

# The Degree of Material Distribution on Environmental Outcomes in Selected Large-Scale Fabrics Manufacturing Firms in Lagos State, Nigeria: A Control Approach

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## ABSTRACT

The research was conducted within the selected large-scale fabrics manufacturing firms in Lagos State with the goal of examining the degree of material distribution on environmental outcome. The study was done utilizing an outlined questionnaire through purposive sampling and total enumeration approach. The information was examined utilizing partial least square (PLS) that showed the opinion of participants in the transportation, warehousing, purchasing, inventory, and production section. The result of the study uncovered that material distribution does not have a marginal impact on environmental outcome. Nonetheless, the discoveries also show an inverse connection between material distribution and environmental outcome. This carefully suggests that an increment in material distribution philosophy will impact the environmental outcome of textile firms and otherwise.

## KEYWORDS

Environmental Outcome, Material Distribution, Philosophy, Textile Manufacturing Firms

## 1. INTRODUCTION

Material distribution is a functional and interdependent operation within any production facility that deals with the allotment and movement of materials. The interaction involves various operational mechanisms such as planning, implementation, and the optimization of material flow, and related information from the source to the point of need. Streamlining and optimizing these processes provides an advantage in terms of income maximization, stock turnover, inventory network speed, and effective client delivery (Yang, Hou, Ju, Gu, Qian, & Wang, 2020). According to Singh, Singh, Singh, and Kumar (2020) resources such as materials and plant design are maximized to enhance productivity. An effective dissemination of materials is the key to realizing rapid distribution. This could tackle the issue of crisis or shortage. Consequently, an optimal distribution of materials within

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a production chain can be accomplished by forecasting demand, retaining base stock, and allocation models(Rejeb, Rejeb, Simske, & Treiblmaier, 2021).

The primary goal of material distribution is optimal material allotment. Therefore, the optimization of material distribution is an integral aspect of production that can serve as a control model(Guarnieri, De-Aguiar, Thome, & Watanabe, 2021). The intricacies of production chain have significantly expanded due to the interaction of numerous echelons working interdependently and contending to serve the peculiarity of each client request. Besides these intricacies, production chains also face various material distribution vulnerabilities. Therefore, material distribution assumes a fundamental function in production procedures. Furthermore, the productivity of a distribution channel could be estimated by the capacity of the organization to optimize costs that are related to performing essential functions and distributions. The paradigm of material distribution within the boundaries of manufacturing entails primary distribution and secondary distribution(Cano, Gomez, & Cortes, 2021).

Given this, the deterioration of the environment by the utilisation of fossils could be linked to fossil fuel by-products from various energy and exchange-related sources(Shan, Genc, Kamran, & Dinca, 2021). Consoli, Haller, Doring, Hashemi, and Robinson (2021) posited that the overall carbon emanation is an after-effect of inventory chain and extensive proportion of energy utilisation during material distribution. Consequently, sustainable ecological techniques during material distribution is an essential variable in environmental outcome (Ufua, Emielu, Olujobi, Lakhani, Borishade, Ibidunni, & Osabuohien, 2021). The review by Chow (2021) affirmed that environmental outcome depends on industrial operations such as material distribution and numerous anthropogenic materials channeled into the environment. During the procedure of material distribution such as picking and allotment a machine with an optimal output should be selected. Moreover, a reduction in energy such as fossil fuel utilization within the distribution centre would enhance the environment from an environmental standpoint. Therefore, energy optimality is a focal means of achieving sustainability. Subsequently manufacturing firms need to focus on eco-production cycles and minimal material utilisation per unit production in a post-pandemic era(Olokundun, Ibidunni, Ogbari, Falola, & Salau, 2021). Extant literature's have examined material distribution and environmental outcome separately. However, the operational effect of material distribution on environmental outcome has not been given much consideration. It is on this surmise that the study seeks to assess the degree of material distribution on environmental outcome of selected large-scale fabrics manufacturing firms in Lagos State.

