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Sustainable organization capabilities in supply chain management

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Abstract

Sustainability has gained growing interests among both practitioners and academics with the environment that we are living in deteriorates. With the consumers' advocate towards sustainability, companies nowadays are also trying to integrate the theme into theirs business operations thus developing sustainable organization capabilities that helps them to compete in the business world. The thesis picks up the angle of supply chain management to study the sustainable organization capabilities because greening the supply chain activities is also an area that's increasingly gaining public recognition.

The literature part of the thesis is fulfilled by reading previous literature on the topic thus providing guidelines for the research. The empirical part is done through the method of systematic review. The comparison between the two parts provides insights for further research. The objective of the thesis is define sustainable organizational capabilities through earlier literature and to explore its application within supply chain management field thus providing useful insights both for practitioners and academics.

The author used a quantitative research method in conducting a qualitative research. The main methodological framework of the thesis is systematic literature review. In addition, for developing the search concept, triple bottom line and Porter's value chain model are also engaged for providing guidelines for the study. The thesis engages systematic literature review as the main method for providing a comprehensive result of the current literature. With 226 defined search strings, the search took place between 2015 to year 2016. It covers the 5006 search hits, 2264 articles. Out of which, 24 are selected for final discussion.

The results provide a comprehensive overview of current literature in sustainable organizational capabilities in supply chain management including: procurement, supplier assessment, IT and also some other miscellaneous supply chain organizational capabilities.

In light to further research area, the author has also pointed out worthy exploring organization operations such as material management and warehousing management. Practical wise, the author provided profound suggestions to supply chain managers and top level managers in business operations.

Keywords Systematic literature review, Supply chain management, Sustainability, organization capabilities

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1 Introduction

We are living in the era of globalization. Advanced infrastructure and internet bring remote businesses onto the same platform to compete with each other. In order to survive and thrive in the international business, companies need to develop their own competences. Organization capabilities are the core to one company's competences in competing with its rivalries. Alongside with being competitive, sustainability has as well gained a remarkable status among corporates during the past years with the release of agreements such as Kyoto protocol etc. (Wang Y. et al., 2013) Companies are more than ever willing to demonstrate their environmental initiatives. Data has demonstrated a growing trend for companies to publish their environmental reports (Gabler, et al., 2015; Tate, et al., 2012). Up till now, about 95% of the top 250 companies are disclosing their environmental related reports (KPMG, 2011) and majority of the reports emphasizes on discussing companies' supply chain activities (Carter & Rogers, 2008). The phenomenon and emphasis come as no surprises as regulations start to explicit the importance of avoiding environmental hazards in supply chain activities (Nawrocka D. , 2008). Study has demonstrated a positive link between corporate's environmental initiatives and customer satisfaction. Further, it would help companies to gain market value (Luo & Bhattacharya , 2006).

For companies to gain competitive advantages internationally, environmental compliance is essential. China, as the global factory to many, has bred many manufacture companies that export globally. With the growing interest in the sustainable organization capabilities in the supply chain context robust in recent years, many companies have encountered the so called 'environmental trade barriers' that forces them to operate with considerations to environmental issues (Lai & Wong, 2012).

From academic perspective, the emerging new aspects and opinions of the given research area have been constant evolving. These have constituted the fact that the current research may seem disorganized and lack of categorization. Consequently, such phenomenon raises a need for the author to organize and categorize all current literature by using systematic literature review research method.

In the literature part, the author first made a literature review based on the topic by identifying sub components in sustainable organization capabilities in the supply chain context. Then in the empirical part, the author uses systematic literature review method to identify relevant literature. The result of this thesis provides a clear category for current literature regarding the topic and it is easy to identify what areas are still missing comparing to the more generic background literature review that the author has made in the first part of the thesis. During the course of this thesis, the author has

incorporated two concepts together and developed her own concept of sustainable organization capabilities and applied it into supply chain management context.

The main purpose of this thesis is to gather all the current relevant researches on the topic in order to answer the research questions that are brought up in the second chapter of this thesis. In order to proper answer the research questions, the author break down and re-formulated the concept of sustainable organization capabilities with a focus on environmental effects. By researching in the supply chain context, the author break down the concept into sub categories from procurement, supplier management, Information technologies, Innovation to supply chain in general and studies different capabilities in the given aspect in detail. In addition, the author tries to find research gap among the current literature thus providing useful guidelines for further researches.

The thesis's empirical part takes the form of a systematic review. The author develops her systematic review protocol with reference to (Tranfield, et al., 2003; Kitchenham, 2004; Hiroharu , et al., 2016). The systematic review starts with identify the needs for the review, followed by formulate protocol and then implementation. During the implementation phase, 226 search streams are formulated, 2264 articles are identified. After several rounds of selections, 24 articles ranging from 1997-2015 are included as the basis for the study. The results are analyzed for presenting answers for the research questions, while future research is also enlightened with the understanding to current literature.

The results of the systematic review are presented in two ways. Firstly, a quantitative presentation with tables is presented to categorize the overall features of the selected articles. Then the selected studies are categorized based on their functionalities: Supply chain capabilities, Procurement capabilities, IT capabilities, Supplier capabilities and innovation capabilities, a descriptive summary based on the functionalities is presented to answer the research questions.

The thesis consists seven chapters. In the first chapter, an introduction is given. In the second chapter, the background of the research topic is explained. In the chapter three, research method is introduced, followed by the implementation of the research from chapter four to chapter five. In the end, conclusion and future research as well as limitations and implications are presented.

2 Literature review and research questions

In this chapter, the author will give a description on the concept of organization capabilities and sustainability separately in the beginning, as they constitute the thesis. After which, the author

incorporated those ideas into supply chain management context and identifies sub-sustainable organization capabilities in the supply chain management context through literature thus providing a background literature guideline for latter parts of the thesis. Besides the above descriptions, the latter part of the chapter is constituted by an explanation of why this research area needs to be discussed. In the end of this chapter, the core research problems of this thesis will be raised.

2.1 Organization capabilities

Capability alone stands for the intention and ability of doing something (Dosi, et al., 2001). The nature of the capability has been defined as *'distinct competencies that are difficult to imitate by current competitors, difficult to substitute by current and new competitors and valuable* (Mariadossa, et al., 2011)*'* by recent literature. In reality, certain practices have sometimes been seen as the constitution of capabilities. High level of intentional training on developing such practices makes them into skills that allows one to be better than others in those realms. Coordination and making use of those valuable strategic skills to achieve competitive advantage can be seen as capabilities (Dosi, et al., 2001). In addition to having practices developed into capabilities, the concept of competences is sometimes seen as an alternative of capabilities (Prahalad & Hamel, 2000). According to Prahalad, competences refer to the capabilities of a company that are crucial for survival of the company, i.e. to highlight the tasks at which the company should show excellence to stay competitive on the market (Prahalad & Hamel, 2000). Thus, organizational capabilities can be viewed as organizational competences.

The author first encountered the concept of organization capabilities with enlighten from resource based view (Teece, et al., 1997). Organization capabilities are originally generated from one company's resources including both tangible and intangible ones (Schriber & Löwstedt, 2015). It is then developed into organizational competitive advantages. With the whole set of competitive advantages mature and integrate. It becomes one company's competitive capabilities. Thus certain strategic organization practices can sometimes be seen as the cornerstones for organization capabilities (Dosi, et al., 2001) and such capabilities can be interchangeably understood as competences. Certain practices can be seen as the ones that create competitive advantages for organizations (Aral & Weill, 2007). The author formulated her own understanding about organizational capabilities framework with the inspirations from previous researches (Dosi, et al, 2001; Aral & Weill, 2007) The following figure presents the author's own definition on the topic. (Figure 1. Organization capabilities)

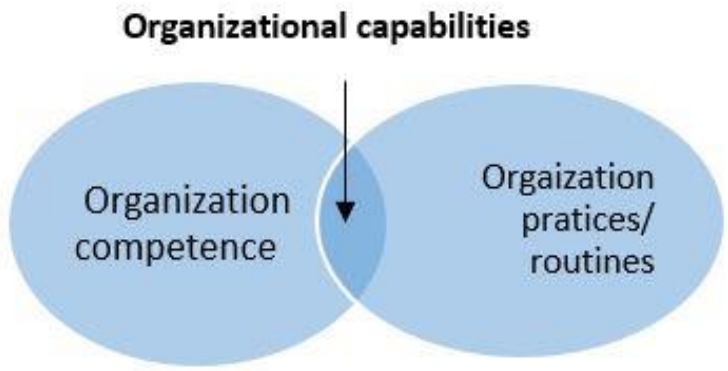

Figure 1. Organization capabilities

It is notable that one of the reasons that the author decided to explore on the topic of organizational capabilities is to provide implications for practitioners, i.e. the author hopes to find results that partakes the trait of universality and can be applied by multiple firms in various industries. The author's intention has decided the organizational capabilities to be common, which makes it fundamentally different than the concept called dynamic capabilities. Dynamic capabilities by definition is '*the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments* (Teece, et al., 1997)*'* According to (Teece, et al., 1997), dynamic capabilities is enlightened by a efficiency based approach and aim to explain the isolated mechanism for sustaining specific firms' competitive advantage, which makes them difficult to be imitated. And in the cases they may be protected by the law (e.g. intellectual property, patented technology etc.). In the case of this thesis, such capabilities will be excluded.

2.2 Sustainability focus

As Brundtland has defined that sustainability as '*..Development that meets the needs of the present without compromising the ability of future generations* (Brundtland, 1987)'. The definition pointed out the term: development, which indicates the advancement of the current state. Usually an advancement can be broken down into different aspects.

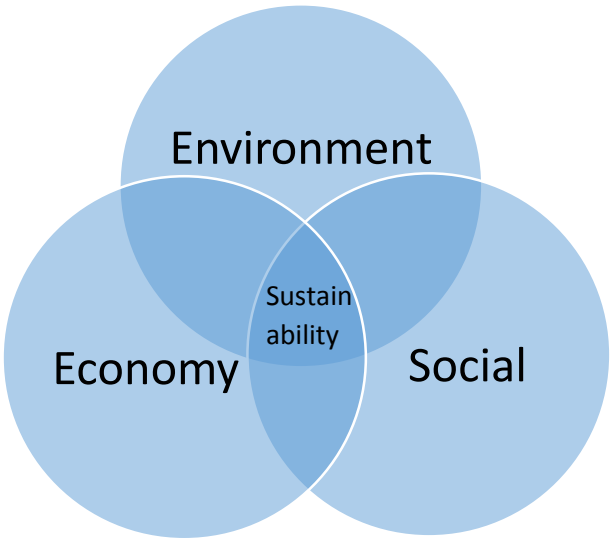

Figure 2. Triple bottom line

The author started her research on sustainability topic by engaging the famous triple bottom line theory (Elkington, 1997). As it can be seen from Figure 2. Triple bottom line, Elkington believes that sustainability can only be found in the overlapping area of environment, economic and social aspects all together (Carter & Rogers, 2008). In the light of Elkington's research, the author started her further research on the sustainability topic based on the above three angles (Figure 2. Triple bottom line).

2.2.1 Social

Nike had been accused for using child labor in Asian countries for its production line, which can be generally seen as unethical and socially unsustainable behavior in the western society. While in regions where people are fighting against poverty and trying to survive, such jobs maybe lifesavers for them (Nisen, 2013). When diverse culture and social norms are engaged in a business setting, it is very hard to quantify result and the experience is usually subjective in relation to the organism and culture. Knowing the complexity and the comprehension of the topic and the objective nature of this thesis, the author thinks that further research on the social aspects may neither generate useful insight practice wise nor academic wise. Thereby, the author has decided to not explore further regarding this topic in the writing of this thesis.

2.2.2 Economy and environmental sustainability

Currently, economic sustainability has been wildly discussed among the business world because of the benefits that it brings upon companies. There are as well many metrics that are dedicated designed to metro economic sustainability such as Dow jones indices, Sarbanes-Oxley Act and so on. However,

the author still finds that most of the literature regarding economic sustainability would lead the focus of the thesis to financial performance. While discussing financial performance is indeed an important component for the author's thesis. In regard to the true initiative on this research topic, the author would like to emphasis studies on sustainability capabilities that have an environment (i.e. decreasing emission, waste management, etc.) orientation. However, as a result, economic gain is usually also achieved with the improved operations, minimized resource usage consequently thus it will be as well mentioned during the course of this thesis.

As the world economy is shifting from industry society to post industry society, new and more sustainable business models have been introduced. People started to look into the post effects left behind by the industry society. Excess pollution come along with excess unattended manufacture/ business operating methods and it is endangering the planet we are living on (e.g. drastic climate change, sea level rise, ozone depletion etc.).

Public pressure, regulatory standards have all set implications for firms' environmental orientation (Hussain; et al., 2016), especially the ones that are consumer-facing. To cater the trend, there are many certificates came into being. ISO 14001:2015, for example, is one of the latest revised environmental management standard certificate. The purpose of the standard is to provide guidelines for companies to measure and mitigate environmental impact. Such standards usually include emission standard, recycled materials etc. to help companies rethink their ways of operations. And as for companies themselves, the benefits and reasons of adopting such standards include compliance to regulations; customer requirements; better corporate image; potential economic return as well as environmental gains. (Nawrocka, et al., 2009)

With the depletion of global resource, being able to incorporated environmental strategy into one company's operations is more than for the company itself. As it was already pointed out in the beginning of 2.2. '*We shall not compromise the ability of the future generation'* (Brundtland, 1987) i.e. we shouldn't over deplete resources for satisfying current needs. Then the current ways of satisfying our needs should be re-explored. Taking mining industry for example. Due to the growing number of players in the industry and limited demand, competition has grown fiercer. As customers' environmental awareness shapes up, traditional mining companies have to start to integrate environmental considerations into their operating models. In addition to social and ethical standards, during Caron's research, environmental quality, which includes energy efficiency, water, air and waste management, were brought up to the agenda in helping with building up future guidelines in operating in the business (Caron, et al., 2016). Other than that, for example in retail industry, leading

companies have also unanimously initiated their environmental initiatives, e.g. Walmart try to eliminate 20m GHG emissions by 2050 (Correia, et al., 2013).

According to (Gabler, et al., 2015), *'the most effective business strategy is aligned with appropriate orientation.'* Reflecting the above trends, the author believes that the correct orientation is environment orientation in the context of this thesis. Thus during the course of this thesis, the author will focus on discussing about the environmental sustainability capabilities while referring to sustainability capabilities.

To combine the above discussion with the concept of organization capability that the author explained in the earlier section 2.1, it is not hard to come to the conclusion that greening organization's initiatives will help creating companies' competitive advantage. Integrating a set of corporate competitive advantages will help shaping up one corporate's capability. Thus we can think that greening corporate operations will help shaping organization's capability while being sustainable at the same time, thus this constituted the core concept of the thesis, that is, sustainable organization capabilities.

2.3 Supply chain management and sustainable organization capabilities

In addition to complying environmental management standards as discussed in 2.2.2, there are proactive approaches that may be even more environmental friendly. Instead of dealing with the result end of the environmental impact, proactive approach and value seeking approach focus on finding the cause for unsustainable behaviors by incorporating sustainability into resource commitment and design phase of the products to prevent environmental hazards from happening. For companies that are proactively putting effort in sustainable development, we can usually see that they are benefiting from the initiatives and proactively leading the industry and some even impact regulations. For example: HP teams up with other major brands in building up European recycling platform (Nidumolu, et al., 2009). Such initiatives would usually require the cooperation from organization activities, additional, such initiatives will heavily involve supply chain activities (Hoek, 1999).

The concept of supply chain management includes management of both information flow and material flow during various supply chain activities from purchasing, transportation, operations and so on (Lai & Wong, 2012). As the sustainability in this thesis, which has been discussed in the earlier section, has a focus on environmental orientation. Here we define a sustainable supply chain consist of supply chain activities that aim at generating minimum harm environment wise, and the goal of such supply chain operations is to reduce all kinds of resource waste.

One common omission from early studies when discussing about sustainable supply chain management is that researchers tend to study from one company's operations perspective while Dao has pointed out that supply chain management can only be sustainable when all the operations obey the same mentality (Dao, et al., 2011). Thereby, in current operations setting when many of the operations can be outsourced, one product's whole lifecycle should be observed (Nawrocka, et al., 2009). Such relationship map thinking leads to a similar and a bigger concept related to the topic that is called green supply chain management (GSCM). Srivastara has defined green supply chain as *'adding the green component to supply chain management involves addressing the influence and relationship between the supply chain management and natural environment* (Srivastara, 2007)*.'* With the reference to GSCM definition, we can break supply chain management into many different operational perspectives from green transportation, procurement, supplier management, IT innovation, warehousing management, and material management and so on in more detailed discussion.

2.3.1 Transportation

Studies has shown that transportation activities accounted for 22% of the total green gas emission in 2012, which is the second largest sector of all, and the trend is still growing (Greenhouse gas emission statistics , 2015). Forecast shows that shipping will account for at least 30% of the total co2 emissions by 2050, meanwhile, the world economy grows along with the logistics activities (McKinnon, et al., 2012). Under this circumstances, companies are strive to minimize the side effects without hampering theirs business operations.

There are many ways to minimize environmental effects during transportation. One way is to redesign the vehicle itself, to make it more efficient or environmental friendly. In this field, Walmart acts as a pioneer. In order to increase its fleet efficiency, Walmart is working on a future concept truck called WAVE. The truck is designed strictly according to aerodynamic and made with carbon fiber, which makes it lighter and able to deliver more with less fuel spent.

