

# The Practices of Green Supply Chain Management towards Corporate Performances in Construction Industry

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**Abstract**— *Green Supply Chain Management (GSCM) practices has different impact on the corporate performances while practitioners are not willing to implement practices that is irrelevant to their organization. Hence, to ensure the most appropriate investment on GSCM is implemented, this study is conducted to identify the relationship between GSCM practices and corporate performances in Malaysia construction industry. To conduct a literature review to figure the relationship between GSCM practices and corporate performances. Systematic literature review method is adopted in data collection stage. The findings of the study show that the green practices are correlated to the corporate performances and a comprehensive conceptual framework is formed from this study to describe the relationships between GSCM practices and corporate performances in Malaysia construction industry. Research on GSCM in Malaysia is still less in construction industry and the findings will provide crucial insights for potential practitioners due to it consistency with prior studies which are related to GSCM in other industries and countries. Implementation of GSCM improves corporate performances in various dimensions. The construction industry should understand the functions and relationship of each element in GSCM to achieve best performance outcome in the form they desired. A comprehensive conceptual framework which shows the relationships of GSCM and its impact construction industry which allow the potential practitioners to understand the potential improvement in corporate performances is constructed through the systematic literature review.*

**Keywords**— *Construction industry, green, green supply chain management, corporate performances, Malaysia*

## 1. Introduction

The issues of climate changes, the depletion of natural resources and greenhouse gases

have been discussed aggressively due to these environmental problems that have affected the world. [1] has said that integrating environmental concerns into supply chain in order to greening the supply chain in firms and industry is one of the effective solutions. Hence, as [2] highlighted that construction industry as one of the industries that majorly contributes to the pollution of environment and more effort should be done to identify their performances in mitigating the environmental impacts while improving their corporate performances is necessary.

A comprehensive framework that can fully describe the flow of Green Supply Chain Management (GSCM) and the impacts on corporate performances is important in the implementation of green initiatives but there is still lack of consensus framework which can be treated as guideline for practitioners [3]. Without a consensus and proper framework to guide, practitioners will might face failures during the practice [4]. However, there are various GSCM practices that can affect different corporate performances, without supporting framework in practicing GSCM, it will be difficult to improve GSCM implementation further in construction industry.

Practicing GSCM practices does not means to adopt every practice but pick only relevant green initiatives that can improve the necessary corporate performances [5]. With the aid of comprehensive framework, organizations can pick the most adequate practices from GSCM and increase their performances based on their requirement. Hence, this study is intended to identify the components of consensus framework by adopting systematic literature review on existing literature review which will show the relationships between the

implementation of GSCM and corporate performances in Malaysia construction industry to improve the adoption rate.

## 2. Methodology

This research is using literature review approach where the similar method is used by [6] and [3] to identify the components of consensus framework between GSCM practices and corporate performances. A conceptual framework will be developed and it is believed that the constructed conceptual framework can contribute to the adoption and application of GSCM based on a survey of extant literature and grey literature. To obtain the related journal papers, the science journal databases such as Emerald Insight, Science Direct and Google Scholar are used in this study. Science Direct is chosen in this study because it is one of the leading databases in the industry as it has numerous of journals that concern on the supply chain management and the green practices operations management. Journals such as Journals of Cleaner Production, Resources and Conservations and Recycling, Transportation Research (Parts A, B, C, D and E), Computers & Industrial Engineering and International Journal of Production Economics. Besides that, Emerald Insight is another popular science database that publishes high quality journal in the field in green operations and supply chain management likes Benchmarking: An International Journal, Supply Chain Management: An International Journal, International Journal of Physical Distribution and Logistics Management, Journal of Manufacturing Technology Management and International Journal of Operations and Production Management.

### *Literature collection*

The purpose of this paper is to review the literature in the past decade on GSCM. Therefore, the impacts of GSCM practices on corporate performances will be reviewed by studying the academic peer-reviewed journals in GSCM literature. In order to obtain an internationally recognized result, only articles published in English language will be selected and studied. The selected databases were explored using a structural keyword search to find the related article in the field. The terms such as “*Green Supply Chain Management*”,

“*Green Supply Chain*”, “*corporate performances*” and “*performances*” were used to search the relevant articles. The purpose of using these keywords are derived from the adoption in previous literature reviews [7]. The using of these keywords is to ensure the relevant papers are selected into the study and unintended omissions can be prevented.

### *Screening of relevant literature*

The relevant journal articles obtained from the databases by searching the keyword give over a thousand articles as return. These articles included the research papers and conference proceedings. Therefore, to ensure the collected literature papers are in the area of study, some terms and conditions are established to filter out non-related results in order to improve the reliability of the obtained results and to avoid the overlapping of publications [8]. Furthermore, only articles published over the past decade (2009-2018) will be taken into account to ensure the trends and researches are the latest. [9] has suggested that reading the abstracts of the journal paper to filter out the irrelevant papers from selection to save works and time. By reading the abstracts, irrelevant papers can be removed from the review in this study. 150 articles from 38 journals have been selected to be reviewed in this study.

