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## EFFECTIVE MATERIAL MANAGEMENT AND FIRM'S PRODUCTIVITY IN SELECTED ALUMINUM MANUFACTURING FIRMS IN DELTA STATE, NIGERIA

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### ABSTRACT

This study investigated how effective material management (MMGT) affects firm's productivity in selected aluminum manufacturing firms in Delta State, Nigeria. The specific objectives of the study are to ascertain effect of the measures of effective MMGT, namely; Planning Strategy (PS), Material Control Management (MCM) and Work-In-Progress Management (WIPM) on Firm's Productivity (FP). The respondents' responses were collected using a five (5) likert scale questionnaire. This study's population is 293 people, with a sample size of 169 employees from the selected Aluminium company in Delta State, Nigeria. The questionnaire was coded using an excel spreadsheet, and the respondents' profiles were analysed manually using basic percentage, while descriptive statistics, correlation matrix, and multiple regression used statistical tools in SPSS version 23. The findings showed that there is a substantial positive association between PS, MCM, and WIPM and FP. The study's findings indicate that good MMGT has a positive and significant effect on company productivity in selected Aluminium manufacturing enterprises in Delta State, Nigeria. As a result, the study proposed that Aluminium manufacturing firms adopt a policy framework to promote speedier implementation of material control systems in Nigerian Aluminium production in order to excel and ensure its future, hence increasing organisational efficiency.

**Keywords:** Material, Management, Productivity, Planning, Strategy and Work-In-Progress.

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## INTRODUCTION

In the current, highly competitive business world, organisations must develop new ways to give value to customers. Due to the growing need for industry to compete on price and quality in a worldwide market, a more productive storage strategy is needed (Egwuatu, 2021). Large manufacturing enterprises now depend on material management (MMGT). MMGT occurs before processing final goods for client distribution (Coyle, Bardi, & Langelly 2016). MMGT appears to be an essential hub in a supply chain network because it helps develop materials, manage items, dismiss vehicle loads, create stock keeping unit combinations, and gather materials for shipments. MMGT plans, executes, and controls field and office events. MMGT aims to keep materials at the ready (Adamu, 2020). MMGT plans and manages all the efforts needed to specify the right quality and quantity of materials in a timely order, at a fair price, and most importantly, always available at the point of use. Production costs can rise due to poor MMGTs (Cross, 2019). All operations from supplier such as physical supply, operations planning and management, and distribution to customer are part of MMGTs (Antony & Navodaya, 2017). Some phrases for these are corporate logistics and supply chain management. Business logistics often prioritises transportation and distribution over production operations. MMGTs optimises customer service and profitability by reducing costs and optimising resources. Assiamah, Daniel, and Hanson (2018) state that MMGTs main goal is to buy and deliver the correct product to manufacturing activities at the proper time, place, and cost. They underlined that poor material resource planning can hinder an organization's performance.

Nigerian manufacturers understand the benefits of good MMGTs and are taking an interest in it because their existence depends on how well they manage their expenses (Bailey, 2014). However, most Nigerian enterprises do not use improved materials administration methods compared to resources spent on purchase and maintenance. Lack of adaptability, committing a lot of sensitive material activities to one office, and lack of a coordinated database to enable data flow on materials are material administration concerns (Wanjogu, Iravo & Arani, 2015). Any organisation must handle raw materials, WIP, and finished materials (Bergamaschi, Cigolini, Perona & Portioli, 2017). Ogbadu (2019) listed basic pricing, purchasing costs, inventory carrying expenses, transportation costs, materials handling costs, office costs, packing costs, marketing costs, obsolescence, and wastages as these items' costs. Commodities Management is the management (MGT) of these commodities to lower costs. Materials account for about 50% of industrial enterprises' yearly turnover. This shows that manufacturing enterprises should prioritise material control to avoid needless costs (Dagim, 2018).

