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THE INFLUENCE OF GREEN PROCUREMENT ON CUSTOMER RELATIONSHIP MANAGEMENT, INFORMATION QUALITY AND REVERSE SUPPLY CHAIN AMONG MANUFACTURING SMES IN GAUTENG PROVINCE

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—Abstract —
The ultimate reason for the need and importance of green procurement is to establish and develop an environmental management system for both environmental benefits and profit maximisation. Green procurement is about reducing waste and finding strategic means of being more efficient to reduce costs. This process of becoming more efficient can impact positively on an organisation's customer relationship management, improve information quality and possibly reduce the rate of product returns. This is possible because, as the need for environmental sustainability increases, organisations that implement sustainable solutions are becoming more competitive and stand a better chance of higher levels of business growth. The research gap is that more organisations are going green in order to enhance their relationship with customers and their corporate reputation. In other words, as competition among organisations becomes more strategic, manufacturing SMEs that refuse to integrate a sustainable green procurement strategy or practice into their business operation might suffer, as customers would only buy from organisations that offer sustainable options. Because sustainable procurement involves collaborative relationships among all parties within a supply chain, developmental tools and techniques have been put in place and, as such, organisations are able to effectively manage and optimise customer relationship management, influence information quality to customers and enhance their reverse supply chain strategy. Green procurement strategies enable organisations to look out for materials, parts, products and production equipment based on price, environmental impact, quality as well as forward and reverse delivery solutions. The purpose of this study, therefore, is to determine the influence of green procurement on customer relationship management, information quality and

reverse supply chain among manufacturing SMEs in Gauteng province. The reliability and validity of the measuring instrument will be tested using the measurement model assessment. This will be achieved through confirmatory factor analysis (CFA). SEM will be used to test the model fit and hypotheses by using Statistical Package for the Social Sciences (SPSS) software and Analysis of Moment Structures (AMOS) version 24.0 to assess the measurement and the structural models. Finally, managerial implications of the findings are discussed and limitations and future research directions are indicated.

Keywords: c*ustomer management, information quality, reverse supply chain, green procurement, social exchange theory.*

JEL Classification: M15

1. INTRODUCTION

Green procurement is buzz word used by manufacturing organisations in affecting their end-to-end supply chain (Mosgaard 2015). Supply chain as the survival of many organisations is defined as "a set of inter-and intra-firm processes, which procure, produce and deliver goods and services to customers" (De Villiers, Nieman & Niemann 2017:7). However, whatever is left of the goods delivered to customers may become harmful if not recycled or reused (Appolloni, Sun, Jia & Li 2014; Mosgaard 2015). Green procurement, therefore, emerges as a result of both government and organisations finding strategic means of ensuring that supply chain management activities efficiently facilitate product recycling, re-use as well as resource reduction instead of discarding it (Appolloni *et al* 2014; Ahsan & Rahman 2017). To ensure the implementation of green practices into procurement procedures, various organisations in South Africa have been forced to adhere to regulations such as the national environmental management: biodiversity act; national environmental management: air quality acts; and national environmental management: integrated coastal management, while still being expected to remain competitive (Government Gazette 2017).

Green procurement is a game-changer into the new way organisations' are thinking about their procurement options (Bohari, Skitmore, Xia & Teo 2017; Kaur & Singh 2017). These options may include organisations incorporating social health and environmental concerns into supply chain practices and processes in order to reduce air and indoor environmental pollution and reduce greenhouse gas emissions and energy consumption (Rebelo, Santos & Silva 2016; Shen, Zhang & Zhang 2017). According to Ho, Dickinson and Chan (2010:24), "green procurement involves the

purchase of any product or service that results in a lesser environmental impact while performing a similar function (to comparable products or services) and while demonstrating social responsibility and ethics, at its comparable price to enhance competitive performance". For this study, green procurement is defined as the approach by which manufacturing SMEs "integrate environmental criteria into all stages of their procurement process thus encouraging the spread of environmental technologies and the development of environmentally sound products, by seeking and choosing outcomes and solutions that have the least possible impact on the environment throughout their whole life cycle" (Bouwer, de Jong, Jonk, Berman, Bersani, Lusser, Nissinen, Parikka & Szuppinger 2005:19). As a strategic source of firm performance, green procurement may also present risk in reducing organisational performance (Shen, Zhang & Long 2017; Giannakis & Papadopoulos 2017). This may be because, as competition among organisations becomes strategic and leaving customers with so many choices to choose from, manufacturing SMEs that refuse to integrate a sustainable green procurement strategy or practices into their business operation might suffer, as customers would only buy from organisations that offer green and sustainable options (Pacheco-Blanco & Bastante-Ceca 2016).

