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Material Flow Cost Accounting To Enhance Resource Efficiency In Flour Mill Production Process

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Abstract:
The study examined the introduction of Material Flow Cost Accounting to a Flour mill production process; the accounting function has a crucial responsibility part in producing both financial and non-financial waste information to managers in making informed waste reduction. the researcher used a set of coded data to examine how the flour mill manages waste -information and how the existing accounting systems provide production waste information. Furthermore, the study used a different set of coded data comprising of four themes in addressing the set objectives. The themes include the suitability of the technique of gathering waste information and how it enhances waste decisions. The second theme is about the matter of waste responsibly. The third theme highlights the effectiveness of a unified database system for gathering waste information. The last theme centres on the convenience of other forms of waste information choices in support of waste decisions. Findings revealed that despite the Olam Flour Mill Ltd perceived rigorous accounting systems, it failed to accurately supply sufficient waste data useful for making informed waste decisions. The use of the standard variable costing technique to estimate waste inefficiencies makes resultant waste information insufficient and inaccurate to assist managers to make and enhance its waste decisions. A significant obstacle to the Olam Flour Mill Ltd effort to capture and efficiently manage its waste information is the unavailability of process waste information in real-time, thus, limiting its ability to take corrective actions and opportunities for cost-savings. The delay in accessing waste information at each production stage might have caused significant but avoidable losses to the Olam Flour Mill Ltd because of the absence of a more specific waste capturing tool like the MFCA model. Achieving cost-saving targets will give the Olam Flour Mill Ltd a competitive edge over its competitors.

Key Word(S): *Material flow cost accounting; current accounting system; waste information; 'Negative' product; waste -reduction; material flow transparency; material usage efficiency.*

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I. Introduction

Improving material and energy efficiency is still an important focus for organisations to achieve sustainability. Sustainable business practices are linked to achieving process efficiency and utilising cost-saving opportunities for enhanced environmental and economic performances (14). Notwithstanding, there are few studies about improving material efficiency and environmental performance in a production processes (7). The lack of material and energy flow visibility has resulted in lost opportunities to reduce waste and save costs (6). Moreover, conventional accounting has failed to capture sufficient waste information to reduce inefficiencies and support managements' waste decision (11).

The material flow cost accounting (MFCA) model help organisations in capturing the correct material and energy flow information to improve business productivity decisions to improve efficiency. The MFCA model quantifies process inventory and energy flows both in physical quantity and monetary value. Process efficiency could result in social, economic, and environmental benefits for organisational growth (4).Thus, the MFCA model may complement current management accounting system.

Research Objectives

The study reviews how the existing accounting system captures waste information in a flour milling production process in aiding management to understand the size of its inefficiency at each process for improved decision-making. This show processes that generate a loss for the attention of decision-makers. In achieving this goal, the study considers the following sub-objectives:

- To understand the extent that current accounting system captures waste information to ensure transparency regarding material and energy flows to support waste reduction decisions within the flour mill system in Nigeria.
- Examine why the current accounting system in the flour mill company in Nigeria is insufficient enough to provide transparent and visible waste information to support sound waste reduction decisions.
- Examine how the current accounting system in the Nigeria flour mill company can be improved to be enough to provide transparent and visible waste information to support sound waste reduction.

Overview of The Nigeria Flour Mill Company

The Nigerian wheat sector is comprised of 22 milling plants of eleven (11) brands, which include the Flour Mills of Nigeria Plc, Olam Flour Mills and Ideal Flour Milling group. Others include the Crown Flour Mills, Honeywell Flour Mills, and Standard Flour Mills. Flour milling is one of the few agricultural-based companies, which has withstood the challenging economic environment of Nigerian with a capacity utilisation below 40% (Centre for the Study of Living Standards, 2022). Besides, the Nigerian flour milling sector has evolved into an oligopoly where price-fixing is rife. The success story of this sector depends on market share usually controlled through aggressive marketing drives. Low margins characterise this sector because of high production cost. Thus, organisations in this sector must find ways to reduce production costs since the combined unutilised capacities exceed the existing demand. Besides, the four leading companies produce about 50% of the total market demand, with the other eighteen 18 millers supplying the remaining 50% (CSLS, 2023).

