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Green Sourcing: Effects on Supplier Performance Metrics in Fast Food Restaurants in Frontier Markets

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Abstract—Purpose: **Following the banning of expanded polystyrene packaging material, the fast food restaurant industry was serendipitously plunged into green sourcing initiatives for its packaging materials leading to heightened efforts on evaluating the suitability of various suppliers of green packaging material. This study therefore sought to assess the performance of selected suppliers on supplier performance metrics of total cost of ownership, quality of sourced material and delivery performance, in Zimbabwe's restaurant industry.** ***Methodology:*** **Data was collected from senior procurement officers of 30 officially registered fast food restaurants in Zimbabwe. Each restaurant randomly selected 5 suppliers from their supplier lists. Each unit was asked to rate their 5 major suppliers of packaging material leading to an effective sample size of 150 suppliers. Structural Equation Modeling (SEM) was used to analyse data in AMOS. The five steps in SEM, that is: model specification, model identification, parameter estimation, model evaluation and modification were done.** ***Findings:*** **The findings in this study revealed that green sourcing leads to improved procurement performance in terms of total cost of ownership, quality of the materials sourced, and delivery performance.** ***Implications for theory and practice:*** **It was therefore recommended that practically the restaurant industry should explore various options of green packaging material ranging from recyclable and reusable plastic, paper, aluminium and steel material.** ***Originality and value:*** **Although the study was done in a single market, there is dearth in literature on green sourcing in frontier markets, of which the study provides empirical evidence from the restaurant industry in Sub-Saharan Africa.**

***Index Terms*—Green sourcing, Supplier evaluation, Fast food restaurant, Frontier Markets, Supplier performance metrics, Green packaging material, Total cost of ownership, Quality of sourced material, delivery performance.**

I. INTRODUCTION

The need for sustainable production and supply chains is indispensable for mother Earth and humanity. The sustainability initiatives include, inter alia, optimisation of industrial processes (Almeida, Bonilla, Giannett & Huisingh, 2013) and green sourcing. Green sourcing is an important element of sustainability strategies (Almeida, Agostinho, Giannetti & Huisingh (2015).

A brief background to the problem as it obtained in Zimbabwe would help in contextualising the green sourcing initiatives in a typical frontier market. Following the ground breaking research findings from a study conducted by the University of Zimbabwe (UZ) revealing that expanded polystyrene packaging material commonly known as 'kaylites' are non-biodegradable and cause cancer, the Zimbabwean government's Environmental Management Agency (EMA) banned their use in the food industry through invoking Statutory Instrument Number 84 of 2012 (Packaging and Plastic Bottles). This strategic initiative followed the banning of the same packaging material in global markets like the United States of America (USA), France, and Rwanda. EMA suggested the replacement of 'kaylites' with either biodegradable paper or plastic based packaging material; corn based packaging material, or edible packaging material for take-away food.

The initiative involuntarily moved the entire fast food restaurant industry into green practice in general and green sourcing in particular. Green sourcing has emerged as one of the budding business concepts that carry a promise to alleviate the externalities that dominated the contemporary environmental issues (Hervani, Helms & Sarkis, 2005). While acknowledging the broader environmental benefits that accrue from the green issues in general and green sourcing in particular, the business community has been hesitant to embrace the green phenomenon. However, since green issues are widely celebrated along all the stages of supply chain management (Keller, 2008) most businesses have regrettably resorted to green washing (Delmas & Burbano, 2011).

There has been mixed feelings towards green sourcing. Firms involved in green sourcing have been associated with growth in revenue, reduction in production costs, effective risk management, and an accumulation of intangible assets such as brand equity (Mulani, 2008), while others view green sourcing initiative as source of exacerbated operating costs and reduced efficiency (Coyle, Langley, Novack & Gibson, 2008). The absence of clarity on the outcomes of green sourcing calls for a study that would shed some light on this debate, and increase empirical literature on the contemporary issue of green phenomenon. This study therefore seeks to determine the effects of green sourcing on suppler evaluation metrics focusing on the sourcing of packaging material within the fast food restaurant industry.

Whilst several studies and white papers had alluded to the fact that green sourcing is beneficial across several industries, it seems its uptake has been very low for packaging materials in the fast food restaurant industry in Zimbabwe. Several media reports had indicated that most restaurants find the use of green packaging material as an avoidable escalation of total production costs, costly delivery schedule delays and less exponential changes in quality perceptions. Therefore, this study provides further enlightenment in terms of empirical evidence that refutes or support pervasive claims regarding the use of green sourced packaging material specifically in the restaurant industry in a typical frontier market. Whilst it is fully appreciated that the insights into the utility of green sourced material is already awash in the extant literature, it should be equally appreciated that most of these findings are from study samples in developed economies (e.g Zhu, Sarkis, & Lai, 2013). Burgess and Steinkemp (2006) emphatically averred to the fact that models and theories constructed in developed markets should be validated in emerging and frontier markets. Unlike developed markets, emerging and frontier markets are characterised by legal instability, less informed consumers, and an inclination towards hedonic consumption (Sheth, 2011). In that regard, this study serves to test the postulations related to green sourcing of packaging material already advanced in developed markets and also increase the growing chorus in seeking to understand the application of the novel green concepts.

