Industrial Engineering*, 720-733.

[9] Hsu, C.-C., Tan, K. C., Zailani, S. H., & Jayaraman, V. (2013). Supply chain driverd that foster the development of green initiatives in an emerging economy. *International Journal of Operations & Production Management*, 656-688.

[10] Jakhar, S. K. (2014). Designing the Green Supply Chain Performance Optimisation. *Global Journal of Flexible Systems Management*, 235-259.

[11] Kim, H., & Choi, J. (2013). Third-party enterprises' perceptions of green logistics in China. *Journal of International Logistics and Trade*, 27-42.

[12] Kong, D., Feng, Q., Zhou, Y., & Xue, L. (2016). Local implementation for green-manufacturing technology diffusion policy in China: from the user firms' perspectives. *Journal of Cleaner Production*, 113-124.

[13] Kumar, S., & Malegeant, P. (2016). Strategic alliance in a closed-loop supply chain, a case of manufacturer and eco-non-profit organization. *Technovation*, 1127-1135.

[14] Lai, K.-h., & Wong, C. W. (2012). Green logistics management and performance: Some empirical evidence from Chinese manufacturing exporters. *Omega*, 267-282.

[15] Li, X. (2014). Operations Management of Logistics and Supply Chain: Issues and Directions. *Discrete Dynamics in Nature and Society*.

[16] Lin, & Ho. (2011). Determinants of Green Practice Adoption for Logistics Companies in China. *Journal of Business Ethics*, 67-83.

[17] Lin, C.-Y., & Ho, Y.-H. (2011). Determinants of Green Practice Adoption for Logistics Companies in China. *Journal of Business Ethics*, 67-83.

[18] Llgin, M. A., & Gupta, S. M. (2010). Environmentally conscious manufacturing and product recovery (ECMPRO): A review of the state of the art. *Journal of Environmental Management*, 563-591.

[19] Lo, C. W., & Leung, S. W. (2000). Environmental agency and public opinion in Guangzhou: the limits of a popular approach to environmental governance. *The China Quarterly*, 677-704.

[20] Mallidis, I., Dekker, R., & Vlachos, D. (2010, August). *Greening Supply Chaina: Impact on Costs and Design*. Retrieved from Erasmus University, Econometric Institute Website: http://repub.eur.nl/res/pub/20375/

[21] Matus, K. J., Xiao, X., & Zimmerman, J. B. (2012). Green chemistry and green engineering in China: drivers, policies and barriers to innovation. *Journa of Cleaner Production*, 193-203.

[22] Miao, Z., Cai, S., & Xu, D. (2012). Exploring the antecedents of logistics social responsibility: A focus on Chinese firms. *Economics*, 18-27.

[23] Ploberger, C. (2011). China's Multidimensional Environmental Issues a Fundamental Challenge for China's Future Development- a Critical Assessment. *C. East Asia*, 1-20.

[24] Raman, P. (2013). Green SCM: A Marriage of Environmental Management and Supply Chain Management. *International Journal of Management Prudence*, 33-38.

[25] Reefke, H., Ahmed, M. D., & Sundaram, D. (2014). Sustainable Supply Chain Management- Decision Making and Support: The SSCM Maturity Model and System. *Global Business Review*, 1s-12s.

[26] Sarkis, J., Zhu, Q., & Lai, K.-h. (2011). An organizational theoretic review of green supply chain management literature. *International Journal of Production Economics*, 1-15.

[27] Schreier, M. (2012). *Qualitative Content Analysis in Practice.* Bremen, Germany: Sage Publications Ltd.

[28] Seuring, S. (2004). Emerging Issues in Life-Cycle Management. *Greener Management International*, 3-8.

[29] Seuring, S., Gold, S., & Beske, P. (2010). The constructs of sustainable supply chain management: a content analysis based on published case studies. *Industrial Ecology*, 114-137 .

[30] Thiell, M., & Zuluaga, J. P. (2013). Is it Feasible to Implement Green Logistics in Emerging Markets? *International Journal of Applied Logistics*, 1-13.

[31] Tian, X., Chang, M., Tanikawa, H., Shi, F., & Imura, H. (2013). Structural decompostion analyis of the carbonization process in Beijing: a regional explanation of rapid increasing carbon dioxide emissions in China. *Energy Policy*, 279-286.