Olam Flour Mill Ltd

The Olam Flour Mill Ltd started production in 2019 after acquiring the flour mill from Olam Flour Mill on 23rd of April, 2019 and soon became one of the largest and the fastest-growing conglomerates in Nigeria. The Olam Flour Mill has grown substantially throughout the years and will likely grow further if there is a demand for its products. The Olam Flour Mill grinds, process and sells labelled flour. Products in the of the Olam Flour Mills include:

- Pastry flour
- Plain flour
- Whole Wheat (wheat offal), and
- Semolina

Nevertheless, the Olam Flour Mill produces instant noodles, spaghetti and macaroni. In 2023, the Olam Flour Mill Ltd‘s gross domestic product (GDP) totalled about $33.3 million, which is about 2.1 per cent of Nigeria’s GDP. In the 2023 tax year, the Olam Flour Mill Ltd’s tax remittance including personal income tax; value-added tax (VAT); and excise duties to the Federal Inland Revenue Service (FIRS) of Nigeria was $111.4 million (Olam Flour Mill Ltd 2023). This tax payment represents 3.7 per cent of FIRS total tax revenue for 2023. Olam Flour Mill’s revenue for 2023 had reached $15,583.4 billion (Olam Flour Mill Ltd, 2023).

II. Literature Review

Conceptual Review

The MFCA model applies to different manufacturing companies in achieving energy and resource efficiency. (9) argue that the MFCA model provides an insight into material and energy usage cost drivers to improve efficiency ,Nevertheless, proper documentation of information on waste value and quantity will ensure the transparency of waste information for waste reduction decision making in the production processes of the industry. Comber and Rossitto (5) study encourages an alcoholic drinks company to combine the MFCA model with the ERP system in generating accurate waste data for decision-making. Integrating the ERP and the MFCA model could enable the availability of adequate waste data for quicker waste decisions. Manufacturing and other companies usually rely on the more established standard costs approach in analysing cost variance, which has failed to support environmental decisions adequately [1].

For instance, (15) reviewed two cases in the Kansai Electric Power (KEP) and Tokyo Electric Power (TEP) and the process enabling KEP’s ‘negative’ output and waste output quantities of to be made visible for cost-saving opportunities. Besides, the implementation of the MFCA model can minimise adverse effects on the environment and decreased material costs (15). Thus, greater transparency of information from economic loss analysis of wasted materials will complement management decisions.

Additionally, Shang, Li, Chang, Chen, Yang & Duan (12) study that applies the MFCA model in a Czech Republic ceramic tiling plant identifies the stages in which material losses primarily occur enabling management to focus on corrective action. The entire manufacturing process includes material and glazes preparation with the MFCA model calculation focusing on the process produces most of the material losses (Shang et al., 2024). Therefore, the availability of correct waste information on strategic managerial decisions cannot be over-emphasized if organisations were to become environmentally responsible.

Theoretical Framework

Waste management theory

Waste management primarily about avoiding waste, which causes harm to society, the environment through resource optimisation. Waste management theory (WMT) encourages organisations to integrate resource optimisation in their values. An evaluation of WMT supports waste prevention and resource conservation (8). Besides, organisations need to reflect on their product design and seek ways to optimise material utilisation (Pongrácz, 2002). Moreover, Begum and Alam (3) contend that WMT evolves to address the issue of waste creation which harm society and the environment. This expectation can be met through the Integrated Sustainable Waste Management (ISWM) framework based on the Waste Management Hierarchy (WMH) Awino and Apitz (2). The primary drivers for efficient waste management are driven by consideration for a sound waste management system and a safe environment (13). Rodríguez-Espíndola, Cuevas-Romo, Chowdhury., Díaz-Acevedo, Albores, Despoudi & Dey (10). Indicate that manufacturing companies should provide customers and society with a healthy and safe environment by proper management of the waste they generate during production. Besides, implementing the right waste management practices entails accurate waste statistics (16).

Knowledge gap

There is little or no evidence of a study that implemented the MFCA model in a flour milling production process to support waste -reduction decisions. Hence, this study examines whether the current approach to capturing waste information in a flour mill process is enough to support sound waste reduction decisions, the findings contribute to the body of knowledge because it adds new findings to the existing literature on waste -reduction, helping managers to understand existing lapses in using the conventional accounting system by providing a more accurate waste analysis, which identifies weaknesses that require improvement through informed waste information in a flour ling production process.