MMGTs is now considered the last limit for cost control and profit improvement, influencing higher production and productivity and widely created for cost-effectiveness in any business. However, the materials manager must realise that whatever and whenever realised depends primarily on top management support and without it all his efforts are in vain. In MGT or enterprise management, we learned that a company must properly plan, organise, control, and coordinate to achieve its goals and objectives. For the materials to turn out well, the company must strategize how to carry out its production, purchase, and supply schedules and efficiently plan its transportation, warehousing, etc. MMGT reduces project expenses significantly. If supplies are purchased too early, funds may be seized and interest charged for surplus inventory.

Without proper storage, materials may lose value or be stolen. Lack of materials for some activities might cause delays and extra costs. So MMGTs should no longer be seen as a drain-pipe but as a serious stabilising and economic growth force.

The Nigerian aluminium sector is plagued by project delays, inadequate work, disagreements, cost and time overruns due to material shortages and wastages, theft and displacement of materials on site, and weak accounting and security systems. Materials shortages hinder production and raise expenses. The main cause is improper MMGT. Managers may delay by not giving materials. Non-compliance with material requirement planning of quantities, schedule of materials, specifications, and breweries programme in material stock control practise adds to a company's gradual decrease in profitability and often delays material stock control (Udoh, 2018).

Dey (2015) noted that the pace at which materials are wasted due to poor MGT is hurting the company's profit margin and ability to use supplies efficiently to do excellent work. MMGT is crucial in today's fast-paced economy. Stock outs, over supply, over stocking, stock obsolescence, bad forecasting, stock pilferage, poor customer responsiveness, and poor MMGT equipment, methods, and practices impair productivity in most manufacturing organisations. Edwin (2015) discovered that cement manufacturers with good MMGT were more lucrative. Wilfred (2014) discovered that material control MGT enhances sales effectiveness, material storage, and operating cost in a Nigerian seven-up bottling company. Unfortunately, few research have examined how MMGTs affects manufacturing firm productivity in underdeveloped economies like Nigeria. This study filled the knowledge gap by examining how effective MMGT influences company productivity in selected Delta State aluminum manufacturing enterprises.

## **REVIEW OF RELATED LITERATURE**

### **Conceptual Framework**

#### **Material Management (MMGT)**

When we are talking about materials it may include raw materials, components; sub-assemblies etc. The MMGTs is a process that starts with the supplier (Bially 2015). The MMGTs process begins from the point of entry into the company as raw materials and components. The receipt and section functions begin on receipts of delivery notice from the supplier (Heinritz, 2011). The purchase order copies are received and checked so that quality and other specifications meet the firm's requirements. After then, the inspection job is carried out. The inspection can be carried out by the storekeeper, by technical staff, and by the department requisition, (Morrison 2014). MMGT is defined as the process to provide accurate material at the exact place at right time in right quantity so as to minimize the cost of project. MMGT is associated with the planning, identification, procuring, storage, receiving and distribution of material.

The basic goal of MMGT as explained by Jacobs, Chase, & Aquilano, (2009) is to make sure that the right item is purchased and made available to the manufacturing operations at the right time, at the right place and at the minimum cost. Dobler and Burt (2016) states that MMGT provides an integral system approach to the proper arrangement of materials activities and the total material price. They see it as something that stand as assigning to a single operating department all main activities, which contribute to the price of materials. The goal is to enhance performance of materials systems, as opposed to sub-optimizing the performance of sub-individual operating units that are fragment of the material system.

## **Organizational Productivity**

A calculation that compares input and output is called productivity. Outputs are the outcomes of an organization's labour, whereas inputs are the quantity of resources used, including labour, money, time, space, technology, and human resources. The employee is deemed productive if the inputs and outputs are equal. More gets done in a given amount of time when an organisation is productive. Their business also saves money on manpower and time thanks to efficiency. Because they lose more time to projects, people that are unproductive take longer to finish them and incur more costs (Ikeanyibe, 2009). A measure of an organization's efficiency in converting input resources (labour, materials, machinery, and money) into goods and services is called productivity (Tokarčíková, 2013). According to Dorgan (2014), productivity is "the improved organisational and functional performance, including quality." The economic measure of output per unit of input is employee productivity, according to Nda & Fard (2013). On the other hand, Rohan and Madhumita (2012) take a different tack and define employee productivity as the log of net sales divided by total employees. Three definitions of productivity are presented by Pritchard (2015): output/input, which is a measure of efficiency; productivity is a composition of effectiveness and efficiency; and productivity is everything that improves operation inside the organization.