The main research questions which were hypothesised and quantitatively interrogated were;

1. Do green sourcing initiatives lead to reduced total cost of ownership?
2. Do green sourcing initiatives lead to improved quality of material sourced?
3. Do green sourcing initiatives lead to improved delivery performance?

This study is organised as follows; starts with reviewing the relevant literature related to green sourcing as the independent variable and the three dependent constructs which are namely cost, quality and delivery performance. This was followed by the methodology, study findings, discussion of results, and exposition of the conclusions reached as well as directions for future researches.

II. LITERATURE REVIEW

A. Green sourcing

There is a prevailing social and economic trend inclined towards preferences for environmentally friendly products (Keller, 2008). The general rise in green awareness issues have been triggered by the retrogressive effects of climate change such as ozone layer depletion, environmental pollution, depletion of non-renewable resources, and the vigorous resurgence of non-communicable diseases such as cancer (Wisner, Tan & Leong, 2016). In supply chain management several concepts such as green sourcing, green procurement, green logistics and green marketing mushroomed (Hervani et al., 2005). Many businesses have readily embraced these green initiatives as a response to the externalities associated with environmental calamities that had been for decades impacting on this planet (Kotler & Keller, 2016). For instance, a decade ago, in the fast food industry, McDonalds' led the way in green initiatives through making use of unbleached wrapping paper and recyclable boxes (Keller, 2008).

Green sourcing which is a sub-set of sustainable sourcing and green procurement (Lysons & Farrington, 2016) is of particular interest in this study. Green sourcing is defined as the practice of deliberately exploring and evaluating suppliers (Johnson, Howard & Miemczky, 2014) of products that are energy efficient, bio-degradable, environmentally friendly, re-usable, recyclable, and energy efficient (Wisner et al., 2016). Green sourcing has intensified the need for supplier evaluation beyond the traditional evaluation criteria, but using the same traditional metrics. The major purpose of supplier evaluation is to ascertain whether the performances of suppliers are in tandem with the requirements or expectations of the buying organisations (Wisner et al., 2016; Dickson, 1966). Supplier evaluation is an outcome of both quantitative and qualitative evaluations (Ha & Krishnan, 2008; Dickson, 1966) of attributes of the suppliers' efforts in order to make a rationale purchase decision (Younus, Afzal & Ahsan, 2016). In the extant strategic sourcing literature supplier evaluation is also referred to as supplier selection, vendor selection, supplier rating, or supplier appraisal (Dickson, 1966). The use of evaluative criteria is meant to enhance transparency and clarity in the procurement process (Lysons & Farrington, 2016). There is several performance measurement metrics in the extant supply chain management literature, but quality, cost and delivery performance have a pervasive and widespread application (Slack, Chambers & Johnston, 2010; Baily, Farmer, Crocker, Jessop & Jones, 2008; Dickson, 1966), and therefore shall become the cornerstone of this study.

B. Total Cost of Ownership

Contemporary business analytics practice advocate for the assessment of all the costs involved in acquiring and using a product in what is referred to as total cost of ownership (TCO) (Benton, 2014). TCO is defined as the sum of purchase price plus costs incurred prior to and post product delivery (Wisner et al., 2016). TCO focuses on the cost of a product throughout the entire product life cycle. TCO has become of paramount importance as a result of the limited scope presented by the attached price (Harrison & van Hoek, 2011). Price does not include the other costs that may be incurred in maintaining and using the product (Chopra, Meindl & Kalra, 2016). As a result of the limited picture

presented by price, it is imperative in sourcing decisions to pay attention to a more holistic approach of focusing on TCO (Ellram & Maltz, 1995).

Green sourcing has been accused of leading to the sourcing of very expensive products, but if the TCO concept is to be applied the sourced green materials present a lot of benefits across the entire supply chain (Coyle et al., 2008). For instance, sourced green packaging materials tend to enhance the brand equity of the organisation and generate re-patronage behaviours in the downstream section of the supply chain, leading to high value for money and low unit costs in the long run (Chopra et al., 2016; Lysons & Farrington, 2016). Although the relationship between green sourcing initiatives and cost of the sourced material has received conflicting results (e.g. Geng, Mansouri & Aktas, 2017; Chan, He, Chan & Wang, 2012; Feng, Cai, Wang & Zhang, 2015; Choi & Hwang, 2015), therefore, theoretical leanings offer a clearer picture.

