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IMPLICATIONS OF SUSTAINABLE SUPPLY CHAIN MANAGEMENT LITERATURE TO MANAGEMENT ACCOUNTING

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Abstract

The main purpose of this article is to make an extensive review on the sustainable supply chain management literature in order to find some implications to management accounting. It also aims to explain sustainability in supply chain management, the needs of a sustainable supply chain, historical development and importance of sustainable supply chains. As the first step, a keyword search was conducted in the well-known databases, and then, sustainable supply chain management (SSCM) studies, which have connections to and implications for management accounting are evaluated and summarized separately. Although SSCM literature is very rich, the number of SSCM studies which have implications to management accounting is scarce. They point out that management accountants may take parts especially in determining cost and profitability of sustainable products, cost and quality evaluation of input materials and risk evaluation of suppliers, developing costing models for sustainable production, measuring performance in economic, environmental and social areas, and making cost-benefit analysis in the implementation and adoption of sustainability in each steps of sustainable supply chains.

Keywords Sustainability, Sustainable Supply Chains, Management Accounting

1. Introduction

Management accounting plays an important role in businesses and helps managers by providing useful information for decision-making. Cost calculations, cost and activity analyses, forecasting, budgeting, preparing performance reports are main responsibilities of management accountants. They play an important role on the way to "profit maximization". However, using only financial data in the analyses and reports is not enough, they should also use non-financial considerations such as quality, ethics, employee motivation, customer satisfaction and they should try to understand what will be the effects of managerial decisions on financial and nonfinancial outcomes. Management accountants examine operations and processes for risks, opportunities, improvements and corrective actions.

Supply chains are one of the most important processes that are under scrutiny of management. Its starting point is the suppliers of units of production and finishing point is the end consumers. A detailed examination and evaluation by management accountants is necessary at every point of supply chain. Quality and cost of raw materials affect quality, cost and selling price of the product, and consequently its market share. A trustworthy supplier means on time delivery of inputs of production at an agreed upon price, a decrease in the requirement for raw materials and finished goods inventories, and timely satisfied loyal customers. The companies which are chasing the higher profitability prospects for the long run should manage their supply chains very carefully by the help of management accountants.

Business enterprises are like living forms, they affect the environment and society they are in and also, they are affected from them. Profit maximization goal cannot be sustained in the long run by harming and destroying the world. While seeking profit maximization goals in the long run and chasing economic sustainability, enterprises should also manage their operations and take actions for the purpose of environmental and social sustainability. If there are no sources of production and if there are no consumers, it will be meaningless to talk about the existence of enterprises.

However, these doomsday scenarios are not enough to prevent firms from taking harmful actions towards environment and society. Rather written laws and regulations constituted by many governments and the international organizations and unwritten rules emerged in the markets by demand and supply are more forcing and motivating factors. The possibility of fine for pollution, any punishment for a social impact, risk of losing customers who care about social and environmental sustainability, not having access to green funds which means cheaper credit sources are some examples for the motivations behind adaptation and internalization of the "sustainability" concept.

With the emergence of "sustainability" concept, enterprises' internalization efforts of sustainability gave management accountants new roles and new responsibilities. While purchasing the materials and inputs of production, beside cost and quality, those inputs should be evaluated according to their harmoniousness to sustainability. Production processes and products produced should be profitable and also help to sustainability of the firm, environment and society. Distribution, return and recycling processes should also be planned in the context of sustainability.

This study is trying to explain the sustainability and supply chain management concepts and aiming to evaluate sustainable supply chain literature from the perspective of management accounting. In the following parts, after explaining the methodology, it continues with the explanation of sustainability concept, the three dimensions of sustainability, sustainable supply chain management and evaluation of SSCM literature. The study ends with conclusion and implications for further research.

2. Methodology

In this study, the main purpose is to evaluate sustainable supply chain management (SSCM) literature from the perspective of management accounting and so to understand the implications of the literature to the management accountants and managers. As a starting point, a keyword search was conducted in the well-known data bases; Science Direct, EBSCO, JSTOR, EMERALD and Google scholar. "Sustainability", "sustainable supply chain", "green supply chain", "green manufacturing", "performance measurement and SSCM", "material cost flow accounting and SSCM" were the main keywords.

The first search showed that there are many good literature reviews on SSCM and these literature reviews were examined very carefully in order to determine the studies that have connections to managerial accounting literature. The current study also included the studies and the sources which helped to introduce and explain sustainability, development of sustainability literature and its involvement in supply chain literature.

3. Sustainability

Although the sustainability concept started to be popular three decades ago, the birth of it has some earlier roots in increasing poverty all over the world, such as societies' demand for equality and justice, industry revolution and changes in manufacturing processes, and the globalization of the firms.

The triggers or alarm bells coming from the environment and the society initiated a collective action and the UN Conference on the Human Environment was held in Stockholm in 1972. It was the UN's first major conference on international environmental issues and marked a turning point in the development of international environmental policies. Another conference is organized in 1983 and World Commission on Environment and Development (WCED) is established under United Nations. The most famous and mostly referred definition of sustainability is written by Brundtland Commission in the report prepared four years after the conference: "Humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs" (United Nations Commisssion, 1987, p. 15). In this report, the focus is to resource distribution to nations with less access to food and increase awareness of care toward other people.

After that, a UN Conference on the Environment and Development (UNCED), in Rio de Janeiro, Brazil, 1992, provides a Rio Declaration, Agenda 21 and Commission on Sustainable Development which proves that sustainable development finally increases its importance. Kyoto conference, in 1997, is focused on climate change. While the U.S.A. wants to stabilize emissions, without cutting it, the European Union focuses more on 15% cut (Paul, 2008). New circle of sustainable development is a Rio+10, in 2002, in Johannesburg, focuses on sustainable development of Triple Bottom Line like environmental, social and economic (Feil and Schreiber, 2017).