It is impossible to overstate the benefits of increased employee productivity in manufacturing companies, which include: lower costs and prices for both capital and consumer goods; longer workweeks and better living and working conditions; higher incomes and profits; higher earnings; and finally, more opportunities for shorter workweeks. bolstering employees' overall financial base (Parker, Waller & Hu, 2013). Real production divided by labour hours is referred to as productivity. Global capital flows are significantly influenced by it. According to Skoczylas and Tissot (2005), the United States appears to have better productivity levels than the euro area due to its higher employment rates. The ability of an employee to generate work or goods and services that meet or exceed the expectations of their employers is known as productivity, according to Meneze (2006). Bojke (2012) states that productivity is determined by summing the total amount of input and output that was produced. According to Amah(2006), productivity is the amount of resource (input) that is combined and used effectively to produce the long-term, high-quality goods and services that society needs. According to this, efficiency and economical resource usage go hand in hand to produce production. An organisation with high productivity is one where waste is kept to a minimum and resources are used effectively. Various economic, social, technical, and environmental goals are balanced in terms of productivity (Amah, 2006). Increased profitability for investors and business growth are two benefits of high productivity. Measuring productivity reveals areas that could have development as well as the effectiveness of current efforts. Analysis of efficacy and efficiency benefits from its utilisation.

## **THEORETICAL REVIEW**

### **Inventory Management Theory**

Inventory Management Theory is the foundation of this research: By Nowicka-Skowron (2007), the theory of inventory management was introduced. It highlights how important logistics chain management materials are for forecasting and MGMT. According to the hypothesis, the chain operator's capacity to move items and obtain high-quality information is largely dependent on how readily available such resources are. Material theory, also known as the mathematical

theory of inventory and production, is a subfield of operations research and operations management that focuses on designing production and inventory systems to reduce costs. It analyses the choices that businesses and the military make regarding manufacturing, warehousing, supply chains, spare part allocation, and other related issues. It also provides the mathematical underpinnings of logistics. The challenge a company faces when determining how much to order in each time period to meet product demand is known as the inventory control problem. Optimal control dynamic programming and network optimisation are mathematical techniques that can be used to model the problem.

Finding guidelines that MMGT can apply to reduce the expenses of upholding MMGT and satisfying consumer demand is the goal of inventory theory. The goal of studying inventory MMGT is to provide significant cost savings for businesses. The following questions are addressed by inventory MMGT models: When should a product order be placed? How big of an order should each be? MMGT is the aggregate term for the solutions to these problems. Businesses can reduce costs by developing mathematical models that represent the inventory system and then using those models to determine the best MMGT strategy.

### **Economic Order Quantity [EOQ]**

The EOQ is a mathematical model for inventory control management developed by F.W. Harris in 1913. This inventory model is concerned with two main decisions: how much to order (purchase or produce) and when to order so as to minimize the total cost. For the foremost decision—there are two basic costs to consider namely, inventory carrying/holding costs and the ordering/acquisition costs. As the quantity ordered is increased, the inventory carrying cost increases while the ordering cost decreases. The ‘order quantity’ means the quantity produced or procured during one production cycle. EOQ is computed by balancing the two costs. EOQ is that size of order which minimizes total costs of carrying/holding and cost of ordering/acquisition. i.e., Minimum Total Cost occurs when Inventory Carrying Cost = Ordering Cost. Holding cost include the cost of financing the inventory along with the cost of physically maintaining the inventory.

Ordering cost include the cost associated with actually placing the order. These include a labor cost as well as a material and overhead cost. Organisation can therefore rely on the EOQ principles deploying the when to order (re-order level/point) and how much to order (EOQ) in an attempt to enhance their MM practices to reduce total inventory cost.