## **2. STATEMENT OF THE RESEARCH PROBLEM**

Any material distribution framework embraced in a production firm assumes a huge role in environmental sustenance i.e. environmental outcome. A proportion of energy such as fossil fuel is required during the process of material distribution via machines in fabrics firms (Knaga, Lis, Kurpaska, Lyszczarz, & Tomasik, 2021). Given this, the reduction of fossil fuel utilization would be of benefit to the environment. Furthermore an eco-friendly framework permitting minimal to zero utilization of fossil fuel during material distribution represents a bottleneck in the system. The reduction of non-renewable energy due to allocation and designating operations during material distribution is key to accomplishing environmental sustainability outcome. Thus, material distribution procedure is energy dependent. This can be traced to the release of carbon in view of longer freight pulls, extended stocks, and growing warehouses. Copious studies asserted that the fabrics industry make use of camber sewing equipment for sewing, and the completion activity is accomplished with the guide of bailing while, mechanical equipment handles material distribution. However, the environment is negatively affected because of the high pace of fossil combustion. Consequently, the study seeks to investigate the degree of material distribution on environmental outcome of selected large scale fabrics manufacturing firms in Lagos State, Nigeria.

### 3. LITERATURE REVIEW

In this section environmental outcome and material distribution is examined. This includes primary distribution and secondary distribution.

#### 3.1. Primary Distribution

Primary distribution is the progression of resources such as products, and materials from the manufacturer to the store and circulation centre. Hence, the determination of channel conveyance is impacted by the accompanying variables: the client, the item, the manufacturers objective, and the retailer's perspective (Save, 2019). According to Cano, Gomez, and Cortes, (2021) to achieve an optimal distribution, manufacturing firms depends on primary distribution, which infers the circulation of items from the production plant to the warehouses. If a production chain is disrupted the echelon impacted the most is identified to limit the disruptions in supplies and requests thus, organizations search for techniques of survival in difficult periods to sustain their market stake (Farooq, Hussain, Masood, & Habib, 2021). Consequently, the optimization of operations and modules in manufacturing firms is an essential variable in primary distribution.

According to De-Koster, Johnson, and Roy (2017) storerooms frequently convey items with different life cycles therefore, the distribution procedure is significant in terms of demand. However, the implication on the storeroom activities is often neglected. Storerooms play a fundamental function in coordinating the item demand with supply across various echelons in the production chain. No production network plan is satisfactory without considering the area, plan, and storage. The proficiency of a channel can improve by including an intermediary. Notwithstanding, the quantity of intermediaries associated with the distribution within any production plant can influence the effectiveness of the whole channel (Andjelkovic & Radosavljevic, 2020). Therefore, an increase in intermediaries influence the appropriation costs.

#### 3.2. Secondary Distribution

Secondary distribution is the conveyance of resources such as products from the warehouse to the clients (stores). Secondary distribution is a complex hierarchical chain due to clients and grocery stores situated outside of the manufacturing facility. According to Nie, Zhang, Yan, and Yang (2019) manufacturing firms and retailers utilize secondary distribution model in the first period of distribution and decide their individual selling costs in the subsequent period. The study utilized on-line and off-line technique with the condition under which retailers pick prices utilizing secondary distributive models. Ufua, Ibidunni, Akinbode, Adeniji, and Kehinde (2021) posited that the removal of waste and the decrease in lag time in a distribution chain leads to an improvement in the inventory chain. Therefore, the efficiency of a distribution chain leads to an optimal performance in other to sustain the framework. As business entities continually search for ways of reinforcing their market stake and adapting to the dynamics of globalisation, there is a need for an adaptable distributive framework. Multi-distribution allocation is done by many organizations, taking into account that a major portion of the participants within the production chain creates bottlenecks (Pafenov, Shamina, Niu, & Yadykin, 2021). This circumstance is compounded by the way affiliates, specifically external sales team, regularly interface with the supplies.

#### 3.3. Environmental Outcome

Environmental outcome is an incorporated framework that entails management metrics and its effect on the society. Zhang, Zhang, Perez, Skitmore, Yang, Phiblin, and Lu (2021) in there study stated that the outcome of ecological consequence such as environmental change, deforestation, biodiversity depletion, exhaustion of water create contamination and ecological bottleneck that compromise sustainability. Thus, environmental outcome can be an organization's estimation of its ecological effect, minimization of resources and energy utilization such as fossil fuel. The matters of the environment

according to Petera, Wagner, and Pakšiová (2021) is increasingly important for companies and the reduction harmful discharge or waste. The inclusion of environmental bottlenecks into a production model prompts the inclusion of sustainability into business and invigorates the implementation of environmental framework. Van and Goldworthy (2021) asserted that the knowledge of ecological effects might assist with the modification of technological models that will consider the environment. The study therefore, contend that consideration should be given to the environment as well as the technological output.