According to the summit held in New York, in 2015, agenda is made and planned to be implemented by 2030. Every country should have a responsibility to mobilize its financial resources and environmentally sound technologies to those in need, mobilizing public resources to vulnerable and least developed countries. Main target is to focus on ending poverty, hunger, and to enhance access to good education, modern energy, sustainable consumption, make cities safer and sustainable, protect ecosystem, with each goal explaining how achievement is going to be made. The main point is to bring sustainable development within national financing framework; so that each country's national economic and social development is reached. Also, labor rights and environmental and health standards should be in line with international agreements. International trade is a trigger for economic growth, hence sustainable development contribution. Moreover, it will be worked on innovation-related matters and science to improve efficiency in all way possible. From national level, across regional, system-wide strategic planning needs to be put into action.

In the future, many conferences and events will be held in different locations around the world. In September 2018, there are numerous events mostly held in New York, such as Concordia Annual Summit **(**advancing healthcare, refugee crises)**,** Small City Resilience **(**new finance models and fund ways of climate resilience, benefits to reasonable limited resources usage**),** 100% Clean Energy Transition **(**innovative renewable energy solutions), Forest-smart Mining to Advance the New York Declaration on Forests and SDGs (new discoveries on forest-smart mining and New York Declaration on Forests and its Global Platform), African Forest Policies and Politics in Cameroon where deforestation and forest plantations, forestland and climate change, political instability, governance initiatives relations will be discussed. Also, in October there are Seventh Conference on Climate Change and Development in Africa in Nairobi, Kenya (various options to finance climate actions, sustainable economic development), Global Infrastructure Forum 2018 in Bali, Jakarta Raya, Indonesia (sustainable infrastructure for developing countries), Cairo Water Week 2018 in Cairo, Egypt (water scarcity, climate change and the environment, water management for sustainable development), 45th Session of the Committee on World Food Security in Rome, Italy, Third Global Conference on Health and Climate in Grenada **(**national climate change planning; constructing climate-resilient health systems) and many others. The list goes on even until November 2021 with 2021UN Climate

Change Conference. All these prove how serious approach the world is taking on sustainable development**.**

In the related literature, the three dimensions of sustainability are economic, environmental and social dimensions. Some studies examine those dimensions separately; whereas some say they cannot be separable in fact.

3.1. Economic dimension

Joumard (2013) states that economic dimension of sustainability is related to living environment that comes from economic activity such as "local and reversible nuisances". Economic sustainability is related to materials quality, product longevity, product recyclability, quantity and quality of product manufacturing waste, energy efficiency in production processes and use of services instead of owning goods (Salonen and Ahlberg, 2011).

The population welfare is the most important socioeconomic objective of a country (Despotovic *et al.* 2015). United Nations, Economic and Social Council (2015, p. 8) states that in order to have an economic growth of high quality, it is needed to be focused on "investments in human capital, social justice and economic dynamism". According to the Council, a green growth can be achieved through resource savings as well as the sustainable management of natural capital.

3.2. Environmental dimension

The five issues representing environmental dimension are climate change, pollution and its effect on health, globalization backlash, the energy crunch, erosion of trust in institutions (Khare, 2005). According to Salonen and Ahlberg (2011), environmental sustainability is about local food, recycling, water saving, energy saving, hazardous waste care. The environmental sustainability tends to cut off waste and support efficiency, actuate innovation in long run rather than short run by controlling natural resources and taking up seriously pollution externalities (Esty and Charnovitz, 2008).

The environmental impact reduction should be measured through: GHG emissions reduction, hazardous waste reduction, wastewater discharge reduction and solid waste disposal reduction (Shi *et al.* 2012). The three aspects of sustainability in supply chain that can be measured as follows: economic performance through service level, supply chain costs; social performance through human rights, product responsibility, labor practices; and environmental performances through water usage, energy consumption, generation of wastes, hazardous substance usage, GHG emission (Varsei *et al.* 2014).

3.3. Social dimension

The social dimension is linked to labor opportunities and accessing to resources of agricultural households in rural areas. It also includes ethical concerns related to agricultural way of producing goods (EU Commission Agriculture Directorate-General, 2001). People need to care about food malnutrition in many areas, enough funds should be provided to cover living costs, lack of healthy and sufficient food, child poverty and illiteracy in all over the world. Social dimension of sustainable development is based on environmental degradation and lack of renewable resource that alter global social problems like poverty, infant mortality, no or low education quality, unequally distributed income and injustice (Vanags *et al.* 2012). According to Torjman (2000), the priorities of social dimension in sustainability development are poverty reduction that needs to be reduced through income redistribution by government, while caring environment is seen in direct involvement in many activities through schools and recreational, cultural and environmental groups.

4. Sustainable supply chain management

The implementation of the sustainability requires a process, or *a systematic approach* (Hall, 2000), beginning from the suppliers and going through the consumers and also including recycling and return of goods. Therefore, implementation of sustainability into supply chains is accepted as a good strategy and gives birth to the literature on sustainable supply chain management.

Sustainable supply chain management (SSCM) manages the whole supply chain in order to reach the economic sustainability goal of the business entity and also questioning the harmoniousness of the activities in each step with the goal of social and environmental sustainability. There are many good definitions of SSCM in the related literature. Seuring and Miller (2008, p. 1700) defines SSCM as "the management of material, information and capital flows as well as cooperation among companies along the supply chain while aiming all three dimensions of the sustainability". Srivastava (2007, p. 55) names the process as Green Supply Chain Management and defines it as "integrating environmental thinking into supply-chain management, including product design, material sourcing and selection, manufacturing processes, delivery of the final product to the consumers as well as end-of-life management of the product after its useful life". Based on their literature review, Al-Odeh and Smallwood (2012, p. 85) determine the most accepted definition of SSCM as "the process of managing the supply chain activities with consideration for environmental, economic and social issues for enhancing the long-term economic goals".

