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Examining factors influencing green supply chain management implementation in the cement manufacturing industry in South Africa

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ABSTRACT

Purpose of the study: Green supply chain management (GSCM) has gained worldwide momentum, however, its successful implementation in most manufacturing companies has remained problematic. The cement manufacturer in South Africa is not immune to problems related to GSCM implementation. An understanding of employees' perceptions towards factors affecting GSCM implementation is a profound strategy to ensure a successful GSCM programme. It is not uncommon that most manufacturing firms, including cement producers, ignore the importance of incorporating the views of employees when making GSCM decisions. This study's purpose is twofold, namely

(i) to assess employees' perceptions of factors affecting GSCM implementation and (ii) to investigate how these factors influence the implementation of the GSCM system.
Design/methodology/approach: A descriptive quantitative case study methodology, through a structured questionnaire, was used to collect data from a sample of 306 employees at the cement manufacturer in the City of Tshwane with a total population of 1500 employees. The Statistical Package for Social Sciences (SPSS) 26 was used to conduct multivariate and descriptive analyses including factor analysis, correlations and regression analyses.
Findings: It was found that employees had a negative perception towards all five factors (internal, external, customers, competitors, and suppliers) for GSCM implementation and a positive statistically significant relationship was found existing between four factors (internal, external, customers and suppliers) and implementation of the GSCM system at the cement manufacturer in the City of Tshwane.
Recommendations/value: The study suggests that management must ensure commitment to green supply chain practice, and this is achieved by taking leaders and managers in different functional areas for green supply chain management training.
Managerial implications: This study implies that the cement manufacturer should provide a supportive organisational structure, source skills, invest in technology, involve suppliers and share knowledge in line with GSCM systems.

Keywords

Cement manufacturers; Competitor; Customers; External environment; Green supply chain management; Implementation; Internal environment; Suppliers.

JEL Classification: M10

1. INTRODUCTION AND BACKGROUND TO THE STUDY

In recent times, green supply chain management (GSCM) has gained worldwide momentum, however, its successful implementation in most manufacturing companies has remained problematic. The cement manufacturer in the City of Tshwane is not immune to problems related to GSCM implementation (Dashore & Sohani, 2013; Mahulo, 2015). According to Dhull and Narwal (2016), an understanding of employees' perceptions towards factors affecting GSCM implementation is a useful strategy to ensure a successful GSCM programme. It is not uncommon that most manufacturing firms, including cement producers, ignore the importance of incorporating the views of employees when making GSCM decisions (Jain & Sharma, 2014; Jayant & Azhar, 2014; Tseng, *et al*., 2019). Greer and Theuri (2012) posit that the failure to incorporate employees' opinions results in inefficient and ineffective green supply chain management, thus leading to possible environmental degradation, litigation, brand damage and

rampant cost. It is based on this argument that cement manufacturers should take into consideration employees' views to understand factors affecting GSCM implementation.

Through this, supply chain sustainability goals, such as operational effectiveness and efficiency, can be achieved. Apart from the GSCM implementation problems, as cited in this section, research in green supply chain management is still in its infancy, especially in the African context. Most known studies have been carried out in the Asian (Hajikhani *et al*., 2012; Kamolkittiwong & Phruksaphanrat 2015) and the European regions (Holt & Ghobadian 2009; Koho, *et al.,* 2011), leaving Africa with a paucity of knowledge. Even in the South African context, prior research on green supply chain management has been conducted in a variety of contexts. For example, Reddy and Naude (2019) focused on the role of green supply chain management in achieving a sustainable competitive advantage and exploring the factors that affect green supply chain management initiatives at a leading pharmaceutical manufacturer in Durban. In addition, Mafini and Muposhi (2017) examined the association between green supply chain management (GSCM) practices, environmental collaboration and financial performance of SMEs based in the Gauteng province of South Africa. Furthermore, Pooe and Mhelembe (2014) explored the challenges associated with the greening of supply chains in the South African manganese and phosphate mining industry. Additionally, Mafini and Loury-Okoumba (2018) investigated the relationship between green supply chain management activities, operational performance and supply chain performance in manufacturing SMEs in South Africa. Moreover, using a sample of 303 supply chain professionals working in the food processing industry in Gauteng Province, Nguegan-Nguegan and Mafini (2017) investigated supply chain management problems in the food processing industry and their influence on business performance.

Deducing from the aforementioned studies, it can also be stated that even within the South African context, there are deficiencies in studies that have focused on examining the factors that influence green supply chain implementation in South Africa. Hence, this gap deserves empirical inspection in the case of a neglected context of cement manufacturers in developing countries, South Africa in particular. It will be naive and unwise to believe *a priori* that in developing nations such as South Africa, findings from the developed world can be implemented *pro rata*. This gap is therefore subject to confirmation and deserves to be addressed on its own.

This study, therefore, encourages debate and discourse of green supply chain management in the South African context which has suffered neglect and failed to occupy mainstream GSCM research for a long time (Niemann *et al*., 2016). It is against this background that the objectives of this study are two-fold, namely, to:

- To assess employees' perceptions towards factors affecting the implementation of green supply chain management
- To investigate how factors in the implementation of GSCM influence the implementation of a green supply chain management system.

