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Constraints to Green Supply Chain Management in South Africa's FMCG Sector: A Case Study Approach.

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ABSTRACT

Organizations across various sectors including those in the Fast-Moving Consumer Goods (FMCG) industry are increasingly recognizing the importance of adopting green supply chain management (GSCM) practices in their operations. This article aims to explore the specific constraints encountered by an FMCG factory located in Durban in implementing GSCM practices, and to examine the strategies the factory employs to mitigate these challenges. The study adopts an exploratory research design, utilizing primary data collected through eight semi-structured interviews conducted with key personnel at the factory. A purposive sampling approach guided the selection of participants. The findings reveal that GSCM constraints fall into four main categories: green procurement, green manufacturing, green transportation, and product recovery. In response to these challenges, the factory has implemented measures such as aligning its green supply chain goals with broader business objectives and prioritizing waste reduction initiatives. Recommendations from the study include strengthening supplier relationships and fostering a workplace culture that encourages employee engagement with environmental sustainability efforts. Given the limited research on GSCM barriers within the South African FMCG sector, this study contributes to the academic discourse by highlighting actionable areas for improvement and offering practical insights for industry stakeholders.

Background

'Green', in the context of this article, can be defined as a sustainable environmentally-friendly approach to business for the benefit of the natural environment. The adoption of green supply chain management has become a requirement for organisations to ensure environmental sustainability and improve their image (Srivastava 2011:12). This is due to the negative impact of economic growth on ecological systems and society.

Already, in 1987, the United Nations (UN) published a report titled 'Our common future' to facilitate the establishment of environmental sustainability and promote protection of the environment and the society (Brundtland Commission 1987:132). The UN established frameworks such as the Kyoto Protocol (UNFCCC 1997:81) to facilitate the adoption of green initiatives and require countries to comply with the environmental standards (UNFCCC 1997:82). The Kyoto

Protocol contains internationally binding targets to reduce deforestation, irresponsible disposal of waste and the emission of carbon dioxide.

Another United Nations' intervention to protect the natural environment includes the congress of parties (Cop), the United Nation's climate conferences, where representatives of countries from around the world meet to share ideas and establish resolutions to encourage a green economy.

One of these conferences is the Cop 17, which took place in the city of Durban, South Africa in 2011. In response to international frameworks on environmental sustainability, the South African government formulated legislations, which requires fast-moving goods and consumer (FMGC) organisations in South Africa such as Procter and Gamble, Unilever and Nestle to be environmentally responsible when conducting their supply chain activities.

The above interventions were triggered by concerns of numerous customers and governments globally as they are developing a deferential and more conscious attitude towards environmental sustainability (Srivastava 2011:72).

Consequently, a larger number of organisations and customers globally embrace the implementation of green practices as a fundamental requirement for conducting business. In this context, a range of constraints exist that are faced by FMCG organisations in ensuring effective and efficient adoption of GSCM practices in their activities (Abbasi & Nilsson 2012:104). As a result, numerous organisations fail to strengthen and improve green practices.

Against the above background, the aim of this article is to determine the green supply chain management constraints that FMCG Factory X in Durban faces (a pseudonym used for the purpose of this article as the participating FMCG requested to remain anonymous), and to determine the positive interventions that it can employ to overcome such constraints.

The FMCG industry contributes significantly to the gross domestic product (GDP) of South Africa and it is one of the largest sectors in the South African economy (CGCSA) nd:Internet.)

A dearth of research exists on green supply chain management constraints facing FMCG organisations in South Africa. In this context, the findings and recommendations of this article contribute to the existing body of knowledge by identifying areas through which green supply chain management in the FMCG industry in South Africa can be improved. This is vital for such businesses as adhering to, and improving upon, green practices can play a role in maintaining and elevating their reputational status in the minds of their customers and broader society.

Firstly, the article provides a review of literature relevant to the research. This is followed by an explanation of the research methodology, after which the results and discussion of the findings are provided. The article then concludes with recommendations and concluding remarks.

Literature review

This section of the article presents an overview of the South African FMCG industry as described in the literature as well as an overview of selected and existing supply chain management and green supply chain management literature.

South African FMCG Industry

As one of the largest sectors in the South African economy, the FMCG industry contributes substantially to the gross domestic product (GDP) of South Africa. The Consumer Goods Council of South Africa (CGCSA) is the representative body of the South African FMCG industry (CGCSA nd:Internet). This body was established in 2002 and it represents 12 000 FMCG organisations in

South Africa across the value chain of consumer goods. This includes the retail sector, the wholesale and production sectors (Srinivasu 2014:1). The CGCSA promotes engagement between stakeholders in the industry, and represents the interest of the FMCG industry to government and other stakeholders. Notable organisations in this sector include FMCG A, Coca-Cola, Procter and Gamble, Pepsi and Nestlé (CGCSA nd:Internet).