[..]it can ship up to 40% more merchandise than conventional tractor-trailer combinations, reducing costs by 24% and greenhouse gas emissions by 14%' (Fretheim, 2014)

In addition to the vehicle itself. Walmart is also devoted to optimizing its delivery process from route planning, shifting time to loading merchandise and so on. With all these operations optimized, Walmart has almost double its own transportation efficiency compare to 2005 (Fretheim, 2014).

2.3.2 Procurement

Procurement in general, is being seen as the activity to acquire products at their optimal price for the company. As a very big part in supply chain management, it represents the buying process of a firm. To purchasing from an external partner, there are many factors that need to be considered, from the partner itself (separately discussed in 2.3.3) to the material as well as the delivery and so on. And such considerations will involve many subcategories in supply chain management, e.g. manufacture, delivery/ focal company's inventory policy, material management and so on. Incorporating sustainability into the concept, thus enables procurement to be both sustainable and profitable thereby resonates very well with our thesis concept, i.e. sustainability capability.

Common approaches for organizations to engage sustainable procurement includes reduce, recycle, reuse resources and so on (Zsidisin & Siferd, 2001). A very good example comes from the reuse of pallets during delivery. In most of the cases, it is inevitable that wastes are generated during the procurement process when materials is moved from suppliers to warehouses (e.g. packaging, transportation pallets materials). However, efficient reuse of the pallets and the packaging would help reduce the wastes. A study has indicated that almost 80% of the logistic trades involves pallets during transportation in the U.S., but most of them are only used few times then it leads to disposal (Bilbao; et al., 2011). Pallet racking system is a good way to help these items to be stored and pallets to be used efficiently. There are many sub categories of pallet rack, but they all allow that pallets to work as beams to create horizontal space and vertical layers so that items can be stacked on top of each other. The success use of pallet racking can increase labor efficiency and decrease some operating costs (e.g. beam manufacture, etc.). In some of the pallet racking systems, it is advised to transport products together with the given pallets. In these scenarios, pallets moves along with supply chain flow. There are generally two situations at the moment, one is that pallets follows the supply chain flow and reach the end user. Most of the end users do not reuse pallets hence lead to its disposal, and this is the scenario that we least want to see. In other scenarios, actions can be taken, a very good system is called pallet pooling, which is about having one party or third party in the supply chain own the pallets and all other parties who uses the pallets are using them as renting, hence it will lead to recycle (Bilbao; et al., 2011). The success reuse of pallet can increase labor efficiency and storage density.

2.3.3 Supplier management

In modern supply chain operations, researchers have shifted focus from one company to a supply chain network setting, which helps in revealing the importance of cooperation in supply chain

management. Transportation is the most commonly outsource activity in supply chain management. Currently, TPL (third party logistics) is a very popular concept among supply chain management. One way to minimize environmental effects during transportation is to choose and collaborate with partners that share the same value. The most common service from a TPL is transportation service, as transportation is the major activity that produces CO2 emission, TPL's transportation activities arouse attention among focal companies. Nowadays, environmental performances has been integrated into the selection criteria for focal companies to choose their logistics providers. Most of the TPL would have to have ISO 14001 certificate or demonstrate some green practices in order to being competitive in the market (Wolf & Seuring, 2010; Lieb & Libe, 2010). However, to achieve sustainability would require mutual effort from both TPL and focal company. Trust and commitment is essential for both parties.

From a TPL perspective, there are also many things that can be done. For example, establish sustainability programs; participate in governmental sustainability programs (e.g. US EPA's Smartway Program); use website to demonstrate their sustainability initiatives; use analytics etc. The programs would help companies to understand governmental regulations and influence subsequent regulations. The analytical initiative can take many forms, for example: calculating its carbon footprint; evaluating GHG emissions etc. The initiatives help the company itself to monitor its carbon footprint better and also provide a straight forward view for customers to see the environmental costs and benefits with the solution that TPL provided (Lieb & Libe, 2010).

A very good example in this case is Nike. On Nike's website and in its' Corporate responsibility report, there are lots of statistics concerning the carbon footprint calculations. Nike has realized the environmental effects that is created by its' transportation partners and thereby co-created the CO2 emissions measurements with its partners. In additions to that, Nike's logistics partner (Maersk Logistics) also shares information and access with Nike actively to minimize emissions together. Under force majeure situations, Nike also comes up with other solutions timely. For example: Nike is reducing their air freight shipments actively as it is the means that produces the most emissions among all shipping methods. With the reduction of air shipments, Nike's revenue grew dramatically during the years with only very little environmental effects it produced along, which is on the contradictory with what we usually think 'economy grows along with the logistics activities'. (Nike, 2009)

2.3.4 Information technology innovation

The robust of Information technology innovation has already led to game changing effects for many traditional industries and operations. Engaging information technology innovation has as well helped in advancing organization's sustainability and performances greatly. The following paragraphs are examples of adopting information technologies in helping with improving some of the traditional supply chain functions with delightful results.

2.3.4.1 Freight consolidation

Freight consolidation is the process of having several small shipments combined and create a bigger shipment and ship them out all together at once. It is a widely used method in transportation in order to achieve max freight utilization and create less shipments which also moderates the transport congestion and emission problems, making shipments more efficient and sustainable. Studies have shown that the truck utility rate is only about 75% in EU on average, which means that the rest 25% trucks run empty loaded (Eurostat, 2007). Critics have concerned that freight consolidation may leads to some delays. However, the adoption of information systems would help to solve the problem. Companies usually hesitate between the large investments on information systems and the unknown potential cost saving that freight consolidation brings. In the long run, the benefits of consolidation is very foreseeable. A very good example is General Motors, studies has shown that 26% of the logistics costs have been avoided by the implementation of freight consolidation (Wu & Dunn, 1995).

In addition to that, with the globalization of supply chain management, the implementation of superior information systems has successfully helped with decreasing the regular transportation from 8- 14 days down to 2- 4 days with the method of freight consolidation (Tyan, et al., 2002).

2.3.4.2 Cross-docking/minimal warehousing

Cross docking is a concept that is particularly widely used within retail industry's supply chain management operations. It minimizes the warehouse nodes. Most of the products go from suppliers directly to retailers. If there were a warehouses exists, it functions more like a distribution center and works as the information center and material handling point (Gunasekaran & Cheng, 2008).

Developed information sharing and monitoring systems are very important for the implementation of cross-docking systems. Walmart is a good example in well implementation of cross docking. Walmart has started to use cross docking systems in the 1980s already. In order to maximize the benefits that the system can bring, Walmart has launched its own satellite communication, which minimized unproductive inventories. In addition to that, Walmart's information infrastructure is also very advanced which levitated the efficiency of cross docking system. The cross docking system that

Walmart uses allows it to track all of their products and their real time locations. The strategy saves Walmart from unnecessary operating costs and eliminated 'bad inventories' for Walmart (Akwasi, 2013)

2.3.5 Material management

Strategic material management decisions usually creates a win-win situations and decreases operating costs for both suppliers and manufacturers. A good example is chocolate company's supply to confectionary. Instead of supply the chocolate in bars and with package as how the chocolate company usually do, chocolate companies can chose to transport chocolates in a tank car to confectionary. In this way, chocolate company saves the money and time spent on making packages and putting chocolates into bards, confectionary saves the time re-melting and also the potential to create packaging wastes (Wu & Dunn, 1995).

2.3.6 Warehousing management

Warehouses usually tend to maintain room temperature due to the temperature requirements of some of the stock. Fuel or electricity is used for maintain the temperature, which leads to the generation of emissions. However, room temperature can be maintained with the warehouse building itself sometimes. The orientation of the building towards the sun and also the material in the building itself influence the room temperature. 1 degree's difference can save 10% of the energy consumed. In addition to that, ventilation design can also influence one warehouse's temperature (McKinnon, et al., 2012).

In addition to temperature, lighting is also a major source of energy consumption. Instead of using the regular incandescent bulb, LED (Light Emitting Diode) or CFL (Compact Fluorescent Lights) should be used. Even though LED and CFL bulbs are usually more expensive than traditional incandescent ones, studies have shown that incandescent bulbs consumes about 5 to 10 times more electricity than LED or CFL bulbs during its life time usage (Energy efficiency lighting, 2014)In this case, the choice of LED or CFL bulbs would create a significantly saving in the long run. Moreover, regular cleaning on the bulbs in case of dusts should be executed as well. Studies have shown that accumulation of dusts would lead to 15% more of the bulb energy consumption (McKinnon, et al., 2012).

On top of temperature and lighting choice, scale of the warehouse is also very relevant to sustainable warehouse management. The scale of the warehouse is closely linked to the concept of warehouse energy consumption, and the utility rate of the warehouses. Most of the warehouses uses fuel oil or

gas for heating. The use of energy will lead to the emissions of GHG gases. Currently, commercial buildings account for 18% of the total energy consumption and CO2 emissions in the U.S. (Buildings and Emissions: Making the Connection, 2008)Warehouses, as one major component that constitute commercial building's energy consumption, should be paid attention to. Not only in the U.S., warehouse' floor space has also grew substantially during the years in UK. The increasing of warehouse's floor space does not only lead to more emissions but also indicates that there are more businesses activities going on. In this case, the utility rate of the warehouses is also a key factor that can influence warehouses' sustainability capabilities (McKinnon, et al., 2012).There are many ways to increase one warehouse's utility rate, not only to have workers work six days per week to reduce inventory, but also by the warehouse's own design and its' management. For example, design the warehouse layout according to the product flow; reduce aisle way space and so on.

2.4 Motivation of the study

The reasons why this topic needs to be studied and the motivation for the author's thesis is presented in the following sections.

2.4.1 Sustainable organization capabilities

Very little result has been generated by studying the topic of sustainable organization capabilities itself as well as in the context of supply chain management. As it was explained in the introduction chapter, sustainable organization capabilities can be finalized in short as: organizational capabilities that are both environmental friendly and profit generating. However, earlier researches have posed the question such as: *'Can we be environmental friendly and profitable at the same time?* (Polonsky & Rosenberger, 2001)*'* While many researches have studied the motives for corporate to be sustainable. In early researches, they were still very little connected to gaining competitive advantage or generating profit for companies. In recent literature, by engaging resource based view (Wang, et al., 2015; Dao, et al., 2011; Gabler, et al., 2015; Sharma & Iyer, 2012) and other methodologies, some researches have generated useful results in terms of the discussion of sustainable organization capabilities and found positive link between environmental performance and financial performance (Dao, et al., 2011). Even so, many have admitted that the research area is new (Gabler, et al., 2015). Thus, this phenomenon generated the interest for the author to explore further in this area in the hope to provide some useful insights.

2.4.2 Sustainable supply chain management

Due to the nature of supply chain activities that impacts on environment and its' correlation with many other activities (Wu & Dunn, 1995), sustainability has always been discussed in the business context when we discuss about environmental degradation. As it was mentioned in the first chapter that more and more companies are starting to disclose their environment-oriented reports, study has shown that around 80% of those discussions are supply chain related (Carter & Easton, 2011).

While operating globally, the integration of supply chain activities plays a vital role in determining companies' performance. Supply chain management has also been seen as the most important component in corporate strategy that determines organizations' competitiveness (Gunasekaran & Cheng, 2008; Aliakbar & Khosrojerdi, 2016). Operating globally brings up impacts to supply chain management such as longer lead-time, transportation, and little control over suppliers as well as the increasing risk of encountering force majeure (Aydin, et al., 2014; Evangelista, 2014; Aliakbar & Khosrojerdi, 2016). Out of all the risks, environmental impacts are the most institutional and discussed one. E.g. Finland and Russia's trading has been increasing (Itella Annual Report, 2013) which leads to potential grows in international supply chain activities furthermore leads to potential environmental effects.

With manufacturers' and suppliers' growing emphasis on complying with environmental regulations, the combination of the supply chain topic and sustainable organization capabilities refers to the current business world very well and the author believes that the research will provide practical implications.

2.5 Research objectives and questions

With the background and motivation on the topic explained above within the same chapter, we can see that there is still a lack of the official definition for sustainable organization capability. Cross discipline studies in supply chain management field are also sparse. Thus, the field rises the author's interests to explore. The objective of the thesis is to understand sustainable organization capabilities' within supply chain context through literature and empirical studies, also to provide a basis of sustainable organization capabilities studies in supply chain management field for further studies. In order to full the research objectives, two research questions are formulated as in below:

What is sustainable capabilities in organizations' supply chain management?

How are they used in practice?

3 Research methodology

In this chapter, the main research methodologies used in this thesis are discussed. Two main research methodologies are used as guidelines for this thesis. What are they and how they are used are discussed in this chapter.

3.1 Systematic review

Systematic review is the fundamental research method used during the course of this thesis. The following subsections are dedicated to explaining the definitions as well as the steps taken during systematic review processes.

3.1.1 Definition

Systematic review research method was first adopted and widely used among healthcare industry in the 90s (Tranfield; et al., 2003). Its' application in business management literature hadn't started to appear until the 21st century. Comparing to many other field, the adoption of systematic review in supply chain management is still sparse, however, a growing trend can be expected with the maturity of the research field and literature. Existing literature has defined systematic review as '*the fundamental scientific activity'* (Cook, et al., 1997). By summarize literature that all focused on the same subject, the researchers provide the best unbiased result for the research subject (Cook, et al., 1997; Tranfield, et al., 2003). During the process of summarizing literature, a systematic review often engages meta-analysis method for providing statistical result. Such research method is often used when a systematic review is meant for testing hypothesis or when the data is easy to be quantified. In other scenarios when the data or the research topic don't comply, it is not necessary to engage meta-analysis.

3.1.2 Systematic review process

The following systematic review process figure is developed with reference to (Hiroharu , et al., 2016; Tranfield, et al., 2003; Kitchenham, 2004). A detailed review process is presented as in the below Figure 2. In short, a systematic review process can be quantified into three steps: Plan the review→ Conduct the review→ Review the results. In the following sub sections, each step will be explained more in detail.

Figure 3. Systematic review process

3.1.2.1 Plan systematic review

- Need for adopting systematic review

Prior to the review, a set of activities meant for clarify, define, and refine on the topic needs to be discussed (Tranfield, et al., 2003). First of all, the needs for using systematic review for the thesis needs to be evaluated. Proper research questions needs to be presented. In addition, background regarding the study field may be presented as well. The need for adopting systematic review on the selected topic can that there weren't previous systematic literature review in the given topic or strong need for cross disciplinary studies on it and so on.

- Review protocol

Another important process before conducting the review is to formulate a review protocol. A review protocol acts as unbiased guideline throughout the research. As a management review, the protocol is usually an open discussion on the research topic for not limiting the researcher's exploration on the topic (Tranfield, et al., 2003).

3.1.2.2 Conducting the review

- Research method

For thorough study on the topic, the author has to first define the research scope by narrow down the context to the type of target data that should be considered, such as journals, article books etc. Then, the author has to clarify what he/she wants to find out through the data. Usually, this can be achieved by keeping the research questions in mind.

- Search strategy

When it comes closer to implementing the search, more elements should be considered. Choice of database can have a direct influence on the quality of the sample data so are the search strings. Some databases may even have different rules concerning search methods. In a systematic review, there are two ways to formulate search strings and both should both be considered during searches. One way to do search is to search with *'controlled vocabularies* (Tufts University Libraries, 2016)*'*. The purpose of controlled vocabulary search is to search with concepts with a series of synonymous generated from an original concept. The other way to search is to search through key words. Boolean logic is usually engaged in key words based searches. AND, OR, are used to in the situation when there are several keywords (Kitchenham, 2004). In addition, symbols used at the end of each key word/root may also generate different results. One commonly used symbol is an asterisk. Placing it by the end of a word or a root would allow same word with different endings to all appear in the search. Another commonly used symbol is quotation mark. It is usually used for combining words search. By placing it on a phrase, the result will only demonstrate articles containing the term or when the words are very close to each other (Tufts University Libraries, 2016).

- Selection of studies

When all the preparatory studies have been carried out, then we can move on to the search. The selection of data usually consists of a few rounds, and methods for selecting can vary a lot when studies are different too. One common way to choose search result is by reading article abstracts and select the ones that have the potential to be relevant to the research topic. This can be done in a more

systematic way by generating criteria (inclusion, exclusion) based on research questions and taking into considerations of the search environment, prerequisite listed earlier and screen article abstract based on them (Kitchenham, 2004). After potential ones are selected, they can be read in a more detailed way to identify if they actually fit to the research.

- Quality assessment

The quality of the research can be assessed by peer review (Hiroharu , et al., 2016) or review against criteria set ahead (Tranfield, et al., 2003). According to Kitchenham, the assessment can be done by examine from both internal and external perspective (Kitchenham, 2004). The nature of systematic review is quantitative, however, the quality of the selected studies cannot be tested through statistical models and studies have agreed that it is generally difficult to build checklists for that, especially in management research as articles are selected based on subject findings. Most of the time, the quality of the selected articles are identified based on where it was published (Tranfield, et al. 2003).

- Data extraction and synthesis

Data extraction is usually a form that records the process of how the research is done. Usually, several rounds of data extractions are performed. How those are done and the how is the final result chosen should be recorded during data extraction period. If possible, data extraction should be done by more than one person to reduce bias (Tranfield, et al., 2003; Kitchenham, 2004).After data has been extracted, a synthesis is generated. Data synthesis usually done with meta-analysis, however, in the context of management review, meta-analysis is unlikely to be used as explained in the beginning of this chapter.