The possibility of green sourced material leading to reduced production costs can be inferred from the resource-based view theory (RBV) (Burney, 1991) which states that efficiency and effectiveness in the operations of a business are leveraged on the resources at its disposal (Alvarez & Barney, 2000). Resources range from tangible to intangible possessions such as equipment, stock, competences and skills (Wade & Hulland, 2004; Barney, Wright & Ketchen, 2001). The strategic advantage revealed in the RBV theory emanate from the fact that resources at the disposal of firms are heterogeneous (Alvarez & Burney, 2000) and heterogeneity of resources is a necessary parameter for creating sustainable competitive advantage (Alvarez & Busenitz, 2001). The RBV theory is associated with investments in new technology to replace the redundant equipment thereby necessitating the attainment of efficiency and effectiveness (Peteraf, 1993). This is particularly valid where resources are channelled towards the green outputs (Hart, 1995) leading to plummeting of environmental and reputational costs (Christmann, 2000) and improving financial performance (Dowell, Hart & Yeung, 2000). Moreover, green sourced packaging material as an innovation is likely to be associated with innovative equipment which inherently increases the efficiency and effectiveness in operations management (Lysons & Farrington, 2016). This in turn leads to reduced total cost of production. It is therefore anticipated that;

H1: *Green sourcing initiatives lead to reduced total cost of ownership.*

C. Quality of sourced material

Quality is one of the most important metrics in supply chain management (Christopher & Towill, 2001). There are several definitions of quality emanating from different perspectives, but the most consistently used definition that has received a widespread acceptance and application, is that quality is the ability of a product to meet or exceed customer expectations (Groonroos, 2007; Juran, Blanton & Edward, 2001). However, the major challenge with this definition is that customer (buyer) expectations vary a lot, bringing in the much dreaded element of subjectivity. The attainment of high quality material at a low cost is only possible through meticulous supplier evaluation process (Weber et al., 1991). Quality is one of the major criterions for the supplier evaluation and selection process (Bailey et al., 2008), despite the fact that it is one of the constructs whose measurement is highly subjective (Parasuraman, Berry, and Zeithaml, 1988), and its definition extremely elusive (Slack et al., 2010). There are generally eight dimensions of quality: performance, features, reliability, durability, conformance, serviceability, aesthetics, and perceived quality (Garvin, 1987). The attainment of all or some of these quality attributes is associated with a cost trade off (Slack et al., 2010). That is the attainment of high quality in sourced material tends to have an inverse relationship with cost reduction (Chopra et al., 2016). The costs that are associated with quality are preventions costs, assessment costs, and correction costs (Slack et al., 2010). Quality has an effect on the end product's shelf life, consumer satisfaction, and reduction in product re-runs. Innovation is one of the phenomena that are attributed to the attainment of quality in production processes (Benton, 2014) since recent innovations are within the domain of green technology (Lysons & Farrington, 2016).

There is an exponential growth in empirical studies that confirms the significant and positive relationship between green sourcing initiatives and quality attainment (e.g. Lee, 2015; Chan, Yee, Dai, J. & Lim, 2015; Mitra & Datta, 2014; Laosirihongthong, Adebanjo & Tan, 2013; Chan, He, Chan & Wang, 2012). Considering that lager and influential corporations like MacDonald's have already adopted green practices such as green packaging for fast food it is most likely that suppliers will strive to provide quality green packaging materials in order to remain or to be included in various buyers' preferred supplier lists. Coercive pressure usually features in the form of company policies. Most firms have got quality assurance policies that include sourcing quality material (Lysons & Farrington, 2016). These policies have clauses that relate to penalising suppliers for producing and delivering substandard materials. It is such coercive approaches that make it likely that green initiatives may prime suppliers to match or exceeded the prevailing quality standards. Lastly, normative pressure pushes most buyers and their suppliers to adopt green practices (Zhu et al., 2013). There is pressure for green products that emanates from the downstream of the supply chain in the form of customers and quasi-government departments (Lai, Wong & Cheng, 2011) such as EMA. Therefore based on the institutional theory it is prudent to suggest that;

H2: *Green sourcing initiatives lead to improved quality of sourced material*

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D. Delivery performance

Product delivery is one of the key performance attributes in supplier evaluation (Cousins, Lamming, Lawson & Squire, 2008). It is through product delivery that a sourcing entity can attain product availability which leads to place utility (Chopra et al., 2016). Delivery performance is associated with many aspects such as on-time delivery, delivery frequencies, delivery reliability, lead time, and delivery synchronisation (Hill, 2000; Saad & Patel, 2006; Garg, Harahari & Viswanadham, 2003; Morgan & Dewhurst, 2008). Delivery performance has a large bearing on production schedules and inventory holding costs (Lysons & Farrington, 2016). It has become a common practice for firms to penalise their suppliers for early or late deliveries since early deliveries lead to excess inventory, while late deliveries lead to production stoppages (Guiffrida & Nagi, 2006; Schneiderman, 1996; Burt, 1989). Green materials as innovative products that are at the early stages of the product life cycle have got a limited supplier base and are usually produced on customer orders. Suppliers of products at the early stages of product life cycle tend to be very responsive to customer needs in terms of both the core and augmented product such as delivery performance (Kotler & Keller, 2016).