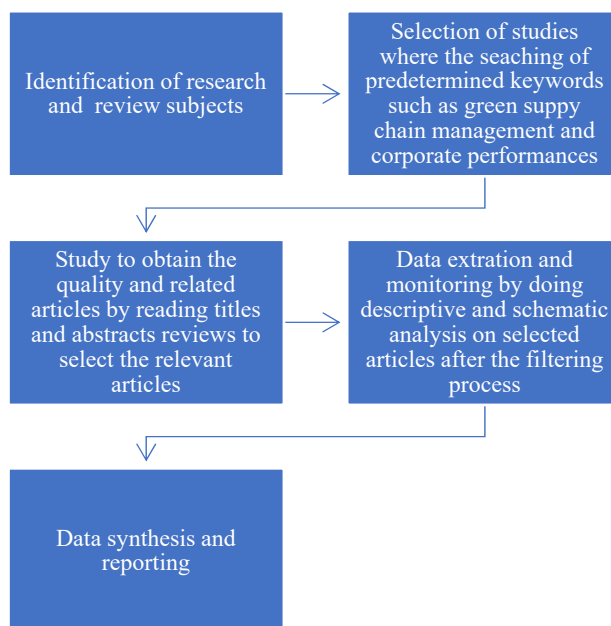
**Table 1:** Inclusion and exclusion criteria of selecting articles

Criteria	Reason for inclusion/exclusion
<b>Inclusion criteria</b>	
Publications from 2009 to 2018	The journal paper works regarding performance measurement and management in GSCM, starting back at the introduction of the Journal of Manufacturing Technology Management
Articles in English language	Almost all academic journals are published in English. Although certain researches are made in author's mother tongue

	but these researches are translated into English
Articles address sustainability, green environmental and corporate performances issues	To ensure the term “green” was applied to environmental, economic growth in long/short term, social and operational of green practices in supply chain management issues
Articles provided management tools	To ensure the focus was on management appliances that dealing with corporate performances measurement in GSCM practices
Scholarly published articles	To provide more robust and rigid useful knowledge in the GSCM field
<b>Exclusion criteria</b>	
Articles that not focusing in any of the primary fields of inquiry, including Green or sustainability, supply chain and corporate performances measurement.	The intention of this review is to study the literatures that discussed GSCM impacts on corporate performances and a reference has to be made to at least one of the main areas of inquiry
Conference papers, working papers, technical reports and practical handbooks	To guarantee the quality and consistency in the study, all articles must be peer-reviewed.

*Category Selection*

Since the required dimensions of GSCM characteristics have been covered, appropriate analysis of existing structure of facts can be carried out. In order to carry out the literature review, a structured procedure is developed to ensure effective process of literature review is carried out [7]. Below are the methodological stages suggested by [10] to conduct a systematic literature review.

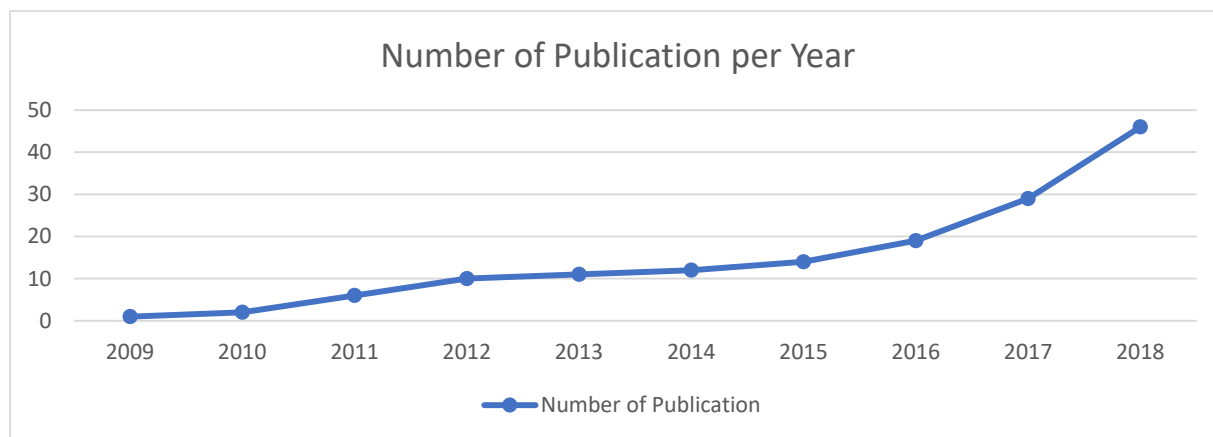


**Figure 1:** The procedure of systematic literature review

Different research methodology adopted in journal papers will reflects the sources of gathered data and various obtained results can make good comparison to support the acquired conclusions. The selected articles will be categorized into different research methodology type where every article will be analysed and figure out their adopted research methodology in the articles which also done by [11]. This theory-building research can be classified into five main groups which are the survey, mathematical modelling, conceptual framework, qualitative methods and literature review.

Next, [12] has highlighted the important to identify the practice of GSCM in every different country as different cultures and perspectives will cause different result. Therefore, the selected articles were also classified on the basis of physical boundaries and locations where the articles are categorized according to their countries. The reason for this category is to differentiate the standard of the organizations from different countries in the GSCM practices towards the corporate performances in their supply chains as the culture of divergent countries are believed to bring different impacts on the corporate performances.

Furthermore, this study is intended to figure out the trend of GSCM practices in the last 10 years, thus, the selected articles are divided into journal type where the selected journal papers were spread across variety of industry, technology and



operations journal where the contribution of each selected journal towards the existing body of knowledge in the GSCM area is shown.

Moreover, the difference in industries will also have different effective factors that will cause different degree of impacts toward the corporate performances. Therefore, it is important to gather every impact of GSCM towards corporate performances in different industry to obtain the most accurate results. Hence, selected articles should be classified by their industries such as manufacturing, service and other industries such as mining, information technology, construction, banking, retails, tourism and education.

Lastly, every selected journal article is read and the corporate performances that affected by GSCM practices is identified. These practices will be analyzed based on their impact rate and eventually identify the components of the conceptual framework in construction industry that is practicable in construction industry.