3.1.2.3 Review

- Discussion and report

The review of the result comprises two parts. One is to provide a general overview of the articles by summarizing relevant information of theirs. This can be provided with a overview of the tables and quantitative data. Following up, a descriptive analysis should be presented. The author can summarize the data by answering to the research questions or enlight further research within the research field (Tranfield, et al., 2003).

3.2 Planning of systematic literature review

Following the guidelines provided above regarding the planning phase of the systematic literature review, the following two sub sections are dedicated to the planning phase of the systematic review.

Reasons for adopting systematic review research method are justified and review protocol is developed to provide guidance for the author to conduct the research.

3.2.1 Reasons for adopting systematic review

Critics have pointed out that management reviews provide biased perspectives due to the subject nature of the research and the narrative research methods especially in early years. Little efforts have been spent in preserving earlier research thus making the perpetuation of the research very unprogressive (Tranfield, et al., 2003). The benefit for studies to take references from earlier researches is that we can absorb the best practices from previous studies; improve the quality of current research and generating useful guidelines for future. In addition to that, synthesis the best practice from previous research to formulate new research frameworks (Tranfield, et al., 2003), systematic review method has also been used in testing hypothesis (Kitchenham, 2004).

To complement the drawbacks in traditional research methods, systematic literature review method was taken into consideration by the author during the writing of her thesis. The objective of the systematic literature review is to find answers to the research questions by performing comprehensive unbiased search among existing literature (Tranfield, et al., 2003). Comparing to traditional research methods, systematic literature review may be more time consuming, however, the guaranteed informative and evidenced results still attract many researcher's interests.

Thereby, taking into consideration of the nature of this thesis, the author finds very strong need for the adopting of systematic review research method in helping providing comprehensive answers to the research questions.

3.2.2 Review protocol

The review protocol is developed following steps in figure 3. Details of the actual implementation of the given review protocol is presented throughout chapter 4 to chapter 6 during this thesis. The purpose of this review is to answer the two research questions mentioned in chapter 2 in the hope that this area of research will be enlighten and practical implications may be generated.

3.3 Porter's value chain model

According to Grant, there are generally two ways to approach identifying one organization's capabilities (Grant, 2010). One is to category by organization functions. For example, one organization can by categorized by common functions such as Strategic; Marketing; Research and development and so on. Within the strategy function, organization capabilities can be standard work

flow development, Strategy control and so on. In marketing function, example organization capabilities can be brand benchmarking, customer engagement, in-depth understanding of the market etc. Example organizational capabilities from research and development function ca be agile development, research and development that caters market needs and so on.

The other commonly used method to identify organization capabilities is to integrate it with Porter's value chain model (Porter, 1985; Grant, 2010). Comparing to using function based categorization, Porter's value chain provides a more systematic and comprehensive overview of organizations and it can be applied to any organizations as seen below:

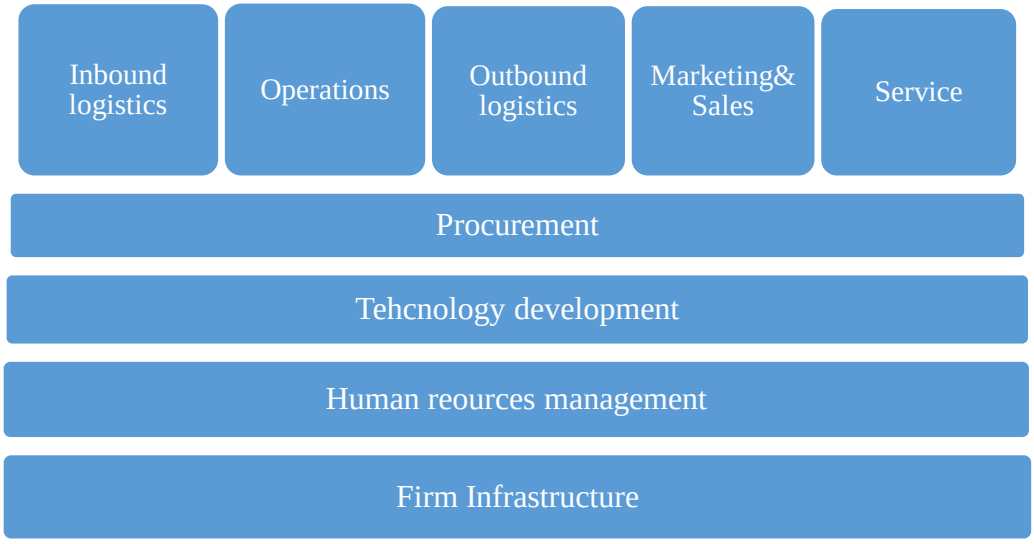

Figure 4. Porter's Value Chain model

In addition to cover different functions in organizations, Porter's value chain model categorizes organizations by their operations mainly. (Porter, 1985) The purpose of value chain is to exam the value flow. For organizations, value is often created through exchange (Andrew Feller, 2016). From organizations' point of view, value chain model is mostly applied to the study of supply chain activities in organization operations. While supply chain focus on the down flow of goods, value chain explains about the up flow of the money. Furthermore, considering the strong ties between value chain model and environment management in operations management (Handfield, et al., 1997), the author thinks that the engagement of value chain model in further building up the theoretical framework for the research do not only resonates with the concept of organization capabilities, but also put an emphasis on environment focus in the context of supply chain management, thus is our optimal choice.

4 Implementation of the review

The author applied systematic review research method as the main research method in this thesis. By engaging that, the author hopes to define sustainable organization capabilities in supply chain management and to assess them in practice. This chapter focuses on discussing how the review is conducted.

4.1 Research method

First steps in initiating the review process is to define the research scope; to set expectations for the research; and to clarifying what kind of results the author want to achieve through the writing. In the following subsections, the author focuses on explaining the research method in regarding to these two perspectives.

4.1.1 Research scope

In the research of this thesis, the author focused on searching only journal articles that are published in top tier journals (the definition of top tier journals will be explained in latter section 4.4 in detail), excluding other forms of research such as report and books. The author believes that the singularity of selected format will make the results more comparable. The author believes that the research quality can thus be guaranteed by the limitation on selected studies (Schmeisser, 2013). However, in order to gain a full picture on the research topic, the author didn't set limitations to journals' functionality thus the research result contains journals vary from accounting sector (e.g. Accounting, Organizations and Society) to operations management sector (e.g. journals of operations management).

4.1.2 Expected result measures

The selected articles should hold a strong relevance to the concept of sustainable organization capabilities or include in-depth analysis of environmental oriented practices in supply chain management. Selected articles should provide concrete synthesized results in the research aspects as mentioned in chapter 2 or provide insights for further research.

4.2 Search strategy

After the research method has been clarified, the author defines her search strategy in the following sections. The search strategy contains the choice of population for the research and detailed search

string development. The author's choice of population is defined by the author's choice of database as in the following section followed by the search string development.

4.2.1 Database

Prior to the research, the author considered engaging multiple research engines so that it may provide more comprehensive result. Emerald and Science Direct are the first two data bases that the author considered to use for two reasons. First of all, it is because that they are the most used ones among business students. As business students tend to work in industries after graduation. The author believes these two database provides the most suitable contents for the purpose of the thesis. Secondly, it is notable that these two databases are famous for their different orientations. When Emerald is more focused on business oriented journals, Science Direct provide comprehensive results for scientific research journals. However, a trial was performed by the author and it turned out that both database generated very similar results. Thereby, the author decided to use only one database during her research due to the huge amount of overlapping research result generated by using two databases. And the author chose Science Direct in the end as it generates the most result for the search strings that the author created. During the research, the author has used the time ranging from 1990 onwards as literature regarding sustainability, capability in the supply chain context first started to appear around that time. The author believe the setting would cover all the literature existing serving the research topic.

4.2.2 Search strings

The development of search string for the use of the thesis consist of two parts. Due to the author's special viewpoint on sustainability capability in regard to environment considerations, the author dedicated her first part of the search string to study about the suitable context and alternatives for the thesis regarding 'sustainability' and 'capability'. In the second part of the search string development, the author combined the defined concept with the topic focusing on organization capabilities and thus constitute search strings serving the purpose of the thesis.

4.2.2.1 Background search string

The author started her research first on the topic of sustainable capabilities, due to the comprehensive definitions on the topic, the author first decided to study the background of the topic to gain a comprehensive understanding about sustainable capabilities with sustainability and capability as the original controlled vocabulary. Based on them, synonymous keywords are generated to form the following search string:

Table 1: Background search strings

Sustainability	**Capability**
Green* Environment* Lean*	Practice* Competence*

4.2.2.2 Search string on the topic

As the author has decided to explore the subject within the context of supply chain management, the author decides to create her search string under the guidance of value chain model (Figure 4. Porter's Value Chain model). Value chain provides a generally analysis of company's core competences by going through a set of firm activities, which would give an overview of how has sustainable capabilities been used in practice, and providing baseline controlled vocabulary in building search strings. In the following chapter, the author engaged the primary activities in value chain model from inbound logistics; operations; outbound logistic; marketing and sales; service; procurement and firm infrastructure as the main focus operations controlled vocabularies and find their synonyms keywords in expanding the search searches.

Furthermore, the author excluded two secondary operations i.e. technology development and human resource management due to the reason that the author engaged value chain model as a guideline to study operations in supply chain management, and the author thinks these two are not the core activities in supply chain management. The author believes that the word 'operations' would cover for these two aspects if relevant.

Taking the above factors into considerations, the author has generated the following search strings according to study the research topic: sustainable organization capabilities in supply chain management (detailed combination of search strings can be seen from the appendix 9.2):

Table 2: Search strings

Sustainability	**Capability**	**Inbound logistics**
Green* Environment* Lean*	Practice* Competence*	'Inbound logistics' Transportation* 'Material handling' Warehousing* 'Freight consolidation'

Sustainability	Capability	Operations
Green*	Practice*	Operations
Environment*	Competence*	Manufactur*
Lean*		Facility
		Equipment
		~~'Inventory management'~~
		'Supply chain'

Sustainability	Capability	Outbound logistics
Green*	Practice*	'Order tracking'
Environment*	Competence*	'Outbound logistics'
Lean*		Schedul*

Sustainability	Capability	Marketing& sales
Green*	Practice*	Marketing
Environment*	Competence*	Sales
Lean*		

Sustainability	Capability	Service
Green*	Practice*	Service
Environment*	Competence*	Maintenance*
Lean*		Return*
		'Reverse logistics'
		~~'Spare parts'~~

Sustainability	Capability	Procurement
Green*	Practice*	Procurement
Environment*	Competence*	Purchas*
Lean*		

Sustainability	Capability	Firm infrastructure

Green* Environment* Lean*	Practice* Competence*	~~'Firm infrastructure'~~ Corporat* ~~'Firm utility'~~ ~~'Quality control'~~

Note: ~~Red crossed out key words~~ are the ones that don't generate any results with any other combination; ~~Black crossed out key words~~ are the ones that generate similar results as other keywords (e.g. 'inventory management' and warehousing *)

4.2.2.3 Pilot trial

The author conducted her search through the combinations of different keywords. Prior to the above formulation of the search strings, the author had overlooked the keyword 'capability' and formulated her initial research based on keyword sustainability+ Value chain based supply chain activities key words. With sustainability as the controlled vocabulary, the author also formulated bad key words such as 'efficiency' and so on. Result has demonstrated over 10,000 repetitive results and many of them focused on discussing social and economic themes, little are found to be useful to this thesis. Thus the author rechecked search strings and came up with the final ones as presented above. In the final search phase, the author has marked the bad keywords as in the above for providing better quality of the result.

4.3 Selection of the articles

Inclusion criteria	Exclusion criteria
• Written in English • Scientific, peer-reviewed article, academic journal, full text available • The article presents a tool for assessment/forecasting of environmental performance within the supply chain. The tool is an applied framework/ hypothesis which is built on interrelation between business processes and environmental impact. Application of the framework/ hypothesis in real-life context is demonstrated in the article, with numerical results shown.	• Trade magazines, practitioner papers, books etc. • i.e. search is limited to peer-reviewed and/or academic journals or equivalent if applicable within the search engine • Fragmented articles, "Book review" articles excluded, also those with anonymous author • Non- English language • The hit to the thesis's search string is in the article reference list, not in the abstract or article text • Discusses sustainability in relation to business in general, not specific to SCM nor environmental focus

Figure 5. Selection criteria

With the previous research method and search strategy in mind, the author has formulated selection criteria as in the above figure for the final selection of the articles.

4.4 Quality assessment

As it was pointed out by (Tranfield, Denyer, & Smart, 2003) in the earlier chapter, the quality of the review is usually hard to be evaluated due to the nature of management review. Sometimes, the inclusion criteria and the publishing journal can used to represent the quality of the selected articles. Thus, in the course of this thesis. The quality of the selected results can be evaluated based on two main categories. One from the publishing journal, the other from the articles' content. Based on these two criteria, the author formulated the following two main quality assessment measures:

Publishing Journal	Article Content
• Publishing journal has to be in the top 5% ranking of its field. i.e. 'Top tier' journal	• Selected articles should have a clear research method. The used research method should complement the research gap • Research paper should generate results instead of mere discussion. Result should answer or provide insights for answering the research questions

Figure 6. Quality assessment measures

It is notable that there are many journal ranking methods available. As difficult as it is to justify optimal one for this thesis, the author determined her own rules to screen the top 5% percent journal. By taking into considerations of how many times the journals are cited, the author selected the top 10% cited articles, among the 10%, the author select articles based on her own perception about the journals (Tüselmann, et al., 2015).

4.5 Data extraction and synthesis

The data extraction took place from year 2015 to year 2016. In the beginning of the data extraction, there were two assessors involved, both the author of the thesis and Ms. Marta Malik to guarantee the quality of the results. The final data extraction form is an excel sheet attached in the appendix 1.

Information include author, article, publishing journal, year, summary, research type, measurement, found with keywords, applied industry and discussion functions are explicated.

The author has formulated 226 search queries (9.2) in total and went through 5006 hits (9.2) which add up to 2264 articles (repetition excluded). The following table is a brief summary of the total hits of controlled vocabularies and their based varied key words.

Table 3: Search hits

Key word	Key word	Key word	Hits/selected article
Sustainability	Capability		746/5
Sustainability	Capability	Inbound logistics	559/12
Sustainability	Capability	Operations	1402/9
Sustainability	Capability	Outbound logistics	275/6
Sustainability	Capability	Marketing& Sales	493/6
Sustainability	Capability	Service	886/7
Sustainability	Capability	Procurement	418/12
Sustainability	Capability	Firm infrastructure	227/6

Based on the hits, it may be concluded that the concept of 'operations' has raised considerably more interests among researchers than in other areas as a keyword. However, little suitable content for this thesis has been generated. Among all the areas, procurement and inbound logistics fields related articles have been generated the most useful results for the thesis research area.

Table 4: Data extraction process

Search/Number of articles	Rejected	Potential to be accepted	Accepted
Initial search	4349	41	37
Reducing duplicate results	2188	40	36
Primary analysis	2191	39	34
Secondary analysis	2240		24

The author started her first round of search in Science Direct database a generated the following result without excluding duplicate search results and the result is presented as in the following figure. By generally applying the inclusion criteria in the beginning, the author has included 78 articles in the beginning. After removing duplicate results, the selected range comes down to 76. By reading through the abstract and comparing with the selection criteria, the author comes down to her analysis as in the following:

- First round of selection/ primary analysis

During the first round, the author has selected 34 articles and 39 potential articles that may provide some insights in answering the research questions based on the reading of abstracts and the content of the articles.

- Secondary analysis

Upon the finish of primary analysis, second round of analysis was conducted by thorough reading of both the 34 and 39 potential articles and analyzing them based on their theme, research methods, content and conclusion as well as industry. In order to select the most representative articles and put them into categories, the author has finally selected 24 articles for the basis of writing this thesis in the hope to answer the research questions. The detailed actual selected articles and the keywords that found them can be seen in Appendix 9.1.

5 Review

24 articles are chosen as the final selected ones for the discussion on the topic of sustainable capabilities and their use in practice. The selected articles range from year 1997 to year 2015, covering different types of research from peer review, empirical, case studies, hypothesis testing and so on. Each article is analyzed by its content, research method, research topic as well as the results. The studies cover a wide range of capabilities. In order to categorize them to fit better of the thesis topic, the author engaged different supply chain activities that the articles discussed about, and categorized them into the following five main groups, which will be discussed in latter sections.

- Sustainable supply chain management capabilities
- Sustainable Procurement capabilities
- Sustainable Supplier assessment capabilities
- Sustainable information technology capabilities
- Sustainable innovation capabilities

5.1 Overview of the results

In this section, an overview of the final results are presented in a visualized way by summarizing some of the commonalities of the selected articles.

5.1.1 Publication Year

The first discussion regarding sustainability in supply chain management started in the 90s thus the author has set the search scope to start since 1990 till now, however, the author found that most of the relevant articles started to appear after the 20th century. And it is notable that most of the relevant articled are published after the 2010s, especially the number of relevant articles from year 2015. It can be concluded that there has been a growing trend regarding the sustainability research articles in recent years and the trend is drastically growing.