[32] Vachon, S., & Klassen, R. D. (2006). Extending green practices across the supply chain: The impact of upstream and downstream integration. *International Journal of Operations & Production Management*, 795-821.

[33] Walliman, N. (2011). *Research Methods: The basics.* New York: Routledge.

[34] Wang, K., Wei, Y., & Huang, Z. M. (2016). Potential gains from carbon emissions trading in China: a DEA based estimation on abatement cost savings. *Omega*, 48-59.

[35] Wang, Q. (2013). China's citizens must act to save their enviroment. *Nature*, 159.

[36] Wang, Q., & Yang, Z. (2016). Industrial water pollution, water environment treatment, and health risks in China. *Environmental Pollution*, 358-365.

[37] Wu, J., & Zhou, Z. Z. (2015). Environmental issues in China: Monitoring, assessment and management. *Ecological indicators*, 1-2.

[38] Wu, J., Song, M., & Yang, L. (2015). Advances in energy and environmental issues in China: theory, models and applications. *Annals of Operations Research* , 1-8.

[39] Ye, F., Zhao, X., Prahinski, C., & Li, Y. (2013). The impact of institutional pressures, top managers' posture and reversw logistics in performance - Evidence from China. *International Journal of Production Economics*, 132-143.

[40] Zhang, S., Lee, C., Chan, H., Choy, K., & Wu, Z. (2015). Swarm intelligence applied in green logistics: A literature review. *Engineering Applications of Artificial Intelligencw*, 154-169.

[41] Zhang, X., Platten, A., & Shen, L. (2011). Green property development practice in China: Costs and barriers. *Building and Environment*, 2153-2160.

[42] Zhang, Y. J., & Da, Y. B. (2015). The decomposition of energy related carbon emission and its decoupling with economic growth in China. *Renewable Sustainable Energy Rev.*, 1255-1266.

[43] Zhang, Y. J., & Hao, J. F. (2015). The allocation of carbon emission intensity reduction target by 2020 among provinces in China. *Natural Hazards*, 921-937.

[44] Zhang, Y. J., Wang, A., & Da, Y. B. (2014). Regional allocation of carbon emission quotas in China: evidence from the Shapley value method. *Energy Policy*, 454-464.

[45] Zhang, Y., Thompson, R. G., Bao, X., & Jiang, Y. (2014). Analyzing the promoting factors for adopting green logistics practices: A case study of road freight industry in Nanjing, China. *Procedia- Social and Behavioral Sciences*, 432-444.

[46] Zhang, Y.-J., Peng, Y.-L., Ma, C.-Q., & Shen, B. (2017). Can environmental innovation facilitate carbon enissions reduction? Evidence from China. *Energy Policy*, 18-28.

[47] Zhao, X. L., Yin, H. T., & Zhao, Y. (2015). Impact of environmental regulations on the efficiency and CO2 emissions of power plants in China. *Applied Energy*, 238-247.

[48] Zheng, Z., & Yu, W. (2015). Exploration of China's Green Logistics Development. *Management Science and Engineering*, 50-54.

[49] Zhu, Q., & Sarkis, J. (2004). Relationships between operational practices and performance among early adopters of green supply chain management practices in Chinese manufacturing enterprises. *Journal of Operations Management*, 256-289.

[50] Zhu, Q., Sarkis, J., & Geng, Y. (2005). Green Supply Chain Management in China: Pressures, practices and performance. *International Journal of Operations & Production Management*, 449-468.

[51] Zhu, Q., Sarkis, J., Cordeiro, J. J., & Lai, K.-H. (2008). Firm-level correlates of emergent green supply chain management practices in the Chinese context. *Omega*, 577-591.

[52] Zhu, Q., Sarkis, J., Cordeiro, J. J., & Lai, K.-H. (2008). Firm-level correlates of energent green supply chain management practices in the Chinese context . *Omega*, 577-591.

[53] Zhu, Q., Sarkis, J., Cordeiro, J. J., & Lai, K.-H. (2008). Firm-level correlates pf emergent green supply chain management practices in the Chinese context. *Omega*, 577-591.

Abbreviations: GSCM – Green Supply Chain Management; CLSC – Closed-Loop Supply Chain; DC – Distribution Centre; MHE – Material Handling Equipment; KPI – Key Performance Indicators; SC – Supply Chain