The mostly mentioned motivations behind the integration of sustainability into business processes are customers' demand for environmentally friendly products, gaining competitive advantage, increasing market share, satisfying stakeholders, more effective risk management, cost reduction, having cheaper funds, access to new capital sources, firm's reputation improvement, operational improvement, greater transparency concerning both environmental and social actions, institutional pressures, regulations and laws to protect environment and consequently possibility of penalties for pollution (Lamming and Hampson, 1996; Hall, 2000; Bansal and Roth, 2000; Preuss, 2001; Handfield *et al.* 2005; Rao and Holt, 2005; Lintukangas *et al.* 2016; Seuring and Miller, 2008, Carter and Easton, 2011; Alves *et al.* 2017, Varsei *et al.* 2014).

Those motivations push firms to stop focusing only on profit maximization and to integrate sustainability into their operations. A transformation is required in the management functions and a supply chain perspective is a useful and important way of transformation in order to address environmental issues (Green *et al.* 1996). Environmental management practices and supply chain management practices are parallels. Producing a "green" product requires setting the environmental purchasing strategies, environmentally friendly packaging, waste minimization in the production and effective logistics. There is a need to take environmental issues to whole life costing which determines the actual price of materials or goods as the total of purchasing price, the cost of owning it and disposing it (Lamming and Hampson, 1996).

When we try to integrate sustainability into supply chain management, planning should be made first about the integration. Designing includes the design of recyclable and sustainable products which is environmentally friendly. Sourcing is about choosing the suppliers that can provide sustainable goods and services and the manufacturing process is related to producing products or services in conformity with sustainability. Delivery is the transportation of products to the customers with lowest carbon emissions. Return is a stage when product is sent back due to some problems or recycling purposes (Gerrits, 2012).

There are many literature reviews on SSCM. One of them belongs to Rajeev *et al.* (2017). They have made a thematic analysis on 1068 filtered articles published after 2000. They determine 190 of them include one or more pillars of SSCM and 59 of those 190 selected papers are literature reviews. Their examinations show that number of studies in the literature especially increased after 2011, special issues of top cited journals play an important role in this.

In their extensive literature review on SSCM, Seuring and Müller (2008, p. 1703) determined pressures and incentives for sustainable supply chains as "legal regulations, customer demands, stakeholders' demands, gaining competitive advantage, environmental and social pressure groups and possibility of reputation loss". Seuring and Müller (2008, p. 1704) also determine the barriers for and supporters of SSCM from the reviewed literature and state that

barriers are “higher costs, coordination complexity and insufficient communication in the supply chain” and supporting factors are “company overlapping communication, management systems, monitoring, evaluation and reporting, education of purchasing employees and integration into the corporate policy”.

Gupta and Palsule-Desai (2011) also make a literature review on sustainable supply chain management. After pointing out the increase in environmental pollution and carbon emissions, they draw attention to the necessity of designing and managing supply chain activities to promote environmental sustainability. Nakamba *et al.* (2017) divide periods of social sustainability in many different sub-periods to discover the most used tools for sustainability measurement. In sub-period I (2007-2010), the codes of conduct and social standards are mostly used in the analysis of sustainability. Social standards are assessing the influence of standard implementation on performance of a company. In the sub-period II (2011-2014), performance of suppliers is assessed by social indicators. Social performance is altered by many supply chain drivers and barriers play important roles. In sub-period III (2015-2017), there is a highlighted influence of drivers of social sustainability and empirical evidence.

Although most of the studies promoting the integration of sustainability into supply chain, Carter and Easton (2011) claim that more than half of the researches showed a failure to insert any sort of theory. The lack of theory is actually limiting the motivation to process sustainability. Additionally, although the government pressure, laws and regulations are claimed to be important motivations behind sustainable business processes, the research of Sayed *et al.* (2017) surprisingly show that the government pressure on firms might actually be really low. Especially big firms just follow a profit maximization leaving aside negative effects of gas emissions, wastes and other results from their production. Especially in less developed countries, being big may mean dictating to even governments.

5. Implications of SSCM literature to management accounting

Managerial or management accounting provides economic, financial and non-financial information for managers and other internal users mainly for managerial decision making. The steps of managerial decision making are identifying the problem, determining and evaluating the possible courses of action, making decision, reviewing the results of the action and taking corrective actions if necessary (Weygandt *et al.* 2012). Sustainability is one of the areas that need managerial decision making and management accountants are the main helpers and information providers in the integration process of sustainability into the management philosophy.

Managerial accounting functions are mainly calculating unit cost of a product or cost of providing a service, analyzing cost behavior and estimating costs, presenting the required data for decision making and evaluating alternatives, preparing budgets and making performance analyses (Weygandt *et al.* 2012). For a company which wants to have sustainability in its supply chain management and in overall management strategies, integrating the sustainability concept in each function of management accounting is very important. Hanfield *et al.* (2005, p. 12) determine some strategies for environmental impact reduction in supply chains as follows:

- “redesigning the product or process to reduce environmental waste; substituting fewer polluting materials or processes, including increasing use of recycled inputs;
- reducing the number and amount of materials that contribute to waste streams;
- recycling the product at the end of its useful life;
- remanufacturing items returned from customers;
- extending the products’ life cycle by selecting materials with longer useful lives;
- supporting suppliers with established environmentally responsible reputations and life cycle assessment to better understand total costs.”

These strategies help us while finding and classifying the implications of SSCM literature. In the following part, we summarize the implications of sustainability strategies and SSCM literature to management accounting.

5.1. Redesigning the product, production processes and the packaging

Inputs of production are direct materials, direct labor and manufacturing overhead. In the SSCM literature, the mostly stressed input is material. The importance of using environmentally sustainable materials in products and packaging is stressed very well. However, sustainability of labor and overhead are not mentioned much.

Designing environmentally respectful products, not using hazardous materials in the production process, efficient use of natural sources (Lamming and Hampson, 1996; Hanfield *et al.* 2005) are important factors at the product design step of the supply chain. Additionally, recycling and remanufacturing possibilities should be taken into consideration while designing the product. Hanfield *et al.* (2005) separate materials into two; low environmental risk and high environmental risk commodities; and the materials with high risk require a more detailed strategy. Product and packaging design are not the job of management accountants, however; they are related to the cost of the product. Therefore, management accountants should be integrated into the process.