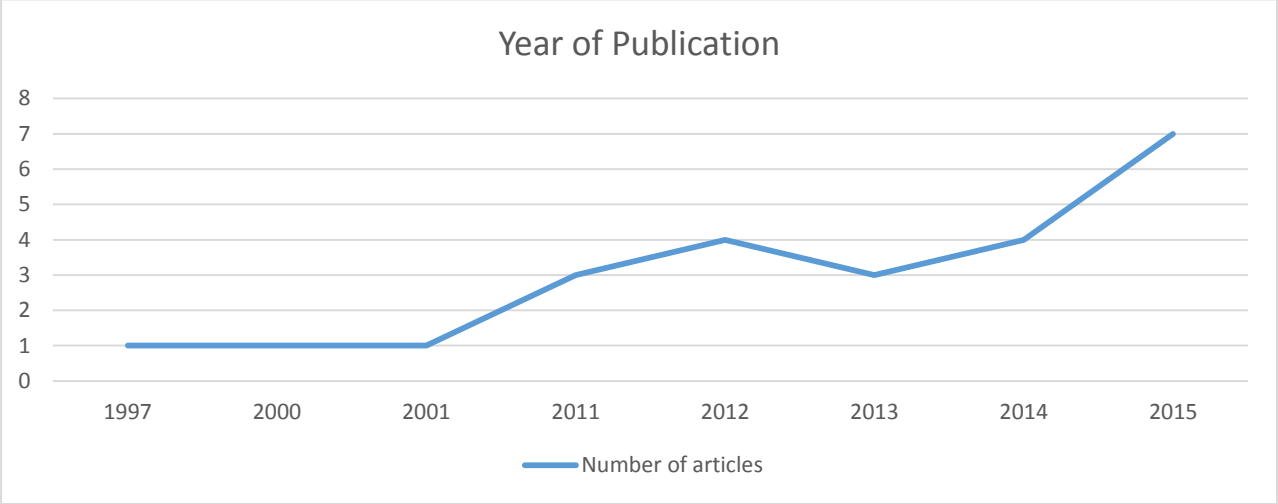

Figure 7. Year of publication

5.1.2 Publication Journal

The research has gone through numerous research journals, within which, the following 14 top tier journals have been found to have produced valuable results for the writing of this thesis. As it can be seen, the range of the journals goes from accounting to management science. However, it is notable that supply chain management-focused journals provide the most comprehensive results. The given results coincide with the author's focus area thus providing profound basis for the author's research.

Table 5: Publication journal

Name of the Publication Journal	*Number of Articles*
Accounting, Organizations and Society	*1*
European Journal of Purchasing & Supply Management	*1*
European Management Journal	*1*
Expert Systems with Applications	*2*
Industrial Marketing Management	*2*

International Journal of Hospitality Management	*2*
Journal of Purchasing and Supply Management	*6*
Omega	*2*
Research in Transportation Business & Management	*1*
Technological Forecasting and Social Change	*1*
The Journal of Strategic Information Systems	*1*
Journal of Operations Management	*1*
Tourism Management Perspectives	*1*
Transportation Research Part E: Logistics and Transportation Review	*2*
Grand Total	*24*

5.1.3 Research type

Among the 24 chosen articles, 9 different research methodologies are used. From here, we can see that most used research method are hypothesis testing and proposition development. From that, we can deduct that most of the selected articles have formulated certain frameworks or generated new results for this area of research.

Table 6: Research types

Research type	*Number of articles*
Systematic review	2
Empirical research	2
Empirical research/ Industry experience	2
Empirical research/Case studies	2
Empirical research/Proposition development	5
Empirical research/ Survey	1
Operations research	1
Peer review	2
Scientific research/ hypothesis testing	7
Grand total	24

5.2 Results analysis

One of the reason that the author adopted the value chain model as a guideline for formulating search stings is that the author thought the final results may be able to be grouped with the guidelines from value chain model. However, as the author noticed that repetitive results can appear while the author searches with different search strings, which are intended for heterogeneous results (chapter 4.2.2). It makes grouping very difficult. Thus, by looking through the content, the author find it possible to group them with reference to the different sub components the author discussed about in the literature part of the thesis (chapter 2.3). In that way, gap between literature and the author's study area can be observed, meanwhile, thesis questions can be answered too.

In order to answer the research questions, the author realized that there are two ways to study the selected articles. One is to category them based on their functionality thus providing basis for answering the research question: What is sustainable capabilities in organization's supply chain management? The other way is to answer them based on the research industry thus answering the second questions: How are they used in practice?

- Unit of analysis

After thorough reading of the articles, the author found out that the articles provide better analysis if categorized by functionality even though the research was performed with a set of activities based guidelines. It is also interesting to see how different industry practices are studied under the same function. Thus the author select the following functions as the unit of analysis while at the end of each section, the author added her observations based on the different industries engaged in the same function.

Table 7: Unit of analysis

Sustainable capabilities in supply chain	Sustainable supply chain management capabilities and practices 1. Adoption of environmental management system 2. Quality management and its relation to sustainable capabilities 3. Value chain thinking 4. Food and service industry

	Models for selecting sustainable supply chain management practices
Sustainable Procurement capabilities	Procurement capabilities Transition from procurement to supplier assessment
Sustainable Supplier assessment capabilities	Procurement capabilities Transition from procurement to supplier assessment
Sustainable information technology innovation capabilities	Information technologies capabilities Transition from information technology to innovation Innovation capabilities

The author has finalized five main functions as the basis for presenting the results. Detailed log can be seen from the above Table 7: Unit of analysis. The author starts the analysis with a discussion of sustainable capabilities in supply chain in general to cover some of the capabilities that affect the whole supply chain or network. Followed by more functional based capabilities from procurement, supplier management to IT innovations.

5.2.1 Sustainable organization capabilities in supply chain management

The author started the selected articles with the reading of an editorial (Sheu & Talley, 2011) which finalized 6 articles and pointed out the future important research areas and theories used in green supply chain management. Focus areas in the editorial such as supplier management (Evangelista, 2014; Caniëls, et al., 2013; Tate, et al., 2012; Kumar, et al., 2014) and innovation (Gabler, et al., 2015; Sharma & Iyer, 2012), resource based view (Sharma & Iyer, 2012; Gabler, et al., 2015; Wang, et al., 2015; Dao, et al., 2011) resonate with the author's thesis study area, thus support and enlightened the author's studies.

5.2.2 Sustainable supply chain management capabilities and practices

In the following sections, sustainable supply chain management capabilities and practices are to be discussed and compared.

5.2.2.1 Adoption of environmental management system

One thing is common among the early relevant literature is that they all mentioned Environmental Management System ((Rondinelli & Berry, 2000; Zsidisin & Siferd, 2001). However, with different focus, Environmental Management System can contribute to different operations. By analyzing different mode of transportation and their environmental impact, Rondinelli developed an environmental management system for monitor and reduce environment impact based for transportation related activities (Rondinelli & Berry, 2000) while Zsidisin approached the matter from product innovation and life cycle perspective (Zsidisin & Siferd, 2001) .

5.2.2.2 Quality management and its relation to sustainable capabilities

A survey was conducted on 95 Brazilian companies for studying the correlation among *quality management, environmental management, and green supply chain management* (Jabbour, et al., 2015). As earlier researches have as well discussed about quality management and its link to green supply chain management (Zsidisin & Siferd, 2001; Handfield, et al., 1997). Such rejoin of the topic rouse the attention of the author. The result of the article demonstrates connections among *quality management, environmental management and green supply chain management*. Together, they can improve firm's performance.

5.2.2.3 Value chain thinking

Value chain framework links the evaluation of value with supply chain activities, thus, through such framework, many of the researches combined the topic of operations performance and sustainable capabilities together (Handfield, et al., 1997; Lai & Wong, 2012). Even though the operation performance and sustainable capabilities are closely connected topics, both articles have demonstrated that economic performance may not be strictly related to one firm's sustainable capability. Both of the articles have articulated the importance of customer requirements in terms of adopting sustainable initiatives. However, the result towards regulation are different. Lai argues that regulations pose a positive impact on companies' environmental orientation (Lai & Wong, 2012) while Handfield thinks that environmental regulations are only reaching the bottom-line (Handfield, et al., 1997).

5.2.2.4 Food and service industry

The author's initial reason for categorizing this group of articles as in food and service industry is mainly because of the nature of the industry and a few definitions appeared in the articles .i.e. *'consumption of nature resources* (Wang, et al., 2013)'; *'the biggest impact is the goods we source* (Spence & Rinaldi, 2014)*'*. Spence adopted a novel method by developing the concept of analytics

of governmentality and applied it in our case study in food and beverage industry. The result has demonstrated that the analytics of governmentality can provide a guideline to help companies in engaging sustainability and transfer it into economic value, as well in studying the environmental performances together with financial performances. Jacksona applied the Environment- Financial measuring method on the food and beverage industry in the U.S. (Jacksona & Singhb, 2015). Result has suggested that firms are dedicated to sustainable initiatives also perform well in terms of financial result. Such result has positive implications for firms to consider sustainable initiatives together with financial performances in further research. Wang's research tries to study green supply chain management in the context of restaurant industry (Wang, et al., 2013). By developing the concept of 'green restaurant' that engages green supply chain management thinking, the author built up the framework of the article. Using Delphi technology, the author tested the framework by applying to case studies. By doing so, the author has built up green restaurant management standards which provides insights for further research.

The following Table 8. Supply chain management capabilities provides a brief summary of the above discussion.

Table 8. Supply chain management capabilities

Function	*Articles*	*Industry*	*General*	*Measurements*
Supply chain management	(Jabbour, et al., 2015)	Cross industry	The correlation of quality management, environmental management maturity, external green supply chain management practices, firms environmental performances are studied through the article. Quality management has been seen as the prerequisite for all others	Survey, conceptual model developed through the article; Structure equation modeling
Supply chain management	(Spence & Rinaldi, 2014)	Food and service industry	both social and environmental aspects are discussed, senior manager takes sustainability into consideration in decision making	Analytics of government

Supply chain management	(Jacksona & Singhb, 2015)	Food and service industry	Green initiatives can inspire financial performances, in food and beverage industry, it is very important to work with environmental sustainable partners.	SPSS
Supply chain management	(Wang, et al., 2013)	Food and service industry	(Green management standards) Green food, green environment and green management are the key perspective to look into in adopting green supply chain management in restaurant industry.	Delphi technique survey
Supply chain management	(Lai & Wong, 2012)	Manufacture industry	Recycling, reduce, reuse. Adopting GLM will help Chinese manufacture companies, practices include: procedure based, evaluation based, partner based and general environmental management practices	One factor test, factory analysis; Survey
Supply chain management	(Handfield, et al., 1997)	Furniture industry	Environmental friendly practices are developed then tested through propositions. Result show that environmental considerations should be taken into considerations through value chain	Meta matrix
Supply chain management	(Sheu & Talley, 2011)	Non specific	A finalization of six articles,	Content analysis

Transportation	(Rondinelli & Berry, 2000)	Transportation industry	Describe environmental effects brought by different means of transport and multimodal transport. Establishing environmental management system for continuous improvement	Environmental management system

- How do practices transfer into capabilities?

As from above, we have studied a few practices from environmental management system (Rondinelli & Berry, 2000)to regulation compliances (Lai & Wong, 2012). Nevertheless, practices don't transfer into capabilities by themselves. Research has shown that the successful deployment of such practices for organizations is what creates competitive advantage thereby constituting organization capabilities. (Zahay & Handfield, 2004) The following sections provide methods for choosing the right practices for firms to adopt thus would help in creating organization capabilities

5.2.2.5 Models for selecting sustainable supply chain management practices

As detailed sustainable practices are discussed in the earlier chapters, the author can already easily list quite a few sustainable practices for corporates. But is everything for everyone? Among so many initiatives on the market, how would companies select the best initiatives tailored for their operations? Under complex business environmental, we should engage supply chain network thinking in evaluating practices that should be taken. Most of the previous studies have a focal company and discuss sustainable capabilities from one focal company's point of view regardless of many other potential influential factors. The following articles are dedicated to the decision making frameworks for adopting the right sustainable initiatives for corporates thus realizing sustainable supply chain capabilities.

Govindan's article sees the supply chain as a whole and break the green supply chain management into different practices for discussion (Govindan, et al., 2015). Practices include from product design, purchasing to emissions management, suppliers and customer orientation etc. Govindan used an automotive company as a case company to test the above set of practices and their importance in organizations with intuitionistic fuzzy theory. The article provides a good method for organizations to identify different sustainable practices and their importance in organization management. Similar to Govindan, the purpose of Wang's article is also to provide a model for corporates to select the right sustainable initiatives for them (Wang X. , 2015). Wang used a fuzzy approach to evaluate three

dimensions of an organization from organization, environmental performances to resources aspects. A case study on a manufacture company is performed. The result demonstrated the optimal initiatives for the manufacture company tailored with its own operations. The proposed model also provide framework for other companies to identify optimal sustainable initiatives for them. From two articles' researches, we can conclude that a fuzzy approach is a good method in helping transferring the right practices into capabilities.

Table 9. Models for selecting supply chain management capabilities

Function	*Articles*	*Industry*	*General*	*Measurements*
Supply chain management	(Govindan, et al., 2015)	Automotive industry	Green supply chain management practices and their influence on corporate performances are studied. Most useful green supply chain management practices are suggested	Intuitionistic fuzzy set theory
Supply chain management	(Wang X. , 2015)	Manufacture industry	Green raw materials, energy efficiency product design, recyclability improvement, shared facility utilization are the initiatives discussed in relation to company's resources, operations and environmental performances when companies want to implement new green initiatives	Fuzzy Delphi; Fuzzy extent analysis; Fuzzy TOPSIS

5.2.2.6 Practice implications supply chain capabilities in general

From the following Figure 8. Supply chain management capabilities in practice, we can see that food and service industry is the most mentioned industry among the 9 selected articles during this section, followed by manufacture industry. Looking into the top discussed food and service industry (Spence & Rinaldi, 2014; Jacksona & Singhb, 2015; Wang Y. , Chen, et al., 2013), we noticed that all of the articles linked their environmental performances together with the discussion of economic performances. Thus we can conclude that economic performance may demonstrate a noticeable influence on the environmental performance of the food and service industry or vice versa.

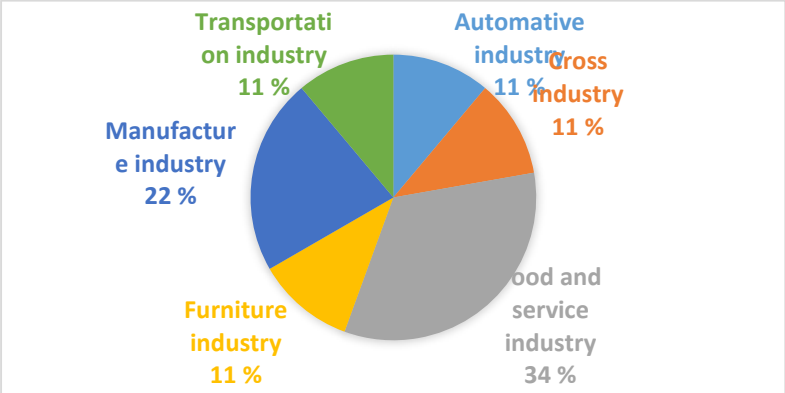

Figure 8. Supply chain management capabilities in practice

5.2.3 Sustainable procurement capabilities

Five of the selected articles focus on the research area of sustainable procurement (Walker;et al., 2012; Zsidisin & Siferd, 2001; Tate;et al., 2012; Mansi, 2015; Correia;et al., 2013). Two of them emphasis on studying the relevant practices within public sector, while the other three focus on the theoretical aspects of the topic. The following Table 10: Procurement and supplier assessment capabilities provides an overview of the articles that are relevant to sustainable procurement.

5.2.3.1 Procurement

Both articles have addressed that around 15%-20% of the GDP are dedicated to public sector procurement (Correia;et al., 2013; Mansi, 2015) even though the subjected geographical region were very different. Due to the economies of scale, researchers believe that there is enough interest in study public sector's sustainable procurement alone. Correia believes that committing to purchasing renewable resources can save more energy, while Mansi advocates to purchase the right thing. Fernando's study focuses on the European countries' public sustainable procurement with specific emphasis on low carbon emission. Correia listed different kinds of emission and discussed about what should be done mostly on theoretical level. On the other hand, Mansi's article emphasis the usage of sustainable procurement in practice by analyze through the top 50 public sector companies. Both of the articles have addressed the importance of policy and governmental requirements in helping with promoting sustainable procurement in public sector.

The emphasis of Walker's framework was a combination of triple bottom line and different perspectives (from organizational to supply chain network), which enlighten a broader guideline and lots of research possibilities of sustainable purchasing in future research (Walker, et al., 2012). In an earlier work relating to the same subject, Zsidisin's article started with a bigger picture as putting sustainable purchasing in the supply chain management context, then it narrowed down to

organizational level of sustainable purchasing as focused discussion area, during which, Zsidisin engaged the transaction cost analysis for companies to identify what are the core competences and brought up the potential question that whether some of the supply chain activities should be outsourced (Zsidisin & Siferd, 2001).