III. Methodology

This study aimed at understanding and assessing how the flour milling managers used generated information using the conventional accounting approach in making waste-reduction decisions. The exploratory case study used both qualitative and quantitative approach, conducting in-depth interviews with participants, the exploratory case study allowed the researcher to assess and comprehend how the existing accounting systems assisted the managers in waste -reduction decisions. The use of the quantitative method assisted in collecting raw data at each level of the participating organisations' processes, the researcher employed in-depth interviews as the primary data collection in understanding current waste information capturing approach on three organisations. The questions were semi-structured enabling participants to clarify issues not correctly understood by the researcher. Apart from this, the participants' answer could trigger further questions not initially contained in semi-structured questions. Data collected throughout this study have been systematically analysed,this analysis necessitated the encoding of the data.The researcher used the *Umberto Efficiency⁺* software to analyse the raw data collected at the various level of the production processes using the quantitative research approach.

Flour Mill Processing

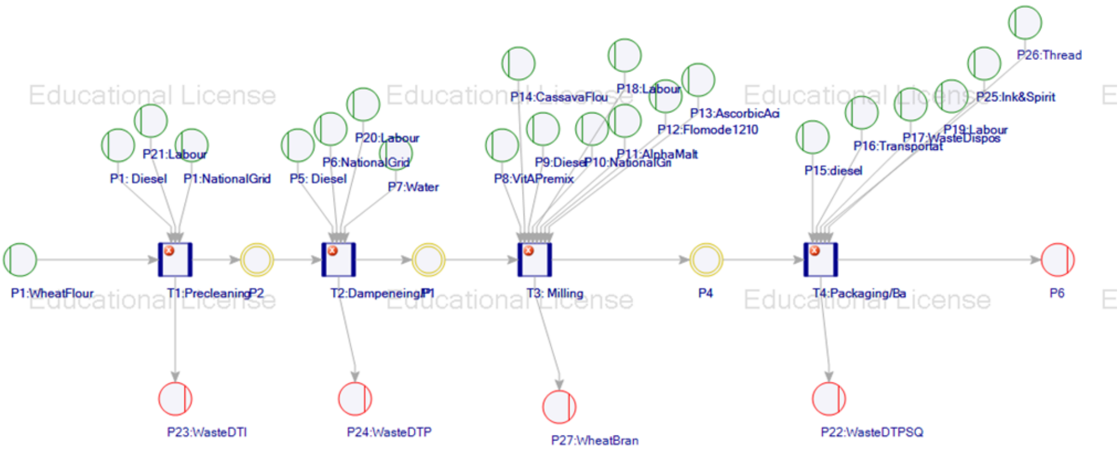

Figure 4.0: Sankey diagram of the Olam Flour Mill production process
Source: Author's description of the Olam Flour Mill Ltd flow

IV. Results And Discussions

Table 4.1: QC V1 – Precleaning

Input							**Output**						
Material	Place	Material Type	Coefficient	Unit	Price	Value	Material	Place	Material Type	Coefficient	Unit	Price	Value
Diesel	P1: Diesel	Good	11 823.06	MJ	160.00 Naira /MJ	1,891,689.60 Naira	WasteDTI	P23:WasteDTI	Material Loss	7 284.76	kg	758.25 Naira/kg	5,523,666.24 Naira
Labour	P21: Labour	Good	2.00	unit	41,191.78 Naira /unit	82,383.56 Naira	AFTCLEANING	P2:AFTCLEANING	Good	17 075.24	kg	758.25 Naira/kg	12,947,300.73 Naira
National Grid	P1: National Grid	Good	240 046.00	MJ	45.04 Naira /MJ	10,811,671.84 Naira							
Wheat Flour	P1: Wheat Flour	Good	24 360.00	kg	233.38 Naira /kg	5,685,136.80 Naira							