Despite being limited, there are also some studies focusing on the sustainability of labor. Graafland (2002) talks about the increased competition in the textile sector and between clothes retailers. There is a search for low cost strategies. One strategy to decrease costs is decreasing the wages of employees. Some focal companies are setting standards related to working conditions, wages and ages of employees of suppliers and having some audit teams to make uninformed audits to the suppliers. Some examples to the criteria that would be audited are the use of child labor, forced labor, abuse of home workers, safety hazards and unhygienic working conditions. Results of this study show that setting standards and making such audits affect two Ps (People and Planet) positively; on the other hand, the third P (Profit) may be affected positively or negatively. Even it is negative, companies should continue because of overall benefit created for the world (Graafland, 2002).

5.2. Selection of the supplier and supply risk management

The implication of supplier selection to management accounting is cost and quality issues. Cost and quality of inputs of production affect the cost and quality of the product produced, so if a company wants to produce sustainable products, it should start from its suppliers.

SSCM literature mainly focused on the supplier selection. Suppliers and even suppliers of the suppliers of focal firm are thought as the starting point in the supply chain. Lamming and Hampson (1996) mention the steps while choosing a supplier and setting minimum standards for them, such as having an environmental policy, action programs and agreed upon targets. One of the necessities of the environmental supply chain management is “auditing and assessing suppliers on environmental performance metrics” (Hanfield *et al.* 2005, p. 7). The ability of focal company in enforcing suppliers in environmental issues depends on the availability of suppliers’ monopolistic or oligopolistic power of the manufacturer (Preuss, 2001).

Lintukangas *et al.* (2016) assert that globalization and increase in international business caused longer and riskier supply chains. After mentioning the increasing amounts of product recalls (such as cars, electronic equipment and toys) and scandals in food supply chains (meat and milk), they accept supply risk as one category of risk that the managers face while managing firms. While trying to determine the supply risk, possible consequences should also be determined and supply risk management should be linked to corporate sustainability strategy. The main finding of the study of Lintukangas *et al.* (2016) is that integrating environmental sustainability into supply chains bears certain costs, but on the other hand creates customer value, therefore cost benefit issues in the supply chain should be analyzed carefully.

According to Silvestre (2015), creating sustainable supply chains is much harder in developing countries because of high degree of complexity and uncertainty in the business environments. Development of suppliers is required before producers offer sustainable products, such as in the textile industry, producers should find organic cotton suppliers before planning the production and sale of organic products (Kogg, 2003).

Channel members tend to make a pressure on partners in order to follow their interests "at the expense of their partner" (Buhalis, 2000, p. 117). Liang and Chang (2008) state that green supply chain brings efficiency and connectedness between business partners and it leads to improve environmental performance, reduce wastes and minimize costs. Therefore, competitive advantage will be obtained. They also find out that green purchasing, green production and green marketing impact the green supply chain management of small medium entities (SMEs) in China. ISO 14001 as environmental management system standard is a main driver of running the supplier environmental performance (Hines and Johns, 2001). This standard actually fosters company to follow strategy of knowing about supplier actions, so multinational companies are seen as good mentors in environmental monitoring because of their strong influence on their suppliers. This monitoring program is easier to maintain on local level than on global due to its lack of investigation abilities. Rao (2002) states that in order to have a green manufacturing process, greening of suppliers is needed first. Even though parent companies integrate sustainability in their manufacturing process, the same companies should still be responsible for environmentally non-friendly products coming from their suppliers.

Grosvold *et al.* (2014) say that there were many companies that had problems of choosing suppliers with appropriate certificates. Although ISO certificate is shown as the most important for supplier selection, it is not suitable in all cases. Authors add codes of conduct and rewards and sanctions, as management practices, to drive sustainability in supply chain. Concerning management tools, audit, risk assessment and monitoring are among the most important tools. Results of their study show that suppliers need to meet minimum sustainability standards and standards need to be audited on regular basis. Supplier questionnaires and key performance indicators (KPIs) are also important in order to collect data about what suppliers are doing. While some companies make certificates as needed documents for suppliers, there is no formal measurement system in reality to check if companies are following these requirements or not.

According to Lo and Shiah (2016), supply uncertainty has stronger effect than demand and competition uncertainty. In a stable supply environment, companies tend to use more aggressive green purchasing approach. In the case of low supply uncertainty, companies know what the capabilities of suppliers are. Therefore, the trust and collaboration between both sides is stronger. Additionally, demand uncertainty is positive but without significance. With no information how the future markets will look like, companies tend to increase competition competence and take actions of high risk.

5.3. Manufacturing processes and costing methods

In the earlier literature, lean manufacturing and environmental sustainability are accepted as good partners. Lean manufacturing requires the usage of sources efficiently and trying to produce the goods with the half of the inputs. Materials-oriented cost reduction is the main focus of lean manufacturing. Production in shorter time, with lesser materials and inputs, having lower levels of inventory are the main features (Lamming and Hampson, 1996; Hanfield *et al.* 2005; Ozcelik, 2013; Martinez-Jurado and Moyano-Fuantes, 2013).

Another terminology which is related to manufacturing processes in the SSCM literature is Product-Services System. It is firstly introduced at late 1980s by some environmentalists, and the main philosophy behind it is that if companies succeed in producing the products and services by using less material and less energy, and if they understand the remanufacturing and recycling are in fact the parts of the initial sale, they could help to sustainability and overall protection of the environment (Li and Found, 2016).

The most popular cost accounting approach which is deemed as compatible with SSCM is Material Flow Cost Accounting (MFCA). The Institut für Management und Umwelt developed the "flow cost accounting" in the late 1990s in Germany, then it became popular in Japan (Christ and Burritt, 2015). International Organization for Standardization issued ISO 14051: Environmental Management - Material Flow Cost Accounting in 2011.