Globally, the FMCG sector, also known as the consumer packaged goods (CPG) sector, is regarded as one of the largest industries. FMCGs are generally low cost products that have a relatively short shelf life, and are usually purchased by consumers on a regular basis. Profit margins on these products are usually low for retailers, who try to offset this by selling large volumes (Srinivasu 2014:4). Products that require frequent purchase and have a low unit value are regarded as consumer purchased goods (CGCSA nd:internet).

Supply Chain Management

Sanders (2012:3) explains that supply chain management (SCM) consists of the design and management of seamless, value-added flows of products, information and funds throughout the supply chain. It involves the co-ordination and management of the various processes within and outside the organisation which are responsible for the supply of products from its origin to meet the real needs of the final customer (Fawcett, Ellram & Ogden 2007:8; Sanders 2012:3).

Larson (2009:224) posits: "SCM integrates business functions such as sales, marketing, forecasting, research and development, production, procurement, logistics, information systems, customer service and finance". It also presents ways to integrate all the partners in the value chain such as suppliers, warehouses, customers and manufactures. The aims is to manufacture and deliver products in the right quantity, right quality, to the right locations, and at the right time, in order to reduce system-wide costs while satisfying customer requirements (Ghobakhloo, Tang, Zulkifli & Ariffin 2013:38; Sanders 2012:3).

Green Supply Chain Management

Green, Zelbst, Meacham and Bhadauria (2012:290) define green supply chain management as integrating environmentally friendly practices into SCM in response to customer demand for products and services that are created through environmentally sustainable practices. These practices require that manufacturers work jointly with suppliers and customers to improve environmental sustainability. Srivastava (2011:8) defines GSCM as "integrating environmental thinking into supply chain management, including product design, material sourcing and selection, manufacturing processes, delivery of the final products to the consumer, and end-of-life management of the product after its useful life".

Kumar and Chandrakar (2012:29) found that the green supply chain concept covers all phases of a product's life cycle, from the extraction of raw materials and materials (green procurement) through the production (green manufacturing), distribution phases (green transportation), to the product disposal and recovery at the end of the product's life cycle.

Potential Green Supply Chain Management Constraints

According to Beamon (2008:94), the word "constraint" is defined as a factor that hinders improvement or accomplishment of a goal. This section explains potential constraints in the four constructs of GSCM, namely, green procurement, green manufacturing, green transportation and product recovery. In the context of this paper, constraints include influences such as lack of supplier interest to change and high initial investment costs, which hold back the process of implementing green supply chain initiatives in the FMCG industry. Mvubu (2016:26-36) in his

study identified various GSCM constraints from the literature reviewed. These are explained in the paragraphs that follow.

Green Procurement Constraints

Kumar and Chandrakar (2012:47) maintain that green procurement functions include "outsourcing, vendor auditing, management and selection, supplier collaboration and supplier development and each of these activities can be expanded to have greening components". Upstream dimensions of the supply chain, as with any activities throughout the supply chain, could have both internal and external constraints that inhibit greening practices in procurement activities. Consequently, this section provides potential green procurement constraints in the FMCG industry.

Lack of knowledge and information sharing between upstream and downstream partners

Lack of information sharing between suppliers and customers is a constraint in the implementation of green procurement. A number of limitations may exist during information sharing, but there could also be constraints with regard to information availability, for example in a case where information is not easily available (Beamon 2008:47). It is necessary for organisations to be aware of the environmental implications of their suppliers and their processes and operations. For competitive reasons, certain suppliers may not be willing to disclose the required information to their buyers (Zhu, Sarkis & Lai 2009:85). At times, suppliers find information valuable that provides them with a competitive edge and therefore may not want to share it.

Supplier reluctance to change towards GSCM

Strong interactions with suppliers lead to lower inventory levels, lower costs and facilitate improved profitability. Sarkar & Mohapatra (2009:35) argue that participation of suppliers in the design process and technology impacts on the total performance efficiency of the whole supply chain. Sage (2010:137) posits that the reluctance of suppliers to change towards green procurement can be attributed to the traditional attitudes and interests of the suppliers being dissimilar from those of the entire network. Sarkar & Mohapatra (2009:35) explain that relationships between suppliers and manufacturers are necessary for the development of GSCM initiatives. The collaboration between manufacturers and customers is essential to facilitate the manufacturing of environmentally friendly products. Suppliers have to fulfil the sustainability requirements of the organisations to sustain supplier relationships.