### **3.4. Material Distribution and Environmental Outcome**

Zanoletti, Bilo, Depero, Zappa, and Bontempi (2018) reported that techniques and materials can be modelled for remediations, however the ecological effect for instance natural resource utilization and discharges, are not given consideration. The study further accepted that techniques should be constantly assessed in-terms of material appropriation and carbon emission. This can be framed to tackle climate issues utilising sustainable techniques. Ecological concern is based on the immediate exposure to air contamination, blockage with respect to climatic inconsistencies, dietary concerns, or different features of “unwanted turn of events” identified with the environment (Ulman, Mihai, Cautisanu, Brumă, Coca, & Stefan, 2021). Environmental damage is connected to under-assessment and material dissemination. This is due to abuse, and the issue has become one of the principal bottlenecks of any conversation identified with sustainability. The study by Briffa, Sinagra, and Blundell (2020) stated that environmental contamination is a synthetic substance that is available at a significant level than other areas of the habitat. The study further stated that industrialization has progressed at a fast pace making the demand for earth’s resources at an imprudent rate. The environment has been contaminated by several inorganic particles, and toxins due to material appropriation operations.

## **4. METHODOLOGY**

The study utilized quantitative procedure that adequately allowed the study to reflect the present circumstance concerning the paradigm of material distribution and environmental outcome. The study utilized quantitative technique in other draw conclusion and inference from an objective view. Quantitative procedure is also suitable for this study because it helps in examining the cause and results of the subject matter. According Abuhamba, Ismail, and Bsharat (2021) quantitative approach helps in comprehending a subject objectively as its requires a holistic overview of a framework. The main information gathering instrument engaged was questionnaire. The utilization of survey instruments such as questionnaire provides bases of gathering key information from participants involved in material distribution. The questionnaire was based on material distribution and environmental indices. The questionnaire was closed ended which was administered to employees in the transportation, warehousing, purchasing, inventory and production division.

### **4.1. Study Population and Model of Analysis**

The investigation embraced purposive sampling and total enumeration approach in other to focus in on material distribution. The populace included 15 large scale fabrics firms operational in Lagos State, so that (659) detailed questionnaires were scattered to transportation, warehousing, purchasing, inventory and production employees of the fabrics manufacturing firms. Five hundred and one (501) questionnaires were recuperated and were suitable for analysis. The information gathered was coded into smart partial least square(PLS) to analyse the information. The connection coefficient was utilized to discover the degree of connection between material distribution and environmental outcome.

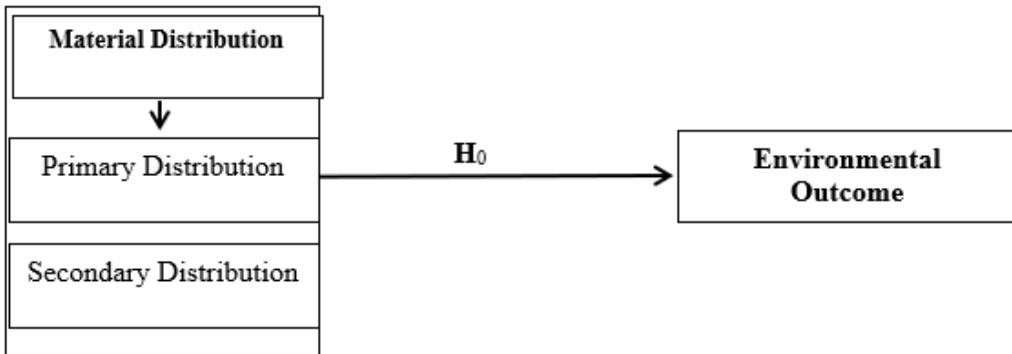
## 4.2. Operational Modelling of Research Variable

$$Z = \mu X + e \dots 1$$

X: material distribution, Z: environmental outcome,  $\mu$ : coefficient, e: error.

Equation 1 explains the connection between Z (environmental outcome) which is a dependent variable and X(material distribution) a leaning variable while, e is the error term.