Thus buyers may have to advise their suppliers of their expectations in terms of delivery schedules and the suppliers who intent to extend or commit to a relationship may as well act accordingly (Lysons & Farrington, 2016). This in turn will make the suppliers meet the delivery schedules of customers within the expected timescales.

It is therefore logical to hypothesise that;

H3: *Green sourcing initiatives lead to acceptable delivery performance.*

The above review logically leads to the conceptual model shown on figure 1.

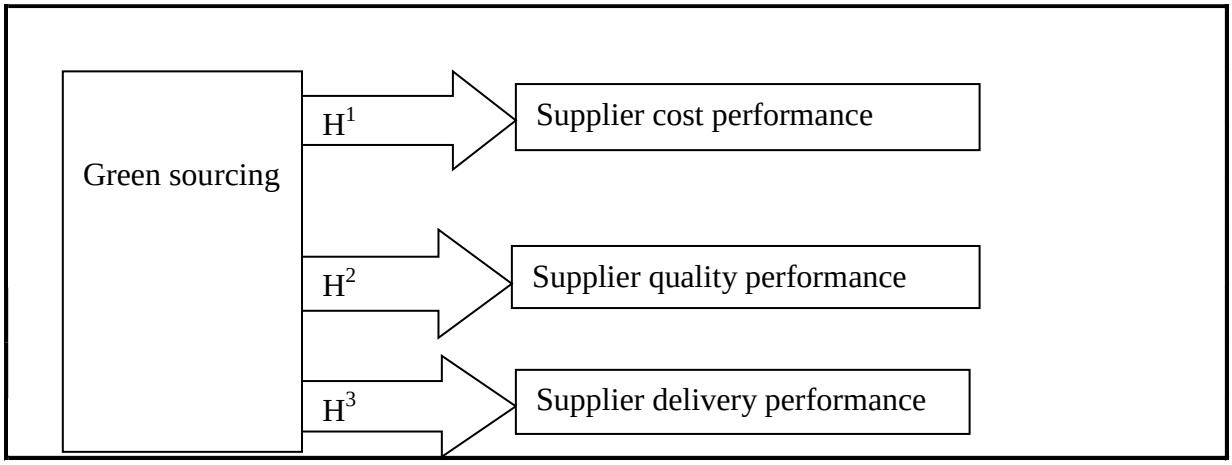


Figure 1. Proposed conceptual model

The next section provides methodology employed.

III. METHODOLOGY/RESEARCH METHODS

This section presents data on sampling and data collection procedures, measures, and data analysis procedures adopted.

A. Sampling and data collection procedures

The respondents in this study were senior procurement officers in the procurement units of registered fast food restaurants in Zimbabwe. There are several restaurant businesses in Zimbabwe, but there are only very few large ones with formalised procurement processes. This study chose 30 biggest restaurants in terms of clientele base and branch network. Restaurants selected for this study further randomly chose five suppliers each to evaluate using simple random sampling. The use of simple random sampling by restaurants from their sampling frames of their list of suppliers made it possible to generalise the findings from this study (Saunders, Lewis & Thornhill, 2016).

B. Measures

The measures for all the three constructs which are namely cost, quality and delivery in this study were distilled from Wisner et al. (2016). These metrics meet the standard of good metrics since they are easy to understand, measure, and interpret (Wisner et al., 2016), and they are the widely used supply chain management performance metrics (Benton,

2014). These metrics serve the purpose of supply evaluation which is to identify highly performing suppliers, supplier development needs, reduce supply risk, and improve supplier communication (Wisner et al., 2016). All the latent variables were measured using a likert type of a scale that ranged from 1 "strongly agree" to 7 "strongly disagree". Green initiative was measured as a categorical variable in a binary format where the respondents indicated whether they have adopted or not adopted green practices. The survey items are shown on Table 1.