Table 4.2: QC V2 - Dampening

Input							Output						
Material	Place	Material Type	Coefficient	Unit	Price	Value	Material	Place	Material Type	Coefficient	Unit	Price	Value
AFTDAMPENING	P1: AFTDAMPENING	Good	17 009.93	kg	1,962.33 Naira /kg	33,379,095.94 Naira	Wheat Bran	P27: Wheat Bran	Material Loss	3 537.56	kg	2,843.96 Naira/kg	10,060,679.14 Naira
Alpha Malt	P11: Alpha Malt	Good	1 081.15	kg	9.92 Naira /kg	10,725.01 Naira	AFTMILLING	P4	Good	13 472.37	kg	2,843.96 Naira/kg	38,314,881.39 Naira
Ascorbic Acid	P13: Ascorbic Acid	Good	1 351.95	kg	2.84 Naira /kg	3,839.54 Naira							
Cassava Flour	P14	Good	2 150.00	kg	76.18 Naira /kg	163,787.00 Naira							
Diesel	P1: AFTDAMPENING	Good	47 292.25	MJ	160.00 Naira /MJ	7,566,760.00 Naira							
Flomode1210L	P12:Flomode1210	Good	720.93	kg	16.02 Naira /kg	11,549.30 EUR							
Labour	P18: Labour	Good	3.00	unit	41,191.78 Naira /unit	123,575.34 Naira							
National Grid	P1: AFTDAMPENING	Good	157 925.00	MJ	45.04 Naira /MJ	7,112,942.00 Naira							
VitAPremix	P1: AFTDAMPENING	Good	6 220.96	kg	0.53 Naira /kg	3,297.11 Naira							

Table 4.3: QC V3 – Milling

Input							**Output**						
Material	Place	Material Type	Coefficient	Unit	Price	Value	Material	Place	Material Type	Coefficient	Unit	Price	Value
AFTCLEANING	P2: AFTCLEANING	Good	17 075.24	Kg	758.25 Naira/kg	12,947,300.73 Naira	WasteDTP	P24: WasteDTP	Material Loss	65.31	kg	1,962.33 Naira/kg	128,165.66 Naira
Diesel	P2: AFTCLEANING	Good	59 115.31	MJ	160.00 Naira/MJ	9,458,449.60 Naira	AFTDAMPENING	P1: AFTDAMPENING	Good	17 009.93	kg	1,962.33 Naira/kg	33,379,095.94 Naira
Labour	P20: Labour	Good	4.00	unit	41,191.78 Naira/unit	164,767.12 Naira							
National Grid	P2: AFTCLEANING	Good	240 046.00	MJ	45.04 Naira/MJ	10,811,671.84 Naira							
Water	P2: AFTCLEANING	Good	10 000.00	kg	8.00 Naira/kg	80,000.00 Naira							

Table 4,4: QC V4 - Packaging/Bagging

Input							Output						
Material	Place	Material Type	Coefficient	Unit	Price	Value	Material	Place	Material Type	Coefficient	Unit	Price	Value
AFTMILLING	P4	Good	13 472.37	Kg	2,843.96 Naira/kg	38,314,881.39 Naira	WasteDTPSQ	P22: WasteDTPSQ	Material Loss	34 691.00	kg	120.00 Naira/kg	4,162,920.00 Naira
Diesel	P4	Good	70 934.40	MJ	160.00 Naira/MJ	11,349,504.00 Naira	Processed Flour	P4	Good	13 472.37	kg	6,818.97 Naira/kg	91,867,686.86 Naira
Ink&Spirit	P25: Ink &Spirit	Good	10.00	m3	950.70 Naira/m3	9,507.00 Naira							
Labour	P19	Good	9.00	Unit	41,191.78 Naira/unit	370,726.02 Naira							
Sack	P5	Good	346 913.00	Unit	120.00 Naira/unit	41,629,560.00 Naira							
Thread	P26: Thread	Good	10.00	M	150.00 Naira/m	1,500.00 Naira							
Transportation	P16: Transportation	Good	1.00	Kg	150,000.00 Naira/kg	150,000.00 Naira							
Waste Disposal	P17: Waste Disposal	Good	1.00	Kg	42,000.00 Naira/kg	42,000.00 Naira							

V. Discussion

Table 4.1 shows the first stage of the wheat flour mill process called the Pre-cleaning. At this quantity centre, the inputs are 24,360/kg of wheat at ₦233.38/kg, also two (2) labourers at ₦41, 191.78/per labourer, diesel of 11,823.06/litre at ₦160/per litre, the national grid of 240,046 at ₦45.04. The total output from this quantity centre is 17,075.24/kg of ‘good’ production at ₦758.25/kg represented as AFTCLEANING in Table 1.1. This material becomes an input to the next process known as dampening. Besides, a 7284.76/kg waste occurred at the cost of ₦758.25/kg was captured at the process of pre-cleaning, this occurs due to the waste generated from the production process of flour and categorised into visible and invisible losses, visible losses are sands, stones, maize and metal. In contrast, intangible losses are moist, dust, exhaust and flour escape.