Figure 1. Schematic model



## 5. STUDY RESULTS

Table 1. Descriptive Result of Material Distribution

Material Distribution	Yes	No
Primary Distribution	258 (51.5)	243 (48.5)
Secondary Distribution	300 (59.8)	201 (40.2)

The analysis of material distribution was estimated utilizing two (2) variables, as displayed in Table 1. One of the things utilized for this estimation was to see whether fabrics firms utilized primary distribution. 258 (51.5%) concurred, while 243 (48.5%) had a contradicting opinion. Likewise, for secondary distribution 201(40.2%) selected yes and 201(40.2%) had a divergent view.

**Table 2. Descriptive Result of Material Distribution and Environmental Outcome**

	Very Great Extent.	Great Extent	Moderate Extent	Small Extent	Not at all	Mean	SD
<b>Material Distribution</b>							
Primary Distribution	0	0	0	222	279	1.44	0.50
Secondary Distribution	0	0	0	221	280	1.44	0.50
<b>Environmental Outcome</b>							
Limit the discharge of harmful substances or waste.	60	118	141	148	34	3.02	1.15
Limit the utilization of energy such as fossil fuel	40	140	134	152	35	3.04	1.09
Limit the utilization of immediate or indirect use of materials	11	147	123	211	9	2.88	0.92
Limit the utilization of dangerous materials	10	156	239	85	11	3.13	0.80
Enhanced the overall environmental outcome	102	104	224	55	16	3.43	1.04
Further developed consistency with ecological guidelines and norms	100	95	98	197	11	3.19	1.21

Accordingly, this data assists in demonstrating that material distribution is a decision variable so much so that it is a significant echelon within manufacturing operations proportionately impacting environmental outcome. The elucidating result of material distribution was estimated utilizing two (2) variables, as displayed in Table 2. The variables utilized for this estimation were used to discover the degree to which fabrics firms utilized material distribution (primary distribution and secondary distribution). The majority of participants opined that fabrics firms sparingly utilized material distribution (primary distribution and secondary distribution). The analysis of the environmental outcome was estimated utilizing six (6) things. This was utilized to discover the degree to which fabrics firms limited the discharge of hazardous substances or waste. It was found that a large percentage of the respondents understood the factors behind environmental outcome.

**Table 3. Construct Validity and Reliability**

	Loading	Outer Weights	VIF	t-statistics	P Value	AVE	Composite Reliability	Cronbach's Alpha
Constructs	≥ 0.6		<3.0	>1.96	<.05	≥0.5	≥ 0.8	> 0.7
<b>Material Distribution</b>						<b>0.629</b>	<b>0.870</b>	<b>0.781</b>
Primary Distribution	0.812	0.453	2.595	12.573	0.000			
Secondary Distribution	0.909	0.460	1.459	29.489	0.000			
<b>Environmental Outcome</b>						<b>0.597</b>	<b>0.898</b>	<b>0.866</b>
Env outcome 1	0.724	0.226	1.780	13.839	0.000			
Env outcome 2	0.729	0.288	1.867	11.638	0.000			

*Table 3 continued on next page*

Table 3 continued

	Loading	Outer Weights	VIF	t-statistics	P Value	AVE	Composite Reliability	Cronbach's Alpha
Env outcome 3	0.699	0.224	1.910	7.386	0.000			
Env outcome 4	0.868	0.278	2.529	33.953	0.000			
Env outcome 5	0.750	0.294	2.369	10.145	0.000			
Env outcome 6	0.851	0.265	2.883	26.813	0.000			

Table 3 depicts the factor loading for material distribution and environmental outcome, as well as the standardized regression and correlation coefficients. In the formative measurement of everything related to material distribution and environmental outcome, the outer weight acquires the relative value of each indicator. The composite reliability, average variance extracted (AVE) calculation, and Cronbach Alpha was also statistically tested to assess the validity and reliability of the research process. The loading factor, composite reliability, AVE, and Cronbach Alpha statistical values were all within the permissible value. Convergent and discriminant validity were also considered for determining construct validity in the report. Convergent validity refers to evidence of a relation between material distribution on environmental outcome, whilst discriminant validity does not require a measure to be strongly correlated with the measures it is supposed to distinguish. All the factor loading of the specific items of measurement are above the recommended thresholds. The consequence is that all the items have a significant amount of variation in common. Furthermore, in assessing discriminant validity, the analysis equated AVE with the squared correlation for each of the constructs. The latent variable's AVE exceeds the squared correlations between the dormant variable and the model's constructs.

