



Green, Closed Loop and Reverse Supply Chain: A literature review

Roya Anvari

School of Business and Administrative Studies, The University of Georgia, Tbilisi, Georgia
r.anvari@ug.edu.ge

Article Information:

Received: November 30, 2022, Accepted: December 21, 2022, Published: January 02, 2023

Abstract

This paper is the first attempt in reviewing and categorizing the literature in three different fields of supply chain including: Green Supply Chain (GSC), Closed Loop Supply Chain (CLSC) and Reverse Supply Chain (RSC) those are partially interconnected. For this reason, each one of these three topics has been divided into several criteria and each criterion is a review of several similar issues. This research aims to: Clarify the different area undergone the researcher's investigation in the three mentioned filed of supply chain management; Show the differences and similarities of green supply chain management, closed loop, supply chain management and Reverse supply chain management; Provide researchers with future research directions in these three fields. This research tries to reach the mentioned objectives through reviewing the other research and summarizing them in parts. The first part will discuss what has been done and second part is reviewing what have been found. Finding also discusses what is done regarding these three topics and their boundaries as well as recommendations for future works (What can be done).

Key Words: Green Supply Chain, Closed Loop Supply Chain and Reverse Supply Chain

Jel codes: D24, L25, L26

1. Introduction

Since supply chain management is introduced, this topic has been altered a lot and the researchers have tried to make it more dynamic according to last decades fast changing economic and environmental conditions. The old concept of Supply Chain just included the technical aspect while recently it is more changed due to the needs of environment.

Here and according to the purpose of this research three supply chain management concepts would be discussed to understand that what are the main topics under each category. This kind of category will help the correspondents of paper to see what the dominant topics under these three areas.



These topics have undergone the researcher's consideration individually and there are significant areas under each category. It is important to have a look on the meaning of these three Green Supply Chain Management has been defined as "Integrating environmental thinking into supply-in management, including product design, material sourcing and selection, manufacturing processes, delivery of the final product to the consumers as well as end-of-life management of the product after its useful life" (Srivastava, 2007, p. 54). Broadly speaking, any sustainability issues encountered in managing supply chain is part of GSCM (Bose & Pal, 2012, Rupa et al., 2021).



Closed Loop Supply Chain means a supply chain in which forward and reverse supply chain activities are integrated and formed a closed-loop system. (Simonetto et al., 2022; Paksoy, Bektaş, & Özceylan, 2011). Fleischmann et al. (1997); Rogers and Tibben- Lembke (1998) Thierry et al (1995) have defined the closed loop and open loop as a part of reverse supply chain management and differentiated two categories for reverse logistic systems those are: open and closed-loop systems, depend on whether the return operations are integrated or not with the initial operation. Simonetto et al (2022) mentioned that a closed-loop supply chain includes the forward supply chain and the reverse supply chain. The reverse supply chain can be defined as the logistics activities all the way from used products no longer required by the customer to products again usable in the market.

Reverse supply chain: The last topic which would be covered in this study is Reverse Supply Chain or reverse logistic which refers to a set of programs or competencies aimed at moving products in the reverse direction in the supply chain (i.e., from consumer to producer). The goal is to maximize value from returned items and insure their proper disposal or both (Rogers & Tibben-Lembke 1999). Related activities may include handling product returns, recycling, reuse of materials, waste disposal, refurbishing, or remanufacturing (Stock, 1998). Liu and Giovanni (2019) defined reverse supply chain includes the recovery of products, which is typically achieved through processes such as repair, remanufacturing and recycling. On the other hand, they know the reverse supply chain as a part of closed supply chain as well.

2. Literature review

Literature review of this research paper consists of more than 110 research papers those are related to GSCM, CLSC, and RSC. As it already mentioned, the method is according to previous researches findings, current and future works. The following section will describe what have been done, what have been found, and what should be done in three areas of GSC, CLSC and RSC.



2.1. What has been done?

As the first purpose of reviewing literature is finding the main research areas and what is done in different branches of a specific topic. Here, like any other research, especially in social sciences, the literature review part is the most important part of research and can be assumed to be a basement for that research. As much as a literature review is elaborated, the research also would have better contribution in that particular science. What has been done would be discussed in following parts.

Green supply chain management: strategies and decision-making system are the main topics those undergone the researchers' examination. Impacts of GSCM on other factors/ criteria and in return, factors that impact GSCM have been discussed in GSCM. Drivers, dimensions and barriers in implementing the GSCM are the next area of GSCM. GSCM's practices and GSCM performance measures are another important part of researcher's works. Relation and collaboration of GSCM with other topics and factors besides the criteria and area which is covered in each study under the GSCM are also investigated by researchers. Finally, tools which can help GSCM are the next topic in GSCM.

Closed loop Supply Chain Management: Since the area of Closed Loop Supply Chain covers different studies, regarding the purpose of this study it is necessary to have a holistic view on what have been done in this field of supply chain. Many authors developed New Models while some authors also tried to design the previous models in an efficient way. CLSC network has been studied and for returning the new products some ideas have been proposed. Efforts in CLSCM are not just limited to designing the networks and proposing the models but also Legislation and Decision making have been studied by different authors. Beside this topic and similar to legislation, different buy back policies have been discussed by different authors.

The next area which grabs the attention of researchers is inventory level. As a part of closed loop supply chain management, inventory plays an important role for collecting and storing the goods or second hand products. Like inventory, capacity planning is also an important part of CLSCM that has been investigated by different authors. Contingency planning is another part of CLSCM which was studied as a potential area of research. Researchers also showed their interest to work on government consumption subsidy as well as performance evaluation/ measures in CLSC. What have been mentioned are the main area that falls within the interest of researchers in CLSC.

Reverse Supply Chain Management: Researchers in Reverse supply chain management like two previous topics have worked on several research areas. Designing the models and strategies in reverse supply chain management has been the main issue for researcher those also have confronted with demand uncertainty. The authors also worked on factors that impact reverse supply chain. For having a comprehensive understanding of issues in reverse supply chain management, some researcher worked on conceptual papers hence these conceptual papers will give the authors a good clue for finding the gap. Since the nature of reverse supply chain management is based on forward and reverse supply chain, some authors also examined the integration of these two streams besides uncertainty. Other research papers discuss about online auction in reverse supply chain management and recycling the electronic wastes. Another



research tried to explore the remanufacturing process based on closed loop supply chain process.

The above mentioned topics are the predominant areas in the field of reverse supply chain management and revealed what have been done in these three areas by different authors.

2.2. What have been found?

After reviewing the different research in three fields (GSCM, CLSC, RSC) it is the time to discuss about what have been found in these areas. Researchers have done a comprehensive investigation on supply chain management and definitely there should be some results regarding their efforts for improving this field of study. What has been found is a good question for revealing the results of what have been done. This part is also divided to three main parts in literature review.

Green Supply Chain Management has been divided into seven criteria. First criteria are about strategies and decision framework. Second and third criteria are about impacts of GSCM on other topics and factors and impact of other factors on GSCM. Criteria 4 talks about drivers, dimensions, barriers, decisions and criteria 5 examines the initiatives, measurement, performance and requirements. Criteria 6 and 7 are related to relation and collaboration of

GSCM with other fields, areas, contents and tools. As it was already mentioned in previous parts, Green Supply Chain Management has been studied by different authors and mainly their findings are concluded in following paragraphs.

Criteria1:

A research paper proposed seven steps which organizations can adapt while implementing green supply chain initiatives through using Information Technology. They also identified five different strategies in GSCM (CTSH), 2008; Anvari, 2022). Agarwal, Kant, and Shankar (2020) proposed a decision framework including different strategies for green supply chain management those are: closed-loop, Risk-based Strategies, Efficiency-based Strategies, and Innovation-based Strategies.