### 3. Analysis and Discussion

#### 3.1. Descriptive analysis

##### 3.1.1. Publication per Year

Initially, the frequency analysis is applied in the descriptive analysis to provide an overview of the statistic on the 150 selected articles to obtain the trend of GSCM practices. In figure 2, the number of articles indexed by SCOPUS publication per year is indicated. The reported figure of publications per year shows that the publication trends is increasing over years. From the figure shown, it illustrates the number of papers that published from 2009 to 2018 where the publication trend is increasing every year which can prove that the awareness level and interest among researchers in GSCM is improving year by year.

**Figure 2:** Number of Publication per Year

##### 3.1.2. Publication on Journal Papers

Furthermore, an overview of quality journals frequencies and types for the identified publications is shown in Table 2. This analysis is known as the pattern and distribution of publications in different journals. Core journals are the journals where most of the articles of a particular research field are published while the next relevant journals are equally important in the research field [13]. The selected articles are widely spread across the management, technology and operations journals. This proof the contribution of the journals on GSCM practices on existing body of knowledge.

There is total of 40 journals which have published articles on GSCM practices and corporate performances until the end of 2018. There are 20 journals that have published only 1 or 2 papers which related to the topic. The top five journals which publish most of the articles can be considered as the core journals in this particular field which are the *Journal of Cleaner Production*, *Benchmarking: An International Journal*, *Resources, Conservation and Recycling*, *Supply Chain Management: An International Journal* and *International Journal of Production Economics*. The core journals contributed 50.3% of all publications with 76 of the 150 papers. The next 12 relevant journals published 51 of the 150 papers which is 33.8%. The remaining journals contributed to 24 of 150 papers (15.9%).

**Table 2:** Journal Frequency

No.	Journal	Frequency
<b>Core Journals</b>		
1	Journal of Cleaner Production	40
2	Benchmarking: An International Journal	11
3	Supply Chain Management: An International Journal	9
4	Resources, Conservation and Recycling	8
5	International Journal of Production Economics	8
<b>Total number of publications in core journals</b>		76
<b>Next Relevant Journals</b>		
6	International Journal of Physical Distribution & Logistics Management	6
7	Transportation Research	6
8	Computers & Industrial Engineering	4
9	International Journal of Operations & Production Management	4
10	Journal of Modelling in Management	4
11	Management Research Review	4

12	The International Journal of Logistics Management	4
13	Competitiveness Review	3
14	Journal of Manufacturing Technology Management	3
15	Expert Systems with Applications	3
16	Industrial Management & Data Systems	3
17	International Journal of Productivity and Performance Management	3
<b>Total number of publications in next related journals</b>		51
<b>Others</b>	20 Journals (with 1 or maximum 2 entries)	23
<b>Total</b>		150

### 3.2. Content Analysis

#### 3.2.1. Geographical Location

Geographical location of each published article has been recorded in this study and shown in Figure 3. [12] believes that different country and industry will have different impact on the GSCM practices and corporate performances. Hence, every publication on different country should be taken into account. Contribution from developing country might be greater than developed countries. Figure 3 clearly indicates that the publication in India, China and Brazil is far more than other countries and this means these countries have made significant contributions on GSCM practices on the green practices field. This is followed by Taiwan, USA and United Kingdom. Therefore, there is tremendous chance in GSCM practices as more than 80% of the countries where researchers have yet to explore the practice and implementation in GSCM field. Since there might be articles that published in

mother tongue other than English language, such as China and Brazil. Thus, Figure 3 may only show partial of the reality.

norms to be followed. Therefore, the selected articles were classified into different industries mentioned in the studies to ease the classification