The article is organised as follows: the next section focuses on the problem statement of the study, then followed by the literature review, conceptual model and the hypotheses formulation. The methodology that guides the study is discussed thereafter and, subsequently, the study results, discussions, implications, recommendations and conclusions are presented.

2. PROBLEM STATEMENT

As previously stated, employees' opinions on factors affecting the implementation of green supply chain management are not considered since major decisions are left to management (Dhull & Narwal, 2016). However, Greer and Theuri (2012) state that the failure to incorporate employees' opinions results in inefficient and ineffective green supply chain management, thus leading to possible environmental degradation, litigation, brand damage and rampant cost. Evidence shows that literature on GSCM is relatively scant in the African context as dominance is claimed by Asia (Kamolkittiwong & Phruksaphanrat, 2015) and Europe (Koho *et al*., 2011). This study seeks to address this gap within the broader supply chain management literature. The study research question is, therefore propounded as follows:

To what extent do employees' perceptions of factors affecting green supply chain management's implementation influence the implementation of green supply chain management within the cement manufacturer in the City of Tshwane?

3. LITERATURE REVIEW

After a search on scholarly online databases and search engines, the literature was reviewed around this study's variables. This section looks at the literature about supply chain management, the supply chain process, theories of supply chain management and the factors affecting green supply chain implementation.

3.1 Definition of supply chain management

Dhull and Narwal (2016) defined supply chain management as integrating manufacturing activities starting from raw materials to the final products and distribution to customers. Dube and Gawande (2011) and Dhull and Narwal (2016) point out that the supply chain is co-ordinated by a network of different channel partners and activities. In their definition, Dube and Gawande (2011) advance that channel network participants include suppliers, manufacturing centres, warehouses, transportation, distribution centres, retail outlets, raw materials, work in progress inventory and finished products. The supply chain is illustrated through a process as shown in the next sub-section.

3.2 The supply chain process

The previous section presented the definition of supply chain management. This sub-section aims to explain the supply chain process through a four-stage and ten-step process, as advised by Kruger and Ramphal (2010). As it relates to the context of a cement manufacturer, the phases and steps involved in the supply chain process are illustrated in Table 1.

Table 1: Supply chain process for cement manufacturers

Phases and steps in the supply chain process	
Phase (Demand management)	**Step 1:** The first step in phase one is characterised by the determination of the cement manufacturer's needs. This is carried out through the development of the specifications of the physical, and performance characteristics of the required goods and services (Worthington, *et al*., 2008).
	Step 2: The identification of potential sources of supply occurs during this step. This step is also known as market search. It involves a broad look into the market in search of possible suppliers (Vachon & Klassen, 2006).

	Step 3: After potential suppliers have been identified, step three involves the qualification of potential suppliers as well as the verification of their goods and services. Kruger and Ramphal (2010) allude that this step aims at getting the best supplier of the required goods and services. Following this, the right criteria for supplier qualification should be utilised.
	Step 4: This step involves developing the request for the supplier's proposal and the quotation. Worthington *et al*., (2008) state that the firm should also move to bid solicitation at step number four.
Phase 2: Selection and contracting	**Step 5:** Selection and contracting begins with bid evaluation and supplier selection. According to Kruger and Ramphal (2010), supply chain authorities should assess the proposals submitted by the different suppliers and choose the best one based on cost and quality provision.
	Step 6: This step involves the negotiation of contractual terms and conditions with the selected suppliers. Kruger and Ramphal (2010) state that the firm should agree to the terms that will best govern their deal.
Phase 3: Post contract and relationship management	**Step 7:** This step can be referred to as soft management tasks. It involves monitoring supplier performance and the management of ongoing supplier relationships.
Phase 4: Post contract and operational delivery	**Step 8:** This step is referred to as the hard management tasks. It involves the establishment of SCM strategies, control systems and performance measurement systems (Kruger & Ramphal, 2010).
	Step 9: At this step, the management of the inventory of the purchased parts, material and supplies commences. The activities carried out at this step are meant to ensure the efficient and effective management of material.
	Step 10: This step involves recycling or disposing of unused material and obsolete finished products, thus also called reverse logistics.

Source: Adapted from Kruger and Ramphal (2010), Worthington *et al*. (2008) and Vachon and Klassen (2006).

4. THEORIES OF SUPPLY CHAIN MANAGEMENT

This study explores the principles of the organisational buying behaviour and decision-making theory, economics of contracting agency theory and transaction cost theory, and the empowerment theory, network and inter-organisational relationships theories, and integrated supply chain theory as they relate to the constructs and the relationships proposed between the constructs. These theories are discussed in the following sections.

4.1 The organisational buying behaviour and decision-making theory

The organisational buying behaviour and decision-making theory is based on the premise that an organisation portrays a behavioural characteristic during the beginning of the supply chain process (Agan *et al*., 2013). This behaviour involves green-related decisions that are made by supply chain authorities (Agan *et al*., 2013). According to Kruger and Ramphal (2010), supply chain authorities make a wide array of decisions, including the choice of products or services to use as inputs in the transformation process and the identification and selection of potential suppliers. Phase 1 and steps 1 to 4 of the supply chain process are grounded in the organisational buying behaviour and decision-making theory (An *et al.*, 2008).