The logic behind MFCA is that monetary and physical amounts of the materials are followed very carefully and with detailed examination during manufacturing processes and even in the supply chain, and so material and energy waste reducing is aimed. The value of input

materials and other sources is compared with the value of output products or services. Cost of production and cost of waste are tried to be separated and presented to the management for decision making. By using MFCA, taking actions to decrease the waste and negative externalities to the environment is intended (Christ and Burritt, 2015; ISO, 2011; Marota *et al.* 2017; Kovanicova, 2011; Chang *et al.* 2015).

Shortly, the studies in the SSCM literature focus on material usage and waste reduction in the production processes and try to develop some costing methods to decrease the amount of materials used and waste.

5.4. Performance measurement

Performance measurement systems are mainly based on the financial measures, however later the need for new performance measures emerged. Elkington (1998) initiates triple bottom line terminology which tries to evaluate firm performances under three headings; economic, environmental and social. The measurement of SCM financial performance can be visible through return on investment, asset costs and total inventory costs. While traditional measurement methods for SCM have been return on investment, net present value, the internal rate of return and the payback period, they do not fit for new challenges of SCM (Bhagwat and Sharma, 2007).

In order to assess the sustainability performance of the supply chain, Kafa *et al.* (2013) assert that there are four approaches in the related literature. They are the use of the standards developed by Global Reporting Initiative, the use of the standards developed by International Organization for Standardization, the use of performance measurement system Green SCOR and the use of Sustainability Balanced Score Card. Kafa *et al.* (2013) also try to develop sustainability performance measures for green supply chain management from three perspectives; economic (such as environmental costs, quality, flexibility), environmental (process optimization for waste reduction, pollution control, product features, recycling efficiency, environmental technology) and social (management commitment, customer satisfaction and employee development).

Rao and Holt (2005) conducted an empirical research to find out the relationship between performance of the firms and greening the supply chain. Their study shows that companies with green supply chains have increased competitiveness, better economic performance, decreased amounts of waste and hazardous materials, decreased costs, increased sales, market shares and found new market opportunities with higher profits. Gates and Germain (2010) studied how deep the sustainability measures are integrated into the firms' strategic performance measurement systems by using 79 questionnaires filled by controllers of French firms. The results show that industrialized and stock market listed firms integrated sustainability measures more into their systems.

The three approaches suggested by Schaltegger and Burritt (2014) are; first, *efficiency approach* like eco-efficiency and socio-efficiency of supply chain measured by carbon footprint or energy intensity of a product. It increases economic value by reducing social and environmental influence in environment. Second, *consistency approach* stems from amount and number of materials that is not natural, product biodegradability, renewable energy usage. A goal of this approach is to replace materials which are not sustainable for natural ones. Lastly, *sufficiency approach* is striving about producing less and consuming less.

Cazeri *et al.* (2017) made a literature review on "performance measurement of green supply chain management", and concluded that nearly all of the papers examine economic and environmental sustainability issues, and social sustainability issues remain unexplored. Kloviene and Speziale (2015) have some good questions related to how sustainability affects the performances of small and medium enterprises, however answers were tried to be found in the literature rather than real business life. According to Nakamba *et al.* (2017), there are not clear and precise definitions of social sustainability. The ones who try to make a definition are missing important facts. They also agree that emphasizing social sustainability to suppliers is based on the pressure of local governments, media and non-governmental organizations. They say that when economic performance is analyzed, cost cutting is most valuable feature, while other performance indicators are of less importance.

Implementation of sustainable supply chain management (SSCM) and sustainability management (SM) has important influences on companies by diversifying them from their competitors and altering their performances (Gualandris *et al.* 2014). In a sample of firms that operate in developed countries with more complex products, it is found that those companies tend to invest more in supply management and therefore gain more benefits from SSCM implementation.

On the other hand, some authors stress the lack of methodologies to measure sustainability performance. Beske-Janssen *et al.* (2015) argue that in the literature there are not many details how the performance measurement is done and whether it involves all the supply chain processes or not. It is unknown by whom the measurement is done, what are the instruments, concepts, standards and management systems used in sustainability performance measurement. After noticing the lack of methodologies to measure environmental sustainability performance, Björklund *et al.* (2012) and El Saadany, *et al.* (2011) suggest some models and scenarios for environmental measurements. According to Green Jr, *et al.* (2012), green purchasing influences economic but not environmental performance. Based on a sample from the USA, investment recovery drives environmental improvement but not economic in a direct way. Dealing with customers is positively related with both economic and environmental performance. Eco-design is positively related to environmental but negatively to economic performance. Environmental performance is related to pollution reduction while economic performance is focused on environmental costs reduction like material and energy consumption cuts-off.

5.5. Cost-benefit analyses and risk management

Lamming and Hampson (1996) see the “environmental issues” as part of risk management and businesses need to develop some practical solutions to meet environmental risks. They also claim that taking the environmental issues into consideration at the supplier selection stage creates many benefits, such as decreasing costs and increasing value of a product or process. However, if there is an increase in the costs, this should be thought as an investment for the future benefits. Giannakis and Papadopoulos (2016), from the related literature and personal interviews, determined 30 types of risks under the three dimensions of sustainability. Their study shows that environmental risks are perceived to be the most important across different industries, sustainability-related risks are very much interconnected and this is causing the need for integrated sustainability risk management approaches.

There is a trade-off between improved environmental performance and costs. It is a big struggle to choose the materials that are environmentally friendly and the materials that meet traditional cost or quality. Additionally, one challenge related to cost-benefit analysis is the lack of analytical tools and procedures while evaluating the ‘cost’ and the ‘benefit’ (Handfield *et al.* 2005). Sustainability is a long-term strategy and choosing the better of the short-term profitability pressures and long-term sustainability goals is an important issue (Wu and Pagel, 2011).