Green Manufacturing Constraints

According to Ninlawan, Seksan, Tossapol & Pilada (2010:64), "green manufacturing enhances the product value, which offsets the cost of environmental investments and improves the corporate image of a company, while green product innovation pertains to the evaluation of a product's economical, technical and commercial feasibility". However, current constraints in green manufacturing inhibit the implementation of environmental sustainability practices in procurement.

Lack of information technology (IT) implementation

According to Ho, Shalishali, Tseng and Ang (2009:83), information technology (IT) systems have the ability to support co-operative supply chain processes and enhance the performance of the supply chain. As a result, it is essential to have an efficient information and technology system in place, in order to support GSCM through various phases of the product life cycle. Well-organised

information systems are necessary to ensure the effective tracking and tracing of product returns and to link with previous sales (Ravi & Shankar 2012:77). The development of relationships to attain effective green manufacturing in FMCG organisations in South Africa requires IT support. It is paramount to facilitate efficient handling of forward and backward information flows of materials to enable efficient management of green supply chain (Alkhidir & Zailani 2009:85).

Organisations' reluctance to adopt technology advancement

Kannan, Noorul-Haq, Sasikumar and Arunachchalam (2008:72) explain that an organisation that is more experienced in adopting and implementing relevant technologies, is likely to have a greater technology innovation. Advancement in technology can be accomplished by ensuring the effective sharing of technological information (Cooper 2011:36). Organisational obstruction leads to difficultly in the execution of essential organisational transformation (Alkhidir & Zailani 2009:25).

Market competition and uncertainty

Lin (2009:193) found that high fluctuations in demand and supply in the market increases global competitiveness. Morelli (2011:33) explains that the external environment in which a company operates its business will influence a company's innovative ability as well as its attempts to adopt innovations.

Lack of implementing green practices

Lin and Ho (2009:192) expound that innovative practices to ensure a green supply chain is connected with the green practices' explicitness to accumulate understanding and knowledge, and organisational reinforcement. Designing for the environment is achieved by considering non-harmful, reusable and recyclable resources in the design phase (Ravi & Shankar 2012:249). The safer discarding of products after effective end of the life can be achieved through the end of life product management. Inventive and creative green practices consist of hazardous disposal of solid waste, energy conservation, recycling and reusing materials.

Lack of top management commitment

Zhu and Sarkis (2010:121) claim that commitment from top management is essential for the execution of any strategic programme. Support from top management is particularly valuable for the accomplishment of green manufacturing. The role of top management is to encourage and effect the establishment of the application of environmental sustainability (Sarkis 2009:39).

Initial investment and costs

Prior to the implementation of greening initiatives, a significant financial investment is needed, which is a cost to the company. Traditionally, cost has been utilised as the primary measure of performance. Typically, high costs are a constraint in the implementation of green manufacturing as opposed to conventional manufacturing (Pooe & Mhelembe 2014:6). There are two types of costs, namely, direct costs and transaction costs. According to Alkhidir and Zailani (2009:47), incurring both types of costs and this is a major constraint in the implementation phase of GSCM. Enablement or facilitation of IT, adoption of technology advancement, recruiting quality workforce, conducting raining programs require a considerable initial investment (Alkhidir & Zailani 2009:47).

Lack of customers awareness and demand

Not all customers are aware of the benefits that can be derived from using environmentally friendly products (Sage 2010:192). Organisations could create awareness among customers by generating advertising initiatives in different platforms. However, Ravi and Shankar (2012:94) explain that government has a role to play, as it should establish awareness campaigns to provide customers with sufficient information regarding environmentally friendly products and what benefits they derive from them. Customer knowledge of environmentally friendly products could encourage them to buy these products, thus improving the reputation of the company and sales volumes (Ravi & Shankar 2012:94).

Green transportation constraints

Green transportation can be defined as "supporting environmental sustainability, such as protection of the global climate, ecosystems, public health, and natural resources" (Ghobakhloo *et al.* 2013:38). It is necessary that it also supports economic and social environments since these are the other two pillars of sustainability. According to Evans and Denney (2009:4), the main goal of green transportation is to support economic growth whilst protecting the environment. However, constraints in green transportation could make it impossible to achieve these goals. According to Scupola (2009:154), regulations from government can facilitate or inhibit the innovation implementation. Alkhidir and Zailani (2009:34) maintain that lack of support from government institutions is a constraint in the adoption of green transportation. Support systems from government may facilitate innovative green transportation, enhance commitment from top management, improve IT adoption and improve the quality of the work force.

