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Green Activity-Based Costing to Enhance Production Flow and Its Impact on Sustainable Development

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ABSTRACT

Economic units are facing continuous challenges in competitive environments due to the constant change and development of costing management strategies and the technologies they rely on to achieve their goals, either to reduce costing or improve the quality level and reduce waste and loss to preserve rare materials. The central challenge of the economic unit is to fulfil its responsibility and obligations to the environment, and one of the modern techniques that concerns in finding solutions to these challenges is the Costing System (CY) according to green activities (G-ABC) and its impact in reducing the environmental contamination levels through enhancing the production activity with concern to the green activity, thus transforming the environmental efforts from financial burdens to the economic unit to a strategic investment with an active role in protecting resources and achieving efficient production flow, in accordance with the rising risk of resources scarcity and to reduce the quantity of contaminants levels and its impact in achieving sustainability Development (SD). This research was applied in Kufa Cement factory. Results reflected a reduction in loss and waste; thus, management of environmental waste and limiting ecological contaminants were achieved, as well as reducing the environmental costs.

Keywords: Costing system, Green activities, Sustainability development, Production flow.

Introduction

The accelerated transformations in modern business environment and increased awareness both on the economical unit level and Customer level in relation to the ecological responsibilities and obligations demonstrated a clear impact on adopting new techniques and tools that considers the environmental ramifications and mechanisms of reducing them, while ensuring effective cost management in harmony with efficient production flow and in light of the resources scarcity and how to employ that in achieving value to the Customer through sustainable products that takes in account the environmental threats and reducing impacts and dangers that may accompany production (Fischer *et al*., 2025; Mansour & Saeed, 2025).

The growth in environmental consciousness and contamination sources was accompanied by the increase in modern industry production systems, which are considered a core hindrance to achieving the required SD, as these systems aim to increase profit and enhancing their performance to present the (best services) to Customers and reduce all forms of waste and loss. This research is concerned with implementing the vision of environmental preservation within the economic units, and achieving the active flow of production, which will reflect positively on meeting the required SD parameters (Rypel *et al*., 2024). Thus, the (core issue) can be summarized as follows: will the utilization of G-ABC-based CY within optimum production flow reduce cost and contamination and achieve SD goals?"

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The importance of this research is concerned with environmental preservation and protection from contaminants through utilizing cost management strategies and technologies. These concerns are with providing environmentally-friendly green products with minimum negative effects (Osluf *et al*., 2024). The green-based activities CY are considered a perfect system to achieve perfect product flow and provide competitive and sustainable qualities reflecting positively on the economy, society, and ecology (Jin *et al*., 2024).

The first Section concerns the philosophy of CY based on a green environment. The second Section will discuss the philosophical concepts of production flow and achieved SD based on G-ABC and its principles. The third Section will review the application of CY based on G-ABC in Kufa with an introduction about the workflow. The last Section will involve the most important conclusions and recommendations of the findings of this research (Csep *et al*., 2024; Raza *et al*., 2025).

Materials and Methods

The research was completed through an applied study of a sample and analyzing the data based on the actual records. The limits of the research were represented within the location of Kufa Cement Factory and the restriction to the actual time of 2022. The aim of the research is to provide a conceptual framework for a CY based on G-ABC as a program to achieve an enhanced competent product flow. Clarifying the environmental role of the CY based on G-ABC that supports the competitive nature of economic units through preserving the environment and supporting its SD. Stating the importance of relying on the cost of product flow in supporting the G-ABC to achieve the required SD. CY based on G-ABC achieves optimum product flow while simultaneously protecting the environment and reducing ecological costs, reflecting positively on the sustainable demands.

Literature Review

The most important studies related to this subject are the study by Jumaa and Mushikir, (2023), which aims to clarify the CY based on G-ABC in reducing unnecessary costs that do not provide any value for the economic units (Musa *et al*., 2025). The research reached multiple conclusions, most importantly that the CY based on G-ABC is efficient in managing the ecological costs and reducing unnecessary costs through redistribution of indirect industrial costs. The study by Abdul Karim and Abdul Kadhim (2023). The aim of the study was to identify the importance of CY based on G-ABC in achieving analysis and measurement of environmental costs and how it reflects on the administrative decisions suitable for enhancing the competitive position of the economic units. The study concluded that using the CY based on green bases supports achieving a realistic study of environmental costs and achieving clear follow-up to direct and indirect costs, and measuring the costs of pollutant thermal emissions to support the possibility of providing data suitable for decision-making. The study of (Ghiga *et al*., 2024; Tsai *et al*., 2024) suggested adopting a mathematical programming model to analyze the decisions related to products and according to the CY based on G-ABC. The goal was to increase the profit of economic units with regard to the increasing awareness of the environmental costs and the resulting effects of those industries that may affect the environment and the effects of the environmental activities on global warming. The research concluded, most importantly, that using a CY based on activities that track material costing and analyzing and stating the unnecessary activities and analyzing the costs of environmental activities, represented by carbon emissions, to reach a more detailed limiting of costs that takes into account the analysis of environmental costs.