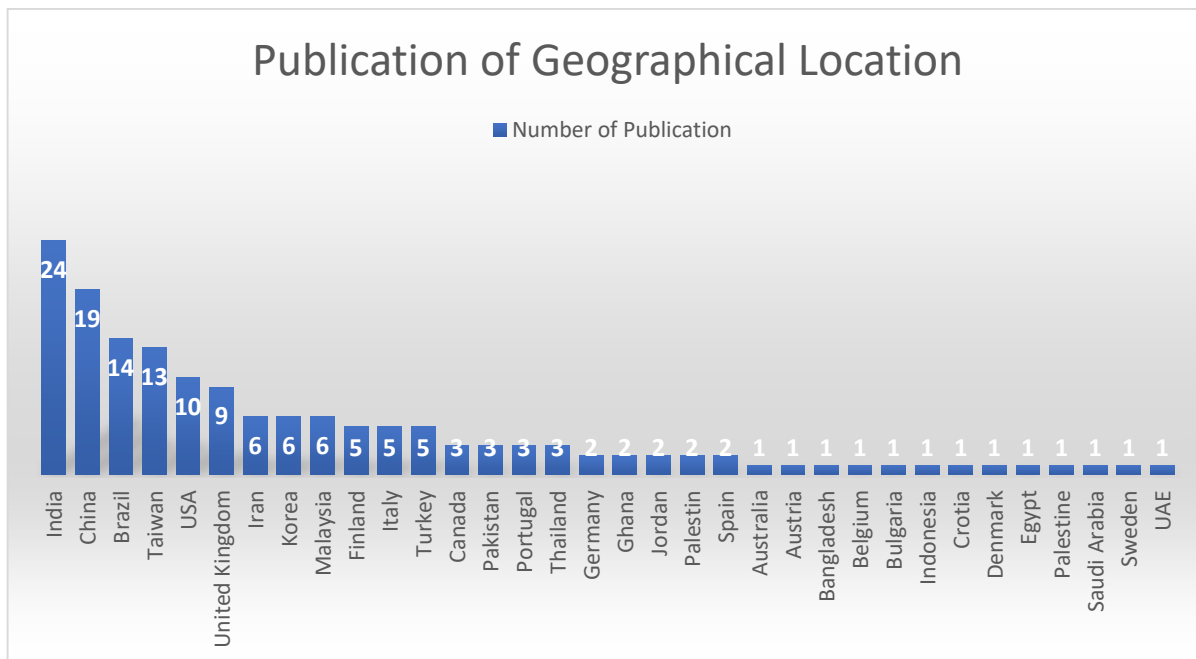


Figure 3: Geographical location

### 3.2.2. Research Methodology Adopted in Journal Articles

Next, the basis of adopted methodology in the articles is classified. [3] have classified their articles in terms of the adopted methodology where the theory-building research can be classified into five groups: survey, mathematical modelling, literature review, qualitative methods and conceptual model. The major adopted research methodology is survey and mathematical modelling which is 39.74% and 21.85% respectively as shown in the figure 3 below. These two research methodologies have occupied more than 50% of the selected articles. Since most of the articles are adopting survey methodology, in the effort on ensuring every survey type research paper is qualified, most of the journals like International Journal of Production Economics and International Journal of Logistics Management have clearly stated that any article that does not achieve the scientific rigors will be rejected [3].

### 3.2.3. Type of Industry

Type of industry is important in deciding the appropriate practices adopted from GSCM as every single industry has their own regulations and

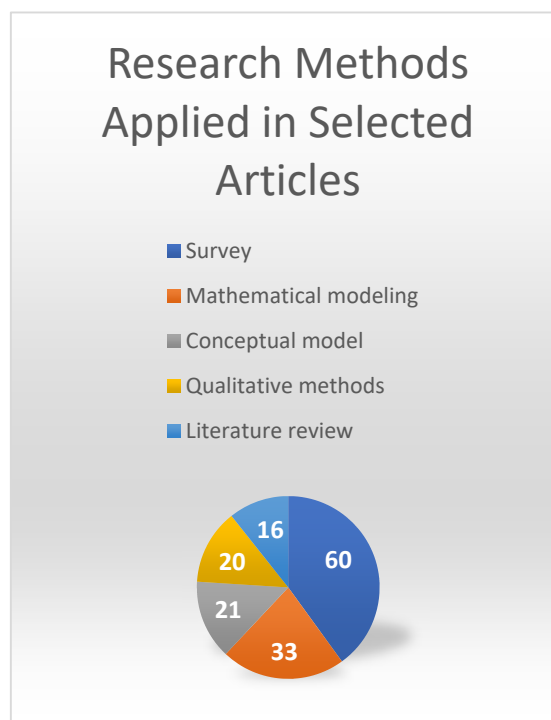
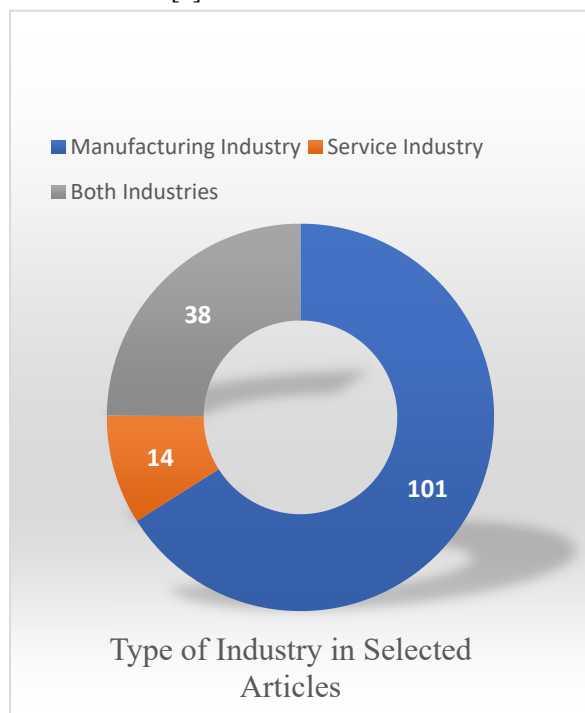


Figure 4: Research Methods Applied in Selected Articles

works. From this study, 65.58% of the selected articles are focusing on the manufacturing sector while the service sector gained only 9.09%. The remaining 25.32% are focusing on both sectors. This shows that most of the environmental issues are caused by manufacturing sector whereas the service

sector cause only minimal effect toward the environmental [7].



**Figure 5:** Type of Industry That Implemented GSCM Practices

#### 4. Overview of Green Supply Chain Management

GSCM in construction industry can be defined as a multiple step of actions start from the design stage to the end of the building life that integrated into the conventional supply chain network which concern about the environmental protection, economic benefits and social improvement which eventually can minimize and eliminate the negative impacts of the supply chain on the environment [14]. In [15] study, The steps mentioned in the definition are green design, green manufacturing, green purchasing, green transportation and reverse logistic that implemented into the traditional approach of supply chain network [16, 17].

[18] and [19] highlighted that GSCM starts to obtain attention in Malaysia in since ten years ago, especially in certain manufacturing companies related to construction industry such as [20] that studied on the outcome of green supply chain initiative among ISO 14001 firms and [21] that investigated the impact of internal and external factors on environmental performance. GSCM practices have been proved to bring improvement in environmental performance. Furthermore, it is also

improving the economic performance, social performance and operational performance of the practitioners' organization in foreign countries [22]. However, most of the studies are only focusing on the environmental performances and construction industry is lacking of a comprehensive framework to guide practitioners in GSCM implementation [3].

There are few main practices in green supply chains which starts from the green design, then followed by the green manufacturing, green purchasing, green logistic and reverse logistic [18, 19, 23, 24]. These practices are categorized under the pro-active practices where organization practice these practices based on their own willingness and awareness toward the importance of protecting the environment [19].