2. THEORETICAL REVIEW, HYPOTHESIS AND RESEARCH FRAMEWORK

2.1 Social Exchange Theory (SET)

The vital premise of SET is that parties involved in exchanges willingly provide benefits, beseeching obligation from the other party to reciprocate and provide some benefit in return (Yoon & Lawler 2005). The reciprocated benefits can be in the form of economic rewards or social benefits (Yoon & Suh, 2003). Social exchange is defined as "voluntary actions of individuals that are motivated by the returns they are expected to bring and typically do in fact bring from others" (Blau 1964:45). The underlying principle of SET demonstrates that reciprocated benefactions create social bonds among exchange actors (Kacmar, Bachrach, Harris & Noble 2012). This is because social exchange shapes feelings of individual obligation, gratitude and trust among partners, all of which lay a basis of social solidarity and micro-social order, even without binding bonds (Thye, Yoon & Lawler 2002; Yoon & Suh 2003).

SET clarifies the exchange relations between two actors, who exchange resources with one another (Rubin *et al*. 2010). It serves a prominent role in explaining exchange (Luo 2002:903). Actors in exchange are motivated to seek self-interest, increase rewards and decrease costs. The expected outcomes of exchange

interactions can be economic or social rewards. Exchange may involve both social and economic outcomes. These results are compared to other exchange alternatives. Constructive outcomes increase trust, cooperation, satisfaction and commitment (Flynn 2003). Rubin, Bommer & Bachrach (2010:401) contend that an individual's intention to continue and make commitment to a relationship depends on his/her satisfaction and comparison level of options. However, the exchange party evaluates the social and economic outcomes (rewards obtained and costs incurred) from a given exchange association in comparison with expectations based on present and past experience with related relationships. The social rewards include social acceptance and approval, respect, emotional rapport, satisfaction and gratification (Cropanzano & Mitchell 2005:874).

Since as an exchange partner repetitively exchanges with another, the actions of SMEs in the Gauteng province in terms of green procurement on customer relationship, information quality and reverse supply chain more anticipated. Green procurement will lead to good customer relationship management, improved information quality and development of reverse supply chain in the SMEs.

2.1. Green Procurement and Customer Management

The benefits for any organisation going green are to retain and satisfy customer specific needs, improve resource efficiency and reconfigure value chain (Ford & Despeisse 2016; Stindt 2017). According to Pazirandeh and Jafari (2013), SMEs implementation of sustainable practices into procurement or supply chain processes can enhance efficiency improvement in customer relationship management, long-term benefits through increased market shares and higher profit margins. With this, the number of green businesses globally, especially within the developed economies, continues to increase, to enhance value added product to customers (Fritz, Schoggl & Baumgartner 2017; Rajeev, Pati, Padhi & Govindan 2017. Therefore, along with globalisation and modern technology as competitive strategy for customer relationship management, green business is also a competitive strategy for managing and creating value for both the organisation and its customers (Coltman, Devinney & Midgley 2011; Demo & Rozzett 2013), hence, the hypothesis that states:

H1: Green procurement practices among manufacturing SMEs have a significant influence on customer relationship management.

2.2. Green Procurement and Information Quality

Green procurement is the process of acquiring goods and services from external sources, which involves strategic collaboration and engagement among all parties.

It takes into account all operational stages from raw material extraction, material transportation, manufacturing, product packaging, storage and handling to the product use, disposal and recycling, which requires information quality to effectively and efficiently facilitate management's decisions and actions as well as support visibility during transit time (Fiorini & Jabbour 2017; Wu, Liao, Tseng, Lim, Hu & Tan 2017; Han, Wang & Naim 2017). According to De Corbière, Rowe and Habib (2016), efficient information quality, among others, is an important predictor and enabler of green procurement. Information quality has been recognised as important and beneficial in the green procurement procedures for transparency and efficiency (Li & Lin 2006; Omar, Ramayah, Lo, Sang & Siron 2010; Mafini & Muposhi 2017). Hence:

H2: The quality of information shared in terms of its accuracy, accessibility, timelines, consistency and usefulness can influence significantly green procurement processes and overall firm performance.