4.2 Economics of contracting agency theory and transaction cost theory

The economics of contracting and transaction cost theory explains matters concerning bid evaluation and supplier selection (Kruger & Rampal, 2010). This theory also involves the negotiation of the contract (Bhool & Narwal, 2013). Agan *et al.,* (2013) postulate that negotiation and supplier selection must be carried out to fulfil the GSCM agenda. The economics of contracting agency theory and transaction cost theory addresses phase 2 and step 5 and 6 specifically. However, it is also valuable for addressing aspects related to step 7 (Kruger & Rampal, 2010).

4.3 Network and inter-organisational relationships theories

The network and inter-organisational relationships theories include the social exchange theory and the relationship dependency theory (Seuring & Muller, 2008). These theories are crucial in ensuring that productive relationships are maintained with channel partners (Kruger & Rampal, 2010). Nieman *et al.,* (2016) and Seuring and Muller (2008) state that collaborative organisational actions can reduce unnecessary waste and improve supply chain efficiencies. The network and inter-organisational relationships theories are relevant to phase 3, including step 7, however, it also addresses step 6 and 8 in the supply chain process (Kruger & Rampal, 2010).

4.4 Integrated supply chain theory

The integrated supply chain theory studies the establishment of supply chain strategies, control systems and performance measurement (Kruger & Rampal, 2010). According to Rehman and

Shrivastava (2011), the integrated supply chain theory caters for the overall operational delivery process. This theory is essential in addressing phase 4, steps 8 – 10 but is also concerned with step 7 (Rehman & Shrivastava, 2011).

5. GREEN SUPPLY CHAIN MANAGEMENT

The definition of supply chain management and its process are provided in the previous section to create a foundation from which green supply chain management can be defined. Niemann *et al.,* (2016) and Bhatia and Gangwani (2021) alluded that green supply chain management is the process of using environmentally friendly supply chain inputs and transforming these inputs into outputs that can be reclaimed and reused at the end of their cycles. Balaji *et al.,* (2014) define green sustainable supply chain as using environmentally friendly inputs and transforming these inputs through change agents whose byproducts can improve or be recycled within the existing environment. The definition of green supply chain management brings about sustainability and the protection of the environment (Walker *et al*., 2008; Jemai *et al*., 2020). Although not exhaustive, the implementation of green processes is clouded by many challenging factors and these fall within the ambit of discourse in this study. The following section presents factors affecting green supply chain implementation.

6. FACTORS AFFECTING GREEN SUPPLY CHAIN IMPLEMENTATION

In this study, factors affecting GSCM implementation form part of the major constructs for discussion. According to Dhull and Narwal (2016) and Luthra *et al*., (2011), GSCM implementation factors include the internal environment, external environment, customers, competition and suppliers. These factors are further discussed in the sub-sections that follow.

6.1 Internal environment

Amongst other factors, the internal environment is comprised of obstructive factors that could undermine the implementation of GSCM (Bhateja*, et al*., 2012). In the context of the cement manufacturers, such factors can include lack of management commitment and inadequate training provided to employees on GSCM (Bhateja *et al*., 2012; Luthra *et al.,* 2014). Furthermore,

according to Dashore and Sohani (2013) and Badi and Murtagh (2019), the internal environment might include inappropriate organisational structures and reluctance to understand the GSCM concept.

6.2 External environment

External environment refers to the hindering factors outside the organisation, such as poor government regulations (Kwiewnawongsa *et al.*, 2013; Tseng *et al*., 2019). Koho *et al*. (2011) and Lettice *et al*. (2010) state that the external environment includes government policies and regulations towards green supply chain management. Also, Luthra *et al.,* (2011) state that a negative external environment is attributed to the shortage of skilled human resources in the society. In South Africa, the Higher Education industry reacted slowly in terms of introducing supply chain management qualifications in the curriculum (Lettice *et al.,* 2010). Koho *et al.* (2011) reiterate that the shortage of technological infrastructure towards green supply chain management is a cause for concern. Thus, the unavailability of technology makes it challenging to detect GSCM weaknesses in the system.

6.3 Customers

Customers are also considered a factor that can lead to obstruction in implementing GSCM practices (Dhull & Narwal, 2016). Customers' reluctance to the demand for green products manifests in manufacturers disinclination to green-driven production processes (Lettice *et al.,* 2010). Holt and Ghobadian (2009) postulate that customers' ignorance on the importance of green products contributes to manufacturers' trepidation in making GSCM products. Zhang and Liu (2009) allude that customers' lack of awareness for green products' benefits creates a barrier in the implementation of green products.

6.4 Competition

The existence of high market uncertainties, attributed to competition in the international market, makes it difficult for manufacturers to keep the production cost down (Shi *et al.,* 2008). Seuring and Muller (2008) argue that market pressure attributed to excessive competition creates hiccups in the implementation of GSCM. Excessive rivalry in the market prevents manufacturers from sharing critical information that transforms the industry into GSCM friendly industry (Walker *et al.,*

2008; Dhull & Narwal, 2016). Shi *et al.* (2008) posit that GSCM transformation in the industry is delayed due to the absence of the green agenda among manufacturers.