#### 4.1. Green Supply Chain Management Practices

##### *Green Design*

The importance of green design has been highlighted by [25-28] saying that controlling the design of product can reduce up to 80 percent of the environmental impact caused at the product consumption stage. According to [29] green design is fall into two main categories which are the design of products [30, 31] and the design of packaging [26, 32]. Therefore, by making good the design of product in the supply chain will have better cost saving than making rectification after the production [15, 23, 33]. Moreover, [34] and [35] think that the design of packaging is also influencing the environmental impact as the method of purchasing and transportation trip will also affect the total materials used for packaging and volume of greenhouse gases air emission.

In construction industry, the design stage is the most important stage in the whole project as it gives the largest impacts including time, cost and quality [36]. Thus, it is important to start the construction design with an environmental impact assessment on the adjacent environment where any potential impact can be found earlier [37, 38]. Besides that, additional consideration of the climate conditions and building forms in the building design can make the outcome more ideal as the life cycle management might be greener toward environment due to efficiently saving in energy consumption [36, 39-41].

### *Green Purchasing*

Green purchasing was first introduced in 1994 in manufacturing industry [42-44]. Green purchasing is proven to improve the environmental and economy performance of a corporate as it shows the possibility of saving cost by buying stocks and products in bulk quantity where the packaging materials and logistics consumption can be reduced [19, 45-47]. An organization who act as buyer in the supply chain will pick their suppliers based on their green achievement and environmental performance and green purchasing strategy provide great opportunities for cost savings [48-50]. Therefore, buying organizations will collaborate and cooperate which include the training, information sharing and joint research results with their suppliers to ensure suppliers are qualified in terms of green practices [51-53]. In construction project, the consideration of implementing green purchasing should be started in the pre-qualification stage where participants of tender must possess environmental management system (EMS) and international organization for standardization (ISO) 14001 certification [16].

However, most of the suppliers are just achieving minimum requirement by only adopt environmental systems that are not strictly supervised and monitored [19] and only implement in initial stages [44]. Hence, it is vital that maximizing the effect of external factors like customer pressure to adopt the environmental management systems like ISO 14001 effectively [54-56]. Moreover, the utilisation of 3R concept like recycling, reusing and reduction of available materials is greatly related to green purchasing practice [27, 29, 57, 58]. To practice green purchasing efficiently, additional compliance and evaluative approach to GSCM practices of buying organizations' supplier is important as these evaluations are based on suppliers' environmental criteria performances and suppliers are required to implement environmental management systems in their organizations in order to strengthen the environmental performance [1, 34, 59].

### *Green Manufacturing*

Green manufacturing can be understood as the optimisation of manufacturing efficiency when producing a product to increase the productivity while minimizing the environmental impacts of production of final end products in the supply chain

[16, 60, 61]. [62] and [46] has suggested the use of automation in production line, wastewater recycling technology [63] and fuel-efficient machinery and energy efficient materials [64] in green manufacturing process. These efforts will maximize the impacts of green manufacturing activities toward environmental [60, 65, 66].

In construction industry, the manufacturing process does not stop in the factory but the process continues on construction site [16]. The construction of the building in a construction project is considered as one of the manufacturing processes. Therefore, the optimization of on-site construction practices will minimize the environmental impacts of construction [16, 67, 68]. The improvement of technology has led to the adoption offsite-prefabrication such as Industrial Building System (IBS) and engineered formworks [69, 70]. The construction materials suppliers' selection and evaluation for construction site activities are as important as the procedure in manufactory [16].

### *Green Logistic*

Green logistic can be understood as a series of activities that mitigating the negative impacts on environment during the movement of supplying materials which including the optimization of fuel, reducing the emission of exhaust perfume from logistic process and decreasing the level of pollution toward environment [31, 71, 72]. Green logistic concerning on environmentally friendly and effective logistic approach which including land, sea and air transport [15, 73]. Green logistic is proved to have significant impact on purchasing, packaging and transportation during the green purchasing, green distribution, green marketing and reverse logistic activities [15].

Large retailing and manufacturing firms frequently need quality and efficient logistic activities between warehouse and buyers to ensure corporate survival [48, 74, 75]. Green logistic also shows positive impacts in outbound logistic and financial performance on corporate competitiveness where improved quality, productivity, efficiency of delivery is recorded [15, 76-78]. In construction industry, the logistic activities are even more and this need more attention to ensure the completion of construction project within the allowance time frame [16].



### *Reverse Logistic*

Reverse logistic has been highlighted as green initiative that has impressive economic return and will improve organizational competitiveness among competitors in the market [25, 79-81]. Although reverse logistic is proved to have significant impact toward the organizational performances, reverse logistic is always fall behind other practices in GSCM [19, 26, 82]. This statement is further strengthen by [83] research where the research shows that most of the reverse logistic practice in developing countries is still at initial stage even though their manufacturing sector contribution towards the world economy has started to grow larger and larger. Hence, there is necessary to empower more effort in reverse logistic in order to make the practice mature[26].

The practices in reverse logistic are mainly focus on the returning of products and remanufacturing [84], recycling and reuse, and redistribution [85]. According to [85] and [86], the reverse logistic is not only apply on the final products but also on their components and packaging materials where buying organizational bought from their suppliers [26, 27]. This shows that the reverse logistic is not only applied on downstream organizations but also upstream stakeholders [26, 83]. However, most of the construction materials are not returnable, the materials can only be returned after the demolition of building is carried out. Therefore, the importance of planning and energy-efficient execution in demolition works [39, 67, 68]. It is believed that carefully planned demolition can reduce 18% of greenhouse gases emission and energy consumption by 30% [87] while the recycling of materials like steel and aluminium can save about 50% of embodied energy [88]. reverse logistic might be difficult to be implemented at construction sites due to the natural characteristic of construction industry but items such as steel reinforcement bars, wooden formwork and wood pallets that used to stabilize cement bags and bricks can still be delivered to the correct places for reverse logistic purpose. Furthermore, crushed concrete can be sold as crusher run and aggregates to lay as foundation to reduce the percentage of building materials wastage at construction site [89].