Wang Lai et al (2011) made a distinguishing model which considers the environmental component such as: environmental level of facility and ecological influence in managing and transportation method. Moreover this multi-objective model minimizes the total cost and environmental side effect. They consider the environmental components such as: environmental level of facility and ecological influence in handling and transportation method. In addition, this is a multi-objective model that minimizes the total cost and environmental side effect.

A strategic decision framework that will aid managerial decision making has been proposed by some researchers. The product life cycle, operational life cycle, organizational performance measurements, and environmentally conscious business practices serve as the basis for a decision framework for prioritizing or selecting systems by the organization that will aid in managing green supply chains. It concentrates on the mechanisms and elements of green supply chain management and the way they work as a basis for the decision framework (Sarkis, 2003). Kuo, Muniroh and Fau (2021) proposed a decision-making system for balancing the



short-term profitability and long-term environmental sustainability. They also stated that choosing the suitable supplier is a key strategic direction in eliminating environmental impact and they tried to find some criteria for finding such a supplier.

Another conceptual framework analyzed the Sustainable Supplier Management. Subsequent, external triggers have been defined and two strategies have been proposed for focal companies those are supplier management for risks and performance, and supply chain management for sustainable products (Seuring & Müller, 2008). Ofori (2000) demonstrated that the impact of construction activity on environment is contrary while the SCM plays a significant role in improving the environment. A research paper shows that key factors that influence an organization to adopt GSCM practices are linked to different strategic approaches such as 1) reputation-led 2) efficiency-led and 3) follower (Testa & Iraldo, 2010).

Criteria2:

Lina et al (2011) and Dheeraj et al (2012)) indicated that GSCM can directly help to control the different pollutions such as soil, water and air pollution. They also indicated that GSCM can have a positive impact on efficiency and productivity of a system in other words resource utilization decreases the resource consumption.

Improvement of international image and enhancement of process performance are also other aspects of implementation of GSCM that discussed by Zhou (2009). Chen and Liang (2012) and Zhou (2009) also claimed that increasing sell revenue, social efficiency, and economic efficiency are other results of GSCM. Bose and Pal (2012) also mentioned that stock price can be influenced by GSCM implementation in an organization. Researchers also claimed that GSCM impact the awareness of customers and risk as well as the degree of environmental, operational, and economic performance, corporate performance and cost reduction (Eltayeb, Zailani& Ramayah, 2011; Sheu, 2008; F. Wang et al., 2011; Liu and Giovanni, 2019).

Criteria 3:

After reviewing what other researchers found about impacts of GSCM implementation on other factors, it is time to review what also impacts the implementation of GSCM. Some authors concluded that cost of raw material, strategic considerations, and decisions at functional interfaces, regulation, government policies are other indicators that impact the GSCM implementation (Lina et al., 2011; Sudheer Gupta & Desai, 2011). Cost variables:

(administrative, capital, material, transportation and inventory costs) are other items those impact the implementation of GSCM (D.-J. CHEN & LIANG, 2012). Trust (Benevolence & credibility), top management support regulations, marketing, supplier, cost pressures, awareness, regulations, green marketing, customer awareness, industry levels of the relevant practice and organizational size beside the ISO 14000 practices are important factors those are impacting implementation of GSCM (Andiç, Yurt, & Baltacıoğlu, 2012; Arimura, Darnall, & Katayama, 2011; Chan, He, & Wang, 2012; Hoejmoose, Brammer, & Millington, 2012; Sikhar, Gaurav, Zhang, Biswajit, & Tiwari, 2012; Liu and Giovanni, 2019; Anvari, Jaberifard and Sohrabi, 2022).



Criteria4:

This part is also discussed about what have been found about barriers, drivers, dimensions and decisions. A six decision-making element sets (product's lifecycle (PL), external factors (EF), operation's lifecycle (OL), environment friendly practices (EP) and performance evaluation (PE)) have been identified for Operation of Sustainable Supply (Jian et al, 2011). Shang, Lu, & Li (2010) proposed the different dimensions of GSCM, those are: green manufacturing and packaging, environmental participation, green marketing, green suppliers, green stock and green eco design. In another research six dimensions of product, promotion, planning, process, people and project (called the 6Ps), external drivers(rules) and internal drivers (Improving the system) have been discussed within the construct of market for integrating the GSCM and marketing efforts (Liu, Kasturiratne & Moizer, 2012).

Different drivers of GSCM have been proposed from different perspectives and by different researchers. A research paper finalized the Drivers of GSCM those are: (1) Certification of suppliers' environmental management system (2) Environmental collaboration with suppliers (3) Collaboration between product designers and suppliers to reduce and eliminate product environmental impacts (4) Green design (5) ISO 14001 certification (6) Integrating quality environmental management into planning and operation process (7) Reducing energy consumption (8) Reusing and recycling materials and packaging (9) Environmental collaboration with customers (10) Reverse logistics (Diabat & Govindan, 2011). Zhu & Sarkis (2006) also claimed that stockholders- rules and regulation, globalization, export, regulative, market, and suppliers are different drivers of GSCM. Walker, Di Sisto, & McBain (2008) divided the drivers to Internal (Organization's values ,Value champions, Costs reduction) and External (Access to environmental information, Regulatory compliance, Environmental risk minimization, Monitor environmental performance, Pressure/encouragement by customers, Regeneration of local areas , Gaining competitive advantage) drivers.

It is important to review the potential barriers those have been discussed by researchers. A research paper finalized and discussed the barriers of GSCM those are divided to two categories: internal and external barriers. The internal barriers such as costs, local nature of project, lack of resources and external barriers includes exposing poor environmental performance, lack of information confidentiality, fragmented industry, small number of suppliers (poor competition), scale of supply chain, lack of industry-wide consistent environmental criteria, procurement legislation, clinical preference, food culture, Inertia by project stakeholders, supplier's (manufacturer) reluctance to change (Walker et al., 2008).

Practices are an important part of GSCM. It is also important to review what has been found by different researchers. A research has proposed several practices regarding implementation of GSCM using Information Technology as an enabler. These practices include software design, packaging, shipping and cost efficient (CTSH), 2008). Another research proposed that internal environmental management, green purchasing, cooperation with customers including environmental requirements, investment recovery, and eco-design practices are practices of GSCM based on review of different research papers (Sarkis, Zhu, & Lai, 2011). Researchers also proposed that Internal Environmental Management (IEM), Green Purchasing (GP) and



Cooperation with Customers (including environmental requirements (CC) Eco design (ECO) Investment recovery (IR)) are known as important GSCM practices. It is also notable that, in accordance to other GSCM practices, Internal EM Green purchasing Customer cooperation Investment recovery and Eco-design have been known as important GSCM practices(Sarkis et al., 2011).

Criteria 5:

Researchers accurately and comprehensively examined the measures for GSCM and they concluded that the measures are divided into Forward and Backward chain measures. Forward chain measures includes: Upstream measures (supplier commitment, greening cost, level of process management, product characteristics, management commitment, traditional supply chain cost, responsiveness, quality and flexibility), Downstream measures (customer perspective). Backward or reverse chain measures includes: Upstream measures (customer involvement), Midstream measures (recycling cost, material features, management commitment and recycling efficiency) and downstream measures (supplier commitment)(Olugu, Wong, & Shaharoun, 2011).

Another research paper focuses on finding the measures for finding and ranking alternative suppliers regarding GSCM material purchasing (Tseng & Chiu, 2010). Eltayeb et al (2011) and Zhu, Sarkis, & Lai (2007a) worked on GSCM initiatives those are: Eco Design, Green Purchasing, Supplier environmental collaboration, Customer environmental collaboration (Customer education, Customer support, and Joint ventures) Reverse logistics (3R).