### **Empirical Review**

Previous researches agree on how materials management affects organisational productivity. Egwuatu (2021) examined MMGT and organisational productivity in South-East Nigerian breweries. We used descriptive survey research. The research was done in South-East Nigeria. The populace The sample size was 328 using sample size computation. The study employed a questionnaire. Face and content validity were used, while test re-test and Cronbach Alpha were used for instrument reliability. Multiple Regression was utilised to evaluate hypotheses and simple percentage analysis answered research questions. Tests were done using SPSS version 21. Results demonstrated that material control boosts organisational productivity in South-East Nigerian breweries. Organisational productivity in Nigeria Brewery South-East is improved via material planning. The study found that MMGT boosts organisational productivity in Nigeria Brewery South-East. The report advised manufacturing enterprises to create a policy framework

to accelerate material control system deployment in Nigerian breweries to succeed and secure their futures, enhancing organisational productivity.

Adamu (2020) conducted a survey with 242 participants and 151 samples to investigate how MMGT affects the Benue Brewery Industry in Nigeria. Descriptive statistics such as frequency and simple percentage were used to examine survey data, and multiple regression analysis was used to confirm the correlations between the model variables. Inventory control systems and stock value significantly improve organisational performance ( $p < 0.05$ ), according to regression analysis. Lead time had a substantial negative correlation ( $p < 0.05$ ). The researcher concludes that well-planned MMGT can enhance workplace productivity. The study proposes that the Nigerian Brewery management increase lead time in order to procure and deliver materials more promptly.

Kisioya and Moronge (2019) study how material handling procedures affect Nairobi manufacturing enterprises. The study targeted 355 large industrial enterprises in Nairobi County, Kenya, using descriptive survey technique. 188 big manufacturing enterprises in Nairobi County, Kenya, were sampled using stratified random sampling. Structured questionnaires on a Likert scale obtained primary data. Completed questionnaires were coded and entered into SPSS. Data analysis included descriptive and inferential statistics. The analysed data was given in tables with explanations." A good 71.3% response rate was achieved. Most material handling techniques indicators improve corporate performance. The study used regression analysis to determine the variables' relationships at 5% significance. Four characteristics significantly affected firm performance, according to the study.

Joel and Noor (2019) examined how MMGT affects large manufacturing firms in Nairobi City County, Kenya. The study used a descriptive research design, which is a plan, structure, and method to answer research questions and control variation. Research data was reviewed for errors and omissions, coded, defined, and entered into SPSS Version 23. Data categories were depicted using descriptive statistics. To determine clustering or dispersion, the dependent and independent constructs' mean, standard deviation, and variance were employed. Multiple linear regression analysis was utilised to examine independent variable statistical significance. The coefficient of determination ( $R^2$ ) was used to test the model's significance by measuring how much variability in implementation on supply chain performance is explained by factors on outsourced distribution services. Supply, pricing, and utilisation are basic materials management functions, according to the study. Large manufacturing companies should examine materials management and how it benefits their supply chain to facilitate production and identify areas of need.

Daniel (2019) explored how materials management affects organisational productivity. Nigerian businesses underestimate the power of materials management to boost efficiency. Yamane's statistical formula yielded 255 from 705 at 5% error tolerance and 95% degree of freedom. The surveys were distributed 255 times, with 250 returned and 5 not returned. A Likert scale was used to create the survey. To ensure questionnaire validity, researchers pre-tested it. Hypotheses were tested using Pearson moment product co-efficient and regression. The study found that MMGT increases corporate profitability, adequate storage facilities prevent production interruptions, and more. since a result, a respectable record system of materials for the organization's operations was suggested, since it affects production and staff training to gain new skills and knowledge for the organization's benefit.

A Case Study in Commercial Bank of Ethiopia by Dagim (2018) examined how MMGT affects organisational effectiveness. The study used descriptive research to examine how MMGT affects bank performance. The study targeted 80 bank MMGT workers. The researcher employed census sampling to sample all bank MMGT staff. The quantitative data were analysed using mean, standard deviation, median, and percentages. The thesis shows that planning and use are practiced, but federal proclamation is not followed. This showed that the bank's material procurement is not legal. Inventory control system is moderately used and lacks depth.