Product recovery constraints

Product recovery is defined as "the task of recovering discarded products; it may include packaging and shipping materials and backhauling them to a central collection point for either recycling or remanufacturing" (Alkhidir & Zailani 2009:82).

Costs related to product recovery

External pressures compel organisations to reduce costs (Pollock 2010: 8). There are numerous cost implications related to product recovery such as investment in activities and equipment to generate energy, minimising waste and recover obsolete products.

Customers' negative perceptions about remanufactured products

Customers have a negative perception about products that undergo remanufacturing and recycling (Zhu *et al*. 2009:28). It becomes a constraint when customers do not regard recycled products as meeting their specified needs. This perception impacts negatively on the sales of recycled products. As a result, organisations are usually reluctant to adopt product recovery initiatives due to a lack of customer demand for these products (Srivastava 2011:85).

Lack of organisational encouragement

Lin and Ho (2009:47) maintain that informal relations and enhanced communications enable organisations to implement product recovery. According to Ravi and Shankar (2012:67), training and education are a key requirement for accomplishing effective adoption and application of GSCM practices in any organisation. Top management may support and encourage the workforce to learn more of green practices and offer support by educating themselves about green practices. Organisations may also reward employees who are willing to and engage themselves in green activities such as facilitating recovery of energy and water (Tsai & Ghoshal 2008:114).

Lack of markets for recovered products

The manufacturers of recovered products may find it problematic to find suppliers as well as customers for their products (Evans & Denney 2009:16). It is often challenging to predict the amount of waste material available because the amount of waste product or scrap material depends on the amount of products that were produced initially. As a result, the recycling organisations may incur high cost of locating suppliers of scrap materials (Kumar & Chandrakar 2012:98).

METHODOLOGY

A case study approach for this study was adopted in order to: (1) identify GSCM constraints FMCG A faces; and (2) to determine the strategies it has in place to overcome these constraints. Case-study research is descriptive and exploratory and can provide a rich body of information about a specific object, individuals or particular situations (Bernard & Ryan 2010:93; Bickman & Rog 2009:167; Terreblanche, Durrheim & Painter 2007:461). This approach is appropriate in order to provide a deeper understanding into and identifying of GSCM constraints that FMCG A faces. However, Malhotra (2007:82) remarks that causal links in case-study research are difficult to test and generalisations cannot be made from single case studies. A convenience purpose sample was used and eight participants at FMCG A in Durban were interviewed for this study (see Table 1). One of the authors conducted the interviews, using a semi-structured interview guide. The interview guide consisted of open-ended questions and was pre-tested to ensure that the questions were clear and unambiguous. The questions were phrased in lay language to capture all aspects of the factors to be measured. The participants were given the opportunity to ask questions and seek clarity before responding to questions. Therefore, consistency and accuracy were maintained during the interviews, which contributed to the trustworthiness of the results of the study.

TABLE 1: List of participants included in this study

Department	Job description
Planning	Sourcing Unit Director
Procurement and planning	Procurement Manager
Manufacturing	Engineering Manager
Quality	Quality Manager
Warehousing	Subject Matter Expert
Transportation and warehousing	Transportation/Delivery Manager
Safety, health and environment	SHE Manager
Manufacturing	Production Manager

Source: Authors' own construction

In order to ensure reliability, the interviews were recorded by making handwritten notes and by audio recording the interviews to be transcribed later. Permission to use a voice recorder was granted by the participants. The recordings were transcribed verbatim and then checked against the voice recordings for accuracy any transcription errors were corrected. The data were analyzed using thematic analysis. Thematic analysis is "an approach to dealing with data that involves the creation and application of 'codes' to data" (Creswell & Plano Clark 2007:88).

Thematic data analysis took the form of the following stages: the coding of the findings of primary studies; the organisation of these 'codes' into related areas to construct 'descriptive' themes; and the development of 'analytical' themes. The process of translation, through the development of descriptive and analytical themes, was carried out in a rigorous way that facilitates transparency of reporting. The process involved the identification of themes through careful reading and re-reading of the data. This is a form of pattern recognition within the data, where emerging themes become the categories for analysis.