Some researcher also worked on performance outcomes of GSCM. Many of researchers have been agreed on three performances outcome those are: GSCM performance, Environmental performance, Positive/Negative economic performance and Operational performance (Zhu et al., 2007a, 2007b).

Criteria6:

GSCM has impact, relationship and collaboration with several topics. For instance: Kainuma & Tawara (2006) founded some relationships and Links between Lean and Green supply chain management practices. They also clarified that green practices are synergistic for Lean and also mentioned that there are opportunities for companies to use their Lean framework as a catalyst to make their processes more efficient and productive. Another research claimed that green marketing and sustainable supply chain management must be impeccably integrated hence green customers' needs can be better met by the supply chain capabilities (Liu et al., 2012). Zhu et al (2012) tried to find out the GSCM innovation diffusion and its relationship to organizational improvement.

Criteria7:

This is also important to understand that what are the criteria, area, and content which can be covered by GSCM.GSCM can help to manage the waste production in different levels and criteria such as: house waste, official waste, hospital waste , industrial waste and so on (Department of Environment, March 2011). Broek (2010) declared that, GSCM



comprehensively covers Sourcing, Production and Delivery. Researchers also claimed that the GSCM is related with Manufacturing, bio-waste, construction, and packaging and there are some opportunities in GSCM with considering them (Johnny et al., 2009). There are different types of organizations those are using GSCM from public sector and private companies as well as municipalities (Jolley and Winter 2009). Many researchers worked on the GSCM's *tools*. Researchers claimed that Information Technology, and computer science can be used as a strong tool for GSCM(CTSH), 2008).

2.3. Closed Loop Supply Chain Management

What researchers have done is already discussed, so it is the time to see what have been found in CLSCM. This part is also divided into several parts.

Criteria1

Wang & Hsu (2010) proposed a model for integration of forward and reverse supply chain management considering the cost and 3Rs (Reduce, Reuse and Recycle). A robust optimization model for handling the natural uncertainty of input data in a closed-loop supply chain network design problem has been proposed by (Pishvae, Rabbani, & Torabi, 2011).

For the recovery of components and the proportion of the product mix at different quality levels at minimum cost a reverse logistic system has been designed (Das & Chowdhury, 2012). Ramkumar et al (2011) argued the function of another model (Kannan Model) and make some modification to it. They proposed a new IPL model for CLSCM. Mitar (2012). Addressed the inventory management issue in closed-loop supply chains, and they developed deterministic and stochastic models for a two-echelon system with correlated demands and returns under general cost structures. By developing this *model* she claimed that a more return and a higher correlation between demand and return decrease the inconsistency of net demand, but it not necessarily help to saving the cost.

Hong & Yeh (2012) proposed a collection model and they compared it with a non-retailer collection model. They claimed that the retailer collection model rationally works better when the third-party firm is a non-profit organization for recycling and disposal.

A research paper written by Chung, Wee, & Yang (2008) who developed an inventory policy for a closed-loop supply chain that maximizes the joint profits of the supplier, the manufacturer, the third-party recycle dealer and the retailer under predetermined design. A closed loop supply chain management is redesigned in a way that reduces the risk of a cash supply chain (CSC) related to banks (Kusumastuti, Piplani, & Hian Lim, 2008).

Redesigning closed-loop service network has been considered for Minimizing the total cost consists of: transportation (freight), holding, taxes, disposal, repair and new parts' purchasing costs, and (lastly) fixed costs (Lundin, 2012). (Guo & Ma) established a collecting price game model for a close-loop supply chain system considering single manufacturer and a retailer who have different logics. They find that 1), the gathering price in decentralized control (non-cooperation) is less than in the centralized control (Cooperation.2), the returns of the manufacturer and the retailer in the decentralized control remain lower than in the centralized



control. Lastly, in the centralized control, collecting price, collecting amounts, sale price, sale amounts and profits of the manufacturers, retailers and supply chain systems are increased.

Qiang et al (2013) made convergence of proposed algorithms that helps to discuss about the effects of competition, distribution channel investment, yield and conversion rates, uncertainties in demand, on equilibrium quantity transactions and prices.

Wei & Zhao (2011) mentioned that there are two decision making systems in closed loop supply chain management 1) the centralized decisions expected profit of the total system is greater than under decentralized decision case. (2) The collecting rate of used products under decentralized decision case is lower in comparison with under centralized decision case And finally the two retailers 'ideal retail fees under decentralized decision case higher than centralized decision case.

Criteria2

This part discusses different types of CLSC and issues related to CLSC.

French & LaForge (2006) had a comprehensive look on reuse issues in CLSC. They divided the issues to internal and external source of return and what is the reason for returning the products. Reason for internal source of return are: Partial containers from batch shortages or overruns rework, product that does not meet required specifications, Wastewater or solvent Equipment cleaning water or solvent, Obsolete products from inventory, Out-of-shelf-life products from inventory By-products, Obsolete raw materials from inventory, Out-of-shelf-life raw materials from inventory. The reason for External source of return are: Product damaged during shipment, Product does not meet specifications, Unsold product, does not perform as promised Contaminated, Product returned in returnable containers, Shelf-life has passed, Sample material, Product is obsolete, Product from sales, demonstration.

Östlin, Sundin and Björkman (2008) concluded that there are different types of closed-loop relationships for gathering cores those are: 1-Ownership.2-Service contract3- Direct-order.4- Depositbased.5- Creditbased.6- Buyback.7- Voluntary. Critical issues: timing and quality of the used products. The also claimed that timing and quality of the used products are two important elements in GSCM.

A research paper discussed about Product Life cycle: BOL_MOL_EOL and their issues in each phase and different useful technology for overcoming to these issues. Finally in this study, they offered the concept of closed- loop PLM. The technologies such as product identification technologies, wireless sensor technologies, and mobile telecommunication technologies, as a part of The PEID help this concept to be implemented. Moreover, this closed loop PLM system helps to gain competitive advantages and increase the efficiency in system.

Criteria3

This part basically tries to find out the main elements those impact CLSC.

A research paper offered a variation inequality methodology to strategic modeling of oligopolistic closed-Loop supply chains under predetermined regulation. This model also assumes that manufacturing and remanufacturing costs are reliant on the scale of operation, and



show laws of diminishing returns. This research paper claimed that Closed-loop supply chain network stability happens when all players reach agreement on volumes shipped and prices charged (Hammond & Beullens, 2007).

Researchers examined consequences of three different used-product collection models on the decisions of the manufacturer, the retailer, and the third party, and based on their own earnings in the expected value model.

Another study emphasizes on buyback policy that gives a partial credit to customer and also mentions that Role of information in buy pack policy is important (Wei & Zhao, 2013).

Chen (2011) find out that information is a key factor for environment of a firm that faces uncertainty with respect to demand, product returns, recovery yield, and capacity utilization. The key findings for this research are: In the case of having high rates of returns, high yield loss, high return variability, and high capacity availability, the yield information is most valuable. On the other hand, with high rates of return and high return variability, high penalty costs and low yield loss generally, capacity information is more useful. While having high demand variability, high capacity availability and a high unit holding cost rate, the demand information is most valuable.

It is notable that all types of information are used, but capacity information is confirmed to have the largest value in 55% of the experiments studied. Moreover, the value of capacity information has more effect on information accuracy.(Bansal & Kilbourne, 2001) examined and compared the NEP (new environmental paradigm) with DSP(dominant social paradigm). As this is one of the few studies about retailers and role of retailers in CLSCM results of this study is quite interesting and significant.

This study mentioned that although retailers are not often designated as major polluters, they are recognized as having the power to induce change among manufacturers because they are a critical link in the supply chain. Authors of this study categorized the main impact of retailer on environment. They proposed three ways (1- Organizational design 2- Organizational systems 3- merchandising) in which current organizational theory can be combined with the NEP. Also NEP can contribute for pushing the frontiers to understand the organizational theory for considering the environmental issues and an exciting and progressive vision of organization theory will be offered by the NEP.