Table 1. Survey items

Code	**Item**
EMP1	EMPs are in place in our organisation in terms of ISO 14001cerification or comparable EMS.
EMP2	We provide design specification to suppliers that include environmental compliance for purchased item
EMP3	We address environmental concerns of our customers in terms of eco-friendly design/ distribution of products.
EMP4	We help suppliers set up environmental management system/get ISO 14001 certification
EMP5	We address environmental concerns of our customers by adopting cleaner production.
EMP6	We have successfully designed our products which consume reduced amount of input material/energy.
CP1	Improved cost through cooperation
CP2	Willingness to negotiate on price
CP3	Provides cost break-downs
QP1	Continuous process improvement
QP2	Improved quality through cooperation
QP3	Statistical process controls
QP4	Documented quality program
DP1	Defect free deliveries
DP2	Improved delivery through cooperation
DP3	Timely delivery

C. Data analysis

The structural relationships involving green sourcing and its proposed outcomes of cost performance, quality performance, and delivery performance was tested using structural equation modelling (SEM) which has become a statistical tool of choice in most quantitative business research designs (Hair, Sarstedt, Ringle & Menu, 2012). This statistical tool is superior over the traditional multivariate statistical tools (Preacher and Merkle, 2012) in that it can test more than one dependent variable simultaneously (Gefen, Rigdon, and Straub, 2011), provides the information on how well the model fits the data (Bryne, 2010), takes error variance into account (Bagozzi and Yi, 2012), can be used on data that violets normality assumptions (Bryne, 2010), applicable to even formatively measured constructs (Oke, Ogunsami, and Ogunlana, 2012), incorporates both observed and unobserved variables (Ringle, Sarstedt, and Straub, 2010), and it assesses psychometric properties of measures focusing on validity, dimensionality and reliability (Diamantopolous, Fuchs, Wilczynski and Kaiser, 2012: Bagozzi and Yi, 2012: 12). While SEM is found on many software packages, the most common SEM packages are Analysis of Moment Structures (AMOS) (Arbuckle, 2009), Linear structural relationships (LISREL) (Joreskog, 1996), Mplus (Muthen and Muthen, 2010) and (ESQ) (Bentler, 2008). In this study AMOS was used for data analysis based on the strength that it is user friendly (Blunch, 2008), can be added to an SPSS set up (Babin, Hair, and Bales, 2008), can perform bootstrapping (Xitao, 2003), has graphical interface, and can be used without any mastery of the programming language (Blunch, 2008).

The study followed the conventional five steps in SEM: model specification, identification, parameter estimation, model evaluation, and model modification (Kline, 2016). Model specification relates to the outlining of the hypothesised relationships among study constructs based on theory and logic. This was done in the literature review section that concluded with the conceptual model specified in Figure 1. Model identification relates to the assessment of whether a model is under-identified, just-identified, or over identified (Xia & Yang, 2019). Model identification in this study was evidenced by the degrees of freedom exceeding zero, and each latent variable had at least two indicators. Parameter estimates relates to the estimation of factor loadings for the measurement model and path coefficients for the structural model (Kline, 2016). The factor loadings were used for determining construct validity and composite reliability shown in Table 4. Parameter estimation also extended to hypotheses testing shown in Table 5. Model evaluation relates to the assessment of how the proposed conceptual model fitted the survey data (Xia & Yang, 2019). This assessment was done using the widely applied indices such as the chi-square, chi-square/df, Root Mean Square

Error of Approximation (RMSEA) (Steiger, 1990), Comparative Fit Index (CFI) (Hu & Bentler, 1999), and Tucker-Lewis Index (TLI) (Tucker & Lewis, 1973). The next section presents the results from the data analysis exercise.

IV. RESULTS

This section presents the statistics related to the demographic profile of the respondents, measurement model validation results, statistical assumptions tests, and hypotheses testing results.

A. Demographic profile

Most of the respondents who participated in this survey were in the 18-30 age group (55%). This perhaps accounted for by the breed of procurement professionals that got recruited in various firms as are result the recent recognition of procurement as a strategic function in most businesses. Males dominated the respondents in this study (55%), and females were (45%). This is reflective of the gender disparities that characterise most of the developing countries like Zimbabwe. The majority of the supplier organisations were in the small enterprise category (40%), while, medium, and large enterprises were 35% and 25% respectively. The presence of many small enterprises in the supplier market is reflective of the informalisation of the economy that has been exponentially taking place in Zimbabwe for the past two decades.

B. Sample statistics

The samples statistics involved information on range, mean, standard deviation, skewness, and kurtosis (see Table 1).

Table 2. Descriptive statistics

	N	Mean	Std. Dev	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Green_Sourcing	150	5.3627	1.07376	-.789	.198	-.306	.394
Cost_Performance	150	5.5844	1.00775	-.975	.198	1.191	.394
Quality_Performance	150	5.1567	1.19897	-.403	.198	-1.152	.394
Delivery_Performance	150	4.8444	1.21981	-.006	.198	-1.303	.394

The presence of normality in data distribution was evidenced by the absolute scores attained for skewness was within the range of +/_ 2 for all the constructs (Chau & Bentler, 1995), and kurtosis being less than 10 (Kline, 2016). Normality is one of the preconditions in studies that intent to use parametric statistical tests (Kline, 2016). Having satisfied the normality assumption this study proceeded to present the validations results.