RESULTS AND EXPLANATION OF THE FINDINGS

The results and explanation of the findings are presented according to the purpose and objectives of this study, namely to determine the GSCM constraints that FMCG A faces and to determine the remedies in place to overcome these constraints.

Green supply chain management constraints

In determining the GSCM constraints that FMCG A faces, data from the semi-structured in- depth interviews were used. Issues frequently brought up and experienced by participants were coded, categorised and grouped in the most logical way. Green supply chain management constraints were categorised into green procurement constraints, green manufacturing constraints, green transportation constraints and product recovery constraints. As previously explained, thematic data, analysis was used to analyse the data. The result of this analysis provided the researcher with a 'thematic map'.

Figure 1 presents the thematic map demonstrating the findings of the data analysis. The subsequent sections of this chapter will 'unpack' the following four themes of the thematic map.

Theme 1: green procurement constraints

In the literature review, potential green procurement constraints were presented. The categories relating to this theme are grouped into two categories, namely: (1) lack of knowledge and information sharing between upstream and downstream partners; and (2) supplier reluctance to change towards GSCM. The categories and the codes relating to this theme are dealt with in the next section.

Lack of knowledge and information sharing between upstream and downstream partners

Beamon (2008:47) identified lack of knowledge and information sharing between upstream and downstream partners as one of the potential green procurement constraints that FMCG organisations face. This constraint was also identified by two participants as one of the most prominent green procurement constraints at FMCG A.

One participant expressed his willingness to ensure that their procurement activities minimise negative impacts on the natural environment. However, the lack of knowledge and information sharing between upstream and downstream partners creates impediments to FMCG A's environmental sustainability initiatives.

Lack of collaborating with local suppliers

Suppliers are key business partners for FMCG A to ensure that activities in the supply chain are carried out in accordance with internationally recognised principles for environmental sustainability. To achieve this, there has to be effective information sharing between Factory X and its suppliers in order to create strong partnerships. Relationship Management (SRM) is an aspect of a Sustainable Operations Management (SOM) agenda is essential in creating a strong partnership. This includes setting requirements to suppliers, contractors and business partners to carry out procurement activities in an environmentally sustainable manner. As a result, the inability to collaborate with the local suppliers is a constraint at Factory X.

Poor communication

Three participants indicated poor communication as one of their green procurement constraints. Effective communication with suppliers ensures that the entire supply chain process, including managing inventory and acquiring goods, runs smoother and becomes more efficient.

According to these three participants, it is essential to have dialogues with business partners on issues related to environmental sustainability. These dialogues can ensure sustainable supplier relationship management (SSRM) which includes supplier support and development (Schiele 2007:281).

Supplier reluctance to change towards GSCM

Sarkar and Mohapatra (2009:35) and Sage (2010:137) identified supplier reluctance to change towards GSCM as a potential constraint in green procurement in the FMCG industry. However, none of the participants at Factory X reported that suppliers are reluctant to change towards GSCM. The procurement manager and planning manager indicated though, that the limited visibility to supplier activities is a constraint in green procurement.

The planning manager reported that a lack of monitoring and sufficient communications of sustainability expectations of suppliers and evaluation of suppliers' corporate sustainability behaviour and performance is an impediment to green procurement.

Building long-term supplier partnerships, effectively monitoring procurement, and incorporating sustainability and corporate social responsibility into the supply chain requires the adoption of the Supplier Relationship Management (SRM) concept.