### **4.2. Corporate Performances**

Purpose of a firm to decide on implementing GSCM practices is to improve the corporate performances [79, 90-92]. The performances can be the triple bottom line which are the economic, environmental and social performances are usually related to the term “sustainable” but then these performances are taking consideration on the operational performance aspect, it becomes “green” where the effectiveness of workers and quality of products and services are improve in the aspect of operational performance [18, 45, 58]. Therefore, in this study, the operational performance is taking into account along with the triple bottom line in order to have the fairest evaluation and outcomes on the implementation of GSCM examination [15, 30, 93-95].

#### *Environmental Performance*

The environmental performance can be understood as the capability of an organization to decrease the hazardous air emission, reduce all kind of wastage and the capability to lessen the total number of hazardous, harmful and toxic material consumption in products making process and reduce the number of accident related to environmental aspect [35, 45, 96, 97]. There are few more important parts in the environmental performance assessment in an organization [98]. These few related aspects are the green packaging and distribution which is also known as the green transportation and lastly the reverse logistic where the used and thrown end products are collected back to the factory for further process to recycle or remanufacturing in order to create valuable products [32, 98-101].

Construction industry is always known as industry that contribute a lot to the environmental issues [40, 41, 68, 102]. Therefore, practicing GSCM such as green design, green purchasing and suppliers selection are vital and crucial in improving environmental performances as these practices can greatly reduce the wastage while improving the energy efficiency during pre and post construction stage [15, 16, 45]. In these processes, picking the most efficient suppliers will aid in transaction cost, wastes and hazardous materials reduction and improvement in recycling and reuse of raw materials where all these processes are obeying and fulfilling the environmental regulations [15, 103, 104].

### *Economic Performance*

In [45] research, the economic performance is explained as the improvement of financial and marketing performance after the implementation of GSCM in organization [22, 79, 105, 106]. After GSCM practices implementation, the firm's economic performances should be greatly enhanced [18, 30, 107, 108]. The improvement in financial performance can be understood as the decrease of cost in material purchasing, energy consumption, waste material management and handling fees for accidents related to environmental issues [58, 109]. On the other hand, the improvement of marketing performance refers to the increase of profit after sales and performance of average market share growth [18]. Besides, the research results in [27] mentioned the economic performance is highly related to the performance of sales and profit and this can be used as the key performance indicator.

Although [25] and [19] said that green purchasing and reverse logistics are said to be the most significant practices that improve corporate economic performances but reverse logistic might not be suitable in construction industry. Instead, green design is more suitable to be implemented in construction industry as a good green design will ensure in work efficiency, energy efficiency and durability which are appropriate to be adopted in buildings [16].

### *Social Performance*

Social performance in an organization refers many aspects such as practicing corporate social responsibility where the organization act due to their own awareness and responsibility toward the environmental but not due to the enforcement of laws and regulations, financial attraction and other benefits, improving the benefits of employees and enhancing corporate and products brands and reputation [45, 52, 110, 111]. However, it is better if an organization can hit two birds with one stone by implementing GSCM as this will motivate them more to be participated in the program [48, 52, 112, 113].

[15] and [112] highlighted that the social performance will indirectly improve its sales and market share relative to their competitors in the market due to the branding popularity, customers and employees' satisfaction, purchase intention or

customer preference and end product's quality. The execution of GSCM will achieve a balance between organization growth and environmental protection [114]. In the effort to fulfil the customer requirement, organization need to take care of their financial capability and as well as the environmental issues [17, 52, 58].

### *Operational Performance*

Operational performances of an organization can be defined as the capabilities to produce and deliver their products more efficiently in the manner of improvement in quality and decreasing in processing time which ultimately bring improvement in organization marketplace [59, 115, 116]. GSCM will improve operational performances and enhance the opportunity to sell their products will be higher due to the better quality and shorter period of time needed to produce their end products [56, 117, 118]. This might lead to the chance to enter into international markets and increase the size of the organization [45, 119, 120].

Customer satisfaction, internal service quality and the flexibility of suppliers and link between these companies are the criteria that needed to be improved in order to improve organization operational performance [116, 121, 122]. Moreover, the environmental management systems will be integrated into existing supply chain and form GSCM where the effort in recycling and reuse will be focused [15, 65, 66]. Branding is important in construction industry as developer reputation will severely affect the house buyer confidence [16, 123].

## **5. Conceptual Framework**

From the literature review, total of 150 articles from 38 journals have been selected to be reviewed in this study. After a thoroughly analysis, it is identified that the green practices in GSCM will improve the corporate performances and the impacts are considered significant. From the study, green design and reverse logistic are agreed to be the most significant practice green practices that improve the corporate performance in GSCM which are 73.33% and 72.67% respectively. Green purchasing and green manufacturing came to the third and fourth practices that improve the corporate performances within the selected articles recorded 66.67% and 56.00% respectively. Lastly, the green logistic

practice is the most less impact GSCM practice as it only agreed by half of the selected articles that will impact the corporate performances.

Since majority of the selected articles proven and agreed that GSCM practices will significantly improve the corporate performances, the mentioned GSCM practices and affected corporate performances are recorded. From the analysis, components in GSCM conceptual framework from multiple backgrounds have been identified and only components that are appropriate and possible to be included in construction industry are selected. Ultimately, a conceptual framework in construction industry is drawn as below to make as a guideline and reference to practitioners in Malaysia' construction industry.



**Figure 6:** Conceptual Framework

## 6. Conclusion

This attempted to synthesize the published existing literature that addressing GSCM issues and present it in a comprehensive way. The trend and opportunities of research in GSCM have been highlighted through the results obtained. From the descriptive analysis done by this paper, the trend showed publication related to GSCM issues have increased consistently in the past ten years. This can be concluded as the improvement in awareness level

among public and private stakeholders on the environmental matter.