Study of Hiesh and Chung (2020) and Kounatidis *et al*., (2024) aimed to structure and introduce a theoretical model to enhance energy preservation and reducing carbon emission through the use of CY based on G-ABC to achieve an active benefit from waste and transforming to a source of energy and fuel by studying the costs of ecologically friendly activities to analyze and transform them to a beneficial resource and a clean energy for the economical unit. The study reached conclusions that include the possibility of studying and analyzing the sustainable operations of waste treatment, which may help in improving the current situation and eliminating the ecological issues that arise from waste production through ecologically friendly activities analysis and classifying the materials (in regard to waste products) to recycle them and transform them to activities that may produce value and reduce production costs in the economic unit (Bukhary, 2024; Chakraborty & Rajasekar, 2024; Ding *et al*., 2024; Narayana *et al*., 2024; Wolderslund *et al*., 2024; Alexandrovna *et al*., 2025; Johar *et al*., 2025; Liedekerke *et al*., 2025).

Conceptual Framework

Costing Based on Activities and Green Activity-Based Costing

Activity-Based Costing (ABC) emerged as an innovative approach to addressing the limitations of traditional costing systems, particularly the allocation of indirect industrial costs. It analyzes the relationship between resources, activities, and cost objects, thereby providing more accurate cost information for managerial and strategic decision-making (Blocher *et al*., 2019; Hilton & Platt, 2020). Garrison *et al*., (2018) emphasizes that ABC supports management by providing reliable cost information for strategic decisions and achieving organizational objectives.

ABC facilitates a more equitable allocation of indirect costs by identifying the activities that consume resources. With increasing environmental pressures and the need for sustainable competitiveness, the concept of Green Activity-Based Costing (G-ABC) has emerged. G-ABC incorporates environmental considerations into costing by identifying, measuring, and managing environmental costs associated with organizational activities. It encourages efficient resource utilization, waste reduction, pollution prevention, and the development of environmentally friendly products and services (Dornfeld *et al*., 2012; Salman *et al*., 2023).

G-ABC integrates environmental activities and costs with conventional organizational activities and provides relevant information for managerial decision-making. It can reduce unnecessary indirect costs arising from pollution control, emissions management, environmental compliance, and waste treatment while supporting environmental preservation and sustainable production (Jusoh *et al*., 2018; Flayyih *et al*., 2019; Mashkoor *et al*., 2023).

Classification of Green Activities

G-ABC costs represent expenditures incurred to prevent, control, or reduce environmental impacts resulting from production processes and regulatory requirements. These activities can be classified into four major categories (Talab *et al*., 2017; Hansen *et al*., 2022; Ali *et al*., 2023):

1. Prevention activities: Costs incurred to prevent environmental damage before it occurs, including redesigning production processes, selecting environmentally appropriate materials, employee training, environmental research, and evaluating pollution-prevention technologies.
2. Protection activities: Costs associated with monitoring and controlling environmental impacts, including pollution measurement, environmental auditing, inspection of products and processes, and evaluating compliance with environmental standards.
3. Internal failure activities: Costs incurred to manage environmental problems within the organization, such as recycling, reusing nonconforming products, treating hazardous waste, maintaining pollution-control equipment, and handling internally generated scrap.
4. External failure activities: Costs incurred after pollutants or wastes have entered the external environment, including environmental remediation, river and land rehabilitation, and treatment of solid and liquid waste.

The major purposes of G-ABC activities are to analyze environmental effects, incorporate environmental information into organizational reports, continuously evaluate environmental risks, and implement preventive measures (Sief, 2014). Its principal objectives include promoting green innovation and environmentally friendly technologies, improving environmental performance and social responsibility, reducing waste and industrial emissions, and supporting efficient resource utilization within a green economy (Meng *et al*., 2022).