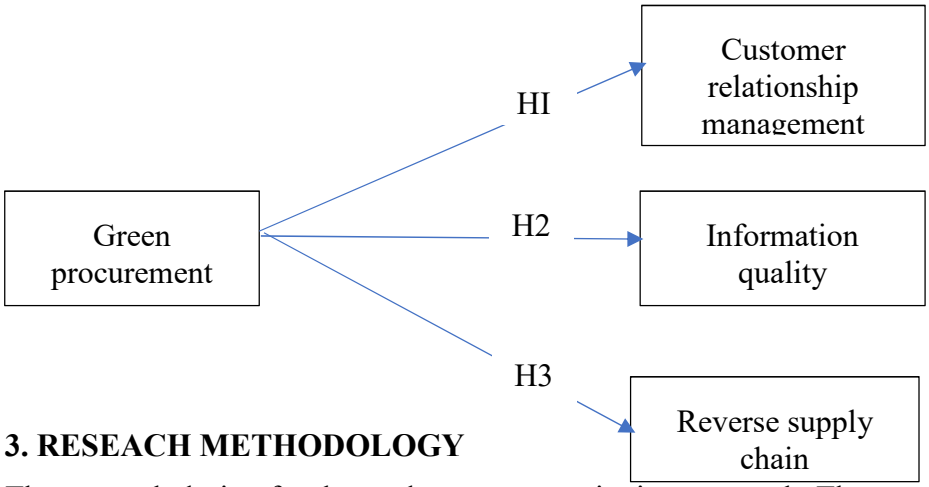
2.3. Green Procurement and Reverse Supply Chain

Another critical component of green procurement for success in SMEs is reverse supply chain. Reverse supply chain is defined as the management of all the activities involved in the flow of goods, demand information and money in the opposite direction to the primary logistics flow; a reduction in the generation of waste, and the management of the collection, transport, disposal, and recycling of hazardous as well as non-hazardous waste in a way that maximises the long-term profitability of the business (De Villiers, Nieman & Niemann 2017:174).

The environmental implications of reclamation, reuse and recycling to save landfill space, fuel and costs are becoming more important for organisations as emerging dimensions for sustainability (Wang & Song 2017; Xu, Elomri, Pokharel, Zhang, Ming & Liu 2017). As the greenest part of any sustainable strategy, SMEs should develop a reverse supply chain strategy to physically handle returns such as stock selection, transportation, centralised collection, data collection, refurbishing or remanufacturing and disposition for competitive advantage and also to enhance both return on investment and overall firm performance (Batarfi, Jaber & Aljazzar 2017; Shaharudin, Govindan, Zailani, Tan & Iranmanesh 2017). This study, therefore, proposes that:

H3: Green procurement has a significant positive influence on reverse supply chain.

Figure 1: Conceptual framework showing the hypothesised causal relationship



3. RESEACH METHODOLOGY

The research design for the study uses a quantitative approach. The survey method was used. The study gathered data using a structured questionnaire. The instrument was adapted from instruments developed by previous researchers.

3.1. Sample Description

In establishing an appropriate sample size, an analysis was undertaken of the sample size used by previous researchers in similar studies (Galloway and Brown 2002; Souitaris, Zerbinati and Al-laham 2007). These studies used sample sizes that ranged between 300 and 350 SMEs. Hence, a final sample size in the region of 350 was deemed appropriate. A total of 260 respondents was finally included in the study yielding a valid response rate of 74 percent. The target population for the study was SMEs in the Gauteng region of South Africa. The study population comprised of registered SMEs that are paying tax.

3.2. Measurement Instruments and Questionnaire Design

Research scales were based on previous work. Proper changes were made in order to fit the current research context and purpose. Green procurement was measured using six-item scales adapted from Demo (2013). Customer relationship used a five-item scale measure adapted from Zulkifli and Tahir (2012). Information quality used a five-item scale measure taken from Rootman, Tait and Bosch (2007). Reverse supply chain was measured using a four-item scale from Demo and Rozzet (2013). Measurement scales were configured on a five-point Likert-type scale that was anchored by one (strongly disagree) to five (strongly agree) in order to express the degree of agreement.