Criteria4

Inventory and the issues related to inventory and inventory planning and contingency planing are discussed by different authors. In this part the findings of other researchers would be discussed.

A research paper they proposed an algorithm for achieving the ideal policy of delivery batch size for LCPs and handling batch size for CRC(Gou et al., 2008).

Simonetto et al. (2022) a research paper examined the Collaboration for a closed- loop deteriorating inventory and claimed that, for both manufacturers and retailers, recycling is beneficial. Moreover, there is a significant increase in the joint profit for the centralized



optimization method in comparison with the sequential optimization method. The recycling's benefit declines for: 1. low buying cost to the supplier, 2. low return rate, and high selling price to the collector. The collaboration's benefit cuts when the turn rate is not much; the detrition rate is low and low price- sensitive parameter besides high scale parameter.

According to researchers' point of view (Georgiadis & Athanasiou, 2013), flexible policy is a good method as an improved replacements to large-scale capacity developments/ contractions in terms of compliance to the real form of end- of- use product return and involved risk in the investments' turn over. In addition flexible policies are good practices to evade over capacity phenomena in assortment and remanufacturing capacity and as robust policies to product demand.

Mitra (2012) emphasized on the role of demand, return and cost as three main elements of inventory management in a two- echelon closed- loop. Research aimed to propose a manufacturing/remanufacturing policy that minimizes the amount of the inventory holding and accumulation costs for manufacturing and remanufacturing products. The result of this provides a production planning model of a mix manufacturing/ remanufacturing system in reverse logistics besides a continuous time stochastic context (Kenné, Dejax & Gharbi, 2012). Yang et al (2010) offers Tow model for inventory (global optimization and integration sequential optimization) then compared these two models. Consequently, the result shows that the global optimization is better than the sequential optimization.

A research paper examined contingency planning for making a rational integrated production planning and control system for remanufacturing in closed- loop supply chain systems. For such a integrated production planning and control three main products has been defined with considering their key dimensions those are categorized as follows: *Key dimensions of aggregate planning for RMTS products*: Returns volume: High, Returns timing: Uncertain, Returns quality: Limited, Product complexity is low to moderate, test and evaluate for complexity is low to moderate and remanufacturing complexity is low to moderate. *Key dimensions of aggregate planning for RATO products*: Returns volume is moderate, returns timing forecast with some certainty, returns quality is uncertain, Product complexity is moderate to high, test and evaluate complexity is moderate to high, remanufacturing complexity is moderate to high. *Key dimensions of aggregate planning for RMTO products*: Returns volume is low, returns timing forecasts with some certainty, returns quality is highly uncertain, Product complexity is High, test and evaluate complexity is high, and remanufacturing complexity is High (Guide Jr, Jayaraman, & Linton, 2003).

Criteria 5

Government activities and supports can be a good incentive for implementation of CLSC.

One study Ma, Zhao and Ke worked on impact of government subsidy on: Consumers Expansion of (GCLSC) Manufacturer retailer. They claimed that all the clients those buy the new products are beneficiaries of The government consumption- subsidy in different quantities; the consumption- grant is a good encouragement for the development of closed- loop supply



chain; both the manufacturer and the retailer are beneficiaries of the consumption- subsidy, while the e-tailer benefits or not is indeterminate.

Criteria6

This part is allocated to performance evaluation and measures in CLSC. It is necessary to understand the main findings in relation to CLSC performance evaluations and its measures.

A study use a set of comprehensive performance measurement items for forward and reverse chain performance evaluation with considering internal and external measures and their subgroups for evaluation and measures of CLSCM. The results shows that the system is easily applicable to assess the performance of an automobile CLSC also the case company's CLSC still requires more attention (Olugu & Wong, 2012).

Paksoy, Bektaş and Özceylan (2011) proposed some of operational and environmental performance measures which can be used for measuring CLSCM performance. These Performance criteria are: total objective function value, Total transportation costs, total transportation cost in the forward, network total transportation cost in the reverse, network total environmental costs, total environmental costs in the forward network, total environmental costs in the reverse network, total purchasing costs, total profit gained recycling. This paper also discusses that demand, capacity, and emission rates impact on performance. Finding of this paper shows that costs of environmental impacts are still not as obvious as operational measures, as same as their other relative importance impact in total cost function. Also, in forward and reverse networks operative expenses of handling products, is the main subject in all considered situations, even when there is a high emissions rate. Moreover, promotion of reusable products, that supposed to reduce the operational costs of the chain but would be added on the environmental costs.

2.4. Reverse Supply Chain Management

What researchers have done is already discussed, so it is the time to see what have been found in RSCM. This part is also divided to several parts.

Criteria1

Here different models and strategies for reverse supply chain management would be discussed. It is also notable that many of these strategies and models are related to demand uncertainly.

Xiao, Shi, and Yang (2010) worked on designing a buyback/markdown money contract by integrating consumer returns policy and manufacturer buyback policy within a modeling framework. They concluded that the refund quantity and variance of the consumer's evaluation are two important elements in the players 'decisions and profitability. The variance of the consumer's valuation impacts the motivation of the supply chain for using the full refund policy over instead of returns policy. They also identified the unit wholesale price- unit profit as two other important elements of designing a RSCM considering buy back policy.

Researchers (Cardoso et al., 2013) aimed to design and plan the supply chains with reverse flows while considering simultaneously production, distribution and reverse logistics activities



beside paying attention to the products' demand uncertainty. By designing this supply chain management researcher aimed to: maximize the expected net present value and the results

provide details on sizing and location of plants, warehouses and retailers, definition of processes to install, establishment of forward and reverse flows and inventory levels to attain (Under demand uncertainty)

A researcher claimed that the buyback agreement can coordinate the dynamic reverse supply chain in a reverse supply chain with one retailer and one manufacturer. Authors of this research also mentioned that price, optimal expected profits and recovery price are other elements that effect buy back agreement (Yan, 2012).

A Mathematical model for analyzing a capacitated reverse supply chain has been proposed by Huang and Su (2013) which considers the optimal batch size and maximal profit. The result also shows that: 1) Even without product change-over delay or cost, product proliferation still eats firm's profit due to the rise in shipping expenses in a reverse supply chain system. 2) When the number of products, number of retailers, holding costs, price, and/or discount rates are larger, managers are more interested to decrease their optimal batch size and normally a discrepancy of unit processing time does not impact the batch size. 3) The quantity of products offered can significantly influence the selection of a firm's logistics strategy.

Lee, Realff, and Ammons, (2011) demonstrate the expectations, risks, and potential shocks linked with cash flows along with retail reverse logistics activities. Finally, they identified the types of liquidity and possible sources of change in liquidity position as well as some managerial suggestion.

A new model which is called: ERE-GIO is based on two major parts: forward and reverse supply chain management. Finally, this new model certificates examination of the company's initial condition as a starting point from which the system might be improved towards the favorite operation model. Moreover using this proposed mode in the logistics flow of an industrial company has permitted the integration of the reverse logistics streams in the traditional supply chain (Govindan, Soleimani, and Kannan, 2015).

A model for vehicle routing planning within product recovery networks-With regard to end-of-life issues has been proposed by Schultmann, Zumkeller, & Rentz (2006). These researchers mentioned two main different motivations for companies to integrate this product life phase into existing supply chains are: profit-oriented motivation and legal motivation. Finally they claim that for comparing different scenarios of creating a reverse supply chain for secondary material collection, flexible algorithms are necessary. In addition apart from ELVs, law also makes obligation to manufacturers of other products for to taking back end-of-life products and meet recycling targets.