Table 4.2 shows the second stage of the wheat flour mill process called the dampening. The output of QC V1 becomes the input of QC V2 in the flour mill company because it is a process. In this quantity centre, the farmer added inputs of 17,075.24/kg of wheat at ₦758.25/kg, and four (4) labourers at ₦41,191.78/per labourer. Besides, the farmer used diesel of 59,115.31/litre at ₦160/per litre. Additionally, the farmer used energy from the national grid of 240 at ₦45.04 and water of 10,000litres at ₦8.00. The total output from this quantity centre is 17,009.93/kg of ‘good’ production at ₦1, 962.33/kg represented as AFTDAMPENING in Table 1.2. This material becomes an input to the next process, milling. It is important to note that a 65.31/kg waste occurred at the cost of ₦1962.33/kg was captured at the process of dampening, this occurs due to the Waste generated from the production process of flour, waste like small stones, sand and chaffs.

Table 4.3 shows the third stage of the wheat flour mill process called the milling. The output of QC V2 becomes the input of QC V3 in the flour mill company because it is a process. At this quantity centre, the inputs are 17,009.93/kg of wheat at ₦1, 962.33/kg, also labourers 3 at ₦41, 191.78/per labourer, diesel of 47,292.25/litre at ₦160/per litre, National grid of 157,925.00 at ₦45.04. Also, the farmer used additives such as Alphamalt of 1,081.15/kg at ₦9.92, and ascorbic acid of 1,351.95/kg at ₦2.84. The farmer used cassava flour of 2,150.00 at ₦76.18, Flomade1210L of 720.93/kg at ₦16.02 and Vitamin A premix of 6,220.96/kg at ₦0.53. The total output from this quantity centre is 13,472.37/kg of ‘good’ production at ₦2, 843.96/kg represented as AFTMILLING in Table 4.3. This material becomes an input to the next process known as packaging/bagging. It is important to note that a 3,537.56/kg waste occurred at the cost of ₦2,843.96kg was captured at the process of milling, this occurs due to the waste generated from the production process of flour which comes out as by-product like wheat bran.

Table 4.4 shows the fourth stage of the wheat flour mill process called the packaging/bagging. The output of QC V3 becomes the input of QC V4 in the flour mill company because it is a process. In quantity centre V4, the farmer added 13,472.37/kg of wheat at ₦2,843.96/kg. Likewise, the farmer employed nine (9) labourers at ₦41,191.78/per labourer. He used diesel of 70,934.40/litre at ₦160/per litre and 10/litre of ink and spirit at ₦950.70. The farmer used 346,913.00/unit of bags at ₦12/per unit and 10/m of thread at N150/per. Transportation of one (1) trailer vehicle amounted to N150,000.00. Waste disposal cost amounted to ₦42,000. The total output from this quantity centre is 13,472.37/kg of 'good' production at ₦6,818.97/kg represented as processed flour in Table 1.4. Notably, a 34,691.00/kg of waste occurred at the cost of ₦120/kg at the packaging/bagging process. This wastage is the result of inferior quality sacks used and poor handling during transportation. Besides, flour discharge into the air during bagging, leakage of the sack of flour, a wrong arrangement of bagging on each other in the truck and warehouse, stale flour and also processed flour that did not meet the required standard of SON (standard organisation of Nigeria) and not safe for human consumption.

VI. Conclusion

The Degree That Current Accounting System Captures Waste Information

This seeks to comprehend the degree that the current accounting systems supply waste information in support of production waste-reduction decisions in the Olam Flour Mill. In understanding the pattern of waste information generation in the Olam Flour Mill, the first research objective includes two themes outlined in the following subsections.

Handling of Waste Information

Waste generated by the Olam Flour Mill Ltd falls into visible and invisible losses. Visible losses are sands, stones, corn and metal, while intangible losses are moist, dust, exhaust, emission and flour escape. Others include wastewater (containing detergents and effluents discharges) from the cleaning of wheat grains, including the plant and machinery and released into the drainage system causing environmental pollution and hazards to the surrounding communities. The Olam Flour Mill faces the challenge of reducing the quantity of waste generated, sands, stones, maize, metal, moist, dust, exhaust, emission, flour escape and wastewater. Besides, rejects like sands, stones and metal items found in the wheat, though maize is found in waste residues sold to local livestock farmers. Hence, the need to minimise wheat dust, exhaust, emissions and wheat escape, and wastewater considered as a normal loss.