- In transition

Another research paper from Tate has one thing in common with Zsidisin's articles, that is they both studied sustainable purchasing from one company's point of view (Zsidisin & Siferd, 2001; Tate, et al., 2012), as Tate approached the subject from one company's standpoint, she quickly captured the fundamental variable in green supply chain management, that is, in reality, some of the supply chain activities are deemed to be outsourced to suppliers. Taking that into consideration, Tate again expanded the sustainable purchasing topic into the supply chain network context with a novel focus on purchasing/outsourcing service from/to suppliers i.e. supplier management. Thus bringing the topic to our next dedicated section- sustainable supplier assessment. As another article discussing about both of the topics in transition, Large started with looking at supply chain management as a whole (Large & Thomsen, 2011). Knowing that the topic of purchasing and green supplier assessment are the major topics in green supply chain management, the authors studied about these two components' correlations with environmental performance of companies. The result demonstrates straight impact from both supplier assessment and purchasing on environmental performance.

Table 10: Procurement and supplier assessment capabilities

Function	*Articles*	*Industry*	*Generalizations*	*Measurements*
Procurement	(Mansi, 2015)	Public sector	Analysis of top 50 India company annual reports. Using sustainable procurement discloser index as benchmark to study sustainable practices among central public sector companies in India	Content analysis
Procurement	(Zsidisin & Siferd, 2001)	Non specific	Define that reduction, recycling and reuse as the main activities in environmental purchasing, integrating cost analysis within environmental supply chain research	Environmental management system; Transaction cost analysis

Procurement	(Walker; et al., 2012)	Non specific	A finalization and discussion of previous studies, propose to build up sustainable procurement framework from TBL perspective	Triple bottom line; Unit of analysis
Procurement	(Correia; et al., 2013)	Public sector	Sustainable procurement, green procurement, low carbon procurement, different types of emissions in public sector	Carbon management; Kyoto protocol
Procurement & Supplier	(Tate; et al., 2012)	Cross industry	Review of current literature in environmental purchasing and supplier management. No dominate research has been formulated yet, the area is lack exploring still. But from past, it can be seen that there is a growing interest in the field. Focusing on supplier management may generate the most result this is field	Content analysis
Procurement & Supplier	(Large & Thomsen, 2011)	Non specific	The study tries to extend sustainability practices to suppliers with different approach and which will be the most effective one, result shows that the degree of green supplier assessment and the level of green collaboration influence on company's environmental performance.	Reliability analysis; exploratory analysis
Supplier	(Kumar; et al., 2014)	Manufacture industry	Taking carbon emissions into consideration while choosing suppliers, build up GDEA model to examine suppliers with it	Green data environmental analysis; GHG protocol
Supplier	(Evangelista, 2014)	Transportation industry	Motives and barriers for Logistics service companies to adopt	Information content analysis

			sustainability steps and initiatives has been taken	
Supplier	(Caniëls; et al., 2013)	Manufacture industry	Customer requirements; Supplier readiness; Relationship management; Supplier development investment are used as key factors to study about their influence on supplier participating in green supply chain initiatives.	Partial least squares model; Reliability and validity test

5.2.3.2 Procurement capabilities in practice

Out of the 6 articles (including the two in transition), the author has found that half of them didn't discuss about any detailed industry regarding sustainable procurement capabilities. From which, we may deduct that sustainable procurement capabilities are mostly universal thus providing homogenous results industry wise. In such situations, we mainly focus on the procurement initiatives themselves. In the above chapter, most of the purchasing strategies are discussed. Almost all the articles have mentioned the perspective to taking into consideration of product life cycle from end to end (Walker, et al., 2012; Correia, et al., 2013; Mansi, 2015; Zsidisin & Siferd, 2001; Tate, et al., 2012). Thus we can take that as the basic for evaluating sustainable procurement capabilities in the future.

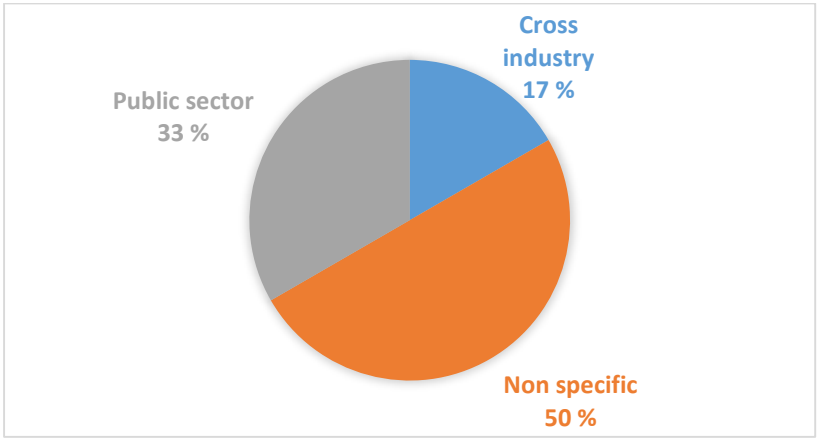

Figure 9. Procurement capabilities in practice

5.2.4 Sustainable supplier management capabilities

In earlier literature, supplier management was one of the areas that was easy to be overlooked due to the spot it holds within supply chain. Being partially responsible/liability for unsustainable behavior gives it a mysterious and safe veil to hide behind, as well less pressure for making changes.

(Caniëls;et al., 2013). However, in recent studies, researchers have started to see the importance of supplier management from a supply chain network perspective. Thus during the author's research, many recent articles regarding the topic have been found. In the following sector, five of the selected articles are presented as dedicated study of supplier management.

As one of the articles discussing on both topics (Large & Thomsen, 2011) brought up the focus of supplier assessment after green purchasing, knowing that the degree of supplier greenness would influence the whole supply chain activities, the article proposed way to encourage suppliers more into improve environmental performances. In Tate's article, the authors' initiative is to study environmental purchasing together with supplier management with the mindset that 'value added' service are provided from suppliers. In many cases, this is true, which also left space to discuss about the environmental impact that is brought up by the suppliers. During the course of the article, the authors found that this area of research is still new thus worth exploring. According to Tate, the emphasis in future research regarding sustainable supplier management should lie in the field of studying supplier initiatives (Tate;et al., 2012).

5.2.4.1 Supplier assessment capabilities

Drivers of adopting green initiatives (Caniëls, et al., 2013; Evangelista, 2014)and supplier green initiatives are thoroughly discussed within the following several articles (Evangelista, 2014; Kumar, et al., 2014).

Kumar focused on building up conceptual model for selecting sustainable suppliers by monitoring their initiatives with considerations to carbon footprint. Green data environmental analysis was invented through the article, the model helps suppliers to identify their current operations in terms of efficiency, whilst also helps companies to reduce emissions and to gain competitive advantage (Kumar;et al., 2014). Evangelista interviewed 13 different logistic service providers and the result demonstrated that support from government is the most important driver for adopting green initiatives (Evangelista, 2014); In addition, Evangelista also identified the barriers to adopting green initiatives such as lack of manpower and IT skills.

Caniëls conducted a survey for 54 automotive suppliers, and the result demonstrated that customer requirements, internal capabilities and cooperative relationship between supplier and customer are the major drivers for suppliers to be incorporated into supply chain level sustainable initiatives (Caniëls, et al., 2013). In addition, Caniëls's conservative attitude towards the utility of environmental regulations on adoption of green initiatives for suppliers, which is due to the low

standard it sets, resonates with Handfield's opinions from early research (Handfield, et al, 1997; Caniëls, et al., 2013).

Evangelista's research has come up with an opinion that most of the suppliers take up green initiatives for the sake of their own company instead of for the whole supply chain level (Evangelista, 2014). Why is it not motivating in taking the bigger picture? Does it imply that there is not much to gain for them in proactively trying to greening their operations for the whole supply chain? Dao's research has pointed out that sustainability can only be achieved through cooperation of different focal points in supply chain, especially in supplier operated environment (Dao, et al., 2011).

5.2.4.2 Supplier assessment capabilities in practice

Five articles have focused on the discussion of supplier assessment capabilities (including the ones discussing about both supplier and purchasing). As can be seen from Figure 10. Supplier assessment capabilities in practice. Out of all, manufacture industry's case companies are the most used, and the total count of articles is two. Both of the article applied capabilities to automobile supplier manufacture case. Two articles present complimentary arguments to each other. Two articles complement each other by discussing drivers for adopting green initiatives and how the initiatives are taken into practices. Articles suggest that cooperative working style would promote suppliers in engaging green initiatives. In addition, a Carbon footprint considered model (GDEA) to assess supplier green initiatives is universal and can be applied for other companies too.

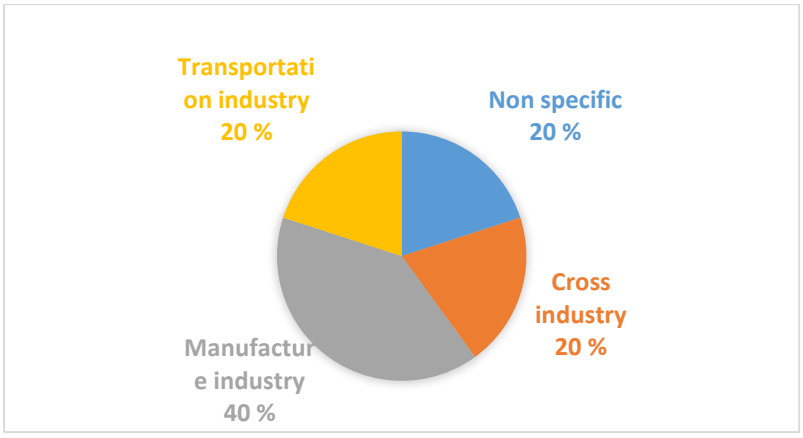

Figure 10. Supplier assessment capabilities in practice

5.2.5 Sustainable information technology and innovation capabilities

As it was mentioned in the previous section, lacking of IT skills may hinder companies' adoption of sustainable initiatives (Evangelista, 2014), thus in this section, we discuss about IT capabilities in detail and how are they connected to firms' sustainable capabilities. Among the selected articles, three

articles are dedicated to the discussion of this topic (Wang;et al., 2015; Dao;et al., 2011; Lee;et al., 2014).

5.2.5.1 Information technology

There are many Information technologies capabilities, IT environmental integration system is a very common one. It can serves the purpose of increase energy efficiency within companies (Wang, et al., 2015; Dao, et al., 2011) In the author's selected articles. Resource based view is often engaged in the study of sustainable IT capabilities (Wang, et al., 2015; Dao, et al., 2011). Wang conducted a survey for 151 Chinese companies, the result shows that IT capabilities *(e.g. IT environmental management integration* (Wang, Chen, & Amado, 2015)*)* can influence one firm's environmental performances and the influence is stronger when one firm is proactively developing its own capabilities to achieve sustainability *(e.g. knowledge management, business flexibility etc.* (Wang, et al., 2015)*).*The authors also pointed out that the study of IT capabilities in environmental performance context is still in its early stage, future research areas should come from IT industry perspective and study the cooperation between firms in integrating and managing IT resources. The topic is then studied in Dao's paper (Dao, et al., 2011). Dao incorporated resource based view with Triple bottom line theory to form his theoretical framework, which sees IT capabilities and resources as one whole and put them together in a broader concept to be discussed with Human resource management and supply chain management. In this way, it enables IT capabilities with more possibilities than just creating energy efficiency (Dao, et al., 2011)*'*. The combination of the framework also broaden the path for further research and indicates contingency possibilities for developing areas as well the management of IT resource capabilities (Wang, et al., 2015; Dao, et al., 2011).

5.2.5.2 From Information technology to innovation

Lee's article linked sustainable IT capabilities with innovation seamlessly thus extended our research topic from information technology process perspective (Wang, et al., 2015; Dao, et al., 2011) to technology process and product innovation. During the article, the correlation of several green supply chain practices are studied together with technology innovation. The result has demonstrated positive correlations between green supply chain practices (e.g. eco product design) and technology innovations (Lee, et al., 2014).

Table 11: IT and innovation capabilities

Function	*Article*	*Industry*	*General*	*Measurements*

IT	(Dao, et al., 2011)	Non specific	Triple bottom line, Use resource based view to evaluate company's different operations and develop integrated sustainability framework including IT, Human resource management resources and supply chain management resources	Resource based view; Sustainable value framework
IT	(Wang, et al., 2015)	Manufacture industry	Engaging resource based view to study the correlation of IT competence, IT environment management, and corporate environment performances.	Resource based view; Questionnaire; Variance- & covariance-based Sem
(IT) innovation	(Lee, et al., 2014)	Manufacture industry	Green supply chain management are broken into 5 dimensions: Top management commitment, eco design, investment recovery, green purchasing, and cooperation with customers. The 5 dimensions are evaluated to impact technology innovation	Statistical analysis
Innovation	(Gabler, et al., 2015)	Cross industry	Eco-capability is developed to Environmental orientation and organization innovations and it can lead to better performance	Exploratory confirmatory factor analysis; Reliability analysis; Structure equation modeling
Innovation	(Sharma & Iyer, 2012)	Non-specific	Using resource based view to discuss how to develop new products based on that thinking and how it meets green supply chain management purpose	Content analysis

Sustainable innovation capabilities

As it was discussed in Lee's article, eco product design holds and important role in the greening the whole supply chain (Lee, et al., 2014). In earlier research, the author found another article dedicated in discussing about it. Engaging resource based view, Sharma started with a novel concept of product developed with minimum resources which then lead to the concept of green products, such result

demonstrates the importance innovation capability in product development which enables firms' competitive advantage while maintaining sustainable at the same time (Sharma & Iyer, 2012). Similar to Sharma's research, Gabler's article also engaged resource based view in explore companies' environmental tendency and combined with companies' innovation capabilities to formulate the base hypothesis and the concept of 'eco-capability' during the article (Gabler, et al., 2015). Gabler conducted a questionnaire facing 850 organizations and the result demonstrates that organizations that develop capability, which combines innovation and sustainability, would also like to achieve competitive advantage in market performance. Such result resonate with Lee's study thus enhanced the significance of sustainable innovation capabilities in supply chain management.

5.2.5.3 Sustainable IT and innovation capabilities in practice

Due to the inseparable nature of IT and innovation sectors, the author decided to discuss these two functions together in practice. According to the result, we can see that manufacture industry and general discussion (non-specific industry) are the most discussed ones. It is notable that within both manufacture industry and general discussions, resource based view was mentioned multiple times within the selected articles. Resource based view, as one of the fundamental constitute for organizations' competitive advantage, can be combined with environmental focus. Compelling results can be achieved through practice. And we can see a strong indication as non-industry restrained from Figure 11. IT and innovation capabilities in practice.

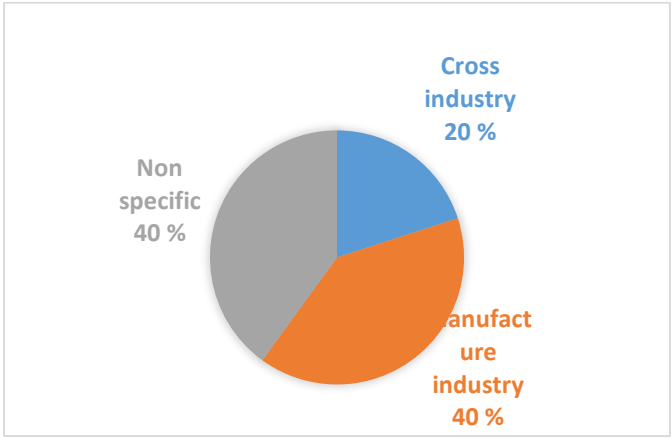

Figure 11. IT and innovation capabilities in practice

6 Conclusion and managerial implications

The thesis presents a systematic literature review on sustainable organization capabilities and its' implications in the supply chain management field. The objective of the study is to explore what is

sustainable capabilities in organizations' supply chain management and their evidence in practice. In addition, the thesis hopes to enlighten the scope for future studies and providing managerial implications if applicable.

The author developed her own systematic review protocol to fit in the condition of the thesis with reference to (Hiroharu , et al., 2016; Tranfield, et al., 2003; Kitchenham, 2004). There are 226 defined search queries in the final search, with which 2264 articles are identified. Out of the 2264 articles, 24 are selected for the thesis study. The given 24 articles are published between 1997- 2015. The thesis answers the research questions identified in the chapter 2 by analyzing of the selected articles. The result is demonstrated in two ways. Firstly, a quantitative overview, containing publishing year; publishing journal; research type, is presented. Secondly, a qualitative in-depth comparative analysis combined with tables and narrative descriptions are presented to answer research questions.

The result indicates five main current research areas regarding sustainable capabilities including supply chain, procurement, supplier assessment, information technology and innovation, which also works as a guideline for corporate to check their current operations. In all of the areas, organizations demonstrated great tendency/result in utilizing sustainable capabilities. Across all the industries, general discussion (non-industry specific) and manufacture industry are the most discussed ones. Although the author specifically tried to categorize practices based on different industries in the hope to find patterns. Results on have demonstrated prevalence in many industries. However, as the strong focus on manufacture industries, the thesis may provide more comprehensive insights for managers for manufacture industry.

From a managerial perspective, three areas of specification can be address. First of all, top management commitment is crucial in shaping one organization's sustainable capability. Multiple articles have identified the importance (Lee;et al., 2014; Sheu & Talley, 2011), top management's support would allow companies with more possibilities to resource and identification of unsustainable behavior. Meanwhile, allowing organizations' tendency to environmental friendly changes thus leading to sustainable capabilities. Secondly, resource based view as a concept closely linked with top management support should be considered. Resource based view can be incorporated into organizations while managers evaluating sustainable investments both within and intra organization. Most of the selected articles have suggested that resource based view can provide basis for sustainable supply chain management as well as helping organizations in gaining competitive advantage (Lee;et al., 2014; Sheu & Talley, 2011; Sharma & Iyer, 2012). Thirdly, the implementation of the set of Rs (reuse, recycle, reduce, resale etc.) can significantly increase firms' performance while minimize

environmental problems (Lee, et al., 2014; Lai & Wong, 2012). The set of Rs can be implemented by utilizing companies' idle assets or optimizing product movements and so on.