C. Validation Tests

Measurement scale validation is a prerequisite for hypotheses testing. The validation process tested model fit, construct validity, and composite reliability using CFA.

D. Model fit

A four-factor measurement model comprising of green sourcing, cost performance, quality performance, and delivery performance was tested for model fit. Model fit relates to the extent to which implied covariance matrix closely resembles the empirical covariance matrix (Hair et al., 2014). An insignificant chi-square value, the values close to zero for RMSEA, and the values closer to one for TLI and CFI indicate a good fit (Byrne, 2010). The initial results from the assessment indicated that GS6 had a low factor loading and was therefore excluded from the subsequent analysis. Furthermore, the model implied did not fit the data and a measurement modification exercise was done. The modification involved co-varying e1 with e4, and e3 with e5. Thereafter, CFA was run again and the results are shown in Figure 2.

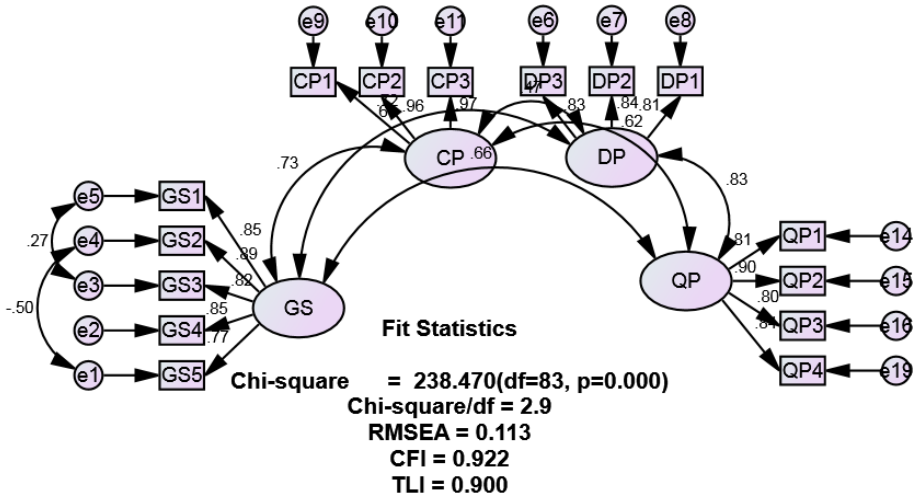


Figure 2. Measurement model

All the fit indices shown in Figure 2 indicate the fitness of the four-factor measurement model except for the X2 which was highly significant, and the RMSEA that was out of range. A significant X2 suggests that there are considerable differences between the predicted model and the actual model. However, since X2 is sensitive to larger sample sizes (Hair et al., 2014), an alternative suggested by Jereskog & Sorbom (1993) which involves examining the ratio of X2 to the degree of freedom was assessed. The X2/df value attained was 2.9 which was within the rule of thumb suggested by Kline (2016). The other fit indices which were also acceptable had the following values: CFI=0.922, TLI=0.900.

E. Construct validity and composite reliability

A four factor structure comprising of green sourcing, cost performance, quality performance, and delivery performance subjected to a CFA analysis produced the factor loadings that were used the determine convergent validity, discriminant validity, and composite reliability.

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Table 3. AVE, CR, and Shared Variance

Construct						Shared Variance			
	ʎ	ʎ2	Є	AVE	CR	1	2	3	4
Green sourcing (1)	0.773	0.597529	0.402471						
	0.852	0.725904	0.274096						
	0.824	0.678976	0.321024						
	0.894	0.799236	0.200764						
	0.852	0.725904	0.274096						
	4.195	3.527549	1.472451	**0.7055**	**0.9228**	**1**			
Cost performance (2)	0.717	0.514089	0.485911						
	0.963	0.927369	0.072631						
	0.967	0.935089	0.064911						
	2.647	2.376547	0.623453	**0.7922**	**0.9183**	**0.5329**	**1**		
Quality performance (3)	0.815	0.664225	0.335775						
	0.899	0.808201	0.191799						
	0.803	0.644809	0.355191						
	0.844	0.888	0.888						
Delivery performance (4)	2.546	3.005235	1.770765	**0.6010**	**0.7854**	**0.2209**	**0.3844**	**1**	
	0.833	0.693889	0.306111						
	0.842	0.708964	0.291036						
	0.813	0.660969	0.339031						
	2.488	2.063822	0.936178	**0.6879**	**0.8686**	**0.3721**	**0.4356**	**0.889**	**1**

A robust test of convergent validity which is Average Variance Extracted (AVE) (Fornell & Larcker, 1981) was used (Hair et al., 2014). The detailed results for this test are shown in Table 2. The AVE for each latent variable was above 0.5 which suggested that there is adequate convergent validity for each of the observed variables. This means that the items for each construct share a high proportion of common variance (Hair et al., 2014). Discriminant validity was also accessed using AVE following the Fornell and Larcker (1981) procedures. The procedures involved comparing each variable's AVE to its shared variance with other variables. The AVE for each latent variable was by far greater than its shared variance with other variables suggesting that there were adequate discriminant validity.