According to the production manager, one of the Olam Flour Mill's corporate social responsibility is aggressive waste-reduction in flour processing; this is hampered because production waste data is only available to managers at weekly. Moreover, the challenge with the current accounting system in the Olam Flour Mill is that waste information is not accessible at each stage of the process to reverse any inefficiency urgently, but instead, a report on the production deviation from target is released at the end of each week. The procedure outlined in the flour mill is to gauge anticipated versus real production after every batch to establish where waste happened for remedial action. Process and quality checks occur in each production batch by weighing the output at each production processing stages. Waste is measured utilising the input-output analysis by the finance department employing the variable cost approach for measuring the value of waste after every batch. However, the flour mill cannot quantify the energy lost in each process. More so, a system of quantitatively assessing waste after a batch makes it challenging to introduce remedial action.

In calculating waste costs, the company excludes the quantity of labour hour lost in production. By apportioning associated waste costs to processes, it ensures that production managers are furnished with accurate waste data in making informed waste-reduction decisions .Associated waste costs consist of labour, depreciation, electricity, idle time of plant and workers, and other fixed costs. Besides, waste information only becomes available to the top management once a month in order to make strategic waste-reduction decisions. Obstacles that inhibit informed waste decisions in the flour mill is the absence of stage by stage waste information. Though from an economic responsibility perspective, the flour mill strives to continue as a viable company by ensuring to keep shareholders satisfied via an increased dividend.

Current Accounting Systems And Waste Data Record

As stated earlier, the Olam Flour Mill's finance division uses the variable costing system to determine its waste costs. Production cost excludes other systems cost in valuing waste because these other processing costs are cued up in overhead accounts. The use of the standard cost accounting system in the Olam Flour Mill Ltd relies on the difference between actual and standard output target in valuing waste costs.

The company considers the material as well as energy costs as variable costs. The finance division of the company calculates waste costs based upon the input-output analysis weekly. The company operates the standard cost system according to the financial manager.

"We would have these overruns (wastages), and these overruns would be the difference between the standard versus the actual usage. In the production process, a normal loss is 2.5%."

Although the financial manager argues that the Olam Flour Mill Ltd has what he termed "a perfect" accounting system that captures all waste-related costs, reality from the findings at the company seems to suggest otherwise. Ideally, in determining the "true" waste costs, depreciation costs of lost plant hours, costs of idle time due to production stoppages, as a result of valve breakage or overhauling due to inefficient processes should not end up in the overhead accounts. However, the weekly production shortfalls are only made available and accessible the following week with the finance department estimating the factory efficiency using the variable standard costing system. In this manner, the total number of hours lost to inefficient plant operations is unknown and are unwittingly charged to overheads accounts.

Although the financial manager claim that waste information supplied through the standard variable costing system influences the company's waste-reduction decisions believing also that the information is timely and available weekly; its relevance is eroded because opportunities for cost-savings are lost by the time the waste information gets to decision-makers. Besides, the evaluation of the waste cost is submitted late to the factory to rectify the inefficiencies noticed from the previous week.

The company uses the input-output analysis to measure waste with an assessment of the quantity of input via verification of the actual inventory used in the factory and by physical tallying of store inventory by the finance division weekly. To ascertain the degree of disparity in reported usage and actual usage weekly, the factory performs a physical verification of inventory. It seems from the approach of the company that specific waste linked costs continue to be concealed in overhead accounts. Despite the claim by the financial manager that the current accounting system supplies sufficient waste information; he believes that there is room for improvement to get to the level where accurate waste information is available and accessible in real-time. Consequently, implementing and integrating a waste capturing tool such as the MFCA model into the current accounting systems will enhance the sufficient supply of waste information in the company's process..

Summary Of Waste Information Supplied By The Current Accounting System

The degree to which the current accounting system in the Olam Flour Mill supplies waste information is insufficient to make proper waste-reduction decisions. In examining the reasons that current accounting system in the flour mill company is insufficient to provide transparent and visible waste information to supports waste reduction decisions, the study's objective was split into four research themes comprising the adequacy of waste information, waste accountability, integration of the database system, and accessibility of waste information alternatives. The researcher discussed each one of the themes in the following sections.