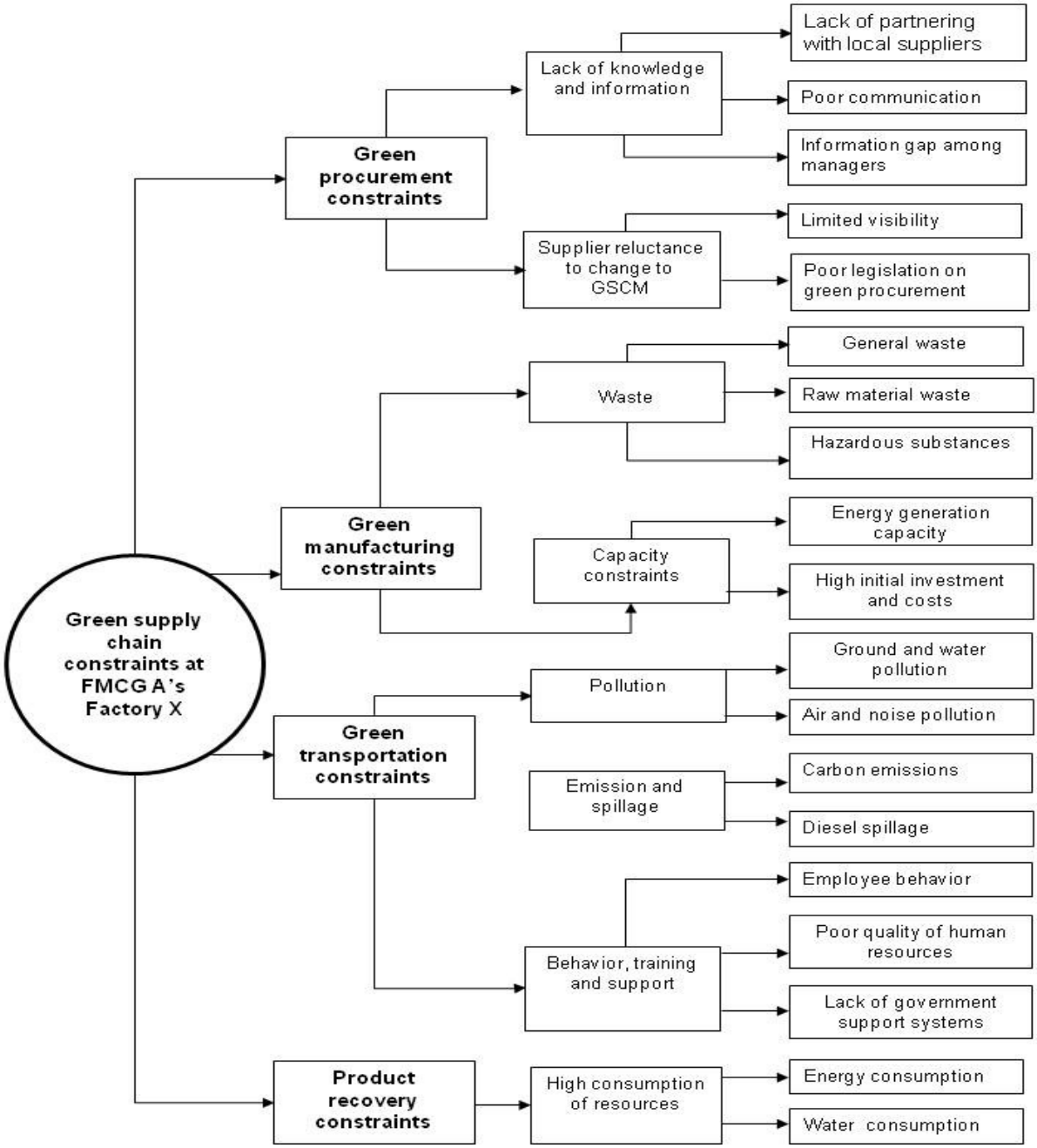

FIGURE 1: The thematic map

Source: Authors' own construction

Theme 2: Green manufacturing constraints

Out of these seven potential green manufacturing constraints identified from literature, considerable initial investment and costs were found as constraints at Factory X. However, waste,

capacity constraints and different types of pollution are other constraints the participating factory faces. The categories and the codes relating to this theme are dealt with in the next section.

Waste

The production manager indicated that waste is a constraint and a driver to implement sustainability initiatives. Considering the dataset as a whole, general waste, raw material waste and hazardous substances were frequently mentioned. Therefore, general waste, raw material waste and hazardous substances in particular pose constraints in green manufacturing.

General waste

General waste at the participating factory includes waste from floor sweepings, vacuum waste, rubber bands, gloves, stores waste and workshop waste. General waste produced during the cleaning of mixers is one of the prominent constraints. As quoted by the quality manager:

> *"All mixers have to be cleaned when changing over to a different product through either wet clean or dry clean."*

Wet cleaning is performed when there are allergens that could be contaminated when making a new batch, whereas dry cleaning takes place when allergens issues are not considered a problem. In both cases, during the cleaning process, a significant amount of powder waste is generated.

Raw material waste

Two participants reported that raw material waste at Factory X is a constraint. There are large amounts of material and energy used during the manufacturing and distribution of products and packages.

Hazardous substances

Two participants indicated that hazardous substances in the form of waste is another constraint at Factory X. Hazardous waste can be in the form of discarded commercial products, such as cleaning fluids or pesticides, or the by-products of manufacturing processes.

Capacity constraints

Capacity constraints were also identified as green manufacturing constraints. The two types of capacity constraints identified during the interviews include lack of energy generation, lack of capacity and a high initial investment and costs.