### 5.1. Common Method Bias

Variance inflation factor (VIF) was used to check for common method bias. It should be noted that if a VIF occurs more than 3.3 times, the model is likely to be influenced by common method bias. If all factor-level VIFs from a complete collinearity test are equal to or less than 3.3, the model does not suffer from common method bias. As a result, the VIF values for each of the measurement items and constructs for **material distribution** and **environmental outcome** are all less than 3.3. This implies that the hypothesis model is free of common method bias.

#### 5.1.1. Statistical Output utilizing smart partial least square(PLS)

Based on the statistical values such as t-value, R<sup>2</sup> value, and the p-outcome. The level of connection between material distribution and the environmental outcome was decided by the coefficient value of the partial least square (PLS) model. -0.510 coefficient portrays the degree of material distribution on environmental outcome. The R<sup>2</sup> value is 0.260, t-statistics = 4.012 > 1.96, P-outcome = 0.000 > 0.05. Given the R<sup>2</sup> value portrayed, it implies that environmental outcome represents 26.0 of material distribution variability. Thus, material distribution has no considerable effect on environmental outcome. In any case, there is an inverse connection between them which infers an expansion in material distribution operations will invariably affect environmental outcome.

Table 4. Coefficients for Material Distribution and Environmental Outcome

	Coefficient	R <sup>2</sup>	Std. Dev	T-statistics	P- outcome
Material Distribution Environmental Outcome	- 0.510	0.260	0.137	4.012	-0.510

Table 4 portrays the partial least square(PLS) outcome of hypothesis H<sub>0</sub>, which zeroed in on the degree of material distribution on environmental outcome. The discoveries shows that material distribution has no marginal effect on environmental outcome at ( $\beta = - 0.510$ ,  $R^2=0.260$ ,  $t\text{-value}=4.012 > 1.96$ ,  $P\text{-outcome} = 0.000 > 0.05$ ). The coefficient of - 0.510 shows that material distribution has a negative outcome and the R<sup>2</sup> outcome of 0.260 demonstrates that 26.0% change in environmental outcome can be explicated by material distribution.

## 6. RESULT OF FINDINGS

The review explored the degree of material distribution on environmental outcome of selected large-scale fabrics firms in Lagos State. The findings uncovered that material distribution has no critical impact on environmental outcome. Obviously, material distribution portrayed a negative at - 0.510, while the T-value of noticeable variables is above the basic value of 1.96 at a level of 95. Notwithstanding, discoveries from existing studies show that material distribution can be re-engineered to meet ecological guidelines, and sustainable material distribution machines that are eco-friendly should be engaged than conventional machines. This indicates an inverse connection between material distribution and environmental outcome. Thus, a sustainable design of an inventory chain ought to be utilized in view of the use of less energy during production and per unit distribution (Adedugba, Ogunnaike, Adeyemo, & Kehinde, 2021). Consequently, eco-friendly machines responsible for picking and stacking offers time and ecological optimality over conventional methods. Nonetheless, there is an inverse connection between material distribution and environmental outcome which infers that a unit increase in material distribution will impact the environmental outcome and otherwise.

## 7. CONCLUSION

The study recognized the need to optimize environmental outcome during material distribution. This likewise demonstrates the validity of the model that portrayed the linkage between material distribution and environmental outcome. Material distribution is an impetus of environmental outcome. Indisputably, the vast majority of the selected large scale fabrics firms examined were not optimizing material distribution. However, primary distribution and secondary distribution inversely moderates the release of harmful substances or waste, the use of hazardous materials, consistency to ecological guidelines. Hence, the study infers that fabrics firms should embrace material distribution frameworks that are eco-friendly. Besides the technique of material distribution should to be re-engineered to meet ecological guidelines and advance sustainable ecological outcome. The study likewise suggests that the management of the fabrics firms should focus on material distribution (primary and secondary distribution) to adequately control the outflow of harmful substances or waste which could also serve as a control approach. The study likewise infers that material distribution is particularly at the forefront of optimizing environmental outcome and habitat sustainability. This suggests that fabrics firms can further develop their material distribution model and aim to sustain the environment. The study acknowledges that other variables aside from the recognized variables in this research can be instrumental to material distribution. Therefore, further studies can be carried out utilizing variables that are not mentioned in this study in any other manufacturing sector. Environmental outcome



wasn't numerically measured by the study consequently, further studies can investigate and measure environmental outcome to ascertain the measure of its impact.

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