Next, the main objective of the paper is to propose a conceptual framework through key issue that identified from the systematic literature review on existing body of knowledge. The conceptual framework has been structured and aligned from the literature review in the most appropriate way. The results obtained from the literature review are further classified in order to ease the efforts to construct the conceptual GSCM framework. The constructed framework is classified into two main components which are the GSCM practices and the affected corporate performances. Lastly, this conceptual framework is believed to contribute to the interest parties in the field by providing crucial insights for potential GSCM practitioners in construction industry.

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## Appendix

Table 3: Impact of GSCM Practices on Corporate Performances

<b>Impact of GSCM Practices on Corporate Performances</b>	[124]	[125]	[126]	[Lau, 127]	[128]	[Kim & Min, 129]	[130]	[131]	[132]	[93]
<b>Green Practices</b>										
Green Design			/				/	/	/	/
Green Manufacturing		/	/					/	/	
Green Purchasing	/		/	/				/	/	/
Green Logistics	/	/		/	/	/	/	/	/	
Reverse Logistics	/		/	/	/		/	/	/	
Others			/	/	/		/	/	/	/
<b>Corporate Performances</b>										
Environmental Performances	/	/	/	/	/	/	/	/	/	/
Economic Performances		/	/	/	/		/	/	/	/
Social Performances		/	/				/		/	/
Operational Performances		/	/	/			/		/	/

<b>Impact of GSCM Practices on Corporate Performances</b>	[133]	[134]	[135]	[Kung et al., 136]	[137]	[138]	[139]	[140]	[141]	[19]
<b>Green Practices</b>										
Green Design	/	/		/	/		/	/		/
Green Manufacturing				/				/		
Green Purchasing	/				/	/	/	/	/	/
Green Logistics		/			/	/				
Reverse Logistics		/	/	/	/		/	/	/	/
Others	/	/		/	/		/	/	/	/
<b>Corporate Performances</b>						/				
Environmental Performances	/	/	/	/	/	/	/	/		/
Economic Performances	/	/	/		/		/	/	/	/
Social Performances			/				/			/
Operational Performances	/	/	/	/		/				/



<b>Impact of GSCM Practices on Corporate Performances</b>	[142]	[Wu, 143]	[144]	[145]	[Wang & Sarkis, 146]	[Tseng & Chiu, 147]	[101]	[148]	[149]	[150]
<b>Green Practices</b>										
Green Design	/	/		/		/	/	/	/	/
Green Manufacturing		/	/	/		/	/	/	/	/
Green Purchasing			/	/	/	/	/	/	/	
Green Logistics			/	/	/	/		/	/	/
Reverse Logistics	/	/	/	/	/	/	/		/	
Others	/	/		/	/	/	/	/	/	/
<b>Corporate Performances</b>										
Environmental Performances	/	/	/	/	/	/	/	/	/	/
Economic Performances	/		/		/	/	/		/	
Social Performances		/				/		/		
Operational Performances	/	/				/		/	/	

<b>Impact of GSCM Practices on Corporate Performances</b>	[151]	[152]	[Vanalle & Santos, 153]	[154]	[155]	[156]	[157]	[158]	[159]	[160]
<b>Green Practices</b>										
Green Design	/	/	/	/	/			/	/	/
Green Manufacturing	/	/		/	/	/	/	/		/
Green Purchasing	/	/	/		/			/	/	
Green Logistics	/	/			/	/	/	/		/
Reverse Logistics				/	/		/		/	/
Others		/	/	/	/		/	/	/	/
<b>Corporate Performances</b>										
Environmental Performances	/	/	/	/	/	/	/	/	/	/
Economic Performances	/	/	/			/	/		/	/
Social Performances	/						/	/		
Operational Performances		/	/							

<b>Impact of GSCM Practices on Corporate Performances</b>	[161]	[162]	[72]	[Lee, 163]	[164]	[165]	[100]	[166]	[167]	[168]
<b>Green Practices</b>										
Green Design	/	/	/		/	/	/	/	/	/
Green Manufacturing	/	/				/	/		/	/
Green Purchasing	/	/			/		/	/	/	
Green Logistics					/		/	/	/	/
Reverse Logistics	/	/			/	/	/	/	/	/
Others	/	/	/	/		/	/	/	/	/
<b>Corporate Performances</b>										
Environmental Performances	/	/	/	/	/	/	/	/	/	/
Economic Performances	/	/		/	/	/	/	/	/	/
Social Performances			/	/	/					
Operational Performances	/			/		/	/	/	/	

<b>Impact of GSCM Practices on Corporate Performances</b>	[106]	[169]	[170]	[171]	[172]	[173]	[Sharma & Gandhi, 65]	[7]	[45]	[174]
<b>Green Practices</b>										
Green Design	/	/	/	/	/	/	/	/	/	/
Green Manufacturing		/		/			/	/		
Green Purchasing	/	/	/	/		/	/		/	/
Green Logistics		/					/	/		
Reverse Logistics	/	/	/	/	/	/	/	/	/	/
Others	/	/	/	/		/	/	/	/	/
<b>Corporate Performances</b>										
Environmental Performances	/	/	/	/	/	/	/	/	/	/
Economic Performances	/	/	/		/		/	/	/	/
Social Performances		/	/				/	/	/	/
Operational Performances		/		/	/		/		/	