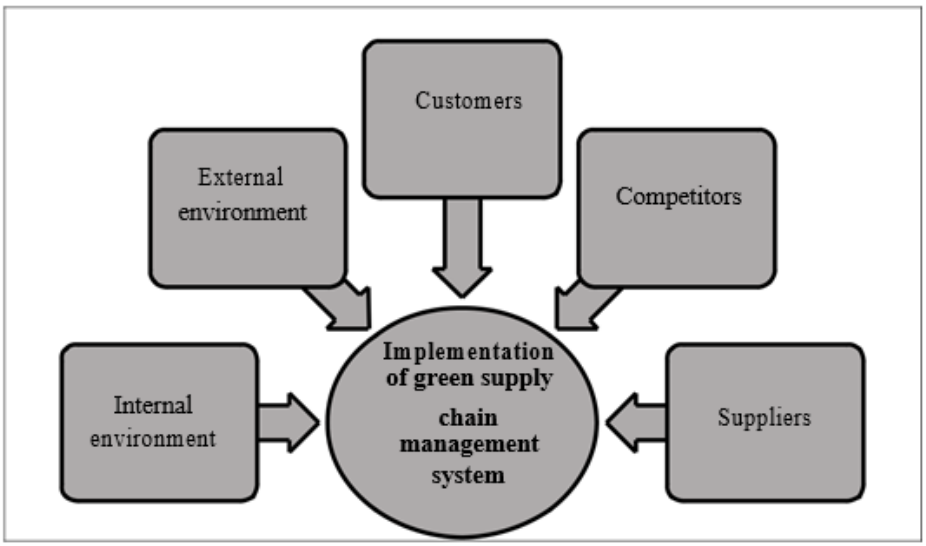
6.5 Suppliers

The lack of understanding and knowledge of the green revolution among suppliers creates a barrier to implementing GSCM practices (Chien & Shih, 2007). According to Routry (2009), suppliers' commitment in the GSCM agenda play a critical role in ensuring the green cause's fast adoption. Hosseini (2007) adds that there is a lack of understanding of the importance of a green supply chain among supply chain management stakeholders and supplier unwillingness to change towards green supply chain management.

7. THE CONCEPTUAL MODEL AND HYPOTHESIS FORMULATION

The conceptual model, given in Figure 1, is grounded in the supply chain theories. Theories of the supply chain, as indicated in section 3.3, include (i) the organisational buying behaviour and organisational decision-making theory, (ii) the economics of contracting agency and transaction cost theory, (iii) the networks and inter-organisational relationships theory and (iv) the integrated supply chain systems theory (Kruger & Ramphal, 2010). The factors that affect the implementation of GSCM are also found within the supply chain process, which is grounded in different supply chain theories. The conceptual theoretical model illustrates the relationship between factors affecting GSCM implementation (internal environment, external environment, customers' issues, competitor issues and supplier issues) and the actual implementation of GSCM. Thus, GSCM implementation represents the dependent construct and factors for GSCM implementation represent the independent constructs.

Figure 1: Conceptual model



Source: Researchers' own compilation

7.1 The internal environment and implementing a green supply chain system.

The empirical evidence (Ahi & Searcy, 2013; Dhull & Narwal, 2016) shows that organisational internal factors are significant barriers to green supply chain management implementation. However, to date, no study has been carried out to understand the significance of the internal factors on green supply chain implementation in the cement manufacturers within the City of Tshwane region. This highlights the importance of conducting this study to determine how crucial the internal factors are towards implementing a green supply chain management system within the cement industry. It is therefore hypothesised that:

H1: There is a statistically significant positive relationship between the internal environment and implementing a green supply chain system.

7.2 The external environment and the implementation of a green supply chain system

Studies carried out by Chin *et al.* (2015) and Dashore and Sohani (2013) found that external factors, such as lack of technological infrastructure, technological innovations, skilled human

resources and poor supplier commitment are barriers for green supply chain implementation. On the contrary, Jain and Sharma (2014) argue that external factors that result in creating barriers for green supply chain implementation are the unwillingness of the market players to exchange green-related information and lack of government support. Due to the lack of consensus in these studies, it became imperative to carry out this study to determine the relationship between external factors and the implementation of GSCM in the cement manufacturer's context in the City of Tshwane. It is hypothesised that:

H2: There is a statistically significant positive relationship between the external environment and the implementation of a green supply chain system.

7.3 Customer issues and the implementation of a green supply chain system

In their study, Jayant and Azhar (2014) found that customers are a critical factor in the implementation of GSCM. Kamolkittiwong and Phruksaphantrat (2015) also found that customers' lack of awareness on the importance of green products and environmental protection translates into a barrier in the implementation of GSCM. In further support of these findings, Kwiewnawongsa and Schmidt (2013) posit that customers' pressure for lower prices results in the disruption of green supply chain management operations. This current study in the African context sought to understand how customers influence the implementation of GSCM. It is, therefore, hypothesised that:

H3: There is a statistically significant positive relationship between customer issues and the implementation of a green supply chain system.