Assiamah, Daniel, and Hanson (2018) examined materials management and supply chain costs at a Ghanaian cocoa processing company. Using primary data, face-to-face and telephone interviews and questionnaire, because of the research, qualitative approach was chosen over others to collect secondary data from university library and online sources. Manufacturing enterprises depend on materials (inventory), which make up 20–60% of their balance sheets. If materials management is implemented with qualified staff, cost can be reduced. As a materials manager promotes supply chain coordination and integration, interdepartmental conflicts, inventory levels, corporate operations knowledge, and materials handling costs are expected to decrease.

Saukkonen (2017) examined Black Bruin MMGT system development. Focus on inventory replenishment and cost modelling. The research method was mixed, including qualitative and quantitative methods. The author used VBA code to create the best inventory control system for Black Bruin Inc. in Excel based on the obtained data. Thus, the model could aid inventory operations decision-making. The model calculates the optimal order quantity and reorder point choice variables for the minimal total cost target. The author listed the model's pros and cons and most sensitive and uncertain parts at the end of the investigation. Guidelines for model use, enhancements, and research proposals were also provided and described.

MMGT affected Mumias Sugar Company Limited in Kenya, according to Cyprian and Makori (2017). Stratified random sample selected 79 Company respondents. The 79 sample represented 10% of the target population, which is statistically significant in a descriptive study with a finite universe. Research questionnaires were used. SPSS was used to calculate frequencies and percentages to answer study questions. Results show that materials procurement and inventory control improved Kenyan sugar manufacture.

### **METHODOLOGY**

The study adopted descriptive survey design. Its purpose was to establish relationships between the independent variables of study and firm's productivity (FP) and ensured that the ensuing sample sufficiently represents the population (Tarurhor & Osazevaru, 2021; Tarurhor & Emudainohwo, 2020).

The sampling object of the study is the staff of Hi-Tech Abata Aluminum Industries, Nefkon Aluminum Nigeria, Whictech Group Limited, Kimbo Aluminum Nigeria Ltd and Viscalo Aluminum Company which their responses were collected with aid of structured questionnaire. Hence, from this, the staff of Hi-Tech Abata Aluminum Industries, Nefkon Aluminum Nigeria, Whictech Group Limited, Kimbo Aluminum Nigeria Ltd and Viscalo Aluminum Company would serve as our respondents. The total number of staff of the five companies is depicted in the table below.

Table 1  
*Profile of the Organization*

Name of Company	Location	Number of Contract Staffs	Number of Core Staffs	Total Number of Staffs
Hi-Tech Aluminum Industries	Abata Warri, Delta State	38	12	50
Nefkon Nigeria	Aluminum Ozoro, Delta State	37	9	46
Whictech Limited	Group Asaba, Delta State	47	9	56
Kimbo Nigeria Ltd	Aluminum Agbor, Delta State	69	13	82
Viscalo Company	Aluminum Sapele, Delta State	49	10	59
<b>Total</b>				<b>293</b>

Source: Personnel Managers of the Firms, 2024.

Thus, the population of this study was two hundred and ninety-three (293) respondents. A total copies of one hundred and sixty nine questionnaires which represent the sample size were distributed to the respondents.

The study will employ Cronbach's alpha coefficient to test for data reliability, whose value falls between zero (0) and one (1). Thus, Cronbach's alpha ( $\alpha$ ) indicates the extent to which a set of test items can be treated, as measuring a single latent variable. Higher values of this coefficient, mean that scales are more reliable. A value of 0.7 is acceptable and a minimum level of 0.6 is also considered good.

The researcher administered the questionnaire to staff of Whictech Group Limited in Asaba, Delta State, Nigeria. The questionnaire was administered in person to give a high response rate. The next step after testing the validity is conducting the reliability test. The results of the reliability test can be seen in the table below:

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.887	.895	5

Source: SPSS Output, 2024.

It is evident from the table, that that the five variables are reliable because its Cronbach Alpha value is greater than 0.6, that is 0.887. All items are reliable, hence, the questionnaire used in this study can be considered as a good instrument for measuring the variables

Data collected from respondents were analyzed by the use of descriptive statistics using SPSS version 23 and presented through percentages, means, standard deviations and frequencies. In addition, the study used regression and correlation analysis, in order to; establish the relationship between measures of effective MMGT on firm's productivity in selected Aluminum Companies Delta State, Nigeria. The dependent variable which is Firm's Productivity (FP) expected to be influenced by the measures of Effective MMGT, namely; Planning Strategy (PS), Material Control Management (MCM) and Work-In-Progress Management (WIPM).