<b>Impact of GSCM Practices on Corporate Performances</b>	[175]	[176]	[177]	[178]	[179]	[180]	[77]	[181]	[Wu & Barnes, 182]	[183]
<b>Green Practices</b>										
Green Design			/	/		/	/	/	/	
Green Manufacturing		/	/	/		/		/	/	/
Green Purchasing					/	/	/	/	/	
Green Logistics			/		/	/		/	/	/
Reverse Logistics		/		/	/	/		/	/	/
Others	/	/		/	/	/	/	/	/	/
<b>Corporate Performances</b>										
Environmental Performances	/	/	/	/	/	/	/	/	/	/
Economic Performances	/	/	/	/	/	/	/	/	/	/
Social Performances		/		/				/		
Operational Performances		/					/	/		/

<b>Impact of GSCM Practices on Corporate Performances</b>	[184]	[185]	[186]	[187]	[188]	[44]	[57]	[55]	[116]	[189]
<b>Green Practices</b>										
Green Design		/		/	/	/	/	/		
Green Manufacturing	/	/		/	/		/			
Green Purchasing	/	/	/	/	/	/	/	/	/	/
Green Logistics	/	/		/			/			
Reverse Logistics	/	/		/	/					/
Others		/		/	/	/		/	/	/
<b>Corporate Performances</b>										
Environmental Performances	/	/	/	/	/	/	/	/	/	/
Economic Performances	/	/	/	/	/	/	/	/	/	/
Social Performances			/	/						/
Operational Performances			/	/				/	/	/

<b>Impact of GSCM Practices on Corporate Performances</b>	[122]	[190]	[27]	[120]	[58]	[191]	[192]	[193]	[Yang, 194]	[195]
<b>Green Practices</b>										
Green Design	/	/	/	/	/	/	/	/	/	/
Green Manufacturing	/		/	/		/		/	/	/
Green Purchasing	/	/	/	/	/		/	/		/
Green Logistics			/	/				/	/	/
Reverse Logistics	/	/	/	/	/	/	/	/	/	/
Others	/	/	/	/	/		/	/	/	/
<b>Corporate Performances</b>										
Environmental Performances	/	/	/	/	/	/	/	/	/	/
Economic Performances	/	/	/		/		/	/	/	/
Social Performances			/		/		/		/	/
Operational Performances	/	/	/	/	/		/	/	/	/

<b>Impact of GSCM Practices on Corporate Performances</b>	[196]	[197]	[198]	[199]	[Zhu & He, 200]	[103]	[53]	[201]	[202]	[203]
<b>Green Practices</b>										
Green Design	/		/	/	/	/		/	/	
Green Manufacturing		/	/	/		/		/		/
Green Purchasing				/		/	/	/		/
Green Logistics	/	/	/					/	/	
Reverse Logistics	/		/			/		/		
Others	/		/	/		/	/	/	/	/
<b>Corporate Performances</b>										
Environmental Performances	/	/	/		/	/	/	/	/	/
Economic Performances		/		/	/	/		/	/	/
Social Performances										
Operational Performances						/		/		



<b>Impact of GSCM Practices on Corporate Performances</b>	[204]	[205]	[Li & Huang, 66]	[206]	[46]	[96]	[79]	[26]	[32]	[207]
<b>Green Practices</b>										
Green Design		/	/	/		/		/	/	/
Green Manufacturing	/	/	/	/	/	/	/	/	/	/
Green Purchasing		/	/	/	/		/	/	/	/
Green Logistics	/	/	/	/					/	/
Reverse Logistics	/		/	/		/	/	/	/	/
Others	/	/	/	/					/	/
<b>Corporate Performances</b>										
Environmental Performances		/			/	/	/	/	/	/
Economic Performances	/	/	/	/	/	/	/	/	/	/
Social Performances	/	/	/	/				/	/	/
Operational Performances		/	/	/	/			/	/	/

<b>Impact of GSCM Practices on Corporate Performances</b>	[30]	[208]	[31]	[209]	[210]	[23]	[211]	[18]	[212]	[213]
<b>Green Practices</b>										
Green Design	/		/			/	/			
Green Manufacturing	/		/		/	/	/	/		
Green Purchasing	/		/	/		/	/			
Green Logistics			/	/			/			
Reverse Logistics	/		/	/		/	/			/
Others	/	/	/	/	/	/	/	/	/	
<b>Corporate Performances</b>										
Environmental Performances	/	/	/	/		/	/	/	/	/
Economic Performances	/	/		/	/	/	/	/		/
Social Performances	/				/					/
Operational Performances	/				/		/		/	

<b>Impact of GSCM Practices on Corporate Performances</b>	[109]	[214]	[48]	[215]	[216]	[35]	[217]	[42]	[49]	[50]
<b>Green Practices</b>										
Green Design	/	/		/		/	/	/	/	/
Green Manufacturing		/						/		/

Green Purchasing	/		/		/	/		/	/	/
Green Logistics			/					/		/
Reverse Logistics	/		/	/	/	/	/	/	/	/
Others	/	/	/				/	/	/	/
<b>Corporate Performances</b>										
Environmental Performances	/	/	/	/	/	/	/	/	/	/
Economic Performances	/	/	/		/	/	/	/		/
Social Performances		/	/		/	/		/		
Operational Performances			/		/		/	/		

<b>Impact of GSCM Practices on Corporate Performances</b>	[218]	[219]	[52]	[220]	[99]	[221]	[222]	[223]	[224]	[225]
<b>Green Practices</b>										
Green Design	/	/	/		/	/	/	/	/	
Green Manufacturing						/		/	/	
Green Purchasing		/	/		/	/	/	/	/	/
Green Logistics	/				/	/	/			/
Reverse Logistics	/	/	/	/	/	/	/	/	/	/
Others	/	/	/	/	/	/	/	/	/	
<b>Corporate Performances</b>										
Environmental Performances	/	/	/	/	/	/	/	/	/	/
Economic Performances	/	/	/	/	/	/	/	/		/
Social Performances			/	/		/		/		/
Operational Performances		/			/	/	/			