Amaro & Barbosa-Póvoa (2008) proposed a modeling approach for the sequential planning and scheduling of supply chain (SC) structures with reverse flows. Finally, the link between the planning and the scheduling levels is performed sequentially by setting the common time domain bounds.

Criteria2



In this part the finding about factors that affect RSCM will be discussed accordingly.

Researchers have counted 12 factors that can impact bullwhip in RSCM. These factors are: erratic human behavior, parameters correcting inventory and WIP, stock policy, time delays, (lead times), forecasting technique, batching policy, information sharing, lack of synchrony, number of links in the chain, variable demand/price policies, operation capacity constraints.

Finally, they concluded that all the nine factors recognized in the literature for the forward supply chain (except the existence of trend in the final customer demand) have been important when considering only the direct chain, but when there is a return flow of material, both the trend and the lot ordering policy seem to be non-significant. All the other “forward factors” are supposed to be significant in the reverse supply chain scenario when talking about bullwhip. From another point of view, regarding the three factors connected to the return of material, neither the average time the final customer keeps the units before returning them is significant, nor the operations capacity at recycler. Only the percentage of the material returned has an influence on bullwhip (Adenso-Díaz, Moreno, Gutiérrez, & Lozano, 2012).

A research paper discussed the issues which can affect supply chain such as: Legislation, Customer demand, Strategic cost/benefit, Strategic cost/benefit, Environmental concerns, Volume and Quality, Incentive, Resource, Integration and coordination. Finally, this paper concluded that: companies participated in recycling operations in reverse supply chains must give more attention to the issues categorized as net dispatchers/drivers (legislation, customer demand, environmental concern) and their influences on the receivers (resource, strategic cost/benefit, integration and coordination and volume and quality (Rahman & Subramanian, 2012).

Huang and Su (2013) discussed about Negative aspects of product proliferation such as complexity in the product recycling, remanufacturing, and resale processes may erode a firm's overall profits. Moreover, results show that the number of products offered is a significant element for a firm's logistics strategy. Managers prefer to shift to an outsourcing strategy when the number of products offered is smaller and they are confronted with products with higher prices and larger discount rates.

A study examined that RFID has positive results such as: Environmental benefits- Economic benefits. RFID measures the reliability, Production lead time, Collection lead time, Capacity of the end-user market, Demand the driving are significant factors in increasing the economic benefits. This study also concluded that information sharing besides the synchronized inventory policies with RFID allows the players to achieve optimal environmental and economic cost reduction. Furthermore, better reorder points under a continuous review given by RFID real-time monitoring, decrease the holding costs (Nativi & Lee, 2012).

Criteria3

The conceptual research helps to understand the area of RSCM and gives a clue to find out what have been done and what is the potential for future researches.

A conceptual paper categorized the founding and the researchers worked in RSCM in several areas those are: Managers' concerns with performance, challenges in distribution and sales,



focus on inspection disposition and remanufacturing, gap in research on reverse logistics, the relationship between the business environment and RSCs (Melo, Nickel, & Saldanha-da-Gama, 2009).

A literature review of facility location models in the context of supply chain management is given in this paper. This paper identified numerous significant issues that permit a facility location model to become well-matched with SCND those are: network structure and basic features, decision variables in supply chain network design, reverse logistics, other supply chain characteristics (Prahinski & Kocabasoglu, 2006).

Jamal Fortes (2007) has reviewed different literatures and categorized them according to following issues: green operations, green design, green manufacturing, reverse logistics and waste management. He also briefly discussed the reasons why organizations would choose a green supply chain. He finally concludes that there is a gap in the literature in terms of the stakeholder views in the direction of green supply chain management. Expressing the different stakeholders' views to greening initiatives requires qualitative study such as interviews – to portray the different views about the concept and how this would implicate management decisions.

Criteria4

The integration or linkage of RSCM has been investigated by different authors. In this part the founding would be discussed.

Lee et al. (2011) a research paper presents a comprehensive model for integrating the price, production, and inventory decisions in a reverse production system (RPS) using retailer collection. Incentives, price, quality, quantity, reverse and forward supply chain are other main elements which have been covered by this paper align with the integration model. Finally, they indicated that generating return flows which are negatively correlated with the forward flows, form the retailer's optimal decision. Moreover the producer and the retailer can use profitable reverse production by appropriately sharing the processing tasks. The authors also showed that an RPS can help to wide range of product recovery processes by obtaining postconsumer materials. A research paper proposed a mixed integer linear programming (MILP) formulation for designing an **integrated** supply chain. The main elements those contribute to this research are production, distribution, and reverse logistics activities. It also tried to examine the products' demand uncertainty. The results of this study show that a reverse supply chain with more flexible flows can help for making profitable network. Also, greater flexibility in terms of flows tends to create a more profitable network. It is also claimed that where the distribution network is independent of the scenarios and or where the transportation links can change with every scenario and in each time period, in both of these cases uncertainty in products' demand can be accrued(Cardoso et al., 2013).

Researchers (de la Fuente, Ros, & Cardós, 2008) also designed an integrated Model for Supply Chain Management process (IMSCM) which is used for redefining: demand management procedures, order management procedures, manufacturing, management procedures, procurement management procedures, distribution Management procedures, and client



management procedures, etc. In this cooperative structure, reviewing and redefining general procedures helped mixed supply chain management as well as the management of the manufacturing company and answered the problems observed in their day-to-day process. The integrated model IMSCM also contains new processes engaged from reverse logistics.

A research paper claimed that four dimensions of business uncertainty, namely munificence, dynamism, hostility and heterogeneity, influenced investments in both forward and reverse supply chains in a link forward and reverse supply chain management. Organizational risk propensity was a significant mediating factor between business uncertainty and investment in linkage of green and reverse supply chain management. Finding of this research reveals that: Firstly, valid and reliable measures were established for RSC investment. Therefore, organizational risk tendency is defined as a significant mediating factor between business uncertainty and investment. Lastly, the empirical results reveal positive relationship between FSC investment and investment in both recycling and waste management, which have a tendency to recover little or no value. Results suggest that the relationship between FSC and RSC investment is not straightforward (Kocabasoglu, Prahinski, & Klassen, 2007).

A researcher worked on Integration of internal and external SCM and also combined the safety stock in a reverse supply chain management. Finally the author analyzed the impact of reverse logistics activities on pure safety stock cost. Other cost elements that make reverse logistics attractive are identified as the prevention of disposal cost besides the reduced external material supply quantities (Minner, 2001).

A study examined remanufacturing logistics process which grounded on closed-loop supply chain management. The process of remanufacturing supply chain management includes collection, inspection/ separation, remanufacturing, redistribution. The current main problems of remanufacturing supply chain management also have been examined those are: (1) Uncertain amount of waste materials recycling (2) Uncertainty of recovery and arrival time (3) Uncertain of recycled products quality (4) Uncertain demand of manufactured goods (5) Uncertainty of remanufacturing cost. They summarized the strategies of reverse supply chain management as follows: structuring a specialized waste products recycling center. (2) Creating remanufacturing products network database. (3) To make stronger collaboration relations, create and develop the logistics supply chain organization model (Wen-hui, Dian-yan, & Yu-ying, 2011).

Criteria5

Researchers examined the usage of online auction for trading the aerospace parts (Emiliani, 2004). They found that in developing countries, the driving source for global sourcing is the buyer's strong interest in fast obtaining lower unit prices due to lower labor costs. Although in developed countries, the margin reduction where components are obtained is known as the driving source for global sourcing. Moreover for bargaining purposes, the online reverse auctions are revealed to be useful technology-helped form and this new type of bargaining was initially unsuccessful as a global sourcing solution.