## RESULTS AND DISCUSSION

A total of one hundred and sixty-nine (169) questionnaires were administered, to members of staff of selected Aluminum company in Delta State, Nigeria, Specifically; Hi-Tech Abata Aluminum Industries in Warri, Nefkon Aluminum Nigeria in Ozoro, Whictech Group Limited



in Asaba, Kimbo Aluminum Nigeria Ltd in Agbor and Viscalo Aluminum Company in Sapele, out of which one hundred and forty-six (146) were retrieved and properly filled. It represents 86.39 percent of the total questionnaire administered, which shows that one hundred and forty-six (146) respondents is sufficient for the study (Draugalis, Coons & Plaza, 2008; Tarurhor, 2024). Thus, the sample used for the study was the one hundred and forty-six (146) respondents from staff of Hi-Tech Abata Aluminum Industries in Warri, Nefkon Aluminum Nigeria in Ozoro, Whictech Group Limited in Asaba, Kimbo Aluminum Nigeria Ltd in Agbor and Viscalo Aluminum Company in Sapele, all in Delta State, Nigeria. This response was excellent and representative of the population and conforms to Cooper & Schindler (2014) stipulation that a response rate of 50% is adequate for analysis and reporting; a rate of 60% is good and a response rate of 70% and above is excellent.

Table3

*Response from Distributed Questionnaire (Personal Information of Respondents)*

S/N	Variables	Frequency	Percentage (%)
1.	<b>Gender</b>		
	Male	121	82.88
	Female	25	17.12
		<b>146</b>	<b>100</b>
2.	<b>Age Distribution</b>		
	15-20years	29	19.86
	21-30years	68	46.57
	31-40years	72	49.32
	41-50years	7	4.79
		<b>146</b>	<b>100</b>
3.	<b>Marital Status</b>		
	Married	58	39.73
	Single	83	56.85
	Separated	4	2.74
	Divorced	1	0.68
		<b>146</b>	<b>100</b>
4	<b>Educational Qualification</b>		
	WAEC/GCE/NECO	67	45.89
	HND/BSC	76	52.05
	MBA/MSC	2	1.37
	OTHERS	1	0.68
		<b>146</b>	<b>100</b>
5.	<b>Designation (Level of Management)</b>		
	Top level	37	25.34
	Middle Level	48	32.88
	Low Level	61	41.78
		<b>146</b>	<b>100</b>

Source: Researcher Field Survey, 2024.

From the Table 3 above showing the demographic characteristics of employees of selected Aluminum company in Delta State, Nigeria, Specifically; Hi-Tech Abata Aluminum Industries in Warri, Nefkon Aluminum Nigeria in Ozoro, Whictech Group Limited in Asaba, Kimbo Aluminum Nigeria Ltd in Agbor and Viscalo Aluminum Company in Sapele, all in Delta State, Nigeria. It can be observed that the Table 3 above sought to determine the respondents' gender. It was established that 82.88% of the respondents were male while 17.12% of the respondents were female. This showed that respondents were evenly distributed across the gender divide although there were more male than female respondents. In terms of age, it showed that 29(19.86%) are within the range of 15-20years, 68(46.57%) are with the range of 21-30years,

72(49.32%) are in the range of 31-40 while the rest are with range 41-50years. Also, Out of the 146 respondents, 58(39.73%) are married, 83(56.85%) are singles, 4(2.74%) are Separated while 1(0.68%) are divorced. Further, the OND/NCE holder formed the greatest number of people that filled the questionnaire. This group constituted 52.05% of the respondents to the questionnaires. Finally, the level management indicated that employees in the lower management constituted the modal score of the total respondents that filled the questionnaire with 61(41.78%).