The result of the thesis is expected to generate insights for practitioners as well helping researchers in identify current research possibilities and potential research gaps by providing a systematic literature review on the current researches that have been done on the topic.

7 Limitations and further research

When it comes to the limitations of the thesis, the research method first comes to the author's mind above all. The reasons for adopting systematic review is justified in section 3.2.1.as to 'perform a comprehensive unbiased search among existing literature (Tranfield, et al., 2003)'. However, as it is also stated in section 4.2.1.that the author only selected one database for sampling. Although it was argued that other database provided comprehensive results, it is still likely that the search didn't cover all the relevant literature and the result may not provide the most comprehensive overview. It should be explicitly stated here that the author does not claim to have cover all the literature. In addition, systematic review method may not be the best suitable research method for the topic as the author didn't compare it with any other research methods in the writing of this thesis.

Besides the choice of research method, the author discovered that are three types of biases, population bias; measurement bias; quality assessment bias (with reference from (Kitchenham, 2004; Tranfield, et al., 2003)), that may further help to explain the limitations of using the research method, thereby explaining the limitations of the thesis.

First of all, the sample population is limited as the author only selected data from one database and specified articles to be chosen should have been published on the top tier journals, The sample group excluded potential relevant books and other source of data in the discussed area thus limited the thesis to generate best analysis for providing useful results both for academics and practitioners, which constitute population bias.

Secondly, taking into account that management reviews have been generally considered narrative, the selection criteria has to rely on content screening. While content screening can be subjective and hard to validate, thus constitute potential measurement bias. One way to mitigate the bias is to have multiple persons screening the content, the author of this thesis engaged another reviewer in the

beginning of the review. However, in later stage, the final selection was carried out by the author alone, thus the bias is not completely avoided.

Thirdly, according to David, who has specifically studied the nature of management review, the quality assessment for management review still needs to be developed. Unlike quantitative research that can be tested against statistical models, the quality assessment for qualitative research usually consists of questions and discussion. While such discussion may be subjective, the quality assessment of qualitative research still needs to be validated. One common method to mitigate bias is to engage data extraction form as the author has done during this thesis. However, it is generally seen that this area still can be improved.

It is worth mention that one common limitation in systematic review is called publication bias. Publication bias means that favorable results tend to appear in the search but they may not explicit meant for answering the author's research questions (Kitchenham, 2004). They may demonstrate in a bigger way. For example, the author has specified that the focus of sustainability in the context of this thesis is environmental orientation. However, when using 'sustainability' as one search keyword, result might demonstrate socially sustainability or economic sustainability. This problem appeared in the author's first pilot search thus in final defining the search keywords, the author choose the synonyms that explicit demonstrate the author's orientation. In the attached appendix, it can be identified how the final studies are chose.

In regard to further research and studies, the author thinks that there are still more areas to be explored.

During the building of the author's search strings, the author engages porter's value chain model for classifying organization operations and includes organization functions. It is surprising to see that the author has generated result only in supply chain, procurement, supplier assessment, IT and innovation perspective, which neither explain all organization functions capabilities nor operations capabilities. From organization function perspective, the author thinks that further research on Firm infrastructure and human resources capabilities can be further developed. Operation wise, the author thinks that logistics perspective should be discussed more in depth, in addition, more detailed capabilities such as manufacture, warehousing and material handling operations would worth to be explored further in connection with sustainability.

8 References

Wolf, C., & Seuring, S. (2010). Environmental impacts as buying criteria for third party logistical services. *International Journal of Physical Distribution & Logistics Management, Vol. 40 Iss: 1/2*, 84 - 102.

(2007). Retrieved from Eurostat: http://ec.europa.eu/eurostat/en/web/products-statistics-in-focus/-/KS-SF-07-117

(2008). Retrieved from Center for Climate and Energy Solutions: http://www.c2es.org/technology/overview/buildings

(2014, march). Retrieved from Walmart blog: http://blog.walmart.com/the-future-of-fleet-efficiency

(2014). Retrieved from Walmart: http://corporate.walmart.com/global-responsibility/environment-sustainability/truck-fleet

(2014). Retrieved from Energy efficiency lighting: http://eartheasy.com/live_energyeff_lighting.htm

Akwasi. (2013). *CROSS DOCKING; WALMAT'S INVENTORY STRATEGY .* Retrieved from http://cmuscm.blogspot.fi/2013/02/cross-docking-walmats-inventory-strategy_12.html

Aliakbar, H., & Khosrojerdi, A. (2016). Robust global supply chain network design under disruption and uncertainty considering resilience strategies: A parallel memetic algorithm for a real-life case study. *Transportation Research Part E: Logistics and Transportation Review, Volume 87,*, 20-52.

Andrew Feller, D. D. (2016). Value Chains Versus Supply Chains. *BPTrends*.

Aral, S., & Weill, P. (2007). IT asserts, Organizational capabilities, and Firm performance: How resouce allocations and organizational differences explain performance variation. *Organization Science*, page 763-780.

Aydin, G., Cattani, K., & Druehl, C. (2014). Global supply chain management. *Business Horizons*, 453-457.

Bilbao, A. M., Carrano, A., Hewitt, M., & Thorn, B. (2011). On the environmental impacts of pallet management operations. *Management Research Review, Vol. 34 Iss: 11,*, 1222 - 1236.

Blaxter, M. (1996). Criteria for the evaluation of qualitative research papers. *Medical sociology news*.

Boston college. (n.d.). Retrieved from https://www2.bc.edu/

Brundtland, G. H. (1987). *the Brundtland Report.*

Buildings and Emissions: Making the Connection. (2008). Retrieved from Center for climate and energy solution: http://www.c2es.org/technology/overview/buildings

Caniëls, M. C., Gehrsitz, M. H., & Semeijn, J. (2013). Participation of suppliers in greening supply chains: An empirical analysis of German automotive suppliers. *Journal of Purchasing and Supply Management, Volume 19, Issue 3,*, Pages 134-143.

Caron, J., Durand, S., & Asselin, H. (2016). Principles and criteria of sustainable development for the mineral exploration industry. *Journal of Cleaner Production, Volume 119*, 215-222.

Carter, C., & Easton, P. (2011). Sustainable supply chain management: evolution and future directions. *International Journal of Physical Distribution and Logistics Management*, 46-62.

Carter, C., & Rogers, D. S. (2008). A framework of sustainable supply chain management: moving toward new theory. *International Journal of Physical Distribution & Logistics Management, Vol. 38 Iss: 5, pp.*, 360 - 387.

Christensena, W., Germain, R., & Birou, L. (2005). Build-to-order and just-in-time as predictors of applied supply chain knowledge and market performance. *Journal of Operations Management, Volume 23, Issue 5,*, 470-481.

Christina Wolf, S. S. (2009). Envrionmental impacts as buying criteria for third party logistical service. *International journal of Physical Distribution& Logistics management*.

Cook, D. J., Mulrow, C. D., & Haynes, R. B. (1997). Systematic Reviews: Synthesis of Best Evidence for Clinical. *Annals of Internal Medicine*, 126:376.

Correia, F., Howard, M., Hawkins, B., Pye, A., & Lamming, R. (2013). Low carbon procurement: An emerging agenda. *Journal of Purchasing and Supply Management, Volume 19, Issue 1,*, Pages 58-64.

Dao, V., Langella, I., & Carbo, J. (2011). From green to sustainability: Information Technology and an integrated sustainability framework. *The Journal of Strategic Information Systems, Volume 20, Issue 1,*, Pages 63-79.

Dosi, G., Nelson, R. R., & Winter, S. (2001). *The Nature and Dynamics of Organizational Capabilities.* Oxford University press.

Elkington, J. (1997). *Cannibals With Forks: The Triple Bottom Line of 21st Century Business.*

Energy efficient lighting. (2014). Retrieved from Eartheasy: http://eartheasy.com/live_energyeff_lighting.htm

Evangelista, P. (2014). Environmental sustainability practices in the transport and logistics service industry: An exploratory case study investigation. *Research in Transportation Business & Management, Volume 12,*, Pages 63-72.

Fretheim, E. (2014). *The future of fleet efficiency*. Retrieved from Walmart blog: http://blog.walmart.com/the-future-of-fleet-efficiency

Gabler, C. B., Richey, R. G., & Rapp, A. (2015). Developing an eco-capability through environmental orientation and organizational innovativeness. *Industrial Marketing Management, Available online 12 March*, In Press, Corrected Proof.

Govindan, K., Khodaverdi, R., & Vafadarnikjoo, A. (2015). Intuitionistic fuzzy based DEMATEL method for developing green practices and performances in a green supply chain. *Expert Systems with Applications, Volume 42, Issue 20, 15*, Pages 7207-7220.

Grant, R. M. (2010). *Contemporary strategy analysis.*

Greenhouse gas emission statistics . (2015). Retrieved from Eurostat: http://ec.europa.eu/eurostat/statistics-explained/index.php/Greenhouse_gas_emission_statistics

Greenhouse gas emission statistics. (2014). Retrieved from eurostat: http://ec.europa.eu/eurostat/statistics-explained/index.php/Greenhouse_gas_emission_statistics

Gunasekaran, A., & Cheng, T. E. (2008). Special Issue On Logistics: New Perspectives and Challenges. *Omega*.

Gunasekaran, A., & Cheng, T. E. (2008). Special Issue on Logistics: New Perspectives and Challenges, Volume 36, Issue 4,. *Omega*, Pages 505–508.

Handfield, R. B., Waltonb, S. V., Seegersc, L. K., & Melnyka, S. A. (1997). 'Green' value chain practices in the furniture industry. *Journal of Operations Management, Volume 15, Issue 4,*, Pages 293–315.

Haw-Jan Wu, S. C. (1995). Environmentally responsible logistics systems. *International Journal of Physical Distribution & Logistics Management*.

Hiroharu , K., Tsutani, K., Katsumata, Y., Yoshizaki, T., Okuizumi, H., & Okada, S. (2016). Effectiveness of Pilates exercise: A quality evaluation and summary of systematic reviews based on randomized controlled trials. *Complementary Therapies in Medicine, Volume 25,*, 1-9.

Hoek, R. I. (1999). "From reversed logistics to green supply chains", Vol. 4 Iss: 3, pp.129 - 135. *Supply Chain Management: An International Journal,*.

Holweg, M., & Miemczyk, J. (2002). Logistics in the "three-day car" age: Assessing the responsiveness of vehicle distribution logistics in the UK". *International Journal of Physical Distribution & Logistics Management, Vol. 32 Iss: 10,*, 829 - 850.

Hussain, M., Khan, M., & Al-Aomar, R. (2016). A framework for supply chain sustainability in service industry with Confirmatory Factor Analysis. *Renewable and Sustainable Energy Reviews*, Pages 1301–1312.

Hülsmann, M., & Pfeffermann , N. (2011). *Strategies and Communications for Innovations, An Integrative Management View for Companies and Networks.*

Itella Annual Report. (2013). Retrieved from Itella: http://annualreport2013.itella.com/en/business-groups/itella-logistics/trade-between-finland-and-russia

Jabbour, A. B., Jabbour, C. J., Latan, H., Teixeira, A. A., & Oliveira, J. H. (2015). Reprint of "Quality management, environmental management maturity, green supply chain practices and green performance of Brazilian companies with ISO 14001 certification: Direct and indirect effects". *Transportation Research Part E: Logistics and Transportation Review, Volume 74,*, Pages 139-151.

Jacksona, L. A., & Singhb, D. (2015). Environmental rankings and financial performance: An analysis of firms in the US food and beverage supply chain. *Tourism Management Perspectives, Volume 14,*, Pages 25–33.

Jonah C. Tyan, F.-K. W. (2002). An evaluation of freight consolidation policies in global third party logistics. *The international journal of management science*.

Kitchenham, B. (2004). *Procedures for performing systematic reviews.* Australia: Keele University Technical report.

KPMG. (2011). *International survey of corporate responsibility reporting.*

Kristin J. Lieb, R. C. (2010). Environmental sustainability in the third-part logistics (3PL) industry. *International Journal of Physical Distribution& Logistics Management*.

Kumar, A., Jain, V., & Kumar, S. (2014). A comprehensive environment friendly approach for supplier selection. *Omega, Volume 42, Issue 1,*, Pages 109-123.

Lai, K.-h., & Wong, C. W. (2012). Green logistics management and performance: Some empirical evidence from Chinese manufacturing exporters. *Omega, Volume 40, Issue 3,*, Pages 267-282.

Large, R. O., & Thomsen, C. (2011). Drivers of green supply management performance: Evidence from Germany. *Journal of Purchasing and Supply Management, Volume 17, Issue 3,*, Pages 176-184.

Lee, V.-H., Ooi, K.-B., Chong, A. Y.-L., & Seow, C. (2014). Creating technological innovation via green supply chain management: An empirical analysis. *Expert Systems with Applications, Volume 41, Issue 16,*, Pages 6983-6994.

Lieb, K., & Libe, R. (2010). Environmental sustainability in the third-party logistics (3PL) industry. *International Journal of Physical Distribution & Logistics Management, Vol. 40 Iss: 7,* , 524 - 533.

Luo, X., & Bhattacharya , C. (2006). Corporate Social Responsibility, Customer Satisfaction, and Market Value. *Journal of Marketing, 70 (4),*, 1-18.

Mansi, M. (2015). Sustainable procurement disclosure practices in central public sector enterprises: Evidence from India. *Journal of Purchasing and Supply Management, Volume 21, Issue 2*, Pages 125-137.

Mariadossa, B. J., Tansuhaja, P. S., & Mourib, N. (2011). Marketing capabilities and innovation-based strategies for environmental sustainability: An exploratory investigation of B2B firms. *Industrial Marketing Management, Volume 40, Issue 8,*, Pages 1305–1318.

McKinnon, A., Browne, M., & Whiteing, A. (2012). *Green Logistics: Improving the Environmental Sustainability of Logistics.* Kogan page Limited.

McKinnon, A., Browne, M., & Whiteing, A. (2012). *Green Logistics: Improving the EnvironmentalGreen Logistics: Improving the Environmental Sustainability of Logistics.* Kogan page Limited.

Mckinsey. (n.d.). Retrieved from http://www.forbes.com/2010/03/05/building-organizational-capability-leadership-managing-mckinsey.html

Nawrocka, D. (2008). Environmental supply chain management, ISO 14001 and RoHS. How are small companies in the electronics sector managing? *Corporate Social Responsibility and Environmental Management, 15 (6)*, 349–360.

Nawrocka, D., Brorson, T., & Lindhqvist, T. (2009). ISO 14001 in environmental supply chain practices. *Journal of Cleaner Production*.

Nidumolu, R., Prahalad, C., & Rangaswami, M. (2009). Why Sustainability Is Now the Key Driver of Innovation. *Harvard Business review*.

Nike. (2009). *Nike corporate responsible report FY 07-09.* Retrieved from http://www.nikebiz.com/crreport/content/pdf/documents/en-US/full-report.pdf

Nike, I. (2009). *Corporate Responsibility.* Retrieved from Nike: http://www.nikebiz.com/crreport/content/environment/4-3-5-inbound-logistics.php?cat=climate-and-energy

Nisen, M. (2013, May 9). *How Nike Solved Its Sweatshop Problem*. Retrieved from Business insider: http://www.businessinsider.com/how-nike-solved-its-sweatshop-problem-2013-5?IR=T

Polonsky, M., & Rosenberger, P. (2001). Reevaluating green marketing: A strategic approach. *Business Horizons*.

Porter, M. E. (1985). *Competitive advantage: Creating and sustaining superior performance.*

Prahalad, C., & Hamel, G. (2000). The Core Competence of the Corporation. In *Strategic Learning in a Knowledge Economy* (pp. 3-22).

Q. Zhu, J. S. (2008). Confirmation of a measurement model for green supply chain management practices implementation. *International Journal of Production Economics, 111 (2)* , 261–273.

Rondinelli, D., & Berry, M. (2000). Multimodal transportation, logistics, and the environment: managing interactions in a global economy. *European Management Journal, Volume 18, Issue 4*, Pages 398-410.

Schmeisser, B. (2013). A Systematic Review of Literature on Offshoring of Value Chain Activities. *Journal of International Management*, 390-406.

Schriber, S., & Löwstedt, J. (2015). Tangible resources and the development of organizational capabilities. *Scandinavian Journal of Management, Volume 31, Issue 1,*, Pages 54–68.

Sharfman, M., Shaft, T., & Anex, R. (2009). The road to cooperative supply-chain environmental management: trust and uncertainty among pro-active firms. *Business Strategy and the Environment, 18 (1)* , 1-13.

Sharma, A., & Iyer, G. R. (2012). Resource-constrained product development: Implications for green marketing and green supply chains. *Industrial Marketing Management, Volume 41, Issue 4,*, Pages 599-608.

Sheu, J.-B., & Talley, W. (2011). Green Supply Chain Management: Trends, Challenges, and Solutions. *Transportation Research Part E: Logistics and Transportation Review, Volume 47, Issue 6,*, Pages 791-792.

Spence, L. J., & Rinaldi, L. (2014). Governmentality in accounting and accountability: A case study of embedding sustainability in a supply chain. *Accounting, Organizations and Society, Volume 39, Issue 6,*, Pages 433-452.