3.3. Statistical Analysis/Psychometric Properties of the Measurement Scale

Polit and Hungler (1999: 699) describe data analysis as "the systematic organization and synthesis of research data, and the testing of research hypothesis using those data". The Statistical Package for Social Sciences (SPSS) version 24.0 and AMOS 24.0 were used to analyse the data. Descriptive analysis was used to analyse the composition of the sample. Numbers utilised to tell one something about the extent to which two or more respondents differ are called inferential statistics (Bunker, Pearlson & Schulz 1975:50).

4. DATA ANALYSIS AND RESULTS

In accordance with the two-step procedure suggested by Anderson and Gerbing (1988), prior to testing the hypotheses, confirmatory factor analysis (CFA) was performed to examine reliability,convergent and discriminant validity of the multi-item construct measures using AMOS 24.0. Overall, acceptable model fit is indicated by goodness-of-fit index (GFI) $\geqq$ .80; root mean square error of approximation (RMSEA) values $\leqq$ .08; incremental index of fit (IFI); Tucker Lewis index (TLI) and comparative fit index (CFI) values $\geqq$ .90. Recommended statistics for the final overall model assessment show acceptable fit of the measurement model to the data: χ^2/(df) = 2.333, GFI = 0.870; IFI = 0.922; TLI = 0.915; CFI = 0.885; RMSEA = 0. 065. Loadings of individual items on their respective constructs are shown in Table 1, while the scale construct correlations are presented in Table 2.

Table 1: Measurement accuracy assessment and descriptive statistics

Research constructs	Descriptive statistics*		Cronbach's test		C.R.	AVE	Item loadings
	Mean	SD	Item-total	α Value			
Green procurement (GP)							
GP 1			0.609				0.760
GP 2			0.791				0.796
GP 3	2.05	1.055	0.863	0.755	0.755	0.623	0.834
GP 4			0.801				0.969
GP 5			0.725				0.804
GP 6			0.678				0.703
Customer relationship (CR)							
CR 1			0.760				0.864

CR 2			0.643				0.745
CR 3	3.55	1.567	0.819	0.711	0.711	0.538	0.706
CR 4			0.601				0.622
CR 5			0.779				0.796
Information quality (IQ)							
IQ 1			0.933				0.969
IQ 2			0.731				0.738
IQ 3	2.80	1.230	0.822	0.845	0.845	0.779	0.829
IQ 4			0.958				0.977
IQ 5			0.889				0.924
Reverse supply chain (RC)							
RC 1			0.789				0.861
RC 2	3.77	1.862	0.785	0.858	0.850	0.792	0.811
RC 3			0.921				0.964
RC 4			0.856				0.879
GP= green procurement; CR= customer relationship; IQ= information quality ; RC= reverse supply chain							

As recommended by Anderson and Gerbing (1988), and Hair, Babin, Anderson and Tatham (2010), individual item loadings should be above 0.5. From the results presented in Table 1, all the remaining item loadings for the research constructs are above 0.60, therefore, proving acceptable individual item reliabilities as more than 60 percent of each item's variance is shared with its respective construct. Using a formula proposed by Fornell and Lacker (1981), the composite reliabilities (CR) and average variance extracted (AVE) for each variable were computed. The composite reliabilities (CR) are all above the recommended value of 0.7 suggested by Hulland (1999); thus, indicating satisfactory internal uniformity and dependability of the respective measures. All average variance explained (AVE) values are above 0.5; thus, tolerable according to the literature (Fraering and Minor 2006). These results provided evidence for acceptable levels of research scale reliability. Discriminant validity was proven by checking if the AVE for each multi-item construct was greater than the shared variance between constructs (Fornell and Larcker 1981; Anderson and Gerbing 1988; Nunnally and Bernstein 1994; Hair *et al*., 2010) and if the inter-construct correlations were less than a unit. Furthermore, the inter-construct correlation values are less than the recommended value of 0.6, revealing an adequate level of discriminant validity (see Table 3).