Environmentally friendly companies tend to have higher costs and consequently ask for higher prices. Recycled products and re-use of materials create cost savings; sustainable supply chain production (SSCP) leads to the cost reduction of companies through the usage of new technologies (Ortas *et al.* 2014). Many companies feel the benefits of SSCP, via improved efficiency, better access to new markets, better public relations, better and enhanced motivation of employees, competitive role, better quality of products and reputation, financial aid (Shi *et al*. 2012) and setting higher prices for green products (Okada and Mais, 2010).

SSCM is an important strategy that improves the overall performance of the firms (Al-Odeh and Smallwood, 2012). Determining a target performance is important. Main issue is to find how to measure and decrease environmental and social influence and how to provide sustainability of markets in society. Managers need to consider sustainability risks and opportunities that appear in supply chain (Schaltegger and Burritt, 2014).

6. Conclusion

Main objective of this study is to review the sustainable supply chain management literature in order to get its implications for management accounting and management accountants. It also tries to explain what sustainability is, how it emerged in supply chain management, what are its drivers and constraints, which problems companies face when they try to implement sustainability into their supply chain, the relationship between sustainability in supply chain and different aspects of management accounting like costs, benefits, performance measurement and risk management.

Sustainability is an important concept started to be seen in the studies from different academic areas. Integrating sustainability into accounting, especially, into management accounting, is very important because management accountants can play great roles in the adaptation and application of sustainable business practices.

Sustainable supply chain management has many steps starting from the supplier selection till the recycling of the product. In each step, a careful planning and a sound decision making are required. Management accountants, as the internal analysts and information providers to decision makers, have big responsibilities in the evaluation of suppliers while determining which one is the best for a sustainable relationship and which can provide sustainable materials for production. When improving the costing method to decrease materials used and waste, while evaluating the economic, environmental and social performances of a firm, and while making cost-benefit and risk analyses, management accountants play important roles. Companies that want to implement sustainability into their management philosophy should integrate management accountants into their SSCM systems.

This study shows that cost and management accountants may take parts especially in determining cost and profitability of sustainable products, cost and quality evaluation of input materials and risk evaluation of suppliers, developing costing models for sustainable production, measuring performance in economic, environmental and social areas, and making cost-benefit analysis in the implementation and adoption of sustainability in each steps of sustainable supply chains.

7. Suggestions for the further research

The number of SSCM studies which have implications to management accounting is scarce, and needs to be improved. The further research may be structured to understand the roles of management accountants in companies that already implemented sustainability into their supply chains. The current research on small and medium sized enterprises (SMEs) are very limited, some research may be conducted to understand sustainability implementation in SMEs. ‘Comparing sustainability performances of firms from developed and developing countries’, ‘trying to develop measures for social sustainability performance evaluation’ and ‘budgeting for sustainability’ may be possible subjects for the researchers.

References

Al-Odeh, M. and Smallwood, J., 2012. Sustainable supply chain management: Literature review, trends and framework. *IJCEM International Journal of Computational Engineering & Management*, 15(1), pp. 85-89.

Bansal, P. and Roth, K., 2000. Why Companies Go Green: A Model of Ecological Responsiveness. *The Academy of Management Journal.* Vol. 43, No. 4. pp. 717-736. https://doi.org/10.5465/1556363

Beske-Janssen, P., Johnson, M.P., and Schaltegger, S., 2015. 20 years of performance measurement in sustainable supply chain management – what has been achieved? *Supply Chain Management: An International Journal,* 20(6), pp. 664-680. https://doi.org/10.1108/SCM-06-2015-0216

Bhagwat, R., and Kumar Sharma, M., 2007. Performance measurement of supply chain management: A balanced scorecard approach. *Computers & Industrial Engineering,* 53, pp. 43-62. https://doi.org/10.1016/j.cie.2007.04.001

Björklund, M., Martinsen, U., and Abrahamsson, M., 2012. Performance measurements in the greening of supply chains. *Supply Chain Management: An International Journal,* 17(1), pp. 29-39. https://doi.org/10.1108/13598541211212186

Buhalis, D. 2000. Relationships in the distribution channel of tourism: Conflicts between hoteliers and tour operators in the Mediterranean region. *International Journal of Hospitality and Tourism Administration,* 1(1), pp. 113-139. https://doi.org/10.1300/J149v01n01_07

Carter, C. R. and Easton, P. L., 2011. Sustainable supply chain management: Evolution and future directions. I*nternational Journal of Physical Distribution & Logistics Management.* 41(1), pp. 46-62.

Cazeri, G. T., Anholon, R., Quelhas, O. L. G., Ordonez, R. E. C., and Novaski, O., 2017. Performance measurement of green supply chain management: A literature review and gaps for further research. *Brazilian Journal of Operations and Production Management.* 14(1), pp. 60-72. https://doi.org/10.14488/BJOPM.2017.v14.n1.a7

Chang, S. H., Chiu, A. A., Chu, C. L. and Wang, T. S. 2015. Material flow cost accounting system for decision making: The case of Taiwan SME in the metal processing industry. *Asian Journal of Finance & Accounting,* 7(1), pp. 118-133. https://doi.org/10.5296/ajfa.v7i1.7033

Christ K. L. and Burritt, R. L., 2015. Material flow cost accounting: A review and agenda for future research. *Journal of Cleaner Production.* 108, Part B, pp. 1378-1389. https://doi.org/10.1016/j.jclepro.2014.09.005

Despotovic, D., Cvetanovic, S., Nedic, V., and Despotovic, M., 2015. Economic, social and environmental dimension of sustainable competitiveness of European countries. *Journal of Environmental Planning and Management,* 59(9), pp. 1-49. https://doi.org/10.1080/09640568.2015.1085370

Elkington, J., 1998. Accounting for the triple bottom line. *Measuring Business Excellence,* 2(3), pp.18-22. https://doi.org/10.1108/eb025539

El Saadany, A., Jaber, M. and Bonney, M., 2011. Environmental performance measures for supply chains. *Management Research Review,* 34(11), pp. 1202-1221. https://doi.org/10.1108/01409171111178756

Esty D.C. and Charnovitz, S., 2008. Environmental sustainability and competitiveness: Policy imperative and corporate opportunity. *Harvard Business School, US Competitive project*, pp.1-14.