The reliability of the measurement scales for latent variables was assessed using the composite reliability (CR) coefficients and he results are shown in Table 2. The CR coefficients for all the latent variables were above the threshold of 0.7 suggested by Nunally and Bernstein (1994) as the minimum for a variable to be considered valid. Having demonstrated that the latent variables in this study have the pre-requisite psychometric properties acceptable in measurement scale validation such as model fit, construct validity, and reliability, the study proceeded to the next stage which was hypothesis testing.

F. Hypotheses Testing

The validation exercise for the measurement model was followed by hypotheses testing. Hypotheses testing were conducted using structural equation modelling and this section presents the results.

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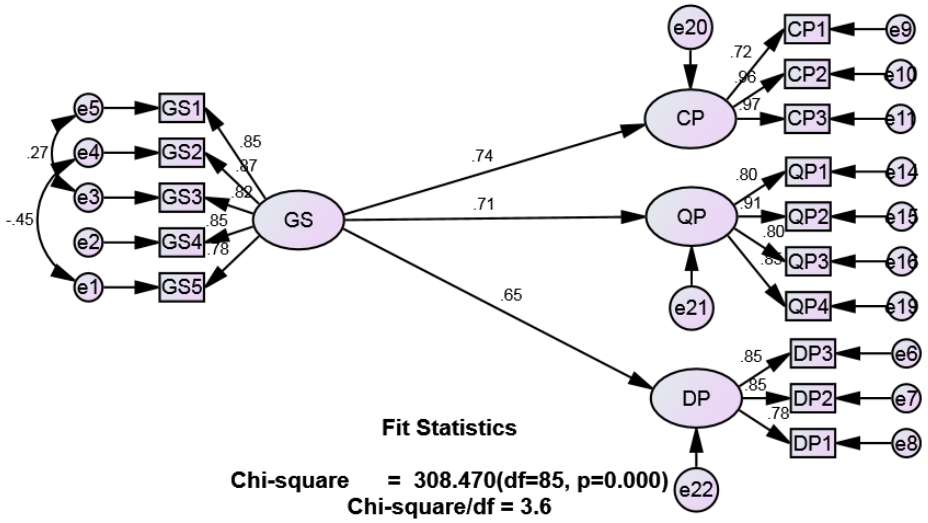


Figure 3. Structural model

H1 stated that green sourcing leads to improved cost performance. Beta weights from the path analysis in Figure 3 indicated a statistically significant relationship (B=0.74, T=7.569, P=0.00). H2 predicted that green sourcing leads to improved quality performance. The path analysis in Figure 2 found that relationship to be statistically significant (B=0.71, T=7.697, P=0.000). H3 specified that green sourcing leads to improved delivery performance. The significance of the relationship between green sourcing and quality performance was supported by path analysis in Figure 3 where the B=0.65, T=3.7.177, P=0.000. The Table 3 below shows the summary of hypotheses tested.

Table 4. Summary of hypotheses tested

Hypotheses	Beta weight	T value	P value	status
Green sourcing - cost performance	0.74	7.569	0.000	Supported
Green sourcing - quality performance	0.71	7.697	0.000	Supported
Green sourcing - cost performance	0.65	7.177	0.000	Supported

All the study hypotheses were supported, and therefore the section below presents a detailed discussion of the results attained above in the context of the previous research findings and the implications to various stakeholders.

V. DISCUSSION

This study tested the structural relationship between green sourcing and supplier performance metrics. This study revealed that green sourcing leads to improved supplier performance metrics.

The results shows that most of the procurement entities in the fast food market that had embraced the idea of going green are in support of the idea that green sourcing leads to reduced TCO. These finding are in support of what many advocates and idealists in green initiative movements have been advocating for (e.g. Delmas & Burbano, 2011).

The TCO concept has three clusters of costs that are considered when sourcing goods: acquisition costs, ownership costs, and post-ownership costs (Chopra et al., 2016). Acquisition costs are made up of all expenses incurred in the procurement of material such as purchase price, financing costs, delivery costs, duties, and taxes. Ownership costs are associated with all the expanses involved in using the sourced material. Post-ownership costs are related to expenses incurred when a product has changed ownership with the supply chain such as product liability, warranty cost, and reputational costs. It is the later clusters of costs that green material tend to be cheaper than traditional material in the sense that green material has lesser product liability, and reputational costs (Chopra et al., 2016). More specifically green practices in the sourcing domain leads to the reduction in TCO, and this in turn has some ripple effects on the financial performance of a firm such as increase in cash flow position, and operating profits. These gains may be channelled towards investments in innovative production resources.