Adequacy of Waste Information

Top management support is necessary to ensure that the flour mill company meets the requirements for its corporate environmental commitment to its investors through high annual dividend payment. The availability and accessibility of waste information ensure that managers increase their production efficiency using fewer resources. Management's desire to improve resource efficiency has resulted in an increasing demand for thorough waste information from production managers. This appears to stimulate more stringent production efficiency so that other managers can understand the grey areas of waste in support of informed waste-reduction decisions. Moreover, the demand by top management for regular weekly production information might have inspired its managers to desire to capture all necessary waste information except that the technique based on the standard variable costing allowed unallocated waste cost to be concealed in overhead accounts.

Waste Accountability

Waste information gathered at each production stages are collected by the production manager and put together at the end of the day. Subsequently, the information is sent to the finance division by the production manager for record purpose. This waste data helps the production manager to focus on using available resources efficiently. The production manager is held accountable for the waste generated during the production processes. The gathering of waste information is essential to efficiently manage any inefficient stage in the flour milling process through the collective effort of all the functions with the company. The collective approach to the gathering of waste information will foster process efficiency among the various divisions to give the company a competitive edge .

Integrated Database System

The Olam Flour Mill Ltd uses the Systems Applications and Products (SAP) database system (SAP) enabling critical data to be available to all from every division forming part of the production management. However, the researcher noted the lack of integration of the various divisions' database systems into the SAP system, which could potentially reduce its waste generation. Although the SAP in the F Olam lour Mill Ltd has assisted managers in undertaking promotional activities to drive production to meet forecast sales; it has not been able to diminish over-production, thus, waste generation in the past. Whereas, the SAP system can reduce the risk of over-stocking of the physical inventory; its lack of positively correlated integration and use among the various divisions had made its usefulness insignificant to efficiently manage resource flow, hence, the incidences of process waste. Thus, the SAP in the Olam Flour Mill Ltd requires restructuring to align material acquisitions and production requirements to the sales forecast for enhanced product supply. The lack of correlated integration of the SAP system, which is optimised by each division has not enabled managers to take swift corrective waste-reduction decisions. Though the SAP database system has proven useful by meeting the different divisions' need, it is limited in effectiveness because of the lack of integration with existing systems. Besides, it could be that the integration of the MFCA model into the SAP systems will assist in speeding up the availability and accessibility of waste information. Thus, with the systems integration occurs quicker, smarter and concise waste decisions since waste data would be readily accessible, and managers can concentrate on resolving strategic challenges.

Accessibility of Waste Information Options

In the Olam Flour Mill Ltd, waste information is vital to its waste-reduction decisions. Even though managers would prefer other information options, however, Olam Flour Mill Ltd depends on the conventional accounting generated information which conceals individual unallocated waste-related costs (systems costs) in overhead accounts. The current accounting system in the Olam Flour Ltd is considered rigorous by the reckoning of the financial manager; nevertheless, findings show that it is yet insufficient to supply accurate waste information necessary to enhance waste decisions. Thus, implementing the MFCA model in conjunction with current accounting system could provide the needed support and improvements that will assist managers to make informed waste-reduction decisions. It seems that the Olam Flour Mill Ltd will benefit more efficiently by having a devoted waste accounting system to capture its process waste data to boost its waste-reduction efforts. This dedicated system will result in increased social significance, enhanced environmental accountability and increased organisational profit.

Recommendation

Information on the Olam Flour Mill Ltd suggests that despite the available accounting systems; the organisation is unable to create accurate waste data. The use of the standard variable costs by the Olam Flour Mill Ltd to value waste quantity renders the accounting system insufficient to supply the needed waste information in support of improved informed waste reduction decisions. Moreover, the estimation of waste costs utilising the input-output analysis technique in itself is flawed and distorted since it focuses only on the physical movement of inventory units in processes. Besides, a more relevant waste specific accounting system like the implementation of the MFCA model is needed to produce sufficient and accurate waste information in support of and to improve waste-reduction decisions. Moreover, there is a need to undertake more case studies in different sectors in order to enable for further evaluation of the different dimensions to waste information production.

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