7.4 Competitor issues and implementing a green supply chain system

Hajikhani *et al.* (2012) and Liu *et al*. (2013) found that competition can create barriers for the green supply chain management. Also, Muduli and Barve (2013) and Singh *et al.* (2012) also found that competitive pressure, leading to a decrease in the price of products, resulted in the distraction of green supply chain implementation. While these studies produced insightful findings, it is essential to realise that they were carried out in Asia, for example, the study of Singh *et al.* (2012) was conducted in China, which has different conditions to those in South Africa. It is therefore hypothesised that:

H4: There is a statistically significant positive relationship between competitor issues and implementing a green supply chain system.

7.5 Supplier issues and the implementation of a green supply chain system

Studies carried out by Balasubramanian (2012) found that supplier' factors including poor commitment, lack of knowledge and inadequate experience result in green supply chain barriers. Balasubramanian's (2012) findings were supported by Al Khidir and Zailani (2009) who found that suppliers can result in green supply chain implementation barriers. It is important to note that these studies were carried out in the construction industry. In contrast, this study focuses on implementing a green supply chain management system within the cement industry. In the context of this study, it is hypothesised that:

H5: *There is a statistically significant positive relationship between supplier issues and the implementation of a green supply chain system.*

8. RESEARCH METHODOLOGY

Through a positivism research paradigm, this study used a quantitative descriptive case study design. Data was collected using a self-completion questionnaire that was developed for the cement manufacturing plant in the City of Tshwane. The cement manufacturer was considered due to its active participation within the green movement. From a total population of approximately 1 500 employees at the operational level, a convenient sample of 306 operational employees, who were directly involved in the cement manufacturer's supply chain process, participated in the study. Raosoft was used to determine the minimum sample size to maintain a 5 percent margin of error and a 95 percent confidence interval (Raosoft, 2014). The convenience sampling method implemented was deemed not to compromise the quality of research because the sample was comprised of homogenous elements of employees working within the supply chain processes at one cement manufacturer (Calder *et al.,* 1981). The unit of analysis in this study included GSCM factors such as internal environment, external environment, customers, competition, suppliers and the actual implementation of GSCM. SPSS version 26 was used to conduct descriptive and multivariate analyses including mean, standard deviation, correlations, and regression analyses.

The validity and reliability tests were conducted using Cronbach's alpha and factor analysis, respectively (Evanschitzky *et al.*, 2007). The next section presents the results of the study.

9. RESULTS

9.1 Employees' perceptions of factors affecting green supply chain implementation

Table 2 presents results relating to employees' perceptions towards factors affecting GSCM on each of the 25 items, each of the five constructs, and overall green supply chain management implementation. A five-point Likert scale with 1 = 'strongly agree' and 5 = 'strongly disagree' was used to measure each item relating to employees' perceptions towards factors affecting the implementation of green supply chain management. Perceptions of each of the five constructs were calculated as a summated average of the items used under each dimension. Overall implementation of GSCM was calculated as a summated average of all the items used under the construct. It is important to note that in this study, a scale of 1.0 to 2.40 indicated a positive employee perception, while 2.59 to 5.0 indicated a negative employee perception; therefore, the higher the score, the poorer the performance.

Table 2: Perceived factors affecting GSCM implementation on all respondents – descriptive (n = 306).

	Constructs and items	Mean	Standard deviation
	Internal environment	2.65	1.18
IB1	There is management commitment towards green supply chain Management	2.62	1.18
IB2	There is training towards green supply chain management	2.66	1.18
IB3	There is understanding towards green supply chain Management	2.75	1.11
IB4	There is an appropriate organisational structure towards green supply chain management	2.85	1.14
IB5	There is no organisational reluctance towards green supply chain management	2.38	1.32
	External environment	2.60	1.20
EB1	There are government policies and regulations towards green	2.16	1.17

	supply chain management		
EB2	There are skilled human resources towards green supply chain Management	2.68	1.14
EB3	There is technological infrastructure towards green supply chain management	2.67	1.22
EB4	There is supplier commitment towards green supply chain Management	2.86	1.29
	Customer issues	2.61	1.15
CUB1	There is customer demand for superior products	2.87	1.24
CUB2	There is customer demand for green products	2.92	1.18
CUB3	There is customer awareness of the benefits of green products	2.11	1.07
CUB4	There is customer awareness of green products	2.55	1.12
	Competition issues	2.60	1.29
CB1	There are no high levels of competition that result in lower prices and lower consideration for green products.	2.21	1.23
CB2	There is a willingness to trade green-related information in the Market	2.72	1.19
CB3	There is a high rate of green adaptation in the market	2.63	1.37
CB4	There is a competition of green products	2.73	1.38
	Supplier issues	2.60	1.04
SB1	There is a supplier commitment to change towards green supply chain management	3.02	1.22
SB2	There are knowledge and experience of green supply chain management among suppliers	2.78	1.15
SB3	There is an understanding of the importance of green supply chain among supply chain stakeholders	2.07	0.87
SB4	There is supplier willingness to change towards green supply chain management	2.45	0.95
	Green supply chain management implementation	2.90	1.26
GS1	Implementation of the green supply chain is very fast	2.91	1.16
GS2	Implementation of the green supply chain is having an internal Support	2.64	1.14
GS3	Implementation of the green supply chain is having external Support	3.32	1.35
GS4	Generally, there is good green supply chain management	2.88	1.41