### **Analysis of Research Question One to Five for Responses from Employees of Selected Aluminum Companies in Delta State, Nigeria.**

This section seeks to analyze each of the research questions, the responses of the respondents and fetch out the effect of the study for proper analysis. This study made use of descriptive statistics for the purpose of detailed description of the responses from the questionnaires in respect of the independent variables [PS, MCM and WIPM] and dependent variable [FP] under study which comprises of the minimum, maximum, mean and Std. Dev. values. This is shown on the Table 4.

Table 4

#### *Descriptive Statistics*

	N	Minimum	Maximum	Mean	Std. Deviation
PS	146	12	20	16.79	2.094
MCM	146	12	20	16.02	1.995
WIPM	146	12	20	16.35	2.096
FP	146	12	20	16.56	2.017
Valid N (listwise)	146				

Source: SPSS Output, 2024.

PS indicate a mean of 16.79, a Std. Dev. of 2.094, with the difference in the maximum and minimum values stood at 8. This implies that the PS has witness a tremendously increase over the years since the mean value is greater than the Std. Dev. value. Similarly, MCM indicate a mean of 16.02, a Std. Dev. of 1.995 with the difference in the maximum and minimum values stood at 8. This implies that the MCM has been maximized by the organization over the years since the mean value is greater than the Std. Dev. value. Also, WIPM indicate a mean of 16.35, a Std. Dev. of 2.096 with the difference in the maximum and minimum values stood at 8. This implies that the idea of WIPM has been over the years since the mean value is greater than the Std. Dev. value. Finally, FP has minimum value of 12 and maximum value of 20 leading to the mean and Std. Dev. of 16.56 and 2.017 respectively. This implies that the FP varies aggressively over the years, with a volatility of 201.7%.

Table 5

#### *Correlation Output*

		FP	PS	MCM	WIPM
Pearson Correlation	FP	1.000			
	PS	.227	1.000		
	MCM	.591	.382	1.000	
	WIPM	.454	.498	.526	1.000

Source: SPSS Version 23 Output, 2024.

The PS and FP are strongly linked, as shown by an association coefficient of 0.227. With a r value of 0.227, PS has a strong positive relationship with FP. This is because r is greater than 0.05. The MCM and FP are strongly linked, as shown by a correlation value of 0.591. Since

MCM's  $r$  value of 0.591 is greater than 0.05, it means that there is a strong positive link between it and FP. With a correlation value of 0.454, WIPM and FP are strongly linked in a good way. Because WIPM's  $r$  value of 0.454 is greater than 0.05, it shows that there is a strong positive link between it and FP. The study is focused on enhancing FP through effective MMGT. The results of the correlation analysis involving all the indicators of effective MMGT reported positive correlation coefficient values among the measures. This indicated that they are appropriate measures of effective MMGT [PS, MCM and WIPM].

### DISCUSSION OF FINDINGS

Table 6  
*Multiple Regression Analysis*

Model		Unstandardized Coefficients		Standardized	T	Sig.
		B	Std. Error	Coefficients		
1	(Constant)	6.827	1.644		4.153	.000
	PS	.774	.183	.772	4.230	.001
	MCM	.515	.098	.509	5.255	.000
	WIPM	.225	.093	.234	2.419	.017

a. Dependent Variable: FP

Table 7  
*Model Summary*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.926 <sup>a</sup>	.857	.863	1.609	1.445

a. Predictors: (Constant), MCM, PS, WIPM  
b. Dependent Variable: FP

Table 8  
*ANOVA*

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	176.994	5	35.399	13.666	.000 <sup>b</sup>
	Residual	274.569	106	2.590		
	Total	451.563	111			

a. Dependent Variable: FP  
b. Predictors: (Constant), MCM, PS, WIPM

Source: SPSS Output, 2024.