Stackelberg- type model proposed by Hong & Ke (2011) in electronic to determine advance recycling fees and socially optimal subsidy fees for electronic scrap material in decentralized



reverse supply chains where each entity independently acts according to its own interests. The results shows that a social welfare growth model examining the impacts of ARFs and subsidies on recycled material streams in a decentralized system where the environmental protection administration acts as a leader and manufacturer import and sellers and recyclers are followers.

In addition, this research's results shows that government has superior motivations to encourage MIS to improve their production processes for decreasing the pollution cost or to import and sell a product with lower level of pollutants material which leads to less pollution cost from that uncollected e-scrap products.

Researchers examined behavior of the various decision-makers, consisting of the sources of electronic waste, the recyclers, the processors, as well as the consumers associated with the demand markets for the distinct products. Finally, authors offered the decision-makers 'superior conditions and provided the governing stability conditions, beside the vibrational inequality formulation. Also they delivered price pattern and qualitative properties of the equilibrium electronic waste material movement (Nagurney & Toyasaki, 2005).

Conclusion

Many researchers privileged special attention to Green supply chain management and that's why this area has a considerable number of publications. Findings in GSCM have been divided to seven criteria.

First criteria discussed about strategies and models in GSCM. Second and third criteria examined the impact of GSCM on other topics and elements and also what impacts the GSCM accordingly. Fourth criteria dedicated to divers, barriers, and practices in GSCM. Initiatives, measurement of GSCM and its performance are discussed in fifth criteria. A last seven criteria is allocated to relation and collaboration between GSCM and other filed and topics. Last part is about area covered by GSCM. The different research in Closed Loop Supply Chain also is categorized in 7 criteria. First criteria focused on New Models, Design, and CLSC network. Criteria2 discusses about: Re-use issues

and practices, life cycle information in CLSC and types of closed-loop relationships. Criteria three is reviewing the different topics such as: legislation, decision making, buy back policy, information, retailer power. Government subsidy, delivery batch size, inventory level, capacity planning and contingency planning have been discussed in fourth criteria. Performance evaluation and Measure are examined in 4th and 5th criteria.

Alike to two previous topics, Reverse Supply Chain Management is also discussed in several criteria. Criteria 1 is about model, strategy, Buy back, optimal batch size, liquidity, planning scheduling (under demand uncertainly) the second criteria mainly discuss the main factors affecting bullwhip in Reverse supply chain management and Factors affecting reverse supply chain. Impact of RFID and negative aspect of proliferation on RSCM. A conceptual and an empirical research paper are reviewed in third Criteria. Criteria4 contains the Integrating forward and reverse supply chains/, linking forward and reverse supply chain, logistics process which grounded on closed-loop supply chain management, impact of uncertainty and Safety stock in RSCM.



Criteria5: is about online auction /E marketplace, Electronic scrap and subsidy. After reviewing the different research papers several objectives have been achieved. The reviewing the different studies gives a clue to other researchers to understand what have been done in this three area as a first objective of this research. This is clarified that these three areas of supply chain have some similarities and some differences and how they are interconnected. Some researchers know of Green Supply Chain Management while and they have Closed Loop and Reverse Supply chain as a strategy for GSCM specially when they use for environmental purposes, while some researchers applied the Closed Loop supply chain and Reverse Supply Chain in different area and they are not used just as a strategy for GSCM but also just as a part of supply chain management. It is also mentioned that reverse supply chain is a part of Open Loop and Closed Loop supply chain. What is clear is, the area of closed loop, Reverse supply Chain and Green Supply Chain are partially covered by each other despite the fact that they cover other areas of research which is in accordance to achieving the second objective of this research.

What can be done (Future works and)

Finally, based on the third objective, this review paper can help to understand that, what are the area those have the potential for more investigation. This review shows that the majority of efforts in all three topics are manufacturer based while the role of retailer and customers are not considered despite there are some efforts for investigating the role of market but they are not adequate. The customer role even is more ambitious and even the number of studies in this area is less than two other (Manufacturer and Retailer) while The customers (People) are the last chain of this supply chain and their behavior, knowledge attitude, perception, and cultures can impact the supply chain specially when it goes to environmental issues in relation to GSCM, CLSCM and RSCM. As it was mentioned, service sectors such as retailers and hypermarkets are a key players part of supply chain and their rule should be consider especially in GSCM since they work as a service. The barriers for implementing green supply chain management, green close loop and revered supply chain can be investigated in different companies, countries, sectors. The relationship among supply chain management especially reverse supply chain management and closed loop 3Rs and waste management can be discussed thus they overlap each other and can help for solving environmental issues.

References

- Adenso-Díaz, B., Moreno, P., Gutiérrez, E., & Lozano, S. (2012). An analysis of the main factors affecting bullwhip in reverse supply chains. *International Journal of Production Economics*, 135(2), 917-928.
- Agarwal, S.; Kant, R.; Shankar, R. (2020). Evaluating Solutions to Overcome Humanitarian Supply Chain Management Barriers: A Hybrid Fuzzy SWARA—Fuzzy WASPAS Approach. *Int. J. Disaster Risk Reduct.* , 51, 101838.
- Amaro, A. C. S., & Barbosa-Póvoa, A. P. F. D. (2008). Planning and scheduling of industrial supply chains with reverse flows: A real pharmaceutical case study. *Computers & Chemical Engineering*, 32(11), 2606-2625.



- Andiç, E., Yurt, Ö., & Baltacıoğlu, T. (2012). Green supply chains: Efforts and potential applications for the Turkish market. *Resources, Conservation and Recycling*, 58(0), 50-68.
- Anvari, R. (2022). *Implementation of Human Resource Information System* (Vol I). Penerbit UTM: ISBN: 978-983-52-1052-5.
- Anvari, R. Jaberifard, S.A.F and Sohrabi, A. (2022). Training Factors and Individual Characteristics: A Literature Review. The third international conference on modern researches in the field of educational sciences, psychology and social studies of Iran, Tehran, <https://civilica.com/doc/766157>.
- Arimura, T. H., Darnall, N., & Katayama, H. (2011). Is ISO 14001 a gateway to more advanced voluntary action? The case of green supply chain management. *Journal of Environmental Economics and Management*, 61(2), 170-182.
- Bansal, P., & Kilbourne, W. E. (2001). The ecologically sustainable retailer. *Journal of Retailing and Consumer Services*, 8(3), 139-146.
- Bose, I., & Pal, R. (2012). Do green supply chain management initiatives impact stock prices of firms? *Decision Support Systems*, 52(3), 624-634.
- Broek, F. v. d. (2010). Green Supply Chain Management, Marketing Tool or Revolution? *occasion of the inaugural speech*, 35.
- Cardoso, S. R., Barbosa-Póvoa, A. P. F. D., & Relvas, S. (2013). Design and planning of supply chains with integration of reverse logistics activities under demand uncertainty. *European Journal of Operational Research*, 226(3), 436-451.
- Chan, H. K., He, H., & Wang, W. Y. C. (2012). Green marketing and its impact on supply chain management in industrial markets. *Industrial Marketing Management*, 41(4), 557-562.
- CHEN, D.-J., & LIANG, S.-W. (2012). Evaluation of internal cost and benefits for Taiwanese Computer Manufacturers Adopting Green Supply Chains*. *The Asian Journal of Shipping and Logistics Volume 28*
- Chen, J. (2011). The impact of sharing customer returns information in a supply chain with and without a buyback policy. *European Journal of Operational Research*, 213(3), 478-488.
- Chung, S.-L., Wee, H.-M., & Yang, P.-C. (2008). Optimal policy for a closed-loop supply chain inventory system with remanufacturing. *Mathematical and Computer Modelling*, 48(5-6), 867-881.
- CTSH), C. N. (2008). Information Technology as an Enabler for a Green Supply Chain. From Cognizant (NASDAQ: CTSH)