Energy generation capacity

The engineering manager identified the inability of Factory X to be energy self-sufficient as a constraint in the implementation of green initiatives.

> *"Lack of sustainable energy is a constraint to our greening initiatives since we have not invested in any solar or wind turbines and we are at the mercy of Eskom to provide us with electricity. The factory only focuses on system optimisation rather than changing it."*

According to the engineering manager, FMCG A is still investigating some ways of generating energy for its factories, particularly since load shedding remains a challenge in South Africa.

High initial investment and costs

According to Alkhidir and Zailani (2009:47) high initial investment and costs are a green manufacturing constraint in the FMCG industry. One participant remarked that insufficient financial capacity to invest in green supply chain management initiatives is a constraint.

"Generally, sustainability initiatives do not have attractive business paybacks. So finding money to run project was very difficult especially at the beginning, which made it even harder to invest back into sustainability projects. As much as FMCG A provides capital expenditure for environmental sustainability, the funding does not readily come."

Factory X makes an effort to solve this constraint by focusing more on behavioural driven aspects, as they require less funding. Examples include urging employees to shut down machines when not in use, conservation of energy, less wastage and focusing on machinery settings to minimize waste during start-ups. Factory X is involved in minimizing raw material waste by strengthening its control on large machinery – the filling of these machines is not always accurate. Therefore, Factory X focuses more on aspects that are dependent on machinery efficiency or people efficiency since they do not require a large investment.

Pollution

One of the participants identified pollution as one of the green supply chain management constraints. Pollution is created in various forms such as ground pollution, water pollution, air pollution and noise pollution.

Ground and water pollution

Three participants indicated that ground pollution occurs when there is a spill of chemicals or a leakage in the underground storage tank, thus releasing heavy contaminants into the soil. Water pollution caused by industrial waste products released into river streams and other water bodies is also a constraint.

Air pollution

Exposure to dust is a constraint in minimising the negative environmental impact caused by Factory X. Most of this dust comes from production units. As a result, employees, contractors and visitors are required to use personal protective equipment (PPE) such as hairnets, beard nets, coats and earmuffs when entering the production site.

The injurious smoke (sulphur dioxide, carbon monoxide and nitrogen oxides) emitted by cars, trucks and the factory are also regarded as constraints.

Noise pollution

The Safety, Health and Environment (SHE) manager identified noise pollution during the offloading of trucks and from the equipment on site as a constraint.

> *"We had noise complaints from our neighbouring community, so we built a booth where trucks can come in during loading and offloading, but this facility cannot be used because our employees inhale dust emitted by trucks inside this booth."*

The SHE manager maintained that every piece of equipment is evaluated to determine the amount of noise it produces in order to implement strategies to reduce noise pollution.

Theme 3: Green transportation constraints

This theme covers green transportation constraints experienced at the Factory X. The four prominent categories identified by the authors include emissions and spillage, behaviour and personal motivation, poor quality of human resources, and the lack of government support systems.

Emissions and spillage

The SHE manager at the Factory X indicated that emissions and spillages are constraints experienced in the transportation department.

Carbon emissions

One of the participants remarked that carbon emissions emanate from their transportation modes such as staff cars, trucks and other vehicles used onsite to transport goods or people.

> *"The largest sources of transportation-related greenhouse gas emissions include passenger cars and light-duty trucks, including pickup trucks, and minivans."*

Diesel spillage

Two participants identified diesel spills from delivery trucks as a constraint. However, most participants in the transportation department did think of it as a major constraint since there are mechanisms in place to avoid diesel spills. However, one participant was concerned about the diesel from trucks that drips out of the engines into roads.

Behavior, training and support

Three participants indicated that changing behaviours and promoting an understanding of greening practices is a key constraint at Factory X. In addition, poor quality of human resources and lack of government support as indicated in the literature review (Alkhidir and Zailani 2009:34).

Employee behavior

The engineering manager identified changing employee behaviour, such as taking long showers, the use of plastic bags, switching lights off and using products with more packaging is a constraint. Participants noted that in order to secure a more sustainable future, current pattern of employee behaviour needed to change.

Factory X has initiated numerous employee behavior change interventions to address a range of issues. These include increasing recycling, reducing energy use, reducing greenhouse gas (GHG) emissions, reducing water use and increasing public transport use. However, three participants remarked that attitudes and behaviour patterns are complex and any strategy aimed at changing them must be based on thorough knowledge and understanding of attitudes and behavior patterns. For examples, physical, social, cultural, people's choices and options determines behaviour patterns. Consequently, training and education are key requirements for accomplishing effective adoption and application of GSCM practices (Ravi & Shankar 2012).