The results from this study have also shown that green sourcing leads to access to quality materials. Quality material is perceived to be environmentally friendly and less harmful to the health of consumers and lead to improved brand image (Cousins et al., 2008). It is therefore imperative for fast food restaurant industries to adopt green initiatives since there is ample empirical and scientific evidence that the quality of green material is higher than that of highly engineered material. The quality of green material does not end with the assessments from the immediate consumers of a product, but rather have a ripple impact that is felt throughout the community (Chopra et al., 2016). In this case quality of material is assessed on its environmental friendliness by those tasked with sanitary disposals and the cost of health challenges associated with material that is usually financed from the national fiscus for all the citizens.

Green sourcing also leads to improved delivery performance. How green sourcing leads to improved delivery performance is baffling, but not surprising. Green materials are likely to be novel in nature and therefore are associated with innovative logistics infrastructure. Such innovative logistics infrastructure leads to both efficiency and effectiveness in meeting delivery schedules. This efficiency leads to accurate order picking, reliable delivery system, and timely deliveries. The idea behind delivery performance includes but not limited to timely deliveries. Timely delivery leads to the avoidance of early or late deliveries (Chopra et al., 2016). Early deliveries lead to excess inventory that may deteriorate before use or create storage challenges, while late deliveries may lead to costly production stoppages and failure to meet customer orders (Guiffrida & Nagi, 2006).

More specifically and practically, firms in the entire fast food restaurant industry value chain must focus on the generic green practices of reducing, reusing, and recycling. The introduction of SI 84 of 2012 has actually provided a sectorial targeted intervention of banning the use of non-biodegradable material as an extreme measure of reducing the use of environmentally unfriendly packaging material in the restaurant industry. This practically left operators with reusing and recycling as the other strategies to contend with. In terms of recyclable packaging material the restaurant industry can use green, clear, and amber glasses with up to 90%, 60%, and 50% recyclable content respectively (PRAG, 2009) for serving drinks. Recyclable plastic material can also be used for serving liquids in the restaurant industry, but this needs the introduction of some virgin polymer to improve to its performance. The most common plastic materials are Polyethylene Terephthalate (PET) which is a rigid plastic material made up of polyester in the form of ethylene glycol and terephthalic acid which is strong, clear and light; and High Density Polyethylene (HDPE) which is made up of strong, versatile and light weight monomer ethylene which is highly suitable for reuse. Metal packaging especially from aluminium and steel is equally good for both liquid and solid dishes in the restaurant industry since it can be used as both recycled and reused packaging material. Aluminium which is used for canned drinks can be infinitely recycled without loss of expected quality, while steel can be used for reusable plates especially for those patrons who require table services. The other recyclable packaging material comprises paper and board packaging material for solid food. The recycling process for paper, however, would require some introduction of virgin fibre to maintain the strength of the packaging material.

The final remarks relate encouraging governments to heavily enforce the existing regulations related to the use of green packaging material in the vast fast food restaurant industry. This may entail imposing heavy fines or revoking operating licenses for firms that are found violating the existing regulations. Complimentary efforts should also come from final consumers who must shun environmentally unfriendly packaging material. Equally important are the shareholders of restaurant firms who must also support green practices through disapproving management plans that are environmentally unfriendly.

VI. CONCLUSION AND FUTURE RESEARCH

This study had concluded that suppliers of green packaging material in the fast food industry are rated highly in terms of cost and quality than traditional suppliers of packaging material. However, the ratings in terms of delivery were

found to be similar for both green and traditional suppliers. This study demonstrated that suppliers must progressively shift to supplying green products in line with the prevailing wave full of promises to make this world a better place. Vendor evaluation if done properly leads to reduction in procurement costs and improvement in competitiveness (Jayaswal, Trivedi. & Kumar, 2012). However, future researches should be directed towards collecting hard figures of cost savings in sourcing green materials as a progression from the current study that had entirely relied on perceptions of the senior procurement personnel in procurement management units of various restaurant businesses.

Moreover, future studies should be alerted to the potential for green washing. Green washing is the act of misleading buyers about the environmental benefits associated with a product on offer (Delmas & Burbano, 2011). Therefore technological developments should be channelled towards mechanisms for detecting green washed products (Chopra et al., 2016). Furthermore, future studies must seek to evaluate suppliers based on additional metrics that are aimed at determining green performances of the suppliers in the restaurant industry, since vendor evaluation is more valid if it is industry specific (Ha & Krishan, 2008). This involves the use of metrics such as green competencies, environmental efficiency, green image, and material life cycle costs (Cousins et al., 2008).

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