EU Commission Agriculture Directorate-General, 2001. A framework for Indicators for the Economic and Social Dimensions of Sustainable Agriculture and Rural Development. pp. 1-39.

Feil, A. A. and Schreiber, D., 2017. Sustainability and sustainable development: unravelling overlays and scope of their meanings. *Cad. EBAPE.BR*, 14(3), Article 7. Rio de Janeiro. pp. 667-681. https://doi.org/10.1590/1679-395157473

Gates, S. and Germain, S., 2010. Integrating sustainability measures into strategic performance measurement systems: An empirical study. *Management Accounting Quarterly*, 11(3), pp. 1-7.

Gerrits, R., 2012. Sustainability in the supply chain, guidance note on tools for pollution management. World Bank Group publication: *Getting to Green—A Sourcebook of Pollution Management Policy Tools for Growth and Competitiveness.* pp.1-295.

Giannakis, M., and Papadopoulos, T., 2016. Supply chain sustainability: A risk management approach. *International Journal of Production Economics*, 171, pp. 455–470. https://doi.org/10.1016/j.ijpe.2015.06.032

Graafland, J. J., 2002. Sourcing ethics in the textile sector: The case of C&A. *Business Ethics: A European Review,* 11(3), pp. 282-204. https://doi.org/10.1111/1467-8608.00286

Green, K., Morton, B., and New, S., 1996. Purchasing and environmental management: Interactions, policies and opportunities. *Business Strategy and the Environment,* 5, pp.

188-197. https://doi.org/10.1002/(SICI)1099-0836(199609)5:3<188::AID-BSE60>3.0.CO;2-P

Green Jr, K. W., Zelbst, P. J., Meacham, J. and Bhadauria, V. S., 2012. Green supply chain management practices: Impact on performance. *Supply Chain Management: An International Journal,* 17(3), pp. 290-305. https://doi.org/10.1108/13598541211227126

Grosvold, J., Hoejmose, S. U. and Roehrich, J. K., 2014. Squaring the circle: Management, measurement and performance of sustainability in supply chains. *Supply Chain Management: An International Journal,* 19(3), pp. 295-302. https://doi.org/10.1108/SCM-12-2013-0440

Gualandris, J., Golini, R. and Kalchschmidt, M., 2014. Do supply management and global sourcing matter for firm sustainability performance? An international study. *Supply Chain Management: An International Journal,* 19(3). pp. 265-268. https://doi.org/10.1108/SCM-11-2013-0430

Gupta, S. and Palsule-Desai, O. D., 2011. Sustainable supply chain management: Review and research opportunities. *IIMB Management Review*, 23. pp. 234-245. https://doi.org/10.1016/j.iimb.2011.09.002

Hall, J., 2000. Environmental supply chain dynamics. *Journal of Cleaner Production,* 8. pp. 455–471. https://doi.org/10.1016/S0959-6526(00)00013-5

Handfield, R., Sroufe, R., and Walton, S., 2005. Integrating environmental management and supply chain strategies. *Business Strategy and Environment,* 14(1), pp. 1-19. https://doi.org/10.1002/bse.422

Hines F. and Johns, R., 2001. Environmental supply chain management: Evaluating the use of environmental mentoring through supply chains. In *the Greening of Industry Network Conference*, Bangkok. pp. 1-14.

ISO, 2011. ISO 14051:2011. Environmental management - Material flow cost accounting. Geneva: ISO.

Joumard, R., 2013. How to define the environmental dimension of sustainability. HAL archives-ouvertes**,** 8th Int. Conf. of the European Society for Ecological Economics *Transformation, innovation and adaptation for sustainability – Integrating natural and social sciences*, Ljubljana, 29 June - 2 July, 2009, pp. 1-23.

Kafa, N., Hani, Y., and El Mhammedi, A., 2013. Sustainability performance measurement for green supply chain management. *IFAC Proceedings Volumes,* 46(24), pp. 71-78. https://doi.org/10.3182/20130911-3-BR-3021.00050

Khare, A., 2005. Emerging dimensions of environmental sustainability. *A Canadian perspective of Innovative practices, Fachbuch Verlag Winkler Kantstr.* 1, pp. i1-i16.

Kloviene, L. and Speziale, M-T., 2015. Is performance measurement system going towards sustainability in SMEs? *Procedia Social and Behavioral Sciences,* 213, pp. 328-333. https://doi.org/10.1016/j.sbspro.2015.11.546

Kogg, B., 2003. Greening a cotton-textile supply chain: A case study of the transition towards organic production without a powerful focal company. *Greening management International*, 43. pp. 53-64. https://doi.org/10.9774/GLEAF.3062.2003.au.00007

Kovanicova, D., 2011. Material flow cost accounting in Czech environment. *European Financial and Accounting Journal.* 6(1), pp. 7-18. https://doi.org/10.18267/j.efaj.36

Lamming R., and Hampson, J., 1996. The environment as a supply chain management issue. *British Journal of Management,* 7, Special Issue, pp. S45-S62. https://doi.org/10.1111/j.1467-8551.1996.tb00147.x

Li, A.Q. and Found, P., 2016. Lean and green supply chain for the product-services system (PSS): The literature review and a conceptual framework. *Procedia CIRP*, 47, pp. 162-167. https://doi.org/10.1016/j.procir.2016.03.057

Liang, S. and Chang, W., 2008. An empirical study on relationship between green supply chain management and SME performance in China. *International Conference on Management Science and Engineering.* pp. 611-618.

Lintukangas, K., Kahkonen, A. K., Ritala, P., 2016. Supply risks as drivers of green supply management adoption. *Journal of Cleaner Production,* 112, pp. 1901-1909. https://doi.org/10.1016/j.jclepro.2014.10.089

Lo, S. M., Shiah, Y. A., 2016. Associating the motivation with the practices of firms going green: the moderator role of environmental uncertainty. *Supply Chain Management: An International Journal*, 21(4), pp. 485-498. https://doi.org/10.1108/SCM-05-2015-0184

Marota, R., Ritchi, H., Khasanah, U. and Abadi, R. F., 2017. Material flow cost accounting approach for sustainable supply chain management system. *International Journal of Supply Chain Management,* 6(2), pp. 33-37.