Lack of government support systems

Alkhidir and Zailani (2009:34) maintain that lack of support from government institutions is a constraint in the adoption of green transportation. The transportation manager and the SHE manager noted that Factory X does not receive any support from government to help them successfully implement green transportation initiatives.

Theme 4: Product recovery constraints

This theme covers recovery constraints experienced at Factory X. The participants identified two prominent categories of constraints, namely high consumption of resources and lack of knowledge and understanding.

Energy consumption

Factory X consumes significant amounts of energy, especially since it relies solely on the eThekwini municipality to provide electricity. Most of this energy is used in the entire factory for air conditioning, running equipment, lighting, and water heating and recovery.

Water consumption

One participant commented that a significant amount of water is consumed at Factory X. As manufacturing processes run on a large scale, water is required on a large scale. In addition, the factory consists of 510 workers who include contractors and casual labourers who use water in various ways such as bathrooms, toilets, hygiene stations and hot water coffee stations.

FMCG A's corrective action to overcome their green supply chain constraints

This section presents FMCG A's remedies to overcome their green supply chain constraints. Table 2 summarises the identified green supply chain management and the corrective action steps FMCG A has in place to overcome these constraints.

CONCLUSION

The adoption of GSCM has become a key requirement for organisations to ensure environmental sustainability and improvement of their image. This is due to the negative impact of economic growth on ecological systems and society. The article explained the GSCM constraints that Factory X faces and the remedies it has in place to overcome these constraints.

The data reveal that Factory X faces constraints in green procurement, green manufacturing, green transportation and product recovery.

Green procurement constraints include lack of knowledge and information sharing among partners and supplier reluctance to change towards green supply chain. Green manufacturing constraints include waste, capacity constraints and pollution, whereas green transportation constraints include carbon emissions and diesel spillage. The high energy and water consumption and the lack of knowledge on sustainability are constraints in product recovery.

The use of an environmental scorecard, auditing, KPIs, energy mapping, rainwater harvesting, bonuses and prices, are a number of prominent remedies to constraints in GSCM, faced at Factory X. It is proposed that more investment is made to generate solar energy and facilitating training programmes to transfer knowledge about environmental sustainability.

A limitation of this study is that only one FMCG company was included. Other FMCG organisations operating in South Africa did not form part of this study, as the focus was on one FMCG company only. Therefore, the findings of this research cannot be generalised to all organisations in the FMCG sector in South Africa. In addition, green supply chain management constraints were identified through the literature review and semi-structured in- depth interviews with participants at Factory X. As a result, it should be noted that not all constraints in the green supply chain may have been identified.

The value of this type of study in the field of GSCM is that the findings of this research will occupy a significant role in this area by providing new insights and contribute to the existing body of knowledge of the study area. Currently there is a dearth of research dealing with GSCM constraints in leading FMCG organisations in South Africa. The study contributes to the existing body of knowledge by identifying areas through which the identified GSCM constraints can be remedied. Implementation of the proposed corrective actions could assist other FMCG companies

to overcome their particular GSCM constraints, enabling them to contribute positively to perpetuate the sustainability of the natural environment.

TABLE 2: Identified green supply chain constraints and remedies FMCG A has in place to overcome the constraints

Theme	GSCM constraints identified	Remedies in place by FMCG A to overcome identified constraints
Theme 1: Green procurement constraints	**Category 1:** Lack of knowledge and information sharing • Local of partnering with local suppliers • Poor communication • Information gap among managers **Category 2:** Supplier reluctance to change towards GSCM • Limited visibility • Poor legislation	Adoption of green purchasing/procurement • Alignment of green supply chain objectives with the business objectives • Focus on source reduction to reduce waste
Theme 2: Green manufacturing constraints	**Category 1:** Waste • General waste • Raw material waste • Hazardous substances **Category 2:** Capacity constraints • Energy generation • High initial investment and costs **Category 3:** Pollution	• Promoting green manufacturing • Use green supply chain analysis as a catalyst for innovation • Environmental scorecard • World class manufacturing concepts • Bonuses and Prices • Variable speed drives • Auditing and financial planning

Source: Authors' own construction

As a way forward, it is recommended that research be undertaken to include all role players in the FMCG industry and identify green supply chain constraints facing all role players both upstream and downstream of the supply chain. The data gathered such as that described in this case study can be subjected to more analysis upon which appropriate conclusions can be further vigorously supported.

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