- Das, K., & Chowdhury, A. H. (2012). Designing a reverse logistics network for optimal collection, recovery and quality-based product-mix planning. *International Journal of Production Economics*, 135(1), 209-221.
- Dayna Simpson, a., & Danny Samson. (2008). Developing Strategies for Green Supply Chain Management. *PRODUCTION/OPERATIONS MANAGEMENT*. de la Fuente, M. V., Ros, L., & Cardós, M. (2008). Integrating Forward and Reverse Supply Chains: Application to a metal-mechanic company. *International Journal of Production Economics*, 111(2), 782-792.
- de la Fuente, M. V., Ros, L., & Ortiz, A. (2010). Enterprise modelling methodology for forward and reverse supply chain flows integration. *Computers in Industry*, 61(7), 702-710.
- Department of Environment, C. C. a. W. N. (March 2011). *Reducing Waste: Implementation Strategy 2011–2015*. Retrieved from www.environment.nsw.gov.au
- Dheeraj, N., Visha, N., & Solli, C. (June (2012)). An Overview of Green Supply Chain Management in India [Review Paper]. *Research Journal of Recent Sciences* Vol. 1(6, 6.
- Diabat, A., & Govindan, K. (2011). An analysis of the drivers affecting the implementation of green supply chain management. *Resources, Conservation and Recycling*, 55(6), 659-667.
- Eltayeb, T. K., Zailani, S., & Ramayah, T. (2011). Green supply chain initiatives among certified companies in Malaysia and environmental sustainability: Investigating the outcomes. *Resources, Conservation and Recycling*, 55(5), 495-506.
- Emiliani, M. L. (2004). Sourcing in the global aerospace supply chain using online reverse auctions. *Industrial Marketing Management*, 33(1), 65-72.
- Fortes, J. (2007). Green Supply Chain Management: A Literature Review. *Otago Management Graduate Review*, Volume 7.
- French, M. L., & LaForge, R. L. (2006). Closed-loop supply chains in process industries: An empirical study of producer re-use issues. *Journal of Operations Management*, 24(3), 271-286.
- Georgiadis, P., & Athanasiou, E. (2013). Flexible long-term capacity planning in closed-loop supply chains with remanufacturing. *European Journal of Operational Research*, 225(1), 44-58.
- Gou, Q., Liang, L., Huang, Z., & Xu, C. (2008). A joint inventory model for an open-loop reverse supply chain. *International Journal of Production Economics*, 116(1), 28-42.
- Govindan, K., Soleimani, H, and Kannan, D. (2015). Reverse logistics and closedloop supply chain: A comprehensive review to explore the future. *European Journal of Operational Research*, Vol. 240, No. 3, pp. 603-626.



- Guide Jr, V. D. R., Jayaraman, V., & Linton, J. D. (2003). Building contingency planning for closed-loop supply chains with product recovery. *Journal of Operations Management*, 21(3), 259-279.
- Guo, Y., & Ma, J. Research on game model and complexity of retailer collecting and selling in closed-loop supply chain. *Applied Mathematical Modelling*(0).
- Hammond, D., & Beullens, P. (2007). Closed-loop supply chain network equilibrium under legislation. *European Journal of Operational Research*, 183(2), 895-908.
- Hoejmose, S., Brammer, S., & Millington, A. (2012). “Green” supply chain management: The role of trust and top management in B2B and B2C markets. *Industrial Marketing Management*, 41(4), 609-620.
- Hong, I. H., & Ke, J.-S. (2011). Determining advanced recycling fees and subsidies in “E-scrap” reverse supply chains. *Journal of Environmental Management*, 92(6), 1495-1502.
- Hong, I. H., & Yeh, J.-S. (2012). Modeling closed-loop supply chains in the electronics industry: A retailer collection application. *Transportation Research Part E: Logistics and Transportation Review*, 48(4), 817-829.
- Huang, S.-M., & Su, J. C. P. (2013). Impact of product proliferation on the reverse supply chain. *Omega*, 41(3), 626-639.
- Jian, C., Xuhong, Y., Yu, Q., & Yiner, L. (2011). An Integrative Decision-making Model for the Operation of Sustainable Supply Chain in China. *Energy Procedia*, 5(0), 1497-1501.
- Johnny C. Ho, Maurice K. Shalishali, Tzu-Liang (Bill) Tseng, & David S. Ang. (Spring 2009). opportunities in green supply chain management *The Coastal Business Journal Volume 8, Number 1*, 14. Jolley, G. J. (Winter 2009). Green Supply Chain Management Practices Complement EMS Systems. *sustainable enterprise quarterly, Volume 5, Number 1*.
- Kainuma, Y., & Tawara, N. (2006). A multiple attribute utility theory approach to lean and green supply chain management. *International Journal of Production Economics*, 101(1), 99-108.
- Kenné, J.-P., Dejax, P., & Gharbi, A. (2012). Production planning of a hybrid manufacturing–remanufacturing system under uncertainty within a closed-loop supply chain. *International Journal of Production Economics*, 135(1), 81-93.
- Kocabasoglu, C., Prahinski, C., & Klassen, R. D. (2007). Linking forward and reverse supply chain investments: The role of business uncertainty. *Journal of Operations Management*, 25(6), 1141-1160.
- Kusumastuti, R. D., Piplani, R., & Hian Lim, G. (2008). Redesigning closed-loop service network at a computer manufacturer: A case study. *International Journal of Production Economics*, 111(2), 244-260.



- Kuo, T.-C.; Muniroh, M.; Fau, K.H. (2021). An Integrated Kano Model, Fuzzy Analytical Hierarchy Process, and Decision Matrix for Sustainable Supplier Selection in Palm Oil Industries Indonesia, a Case Study. *Processes*, 9, 1078.
- Lee, C., Realff, M., & Ammons, J. (2011). Integration of channel decisions in a decentralized reverse production system with retailer collection under deterministic non-stationary demands. *Advanced Engineering Informatics*, 25(1), 88-102.
- Lina, R.-J., , R.-H. C., , T.-H. N., & (2011). Green supply chain management performance in automobile manufacturing industry under uncertainty *Elsevier*.
- Liu, S., Kasturiratne, D., & Moizer, J. (2012). A hub-and-spoke model for multi-dimensional integration of green marketing and sustainable supply chain management. *Industrial Marketing Management*, 41(4), 581-588.
- Lundin, J. F. (2012). Redesigning a closed-loop supply chain exposed to risks. *International Journal of Production Economics*, 140(2), 596-603.
- Ma, W.-m., Zhao, Z., & Ke, H. Dual-channel closed-loop supply chain with government consumption-subsidy. *European Journal of Operational Research*(0).
- Melo, M. T., Nickel, S., & Saldanha-da-Gama, F. (2009). Facility location and supply chain management – A review. *European Journal of Operational Research*, 196(2), 401-412.
- Minner, S. (2001). Strategic safety stocks in reverse logistics supply chains. *International Journal of Production Economics*, 71(1–3), 417-428.
- Mitra, S. (2012). Inventory management in a two-echelon closed-loop supply chain with correlated demands and returns. *Computers & Industrial Engineering*, 62(4), 870-879.
- Nagurney, A., & Toyasaki, F. (2005). Reverse supply chain management and electronic waste recycling: a multitiered network equilibrium framework for e-cycling. *Transportation Research Part E: Logistics and Transportation Review*, 41(1), 1-28.
- Nativi, J. J., & Lee, S. (2012). Impact of RFID information-sharing strategies on a decentralized supply chain with reverse logistics operations. *International Journal of Production Economics*, 136(2), 366-377.
- Ofori, G. (2000). Greening the construction supply chain in Singapore. *European Journal of Purchasing & Supply Management*, 6(3–4), 195-206.
- Olugu, E. U., & Wong, K. Y. (2012). An expert fuzzy rule-based system for closed-loop supply chain performance assessment in the automotive industry. *Expert Systems with Applications*, 39(1), 375-384.
- Olugu, E. U., Wong, K. Y., & Shaharoun, A. M. (2011). Development of key performance measures for the automobile green supply chain. *Resources, Conservation and Recycling*, 55(6), 567-579.