Srivastara, S. (2007). Green supply-chain management: a state-of-the-art literature review. *International Journal of Management Reviews*, 53-80.

Tate, W. L., Ellram, L. M., & Dooley, K. J. (2012). Environmental purchasing and supplier management (EPSM): Theory and practice. *Journal of Purchasing and Supply Management, Volume 18, Issue 3*, Pages 173-188.

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic management journal*.

Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review. *British Journal of Management*, 207–222.

Transport 117/2007. (2007). Retrieved from Eurostat.

Tufts University Libraries. (2016, Jan 5). Retrieved from Systematic Reviews: http://researchguides.library.tufts.edu/c.php?g=249127&p=1658789#12780103

Tyan, J., Wang, F.-K., & Du, T. (2002). An evaluation of freight consolidation policies in global third party logistics. *The international journal of management science*.

Tüselmann, H., Sinkovics, R. R., & Pishchulov, G. (2015). Towards a consolidation of worldwide journal rankings – A classification using random forests and aggregate rating via data envelopment analysis. *Omega*, 11-23.

Ulrich, K. (2011). *Strategies and Communications for Innovations.*

Walker, H., Miemczyk, J., Johnsen, T., & Spencer, R. (2012). Sustainable procurement: Past, present and future. *Journal of Purchasing and Supply Management, Volume 18, Issue 4,*, Pages 201-206.

Wang, X. (2015). A comprehensive decision making model for the evaluation of green operations initiatives. *Technological Forecasting and Social Change, Volume 95,*, Pages 191-207.

Wang, Y., Chen, S., Lee, Y., & Tsai, C. (2013). Developing green management standards for restaurants: An application of green supply chain management. *International Journal of Hospitality Management, Volume 34*, Pages 263-273.

Wang, Y., Chen, Y., & Amado, J. B. (2015). How information technology influences environmental performance: Empirical evidence from China. *International Journal of Information Management, Volume 35, Issue 2,*, Pages 160-170.

Vanpoucke, E., Vereecke, A., & Wetzels, M. (2014). Developing supplier integration capabilities for sustainable competitive advantage: A dynamic capabilities approach. *Journal of Operations Management*.

Wu, H.-J., & Dunn, S. C. (1995). Environmentally responsible logistics. *International Journal of Physical Distribution & Logistics Management*, 20-38.

Zahay, D. L., & Handfield, R. (2004). The role of learning and technical capabilities in predicting adoption of B2B technologies. *Industrial Marketing Management, Volume 33, Issue 7,*, Pages 627–641.

Zsidisin, G. A., & Siferd, S. (2001). Environmental purchasing: a framework for theory development. *European Journal of Purchasing & Supply Management, Volume 7, Issue 1*, Pages 61-73.

9 Appendix

9.1 Appendix 1. Selected articles and search strings

Authors	Title	Journal	Found with keyword/keywords	Found with search engine
Laura J. Spence, Leonardo Rinaldi	Governmentality in accounting and accountability: A case study of embedding sustainability in a supply chain	Accounting, Organizations and Society, Volume 39, Issue 6, August 2014, Pages 433-452	Environment* W/100 Practice W/100 Corporat*, Environment* W/10 Practic*, Competitive advantage' W/50 Practic*, Environment* W/100 Practice W/100 Operation*, Green*W/100 Practice W/100 'Supply Chain', Environment* W/100 Practice W/10 'Supply Chain', Environment* W/100 Practice W/100 Sales, Environment* W/100 Practice W/100 Market*	Science Direct

George A Zsidisin, Sue P Siferd	Environmental purchasing: a framework for theory development	European Journal of Purchasing & Supply Management, Volume 7, Issue 1, March 2001, Pages 61-73	Environment* W/100 Practic* W/100 transportation*, Lean* W/100 Practice W/100 'Supply Chain', Green*W/100 Practice W/100 'Supply Chain', Green*W/100 Practic*W/100 'Material handling', Environment* W/100 Practic* W/100 'Material handling', Environment* W/100 Practice W/100 Corporat*, Environment* W/100 Practice W/100 Market*, Environment* W/10 Practic*, 'Competitive advantage' W/50 Practic*, Lean* W/100 Practic*, Green*W/100 Practice W/100 Service, Environment* W/100 Practice W/100 Service, Environment* W/100 Practice W/100 'Reverse logistics', Green*W/100 Practice W/100 Purchasing, Environment* W/100 Practice W/100 Purchasing, Environment* W/100 Practic* W/100 transportation*, Lean* W/100 Practice W/100 'Supply Chain', Green*W/100 Practice W/100 'Supply Chain', Green*W/100 Practic*W/100 'Material handling', Environment* W/100 Practic* W/100 'Material handling'	Science Direct
Dennis Rondinelli, Michael Berry	Multimodal transportation, logistics, and the environment: managing interactions in a global economy	European Management Journal, Volume 18, Issue 4, August 2000, Pages 398-410	Environment* W/100 Competence W/100 transportation*, Environment* W/100 Competence W/100 'Material handling', Environment* W/100 Competence W/100 'Order tracking', Lean* W/100 Practice W/100 Corporat*,Lean* W/100 Practice W/100 Corporat*	Science Direct

Voon-Hsien Lee, Keng-Boon Ooi, Alain Yee-Loong Chong, Christopher Seow	Creating technological innovation via green supply chain management: An empirical analysis	Expert Systems with Applications, Volume 41, Issue 16, 15 November 2014, Pages 6983-6994	Green*W/100 Practice W/100 'Inbound logistics', Environment* W/100 Practice W/100'Inbound logistics', Green*W/100 Practice W/100 'Outbound logistics', Green*W/100 Practice W/100 'Outbound logistics', Environment* W/100 Practice W/100 Corporat*	Science Direct
Kannan Govindan, Roohollah Khodaverdi, Amin Vafadarnikjoo	Intuitionistic fuzzy based DEMATEL method for developing green practices and performances in a green supply chain	Expert Systems with Applications, Volume 42, Issue 20, 15 November 2015, Pages 7207-7220	Green*W/100 Practice W/100 Procurement, Green*W/100 Practice W/100 Procurement, Environment* W/100 Practice W/100 Procurement, Green* W/100 Capability W/100 Corporat*, Environment* W/100 Capability W/100 Corporat*, Green* W/100 Practice W/100 Corporat*, Environment* W/100 Practice W/100 Corporat*,Lean* W/100 Practice W/100 Purchasing	Science Direct
Colin B. Gabler, Robert Glenn Richey Jr., Adam Rapp	Developing an eco-capability through environmental orientation and organizational innovativeness	Industrial Marketing Management, In Press, Corrected Proof, Available online 12 March 2015	Environment* W/50 Capability W/50 Return*	Science Direct

Arun Sharma, Gopalkrishnan R. Iyer	Resource-constrained product development: Implications for green marketing and green supply chains	Industrial Marketing Management, Volume 41, Issue 4, May 2012, Pages 599-608	Environment* W/50 Capabilit*, Environment* W/100 Capability W/100 Market*, Environment* W/100 Practice W/100 Service, Environment* W/10 Practic*, Environment* W/100 Competence W/100 Service, 'Competitive advantage' W/50 Practic*,Green*W/100 Competence W/100 Service, Environment* W/100 Practice W/10 'Supply Chain', Environment* W/100 Practice W/10 'Supply Chain', Green* W/100 Competence, Environment* W/100 Competence, Green*W/100 Practic*W/100 'Material handling', Environment* W/100 Practic* W/100 'Material handling', Green*W/100 Practice W/100 Operation*, Environment* W/100 Practice W/100 Operation*, Green*W/100 Capability W/100 'Supply Chain', Environment* W/100 Capability W/50 'Supply Chain', Green*W/100 Practice W/100 'Supply Chain', Green*W/100 Competence W/100 'Supply Chain', Environment* W/100 Competence W/100 'Supply Chain', Environment* W/100 Practice W/100 Return*,Green*W/100 Practice W/100 Market*, Environment* W/100 Practice W/100 Market*, Green*W/100 CompetenceW/100 Market*, Green*W/100 Capability W/100 Service, Environment* W/100 Capability W/100 Service, Green*W/100 Practice W/100 Service	Science Direct

Yao-Fen Wang, Su-Ping Chen, Yi-Ching Lee, Chen-Tsang (Simon) Tsai	Developing green management standards for restaurants: An application of green supply chain management	International Journal of Hospitality Management, Volume 34, September 2013, Pages 263-273	Green*W/100 Practice W/100 Procurement, Green*W/100 Practic*W/100 'Material handling'	Science Direct
Yi Wang, Yang Chen, Jose Benitez-Amado	How information technology influences environmental perform ance: Empirical evidence from China	International Journal of Information Management, Volume 35, Issue 2, April 2015, Pages 160-170	Environment* W/100 Competence W/100 'Reverse logistics'	Science Direct
Robert B Handfield,Steve V Waltonb, Lisa K Seegersc, Steven A Melnyka	'Green' value chain practices in the furniture industry	Journal of Operations Management, Volume 15, Issue 4, November 1997, Pages 293–315	Lean* W/100 Practic* W/100 Transportation*, Green*W/100 Practice W/100 Procurement, Green*W/100 Practic*W/100 'Material handling'	
Rudolf O. Large, Cristina Gimenez Thomsen	Drivers of green supply management performance: Evidence from Germany	Journal of Purchasing and Supply Management, Volume 17, Issue 3, September 2011, Pages 176-184	Green*W/100 Capability W/100 'Inbound logistics', Green*W/100 Competence W/100 'Supply Chain', Environment* W/100 Capability W/100 'Inbound logistics', Green*W/100 Practice W/100 'Inbound logistics', Environment* W/100 Practice W/100'Inbound logistics', Green*W/100 Competence W/100 Purchasing,Green*W/50 Competence W/100 Purchasing, Environment* W/50 Competence W/50 Purchasing	Science Direct

Wendy L. Tate, Lisa M. Ellram, Kevin J. Dooley	Environmental purchasing and supplier management (EPSM): Theory and practice	Journal of Purchasing and Supply Management, Volume 18, Issue 3, September 2012, Pages 173-188	Green*W/100 Capability W/100 Purchasing,Green*W/100 Capability W/100 Procurement, Environment* W/100 Capability W/100 Procurement,Environment* W/10 Practic*,Environment* W/100 CapabilityW/100 'Order tracking', Environment* W/100 Practice W/100 Service, Lean* W/100 Practice W/100 'Supply Chain', 'Competitive advantage' W/50 Practic*,Green*W/100 Practice W/100 'Supply Chain', Lean* W/100 Practic*, Green*W/100 Practice W/100 Manufactur*,Green*W/100 Capability W/100 Transportation*, Environment* W/100 Capability W/100 transportation*, Green*W/100 Practic* W/100 Transportation*, Environment* W/100 Practic* W/100 transportation*, Green*W/100 Capability W/100 Operation*, Environment* W/100 Capability W/100 Operation*, Green*W/100 Practice W/100 Operation*, Environment* W/100 Practice W/100 Operation*, Lean* W/100 Practice W/100 Operation*, Green*W/100 Capability W/100 Manufactur*, Environment* W/100 Capability W/100 Manufactur*, Green*W/100 Capability W/100 'Supply Chain', Environment* W/100 Capability W/50 'Supply Chain', Green*W/100 Practice W/100 Manufactur*, Green*W/100 Practice W/100 Facility, Environment* W/100 Practice W/100 Facility, Green*W/100 Capability W/100 'Order tracking', Green*W/100 Practice W/100	Science Direct

			Equipment, Environment* W/100 Practice W/100 Equipment, Green*W/100 Practice W/100 'Order tracking', Environment* W/100 PracticeW/100 'Order tracking', Green*W/100 Capability W/100 Service, Environment* W/100 Capability W/100 Service, Green*W/100 Practice W/100 Service, Green*W/100 Practice W/100'Reverse logistics', Environment* W/100 Practice W/100 'Reverse logistics', Environment* W/100 Capability W/100 Purchasing, Green*W/100 Practice W/100 Purchasing, Environment* W/100 Practice W/100 Purchasing, Green*W/100 Practice W/100 Procurement, Environment* W/100 Practice W/100 Procurement, Green* W/100 Capability W/100 Corporat*, Environment* W/100 Practice W/100 Corporat*, Environment* W/50 Capabilit*, Green*W/100 Practice W/100 Market*, Environment* W/100 Practice W/100 Market*	
Helen Walker, Joe Miemczyk, Thomas Johnsen, Robert Spencer	Sustainable procurement: Past, present and future	Journal of Purchasing and Supply Management, Volume 18, Issue 4, December 2012, Pages 201-206	Green*W/100 Practice W/100 Procurement	Science Direct
Fernando Correia, Mickey Howard, Beverley Hawkins, Annie Pye, Richard Lamming	Low carbon procurement: An emerging agenda	Journal of Purchasing and Supply Management, Volume 19, Issue 1, March 2013, Pages 58-64	Green*W/100 Practice W/100 Procurement	Science Direct

Marjolein C.J. Caniëls, Matthias H. Gehrsitz, Janjaap Semeijn	Participation of suppliers in greening supply chains: An empirical analysis of German automotive suppliers	Journal of Purchasing and Supply Management, Volume 19, Issue 3, September 2013, Pages 134-143	Green* W/100 Capabilit*, Lean* W/100 Practice W/100 'Supply Chain',Environment* W/100 Practice W/100 Purchasing, Green*W/100 Practice W/100 Manufactur*,Environment* W/100 Practice W/10 'Supply Chain', Environment* W/10 Practic*,'Competitive advantage' W/50 Practic*, Lean* W/100 Practic*, Green*W/100 Capability W/100 Operation*, Environment* W/100 Capability W/100 Operation*, Green*W/100 Practice W/100 Operation*, Environment* W/100 Practice W/100 Operation*, Lean* W/100 Practice W/100 Operation*, Green*W/100 Capability W/100 'Supply Chain', Environment* W/100 Capability W/50 'Supply Chain', Green*W/100 Practice W/100 Manufactur*, Green*W/100 Practice W/100 'Supply Chain', Green*W/100 Practice W/100 Purchasing,Green* W/100 Capability W/100 Corporat*, Green* W/100 Capability W/100 Corporat*, Environment* W/100 Practice W/100 Corporat*, Environment* W/50 Capabilit*, Green*W/100 Practice W/100 Market*, Environment* W/100 Practice W/100 Market*	Science Direct
Mansi Mansi	Sustainable procurement disclosure practices in central public sector enterprises: Evidence from India	Journal of Purchasing and Supply Management, Volume 21, Issue 2, June 2015, Pages 125-137	Green*W/100 Practice W/100 Procurement	Science Direct

Amit Kumar, Vipul Jain, Sameer Kumar	A comprehensive environment friendly approach for supplier selection	Omega, Volume 42, Issue 1, January 2014, Pages 109-123	Environment* W/100 Capability W/100 Corporat*, Environment* W/100 Practice W/100 Corporat*	Science Direct
Kee-hung Lai, Christina W.Y. Wong	Green logistics management and performance: Some empirical evidence from Chinese manufacturing exporters	Omega, Volume 40, Issue 3, June 2012, Pages 267-282	Green*W/100 Practice W/100 'Inbound logistics', Green*W/100 Practic*W/100 'Material handling', Environment* W/100 Practice W/100'Inbound logistics', Green*W/100 Practice W/100 'Outbound logistics', Environment* W/100Practice W/100 'Outbound logistics'	Science Direct
Pietro Evangelista	Environmental sustainability practices in the transport and logistics service industry: An exploratory case study investigation	Research in Transportation Business & Management, Volume 12, October 2014, Pages 63-72	Green*W/100 Practic* W/100 Warehousing*, Environment* W/100 Practic* W/100 Warehousing*, Green*W/100 Capability W/100 'Order tracking'	Science Direct
Xiaojun Wang	A comprehensive decision making model for the evaluation of green operations initiatives	Technological Forecasting and Social Change, Volume 95, June 2015, Pages 191-207	Lean* W/100 Practice W/100 Purchasing, Green*W/100 Capability W/100 'Material handling', Green*W/100 Practic*W/100 'Material handling', Green*W/100 Capability W/100 'Inventory Management'	Science Direct

Viet Dao, Ian Langella, Jerry Carbo	From green to sustainability: Information Technology and an integrated sustainability framework	The Journal of Strategic Information Systems, Volume 20, Issue 1, March 2011, Pages 63-79	Green* W/100 Capabilit*, Green*W/100 Practice W/100 Operation*, Environment* W/100 Practice W/100 Operation*, Environment* W/100 Capability W/100 Manufactur*, Green*W/100 Capability W/100 'Supply Chain', Environment* W/100 Capability W/50 'Supply Chain', Green*W/100 Practice W/100 Manufactur*, Green*W/100 Practice W/100 'Supply Chain', Environment* W/100 Capability W/100 Service, Environment* W/100 Practice W/100 Return*, Environment* W/100 Practice W/100 'Reverse logistics', Green* W/100 Capability W/100 Corporat*, Lean* W/100 Capability W/100 Corporat*, Environment* W/100 Practice W/100 Corporat*, Environment* W/50 Capabilit*, Lean* W/100 Capabilit*, Environment* W/10 Practic*, Environment* W/10 Practic*, Competitive advantage' W/50 Practic*, Environment* W/100 Capability W/100 Operation*, Environment* W/100 Capability W/100 Market*, Strategic* W/100 Capability W/100 Market*, Green*W/100 Practice W/100 Market*, Environment* W/100 Practice W/100 Market*, Environment* W/50 Capability W/50 Return*	Science Direct
Leonard A. Jacksona,Dipendra Singhb	Environmental rankings and financial performance: An analysis of firms in the US food and beverage supply chain	Tourism Management Perspectives, Volume 14, April 2015, Pages 25–33	Green*W/100 Practice W/100 Manufactur*, Green*W/100 Practice W/100 'Supply Chain', Environment* W/100 Practice W/10 'Supply Chain', Green*W/100 Practice W/100 Market*,	Science Direct