Source: Calculated from survey results

At the sub-constructs level, Table 2 shows that five of the sub-constructs, representing factors affecting GSCM implementation (internal environment (IB), the external environment (EB), customer issues (CUB), competition issues (CB) and supplier issues (SB), carried a negative customer perception. This was deduced from mean values IB (2.65), EB (2.6), CUB (2.61), CB (2.60) and SB (2.60) that were carrying a mean value above 2.5. However, external factors (E) had a mean value at 3.03, which was above 2.59. Hence, the organisation's internal factors, external factors, customer issues, competition issues and supplier issues were negatively perceived by the employees working at the cement manufacturer in the City of Tshwane. These results contrast with the findings of Muduli and Barve (2013) and Singh *et al.*'s (2012) studies that found a positive employee perception towards internal and external factors. Differences in this current study and those of Muduli and Barve (2013) and Singh *et al.* (2012) might be attributed by the differences in the studies' environment. From the 21 items tested, 14 carried a negative perception from employees. These items were IB1 (there is management commitment towards green supply chain management) with a (2.62) mean value, IB2 (there is training towards green supply chain management) with mean value (2.66), IB3 (there is understanding towards green supply chain management) with mean value (2.75), IB4 (there is an appropriate organisational structure towards green supply chain management) with mean value (2.85), EB2 (there are skilled human resources towards green supply chain management) with mean value (2.68), EB3 (there is technological infrastructure towards green supply chain management) with mean value (2.67), EB4 (there is supplier commitment towards green supply chain management) with (2.86) mean value, CUB1 (there is customer demand for superior products) with a mean value (2.87), CUB2 (there is customer demand for green products) with mean value (2.92), CB2 (there is willingness to trade green related information in the market) with mean value (2.72), CB3 (there is a high rate of green adaptation in the market) with a mean value (2.63), CB4 (there is competition of green products) with mean value (2.73), SB1 (there is suppliers commitment to change towards green supply chain management) with mean value (3.02) and SB2 (there is knowledge and experience of green supply chain management among suppliers) with mean value (2.78). The next section presents reliability and validity results.

9.2 Results on validity and reliability analysis

The assessment of the measuring instrument's validity was achieved using exploratory factor analysis using SPSS version 26. The 25 items of factors affecting the implementation of GSCM were factor analysed to test for construct validity. Four items related to competitor issues were discarded for further inferential analysis, as they could not adhere to the minimum threshold of 0.40 (Field, 2009). The remaining 21 items had a threshold higher than 0.40, demonstrating significant evidence regarding the correlation between the factors. The results of the analysis are shown in Table 3.

Table 3: Results of validity and reliability analysis on items and constructs for GSCM implementation

	Constructs					
	1	2	3	4	5	6
Items						
IB1	.61					
IB2	.72					
IB3	.82					
IB4	.70					
IB5	.65					
EB1		.55				
EB2		.66				
EB3		.64				
EB4		.66				
CUB1			.55			
CUB2			.53			
CUB3			.72			
CUB4			.53			
CB1				.15		
CB2				.13		
CB3				.05		
CB4				.03		
SB1					.48	
SB2					.43	
SB3					.44	
SB4					.48	
GS1						.77
GS2						.80

GS3						.76
GS4						.77
A	.83	.79	.79	-	.72	.91

Source: Calculated from survey results

Having established the validity of the instrument, the competitor factor was omitted from further analysis and it was important to assess the reliability of each of the five remaining sub-constructs. Reliability tests were measured using the Cronbach's alpha coefficient. Following standard practice, the minimum threshold of 0.7, as recommended by Field (2009), was used. In all five sub-constructs, the Cronbach's alpha met the minimum required threshold. After having established both the construct validity and reliability of the questionnaire, it was concluded that the items used to measure factors that affect implementation and GSCM implementation were indeed reliable, except for CB1, CB2, CB3 and CB4, that could not meet the minimum required threshold. The next section presents the results of the correlation analysis.

9.3 Correlation analysis

The underlying assumptions of conducting correlation and regression analysis were well met in this study except for one sub-construct "competitor issues" with items that could not meet a 0.4 minimum threshold for factor analysis. Correlation analysis was used to measure the strength of relationships among study constructs. Table 4 presents a summary of the results of the correlation analyses. Correlation is tested through a Pearson coefficient (r-value) and probability value (p-value). Thus, the r-value represents the strength and direction of a relationship between constructs, where (+ 1) indicates a perfect positive relationship, (0) no relationship and (-1) indicates a perfect negative relationship. The p-value is the probability that the obtained r-value, is only seen by chance, and it is used to test the statistical significance of the relationship between two constructs. Correlations results are presented in Table 4.