In Table 6, 7, and 8, the regression coefficient of PS is 0.772 with a  $t$ -value of 4.230 and associated  $p$ -value (sig. value) is 0.001. This suggests that PS has positive effect on FP. Meaning that, the effect is significant given the fact that the  $p$ -value of 0.001 is lesser than 0.05 (5%) level significance, thus the study reject the null hypothesis which says that PS has no significant effect on FP and accept the alternate which says otherwise. The regression coefficient of PS is 0.772; meaning that PS has a positive trend with FP. One percent (1%) movement in PS would lead to 77.2% increase in FP. PS has a significant influence on FP in selected Aluminum company in Delta State, Nigeria, Specifically; Hi-Tech Abata Aluminum Industries in Warri, Nefkon Aluminum Nigeria in Ozoro, Whictech Group Limited in Asaba, Kimbo Aluminum Nigeria Ltd in Agbor and Viscalo Aluminum Company in Sapele, all in Delta State, Nigeria. The regression coefficient of MCM is 0.509 with a  $t$ -value of 5.255 and associated  $p$ -value (sig. value) is 0.000. This suggests that MCM has positive effect on FP. Meaning that, the effect is

significant given the fact that the p-value of 0.001 is lesser than 0.05 (5%) level significance. The regression coefficient of MCM is 0.509, meaning that MCM has a positive trend with FP. One percent (1%) movement in MCM would lead to 50.9% increase in FP. MCM has a significant influence on FP in selected Aluminum company in Delta State, Nigeria, Specifically; Hi-Tech Abata Aluminum Industries in Warri, Nefkon Aluminum Nigeria in Ozoro, Whictech Group Limited in Asaba, Kimbo Aluminum Nigeria Ltd in Agbor and Viscalo Aluminum Company in Sapele, all in Delta State, Nigeria.

The regression coefficient of WIPM is 0.234 with a t-value of 2.419 and associated p-value (sig. value) is 0.017. This suggests that WIPM has positive effect on FP. Meaning that, the effect is significant given the fact that the p-value of 0.017 is lesser than 0.05 (5%) level significance. The regression coefficient of WIPM is 0.234, meaning that WIPM has a positive trend with FP. One percent (1%) movement WIPM would lead to 23.4% increase in FP. WIPM has a significant influence on FP in selected Aluminum company in Delta State, Nigeria, Specifically; Hi-Tech Abata Aluminum Industries in Warri, Nefkon Aluminum Nigeria in Ozoro, Whictech Group Limited in Asaba, Kimbo Aluminum Nigeria Ltd in Agbor and Viscalo Aluminum Company in Sapele, all in Delta State, Nigeria.

Also, the Table 7, which is model summary table show the correlation co-efficient (R) of the regression is 0.926(93%) which indicates a very strong positive relationship between the FP PS, MCM and WIPM. The co-efficient of determination ( $R^2$ ) is 86% (0.857) showing that 86% of the variation in FP has been explained by the PS, MCM and WIPM. While 14% remain unexplained in the model. With an  $R^2$  value of 86% showed that the strong positive relationship is further confirmed. The adjusted  $R^2$  measures the goodness or fit of the model. This shows the goodness of fit of the model and also explains the FP in relation to the PS, MCM and WIPM in 86ways (0.863). The 14% left is known as the error term and other variables outside the model. From the above, there is conclusive evidence of serial or autocorrelation since the Durbin Watson calculated value of 1.445 is less than "2".

Lastly, from table 8 the Anova table revealed that the significance F-change value (13.666) is estimated over all p-value of 0.000 revealed that all the PS, MCM and WIPM jointly influence the FP. This indicates that the model is fit. This falls below the 5% generally acceptable level of significance.

### **CONCLUSION AND RECOMMENDATIONS**

The study investigates the impact of effective MMGT on company productivity in selected aluminium manufacturing enterprises in Delta State, Nigeria. The study's findings show that effective MMGT has a positive substantial influence on firm productivity in selected aluminium manufacturing enterprises in Delta State, Nigeria. The recommendations are based on the study's findings and serve as the researcher's counsel to aluminium firms in Nigeria on how to improve organisational productivity. Based on the findings, the study suggests the following: The study recommended that manufacturing aluminum firms develop a policy framework to facilitate faster implementation material control systems in Nigeria aluminum manufacturing so as to excel and guarantee its future, hence improving organizational productivity. Aluminum manufacturing firms in Nigeria should increase their resource commitment to staff training and Research and Development in material planning strategy so as to develop the necessary skills, update their knowledge, and enhance organizational productivity.

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