			Environment* W/100 Practice W/100 Market*, Green*W/100 Practice W/100 Service, Green*W/100 Practice W/100'Reverse logistics', Green*W/100 Practice W/100 Operation*	
Jiuh-Biing Sheu, Wayne K. Talley	Green Supply Chain Management: Trends, Challenges, and Solutions	Transportation Research Part E: Logistics and Transportation Review, Volume 47, Issue 6, November 2011, Pages 791-792	Green*W/100 Practice W/100 Market*, Environment* W/100 Practice W/100 Market*, Environment* W/50 Capabilit*, 'Competitive advantage' W/50 Practic*,Environment* W/100 Practice W/100 Purchasing, Environment* W/100 Practice W/10 'Supply Chain', Environment* W/100 Practice W/100 Service, Green*W/100 Practice W/100 Service,Green*W/100 Practice W/100 'Supply Chain', Green*W/100 Practic* W/100 Transportation*, Environment* W/100 Practic* W/100 transportation*, Green*W/100 Practice W/100 Operation*, Environment* W/100 Practice W/100 Operation*, Green*W/100 Capability W/100 Manufactur*, Environment* W/100 Capability W/100 Manufactur*,Green*W/100 Capability W/100 'Supply Chain', Green*W/100 Practice W/100 Manufactur*, Green*W/100 Practice W/100 Manufactur*, Green*W/100 Practice W/100'Reverse logistics', Environment* W/100 Practice W/100 'Reverse logistics', Green*W/100 Practice W/100 Purchasing, Environment* W/100 Practice W/100 Procurement, Green* W/100 Capability W/100 Corporat*	Science Direct

Ana Beatriz Lopes de Sousa Jabbour, Charbel Jose Chiappetta Jabbour, Hengky Latan, Adriano Alves Teixeira, Jorge Henrique Caldeira de Oliveira	Reprint of "Quality management, environmental management maturity, green supply chain practices and green performance of Brazilian companies with ISO 14001 certification: Direct and indirect effects"	Transportation Research Part E: Logistics and Transportation Review, Volume 74, February 2015, Pages 139-151	Green*W/100 Practice W/100 Procurement	Science Direct

9.2 Appendix 2. Detailed search strings and hits

#	search strings	hits	Remark
1	Green* W/100 Capabilit*	41	
2	Environment* W/50 Capabilit*	156	
3	Lean* W/100 Capabilit*	33	
4	Green*W/100 Practic*	17	
5	Environment* W/10 Practic*	108	
6	Competitive advantage' W/50 Practic*	150	
7	Lean* W/100 Practic*	60	
8	Green* W/100 Competence	7	
9	Environment* W/100 Competence	35	
10	Lean* W/100 Competence	139	
11	Green*W/100 Capability W/100 'Inbound logistics'	2	
12	Environment* W/100 Capability W/100 'Inbound logistics'	11	
13	Lean* W/100 Capability W/100 'Inbound logistics'	2	
14	Green*W/100 Practice W/100 'Inbound logistics'	14	
15	Environment* W/100 Practice W/100'Inbound logistics'	21	
16	Lean* W/100 Practice W/100 'Inbound logistics'	2	
17	Green*W/100 Competence W/100 'Inbound logistics'	2	
18	Environment* W/100 Competence W/100'Inbound logistics'	2	
19	Lean* W/100 Competence W/100 'Inbound logistics'		No result
20	Green*W/100 Capability W/100 Transportation*	37	
21	Environment* W/100 Capability W/100 transportation*	16	
22	Lean* W/100 Capability W/100 Transportation*	8	
23	Green*W/100 Capability W/100 'Material handling'	20	
24	Environment* W/100 Capability W/100 'Material handling'	8	
25	Lean* W/100 Capability W/100'Material handling'	10	
26	Green*W/100 Capability W/100 Warehousing*	3	
27	Environment* W/100 Capability W/100 Warehousing*	31	
28	Lean* W/100 Capability W/100 Warehousing*	5	
29	Green*W/100 Capability W/100 'Freight consolidation'	1	
30	Environment* W/100Capability W/100 'Freight consolidation'	6	
31	Lean* W/100 Capability W/100 'Freight consolidation'		No result
32	Green*W/100 Practic* W/100 Transportation*	17	
33	Environment* W/100 Practic* W/100 transportation*	33	
34	Lean* W/100 Practic* W/100 Transportation*	24	
35	Green*W/100 Practic*W/100 'Material handling'	74	
36	Environment* W/100 Practic* W/100 'Material handling'	18	
37	Lean* W/100 Practic* W/100'Material handling'	24	
38	Green*W/100 Practic* W/100 Warehousing*	11	

39	Environment* W/100 Practic* W/100 Warehousing*	42	
40	Lean* W/100 Practic* W/100 Warehousing*	5	
41	Green*W/100 Practic* W/100 'Freight consolidation'	5	
42	Environment* W/100 Practic* W/100 'Freight consolidation'	15	
43	Lean* W/100 Practic* W/100 'Freight consolidation'	2	
44	Green*W/100 Competence W/100 Transportation*	8	
45	Environment* W/100 Competence W/100 transportation*	40	
46	Lean* W/100 Competence W/100 Transportation*	1	
47	Green*W/100 Competence W/100 'Material handling'	3	
48	Environment* W/100 Competence W/100 'Material handling'	30	
49	Lean* W/100 Competence W/100'Material handling'	2	
50	Green*W/100 Competence W/100 Warehousing*	1	
51	Environment* W/100 Competence W/100 Warehousing*	2	
52	Lean* W/100 Competence W/100 Warehousing*		No result
53	Green*W/100 Competence W/100 'Freight consolidation'	1	
54	Environment* W/100 Competence W/100 'Freight consolidation'		No result
55	Lean* W/100 Competence W/100 'Freight consolidation'		No result
56	Green*W/100 Capability W/100 Operation*	11	
57	Environment* W/100 Capability W/100 Operation*	82	
58	Lean* W/100 Capability W/100 Operation*	14	
59	Green*W/100 Practice W/100 Operation*	43	
60	Environment* W/100 Practice W/100 Operation*	119	
61	Lean* W/100 Practice W/100 Operation*	25	
62	Green*W/100 Competence W/100 Operation*	2	
63	Environment* W/100 Competence W/100 Operation*	13	
64	Lean* W/100 Competence W/100 Operation*	26	
65	Green*W/100 Capability W/100 Manufactur*	14	
66	Environment* W/100 Capability W/100 Manufactur*	64	
67	Lean* W/100 Capability W/100 Manufactur*	14	
68	Green*W/100 Capability W/100 Facility	2	
69	Environment* W/100 Capability W/100 Facility	15	
70	Lean* W/100 Capability W/100 Facility	16	
71	Green*W/100 Capability W/100 Equipment	38	
72	Environment* Capability W/100 Equipment	54	
73	Lean* W/100 Capability W/100Equipment	2	
74	Green*W/100 Capability W/100 'Inventory Management'	12	
75	Environment* W/100 Capability W/100 'Inventory Management'	30	
76	Lean* W/100 Capability W/100 'Inventory Management'	7	
77	Green*W/100 Capability W/100 'Supply Chain'	36	
78	Environment* W/100 Capability W/50 'Supply Chain'	121	

79	Lean* W/100 Capability W/100 'Supply Chain'	23	
80	Green*W/100 Practice W/100 Manufactur*	38	
81	Environment* W/100 Practice W/100 Manufactur*	110	
82	Lean* W/100 Practice W/100 Manufactur*	31	
83	Green*W/100 Practice W/100 Facility	8	
84	Environment* W/100 Practice W/100 Facility	20	
85	Lean* W/100 Practice W/100 Facility	32	
86	Green*W/100 Practice W/100 Equipment	9	
87	Environment* W/100 Practice W/100 Equipment	18	
88	Lean* W/100 Practice W/100Equipment	3	
89	Green*W/100 Practice W/100 'Supply Chain'	76	
90	Environment* W/100 Practice W/10 'Supply Chain'	50	
91	Lean* W/100 Practice W/100 'Supply Chain'	48	
92	Green*W/100 Competence W/100 Manufactur*	44	
93	Environment* W/100 Competence W/100 Manufactur*	13	
94	Lean* W/100 Competence W/100 Manufactur*	30	
95	Green*W/100 Competence W/100 Facility	6	
96	Environment* W/100 Competence W/100 Facility	3	
97	Lean* W/100 Competence W/100 Facility		No result
98	Green*W/100 Competence W/100 Equipment	8	
99	Environment* W/100 Competence W/10 Equipment	5	
100	Lean* W/100 Competence W/100Equipment	1	
101	Green*W/100 Competence W/100 'Supply Chain'	22	
102	Environment* W/100 Competence W/100 'Supply Chain'	22	
103	Lean* W/100 Competence W/100 'Supply Chain'	22	
104	Green*W/100 Capability W/100 'Order tracking'	14	
105	Environment* W/100 CapabilityW/100 'Order tracking'	11	
106	Lean* W/100 Capability W/100 'Order tracking'	12	
107	Green*W/100 Capability W/100 'Outbound logistics'	1	
108	Environment* W/100 Capability W/100 'Outbound logistics'	10	
109	Lean* W/100 Capability W/100 'Outbound logistics'	1	
110	Green*W/100 Capability W/100 Schedul*	15	
111	Environment* W/100 Capability W/100 Schedul*	11	
112	Lean* W/100 Capability W/100 Schedul*	18	
113	Green*W/100 Practice W/100 'Order tracking'	4	
114	Environment* W/100 PracticeW/100 'Order tracking'	9	
115	Lean* W/100 Practice W/100 'Order tracking'	18	
116	Green*W/100 Practice W/100 'Outbound logistics'	14	
117	Environment* W/100Practice W/100 'Outbound logistics'	21	
118	Lean* W/100 Practice W/100 'Outbound logistics'	1	
119	Green*W/100 Practice W/100 Schedul*	1	
120	Environment* W/100 Practice W/100 Schedul*	13	
121	Lean* W/100 Practice W/100 Schedul*	3	

122	Green*W/100 Competence W/100 'Order tracking'	2	
123	Environment* W/100 Competence W/100 'Order tracking'	35	
124	Lean* W/100 Competence W/100 'Order tracking'	2	
125	Green*W/100 Competence W/100 'Outbound logistics'	1	
126	Environment* W/100Competence W/100 'Outbound logistics'		No result
127	Lean* W/100 Competence W/100 'Outbound logistics'		No result
128	Green*W/100 Competence W/100 Schedul*	2	
129	Environment* W/100 Competence W/100 Schedul*	54	
130	Lean* W/100 Competence W/100 Schedul*	2	
131	Green*W/100 Capability W/100 Sales	1	
132	Environment* W/100 Capability W/100 Sales	17	
133	Green*W/100 Practice W/100 Sales	7	
134	Environment* W/100 Practice W/100 Sales	22	
135	Green*W/100 CompetenceW/100 Sales	17	
136	Environment* W/100 CompetenceW/100 Sales	167	
137	Green*W/100 Capability W/100 Market*	11	
138	Environment* W/100 Capability W/100 Market*	89	
139	Green*W/100 Practice W/100 Market*	36	
140	Environment* W/100 Practice W/100 Market*	108	
141	Green*W/100 CompetenceW/100 Market*	4	
142	Environment* W/100 CompetenceW/100 Market*	14	
143	Green*W/100 Capability W/100 Service	8	
144	Environment* W/100 Capability W/100 Service	57	
145	Lean* W/100 Capability W/100 Service	5	
146	Green*W/100 Practice W/100 Service	25	
147	Environment* W/100 Practice W/100 Service	69	
148	Lean* W/100 Practice W/100 Service	15	
149	Green*W/100 Competence W/100 Service	2	
150	Environment* W/100 Competence W/100 Service	15	
151	Lean* W/100 Competence W/100 Service	2	
152	Green*W/100 Capability W/100 Maintain*	4	
153	Environment* W/100 Capability W/100 Maintain*	26	
154	Lean* W/100 Capability W/100 Maintain*	24	
155	Green*W/100 Capability W/100 Return*	9	
156	Environment* W/50 Capability W/50 Return*	133	
157	Lean* W/100 Capability W/100 Return*	16	
158	Green*W/100 Capability W/100 'Spare parts'	0	
159	Environment* W/100 Capability W/100 'Spare parts'	0	
160	Lean* W/100 Capability W/100 'Spare parts'	0	
161	Green*W/100 Capability W/100'Reverse logistics'	0	
162	Environment* W/100 Capability W/100 'Reverse logistics'	0	
163	Lean* W/100 Capability W/100 'Reverse logistics'	0	
164	Green*W/100 Practice W/100 Maintain*	6	

165	Environment* W/100 Practice W/100 Maintain*	92	
166	Lean* W/100 Practice W/100 Maintain*	52	
167	Green*W/100 Practice W/100 Return*	39	
168	Environment* W/100 Practice W/100 Return*	19	
169	Lean* W/100 Practice W/100 Return*	39	
170	Green*W/100 Practice W/100 'Spare parts'	3	
171	Environment* W/100 Practice W/100 'Spare parts'	2	
172	Lean* W/100 Practice W/100 'Spare parts'	5	
173	Green*W/100 Practice W/100'Reverse logistics'	17	
174	Environment* W/100 Practice W/100 'Reverse logistics'	20	
175	Lean* W/100 Practice W/100 'Reverse logistics'	8	
176	Green*W/100 Competence W/100 Maintain*	19	
177	Environment* W/100 Competence W/100 Maintain*	4	
178	Lean* W/100Competence W/100 Maintain*	8	
179	Green*W/100 Competence W/100 Return*	10	
180	Environment* W/100 Competence W/100 Return*	111	
181	Lean* W/100 Competence W/100 Return*	3	
182	Green*W/100 Competence W/100 'Spare parts'		No result
183	Environment* W/100 Competence W/100 'Spare parts'	6	
184	Lean* W/100 Competence W/100 'Spare parts'		No result
185	Green*W/100 Competence W/100 'Reverse logistics'	2	
186	Environment* W/100 Competence W/100 'Reverse logistics'	10	
187	Lean* W/100 Competence W/100 'Reverse logistics'	1	
188	Green*W/100 Capability W/100 Purchasing	7	
189	Environment* W/100 Capability W/100 Purchasing	18	
190	Lean* W/100 Capability W/100 Purchasing	2	
191	Green*W/100 Capability W/100 Procurement	5	
192	Environment* W/100 Capability W/100 Procurement	13	
193	Lean* W/100 Capability W/100 Procurement	14	
194	Green*W/100 Practice W/100 Purchasing	21	
195	Environment* W/100 Practice W/100 Purchasing	42	
196	Lean* W/100 Practice W/100 Purchasing	66	
197	Green*W/100 Practice W/100 Procurement	74	
198	Environment* W/100 Practice W/100 Procurement	27	+ keyword 'supply chain'
199	Lean* W/100 Practice W/100 Procurement	5	+ keyword 'supply chain'
200	Green*W/50 Competence W/10 Purchasing	17	
201	Environment* W/50 Competence W/50 Purchasing	41	

202	Lean* W/100 Competence W/100 Purchasing	8	
203	Green*W/100 Competence W/100 Procurement	6	
204	Environment* W/100 Competence W/100Procurement	46	
205	Lean* W/100 Competence W/100 Procurement	6	
206	Green* W/100 Capability W/100 'Firm infrastructure'	0	
207	Environment* W/100 Capability W/100 'Firm infrastructure'	0	
208	Lean* W/100 Capability W/100 'Firm infrastructure'	0	
209	Green* W/100 Practice W/100 'Firm infrastructure'	0	
210	Environment* W/100 Practice W/100 'Firm infrastructure'	0	
211	Lean* W/100 Practice W/100 'Firm infrastructure'	0	
212	Green* W/100 Competence W/100 'Firm infrastructure'	0	
213	Environment* W/100 Competence W/100 'Firm infrastructure'	0	
214	Lean* W/100 Competence W/100 'Firm infrastructure'	0	
215	Green* W/100 Capability W/100 Corporat*	11	+ keyword 'supply chain'
216	Environment* W/100 Capability W/100 Corporat*	31	+ keyword 'supply chain'
217	Lean* W/100 Capability W/100 Corporat*	31	
218	Green*W/100 Capability W/100 'Firm utility'	0	
219	Environment* W/100 Capability W/100 'Firm utility'	0	
220	Lean* W/100 Capability W/100 'Firm utility'	0	
221	Green* W/100 Practice W/100 Corporat*	37	+ keyword 'supply chain'
222	Environment* W/100 Practice W/100 Corporat*	64	+ keyword 'supply chain'
223	Lean* W/100 Practice W/50 Corporat*	53	
224	Green*W/100 Practice W/100 'Firm utility'	0	No result
225	Environment* W/100 Practice W/100 'Firm utility'	0	No result
226	Lean* W/100 Practice W/100 'Firm utility'	0	No result
		5006	