- Östlin, J., Sundin, E., & Björkman, M. (2008). Importance of closed-loop supply chain relationships for product remanufacturing. *International Journal of Production Economics*, 115(2), 336-348.
- Paksoy, T., Bektaş, T., & Özceylan, E. (2011). Operational and environmental performance measures in a multi-product closed-loop supply chain. *Transportation Research Part E: Logistics and Transportation Review*, 47(4), 532-546.
- Pishvaei, M. S., Rabbani, M., & Torabi, S. A. (2011). A robust optimization approach to closed-loop supply chain network design under uncertainty. *Applied Mathematical Modelling*, 35(2), 637-649.
- Prahinski, C., & Kocabasoglu, C. (2006). Empirical research opportunities in reverse supply chains. *Omega*, 34(6), 519-532.
- Qiang, Q., Ke, K., Anderson, T., & Dong, J. (2013). The closed-loop supply chain network with competition, distribution channel investment, and uncertainties. *Omega*, 41(2), 186-194.
- Rahman, S., & Subramanian, N. (2012). Factors for implementing end-of-life computer recycling operations in reverse supply chains. *International Journal of Production Economics*, 140(1), 239-248.
- Ramkumar, N., Subramanian, P., Narendran, T. T., & Ganesh, K. (2011). Erratum to “A genetic algorithm approach for solving a closed loop supply chain model: A case of battery recycling” [Appl. Math. Modell. 34 (2010) 655–670]. *Applied Mathematical Modelling*, 35(12), 5921-5932.
- Rupa, Rasheda & Mohammad Saif, Abu Naser. (2021). Impact of Green Supply Chain Management (GSCM) on Business Performance and Environmental Sustainability: Case of a Developing Country. *Business Perspectives and Research*.
- Sarkis, J. (2003). A strategic decision framework for green supply chain management. *Journal of Cleaner Production*, 11(4), 397-409.
- Sarkis, J., Zhu, Q., & Lai, K.-h. (2011). An organizational theoretic review of green supply chain management literature. *International Journal of Production Economics*, 130(1), 1-15.
- Schultmann, F., Zumkeller, M., & Rentz, O. (2006). Modeling reverse logistic tasks within closed-loop supply chains: An example from the automotive industry. *European Journal of Operational Research*, 171(3), 1033-1050.
- Seuring, S., & Müller, M. (2008). From a literature review to a conceptual framework for sustainable supply chain management. *Journal of Cleaner Production*, 16(15), 1699-1710.
- Shang, K.-C., Lu, C.-S., & Li, S. (2010). A taxonomy of green supply chain management capability among electronics-related manufacturing firms in Taiwan. *Journal of Environmental Management*, 91(5), 1218-1226.



- Sheu, J.-B. (2008). Green supply chain management, reverse logistics and nuclear power generation. *Transportation Research Part E: Logistics and Transportation Review*, 44(1), 19-46.
- Sikhar, B., Gaurav, A., Zhang, W. J., Biswajit, M., & Tiwari, M. K. (2012). A decision framework for the analysis of green supply chain contracts: An evolutionary game approach. *Expert Systems with Applications*, 39(3), 2965-2976.
- Simonetto, M.; Sgarbossa, F.; Battini, D.; Govindan, K. Closed Loop Supply Chains 4.0: From Risks to Benefits through Advanced Technologies. A Literature Review and Research Agenda. *Int. J. Prod. Econ.* 2022, 253, 108582.
- Sudheer Gupta, & Desai, O. D. P.-. (2011). Sustainable supply chain management: Review and research opportunities. *IIMB Management Review*.
- Testa, F., & Iraldo, F. (2010). Shadows and lights of GSCM (Green Supply Chain Management): determinants and effects of these practices based on a multi-national study. *Journal of Cleaner Production*, 18(10–11), 953-962.
- Tseng, M.-L., & Chiu, A. S. F. (2010). Evaluating firm's green supply chain management in linguistic preferences. *Journal of Cleaner Production*(0).
- Walker, H., Di Sisto, L., & McBain, D. (2008). Drivers and barriers to environmental supply chain management practices: Lessons from the public and private sectors. *Journal of Purchasing and Supply Management*, 14(1), 69-85.
- Wang, F., Lai, X., & Shi, N. (2011). A multi-objective optimization for green supply chain network design. *Decision Support Systems*, 51(2), 262-269.
- Wang, H., & Hsu, H.-W. (2010). A closed-loop logistic model with a spanning-tree based genetic algorithm. *Computers & Operations Research*, 37(2), 376-389.
- Wei, J., & Zhao, J. (2011). Pricing decisions with retail competition in a fuzzy closed-loop supply chain. *Expert Systems with Applications*, 38(9), 11209-11216.
- Wei, J., & Zhao, J. (2013). Reverse channel decisions for a fuzzy closed-loop supply chain. *Applied Mathematical Modelling*, 37(3), 1502-1513.
- Wen-hui, X. I. A., Dian-yan, J. I. A., & Yu-ying, H. E. (2011). The remanufacturing reverse logistics management based on Closed-loop supply chain management processes. *Procedia Environmental Sciences*, 11, Part A(0), 351-354.
- Wu, Z., & Pagell, M. (2011). Balancing priorities: Decision-making in sustainable supply chain management. *Journal of Operations Management*, 29(6), 577-590.
- Xiao, T., Shi, K., & Yang, D. (2010). Coordination of a supply chain with consumer return under demand uncertainty. *International Journal of Production Economics*, 124(1), 171-180.
- Yan, N. (2012). Dynamic Models and Coordination Analysis of Reverse Supply Chain with Remanufacturing. *Physics Procedia*, 24, Part B(0), 1357-1363.



- Yang, P. C., Chung, S. L., Wee, H. M., Zahara, E., & Peng, C. Y. Collaboration for a closed-loop deteriorating inventory supply chain with multi-retailer and price-sensitive demand. *International Journal of Production Economics*(0).
- Yang, P. C., Wee, H. M., Chung, S. L., & Ho, P. C. (2010). Sequential and global optimization for a closed-loop deteriorating inventory supply chain. *Mathematical and Computer Modelling*, 52(1–2), 161-176.
- Zhou, F. (2009). Study on the Implementation of Green Supply Chain Management in Textile Enterprises *journal of sustainable development*, Vol2.no1.
- Zhu, Q., Geng, Y., Sarkis, J., & Lai, K.-h. (2011). Evaluating green supply chain management among Chinese manufacturers from the ecological modernization perspective. *Transportation Research Part E: Logistics and Transportation Review*, 47(6), 808-821.
- Zhu, Q., & Sarkis, J. (2006). An inter-sectoral comparison of green supply chain management in China: Drivers and practices. *Journal of Cleaner Production*, 14(5), 472-486.
- Zhu, Q., Sarkis, J., & Lai, K.-h. (2007a). Green supply chain management: pressures, practices and performance within the Chinese automobile industry. *Journal of Cleaner Production*, 15(11–12), 1041-1052.
- Zhu, Q., Sarkis, J., & Lai, K.-h. (2007b). Initiatives and outcomes of green supply chain management implementation by Chinese manufacturers. *Journal of Environmental Management*, 85(1), 179-189.
- Zhu, Q., Sarkis, J., & Lai, K.-h. (2012). Green supply chain management innovation diffusion and its relationship to organizational improvement: An ecological modernization perspective. *Journal of Engineering and Technology Management*, 29(1), 168-185.

Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4>).