Table 4: Correlation analysis

	Constructs	1	2	3	4	5
1	Internal issues	1				
2	External issues	.69*	1			
3	Customers issues	.58 *	.45 *	1		
4	Supplier issues	.23 *	.12 ***	.59 *		
5	Green supply chain Management Implementation	.73 *	.64 *	.45 *	.28 **	1
	*p < .05**p < .003 ***p > .05					

Source: Calculated from survey results

Correlation results indicate that there is an existing moderate positive statistically significant relationship among the five constructs tested (Internal environment, external environment, customer issues, supplier issues and GSCM implementation) in this study. The next section presents correlation results.

9.4. Regression analysis and hypotheses testing

This section presents the results on the regression analysis and hypotheses testing. Regression analysis was undertaken using the standard error of the coefficient of determination (SEB), standardised beta coefficient (β) which is equivalent to (r-value), and coefficient of determination as used to measure the explanatory power of predictor constructs (R^2). The higher the value of R2, the greater the explanatory power of the predictor variable. The significance level and t-statistics are also shown. The β is used to measure the relationship between independent constructs and dependent constructs in the study. Regression results are indicated in Table 5 as follows.

Table 5: Regression analysis: Dependent construct: Implementation of green supply chain management

	B	SEB	β	T	Sig	R^2	Hypothesis
(Constant)	2.19	.87		2.53			
Perceived internal Environment	.72	.06	0.73	11.66	0.000*	0.54	Accept H1
(Constant)	3.88	.94		4.15			
Perceived external Environment	.76	.08	0.64	8.93	0.000*	0.40	Accept H2
(Constant)	5.81	.67		5.12			
Perceived customer related issues	.57	.10	0.45	5.52	0.000*	0.21	Accept H3
(Constant)	7.51	1.38		5.42			Accept H5
Perceived supply related issues	.41	.13	0.28	3.19	0.002**	0.08	

*p < 0.00

Source: Calculated from survey results

Based on the findings (Table 5), the hypotheses were tested as follows:

Based on regression results ($p < 0.001$, $r = 0.73$, $\beta = 0.73$), hypothesis H1 which states that there is a statistically significant positive relationship between the internal environment and implementation of green supply chain management, can be accepted at $p < 0.001$ significant level. From this finding, it can be noted that the organisation's internal environment is related to the successful implementation of a green supply chain management system. This finding is consistent with Dhull and Narwal (2016) and Ahi and Searcy's (2013) studies, which confirms that organisational internal factors are critical in determining the implementation of a successful green supply chain management.

Based on results ($p < 0.001$, $r = 0.64$, $\beta = 0.64$), hypothesis H2 stating that there is a statistically significant positive relationship between the external environment and the implementation of a green supply chain system, can be accepted at $p < 0.001$ significant level. Hence, it can be confirmed that the external environment has an influence on the implementation of a successful GSCM. This is in line with Chin *et al.,* (2015) and Dashore and Sohani (2013:117) who found

external factors, such as technological infrastructure, technological innovations and availability of skilled human resources to be critical towards an implementation of a successful GSCM.

Based on the results ($p < 0.001$, $r = 0.45$, $\beta = 0.45$), hypothesis H3 states that there is a statistically significant positive relationship between customer issues and the implementation of a green supply chain system accepted at $p < 0.001$ significant level**.** Results indicate that customers have a significant influence on the implementation of a successful GSCM. This is consistent with Kamolkittiwong and Phruksaphantrat's (2015) denotation that attributes related to customer related issues are related to the implementation of a green supply chain management.

Hypothesis H4 could not be tested further because items for the sub-construct (competitor issues) were omitted after it failed to reach the minimum required threshold (0.4) of the validity test. Based on the results ($p < 0.003$, $r = 0.28$, $\beta = 0.28$), hypothesis H5 stating a statistically significant positive relationship between suppliers and the implementation of a green supply chain system is accepted at $p < 0.003$ significant level. There is a correlation between supplier related matters and the successful implementation of the green supply chain. This confirms Balasubramanian's (2012:15) results that found that aspects related to suppliers are important in determining the success of green supply chain implementation.

10. CONCLUSIONS ON OBJECTIVES AND RESEARCH QUESTION

Objective (i) sought to assess employees' perceptions of factors affecting the implementation of green supply chain management at a cement manufacturer in the City of Tshwane. It is concluded that employees had negative perceptions of all factors affecting GSCM implementation. Thus, factors affecting the implementation of GSCM were regarded as barriers for implementation due to their mean that was above (2.59) as follows: Internal environment (IB) with (2.65), the external environment (EB) with (2.6), customer issues (CUB) with (2.61), competition issues (CB) with (2.60) and supplier issues (SB) with (2.60). Employees also had negative perceptions on IB1 (there is management commitment towards green supply chain management), IB2 (there is training towards green supply chain management), IB3 (there is understanding towards green supply chain management), IB4 (there is an appropriate organisational structure towards green supply chain management), EB2 (there are skilled human resources towards green supply chain management) and EB3 (there is technological infrastructure towards green supply chain

management) with mean value (2.67), EB4 (there is supplier commitment towards green supply chain management), CUB1 (there is customers' demand for superior products), CUB2 (there is customer demand for green products), CB2 (there is willingness to trade green-related information in the market), CB3 (there is a high rate of green adaptation in the market), CB4 (there is competition of green products), SB1 (there is suppliers commitment to change towards green supply chain management) and SB2 (there is knowledge and experience of green supply chain management among suppliers).