Table 2: Sample data statistics and correlations between constructs

Variables	GP	RC	IQ	RC
GP	1.000			
CR	.444***	1.000		
IQ	.395***	.341***	1.000	
RC	.150***	.189***	.431***	1.00

Note: *GP= green procurement; CR= customer relationship; IQ= information quality; RC= reverse supply chain*

4.1. Structural Equation Modelling

This study used structural equation modelling (SEM) to approximate the causal relationship among the constructs based on the conceptual model in Figure 1. The maximum likelihood estimation (MLE) method was used because it has desirable asymptotic properties (e.g., minimum variance and unbiasedness) and is scale-free. The results are reported in Table 1. The model is acceptable in terms of overall GIF. Acceptable model fit is indicated by χ^2 (df) values < 3; GFI and AGFI values ≧ 0.80; RMSEA values ≦ .080; IFI and CFI values ≧ 0.90. Results of this study indicate that, χ^2 (df) = 2.470; GFI (0.895); IFI (0. 921), TLI (0.933), CFI (0.870) and RMSEA (0.068), therefore, achieved the suggested thresholds (Hair *et al*., 2010). This suggests that the model converged well and could be a plausible representation of underlying empirical data structures collected in South Africa.

Table 3: Results of structural equation model analysis

Hypothesis statement	Hypothesis	Path co-efficient
GP → CR	H1	.809***
GP → IQ	H2	. 856***
GP → RC	H3	.788***

Note: *GP= green procurement; CR= customer relationship management; IQ= information quality; RC= reverse supply chain*

5. DISCUSSION OF FINDINGS

The results in Table 3 offer support for three proposed hypotheses. According to the objectives of the study, it can be deduced that the study postulated that there is a positive relationship between the three hypotheses. The first research objective was to examine the relationship between green procurement and customer relationship management. Consistent with hypothesis one (H^1), results indicate

higher levels of green procurement leads to higher levels of customer relationship management. The path co-efficient is 0.809, which shows a significant strong relationship. There is, therefore, a significant positive relationship between green procurement and customer relationship management. The second research objective was to investigate the relationship between green procurement and information quality. Also, in support of hypothesis two (H^2), the results indicate higher levels of green procurement with higher levels of information quality. The results ultimately prove that there is a strong significant positive relationship between green procurement and information quality. The results indicate that higher levels of green procurement are associated with higher levels of information quality. The path co-efficient of 0.856 shows a strong positive relationship. The third research objective was to investigate the relationship between green procurement and reverse supply chain.The path co-efficient for hypothesis three is 0.788, which shows a significant relationship between the two variables. Of all the three hypotheses, the strongest relationship was that of green procurement and information quality, which has a standardised coefficient of 0.856, followed by green procurement and customer relationship management with a standardised coefficient of 0.809 and finally the relationship between green procurement and reverse supply chain has the lowest coefficient of 0.788. Although the results show that there is a positive relationship between between all four variables, green procurement and reverse supply chain have the lowest coefficient compared to other hypotheses.

6. CONCLUSIONS AND MANAGERIAL IMPLICATIONS

The issue of green procurement in SMEs is a hot and current issue in South Africa. This study focused on examining the influence of green procurement on customer relationship management, information quality and reverse supply chain among manufacturing SMEs in South Africa. Green procurement is essential in the environmental management system for both environmental benefits and the organisation's profit maximisation. The study shows a positive relationship among all the posited hypotheses. Green procurement, which is intended specifically to stimulate interest in starting small businesses, is becoming increasingly important.

Although several studies in green procurement education have been conducted previously, they have focussed on identifying the benefits in general for those who started businesses. They also have focused on large companies or corporations not in SMEs. The results revealed that there was a positive relation between green procurement and customer relationship management, information quality and reverse supply chain.

This means that SMEs should focus on improving and adhering to green procurement requirements as this has major benefits for the company. Benefits include boosting production, good company image and customer morale. In this study, green procurement will lead to good customer relationship management, which will lead to loyalty and obedience to the company. Green procurement will also lead to smooth flow of information thereby increasing the quality of the information. Reverse supply chain will also be enhanced for the betterment of the organisation.

7. LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

The study used a quantitative research design, although future research may consider adopting a mixed method approach to get more meaningful results. A larger sample can be considered in order to generalise findings. Katono (2013:203) indicates that, "there is need or a larger sample to make the findings more generalizable". However, the present research can be seen as a preliminary investigation of the opportunity to increase value in designing the green procurement related programmes that stimulate SMEs intentions, attitude and self-efficacy to venture into new business creation.

The sample population inevitably limits the conclusion that can be drawn from the present findings, as only manufacturing companies were included in the sample. Future studies should include service companies as well. However, the purpose was not to generalise the findings outside the sample, but to understand the phenomenon in its context and further research is required to incorporate a wider range of SMEs from different sectors.

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