Martínez-Jurado, P. J. and Moyano-Fuentes, J., 2013. Lean management, supply chain management and sustainability: A literature review. *Journal of Cleaner Production,* 85, pp. 134-150. https://doi.org/10.1016/j.jclepro.2013.09.042

Nakamba, C. C., Chan, P. W. and Sharmina, M., 2017. How does social sustainability feature in studies of supply chain management? A review and research agenda. *Supply Chain Management: An International Journal,* 22(6), pp. 525-533. https://doi.org/10.1108/SCM-12-2016-0436

Okada, E. M. and Mais, E. L., 2010. Framing the "green" alternative for environmentally conscious consumers. *Sustainability Accounting, Management and Policy Journal,* 1(2), pp. 222-234. https://doi.org/10.1108/20408021011089257

Ortas, E., Moneva, J. M. and Álvarez, I., 2014. Sustainable supply chain and company performance: A global examination. *Supply Chain Management: An International Journal,* 19(3), pp. 332-350. https://doi.org/10.1108/SCM-12-2013-0444

Ozcelik, F., 2013. Yalin uretim ortamina uygun maliyet sistemi secimi [Selecting the appropriate cost accounting system in a lean environment]. *Yonetim ve Ekonomi,* 8, pp. 4985-5008.

Paul, B. D., 2008. A history of the concept of sustainable development: Literature review. The Annals of the University of Oradea, *Economic Science Series*, 17(2), pp. 576–580.

Preuss, L. 2001. In dirty chains? Purchasing and greener manufacturing. *Journal of Business Ethics*, 34(3/4), pp. 345-359. https://doi.org/10.1023/A:1012549318786

Rajeev, A., Pati, R. K., Padhi, S. S. and Govindan, K., 2017. Evolution of sustainability in supply chain management: A literature review. *Journal of Cleaner Production,* 162, pp. 299-314. https://doi.org/10.1016/j.jclepro.2017.05.026

Rao, P. 2002. Greening the supply chain: A new initiative in South East Asia. *International Journal of Operations & Production Management,* 22(6), pp. 632-655. https://doi.org/10.1108/01443570210427668

Rao, P. and Holt, D., 2005. Do green supply chains lead to competitiveness and economic performance. *International Journal of Operations & Production Management,* 25(9). pp. 898-916. https://doi.org/10.1108/01443570510613956

Salonen, A. O., Ahlberg, M., 2011. Sustainability in everyday life integrating environmental, social and economic goals. *Research and Solutions, MARY ANN LIEBERT, INC*. 4(3) pp. 134-142. https://doi.org/10.1089/SUS.2011.9693

Sayed, M., Hendry, L. C. and Bell, M. Z., 2017. Institutional complexity and sustainable supply chain management practices. *Supply Chain Management: An International Journal,* 22(6), pp. 542-563. https://doi.org/10.1108/SCM-10-2016-0365

Schaltegger, S. and Burritt, R., 2014. Measuring and managing sustainability performance of supply chains: Review and sustainability supply chain management framework. *Supply Chain Management: An International Journal,* 19(3), pp. 232-241. https://doi.org/10.1108/SCM-02-2014-0061

Seuring, S. and Müller, M., 2008. From a literature review to a conceptual framework for sustainable supply chain management. *Journal of Cleaner Production* 16. pp. 1699–1710. https://doi.org/10.1016/j.jclepro.2008.04.020

Shi, V. G., Koh, S. C. L., Baldwin, L. and Cucchiella, F., 2012. Natural resource based green supply chain management. *Supply Chain Management: An International Journal,* 17(1), pp. 54-67. https://doi.org/10.1108/13598541211212203

Silvestre, B. S., 2015. Sustainable supply chain management in emerging economies: Environmental turbulence, institutional voids and sustainability trajectories. *International Journal of Production Economics*, 167(C), pp. 156-169. https://doi.org/10.1016/j.ijpe.2015.05.025

Srivastava, S. K., 2007. Green supply-chain management: A state-of the-art literature review. *International Journal of Management Reviews,* 9(1), pp. 53-80. https://doi.org/10.1111/j.1468-2370.2007.00202.x

Torjman, S., 2000. The social dimension of sustainable development. *Caledon, Institute of Social Policy*, pp.1-11.

United Nations, Economic and Social Council, 2015. Balancing the three dimensions of sustainable development: from integration to implementation. *Economic and Social Commission for Asia and the Pacific Asia-Pacific Forum on Sustainable Development,* pp. 1-17.

United Nations Commission, 1987. *Our common future: Report of the World Commission on Environment and Development.* [PDF] Available at: <http://www.un-documents.net/our-common-future.pdf> [Accessed on 20 August 2018].

Vanags, J., Geipele, I., Mote, G. and Jirgena, H., 2012. Sustainable development: Social dimension and limitation of material needs. In *Conference "Business and Management 2012" Vilnius*, pp. 1-8. https://doi.org/10.3846/bm.2012.099

Varsei, M., Soosay, C., Fahimnia, B. and Sarkis, J., 2014. Framing sustainability performance of supply chains with multidimensional indicators. *Supply Chain Management: An International Journal,* 19(3). pp. 242-257. https://doi.org/10.1108/SCM-12-2013-0436

Weygandt, J. J., Kimmel, P. D. and Kieso, D. E., 2012. *Managerial accounting tools for decision making.* 6th ed. New Jersey: John Wiley and Sons.

Wu, Z. and Pagell M., 2011. Balancing priorities: Decision-making in sustainable supply chain management. *Journal of Operations management,* 29(6), pp. 577-590. https://doi.org/10.1016/j.jom.2010.10.001