On objective 2 which sought to investigate how factors in the implementation of GSCM influence a green supply chain management, it can be concluded that there is a positive relationship between factors for green supply chain implementation and green supply chain management success. The results show that all sub-constructs representing factors for green supply chain management (internal environment ($p < 0.001$, $r = 0.73$, $\beta = 0.73$), external environment ($p < 0.001$, $r = 0.64$, $\beta = 0.64$), customer issues ($p < 0.001$, $r = 0.45$, $\beta = 0.45$) and supplier issues ($p < 0.001$, $r = 0.28$, $\beta = 0.28$) are positively related to green supply chain management. At this point, the research question formulated as: *"To what extent do employees' perceptions of factors affecting the implementation of green supply chain management influence the implementation of green supply chain management within the cement manufacturer in the City of Tshwane?"* can be answered. It is concluded that internal environment, external environment, customer issues and supplier issues influence GSCM implementation at varying levels. This is obtained from the explanatory power of each construct. Internal related issues ($R^2 = 0.54$) were found to have a higher influence on GSCM. It was followed by the external environment ($R^2 = 0.40$), customer related issues ($R^2 = 0.21$) and supplier issues ($R^2 = 0.08$), respectively. The next section presents implications for practice.

11. IMPLICATIONS FOR PRACTICE

Results indicate that employees had negative perceptions on all the factors (internal environment, external environment, customers issues, competitor issues and supplier issues) influencing GSCM implementation. The cement manufacturer needs to ensure that these factors are favourable towards the implementation of GSCM. Based on the results, implications for practice are as follows:

11.1 Management and employees with green supply chain management training

Management must ensure commitment to green supply chain practice. This is achieved by taking leaders and managers in different functional areas for green supply chain management training. Without knowledge of the importance of the green supply chain, managers are not equipped enough to spearhead progress in implementing the GSCM system, hence, the significance of providing training to managers. Employees should also be provided with training on GSCM related matters. Training assists in reducing resistance to change in the workforce.

11.2 Create an organisational structure that promotes green supply chain management implementation

The organisational structure should be supportive of the implementation of GSCM. The structure needs to have positions that are assigned to the promotion of green supply chain management. Hence, a separate functional area must be established and mandated to enforce green supply chain management practices. There should be a policy document to direct the activities of this department towards the implementation of GSCM.

11.3 Source enough skills for the implementation of green supply chain management

The organisation needs to source the right skills to place in the cement manufacturer's value chain process. It can be argued that the organisation lacks appropriate skills towards the implementation of the GSCM. An environmentalist is needed in the implementation of GSCM at the cement manufacturer.

11.4 Invest in more technology within the green supply chain processes

The implementation of a green supply chain at the cement manufacturer is undermined by the inferior technology that was utilised. It is therefore important for management to introduce more technology in the operational processes. However, the introduction of technology requires management to establish the current position of the organisation and determine what is required

in order to move in the direction of GSCM. Thus, a research and development department is needed to source technological solutions for the organisation.

11.5 Involve suppliers in the commitment of green supply chain management

It was found that suppliers are not committed to the green supply chain initiatives of the organisation. Therefore, it is important that the cement manufacturer establish its network of suppliers and remain committed while providing GSCM support. Involving suppliers in the procurement process at an early stage, is also an important measure to implement.

11.6 Initiate knowledge sharing among companies within the industry

The organisation must initiate knowledge sharing among its industry peers through workshops. The establishment of green processes should be viewed as an opportunity for every player in the cement industry to contribute to long-term cost reduction. Knowledge sharing also creates an opportunity for the organisation to compete on a global scale.

The next section presents the limitations of the study.

12. LIMITATIONS OF THE STUDY

The study population was limited to only employees of one cement manufacturer. Therefore, it is apparent that the findings in this study cannot be generalised to the entire cement industry in South Africa or the world. It should also be noted that data collection was conducted over a short period of time. Data collection was done within a month, consequently this study followed a cross-sectional study approach. Hence, a possible change in employee perception, that could take place in an extended study period, could not be measured. This study made use of quantitative research procedures. The use of a quantitative research method does not provide respondents with an opportunity to respond in their own words. This study concentrated on five factors affecting (internal environment, external environment, customer issues, supplier issues and competitor issues) the implementation of GSCM. Many other factors were omitted in the conceptual framework, for example, the level of technology.

13. DIRECTION FOR FUTURE RESEARCH

Future research can replicate this study by collecting data from more cement manufacturers and employees in different towns and provinces. A further study can also be carried out by other manufacturing firms that are not cement related. Alternatively, a study that compares non-cement manufacturers and cement manufacturers, is desirable. It would be notable for future research to be carried out over an extended duration, for example, six months or longer, emulating a longitudinal study approach. This will help note possible trends within cement manufacturer employees' perceptions over a longer period than that utilised in this study. Future studies can be carried out making use of qualitative research methods to provide respondents with an opportunity to respond in their own words. Other factors might be essential to consider as factors affecting GSCM implementation in future studies.

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