Material Flow Cost Accounting: Concept and Objectives

Material Flow Cost Accounting (MFCA) originated in Germany during the late 1980s and early 1990s as an approach to reducing costs while protecting the environment. It tracks the flow of materials through production processes, identifies material losses and waste, and assigns costs to these flows. MFCA therefore supports environmental cost management, resource efficiency, waste reduction, and improved production performance (Belfiore *et al*., 2024; Figueroa-Valverde *et al*., 2024; Karatas, 2024; Kęska & Suchy, 2024; Lee & Ferreira, 2024; Negreiros & Ory, 2024; Noor *et al*., 2024; Wolderslund *et al*., 2024; Abdullah *et al*., 2025; Schneider & Krüger, 2025; Wong *et al*., 2025).

MFCA provides reliable information for improving competitiveness and customer value, establishes objective measures for monitoring material flows, enhances environmental and industrial performance, improves transparency concerning material and energy consumption, and supports managerial decision-making by identifying the financial and environmental consequences of material losses (Kadhim & Abdulzahra, 2020; Pranata & Adhariani, 2023).

Steps for Applying Material Flow Cost Accounting

The implementation of MFCA generally involves four stages (Berry *et al*., 2024):

1. Planning: Identifying human and financial resources, assigning responsibilities, establishing implementation parameters, and determining the expertise and time required for analysis and improvement.
2. Implementation: Tracking material inputs and outputs and their associated costs throughout production activities, identifying resource-use gaps, and measuring environmental impacts and waste.
3. Assessment: Evaluating production results, waste, energy consumption, and process efficiency; comparing traditional and environmental performance data; and determining the extent to which economic and environmental objectives have been achieved.
4. Action: Implementing corrective measures based on the assessment results and extending improvements across activities and processes while considering their environmental impacts.

MFCA is based on several principles, including balancing the financial and environmental aspects of material flows, ensuring accuracy and objectivity of production data, improving operational and environmental efficiency, pursuing continuous improvement, and integrating financial, material, energy, and environmental information into a comprehensive database (Organisation For Economic Co & Development, 2008; Tachikawa, 2014).

Sustainable Development: Concept and Requirements

Sustainable Development (SD) strengthens economic units' ability to grow and remain competitive while ensuring efficient resource management and environmental protection. Integrating sustainability into all stages of the product life cycle requires organizations to incorporate environmental considerations into product design, production processes, and continuous improvement (Csep *et al*., 2024; Ghiga *et al*., 2024; Jin *et al*., 2024; Kounatidis *et al*., 2024; Osluf *et al*., 2024; Jagsi *et al*., 2025; Musa *et al*., 2025; Raza *et al*., 2025; Wong *et al*., 2025). It also requires cooperation among designers, manufacturers, suppliers, and customers to develop sustainable products and processes (Dongre *et al*., 2017; Asyraf *et al*., 2022).

Strategic environmental cost-management techniques such as G-ABC can contribute to sustainable development by improving production processes through environmentally friendly resources, providing products and services with greater green value and customer satisfaction, supporting market growth and profitability, ensuring organizational continuity while complying with environmental regulations, and replacing pollution-generating activities with cleaner and more sustainable alternatives.

Thus, integrating G-ABC and MFCA provides organizations with a comprehensive framework for identifying environmental costs, controlling material losses, improving production efficiency, reducing waste and pollution, and integrating economic and environmental objectives. This integration can ultimately enhance production performance while supporting the long-term sustainability of economic units (Osluf *et al*., 2024; Rypel *et al*., 2024; Fischer *et al*., 2025; Mansour & Saeed, 2025).

Results and Discussion

The final part of the research concerns the research sample and reviews some of the data to determine how the G-ABC-based CY will support the value flow, enhance the SD of the unit and its products and reduce the environmental side effects arising from its activities and products.

First: Location of practical part: Kufa Cement Factory:

This factory is considered one of the most important factories in Iraq. It is one of the factories of the Iraqi General Southern Company for Cement, one of the companies of the Ministry of Industry and Minerals. It is self-funded and located in Al-Najaf Al-Ashraf governorate. Established by F-L.S. Company (Denmark) in 1977, with a capital of

(63,263,506 IQD). Consists of four production lines and has a designed capacity of (1,781,000) tons of cement annually; each production line has a designed capacity of (1,500) tons daily. The factory utilizes the method of wet production; it is characterized by low environmental effects in comparison with the dry method. The produced cement is according to Iraqi specifications (law no. 5) of 1984, which is a product of excellent quality; it aided in raising the demand levels of this product, both in the public and the private sectors, however, due to the civil atmosphere post-2003 that affected the production up to 2027, which witnessed an exceptional increase in the production levels, exceeding the designed capacities.

Second: Applying the G-ABC based CY in Kufa cement factory:

To apply G-ABC-based CY, there is a group of steps necessary to be followed:

First step: Identifying the primary activities, supporting activities, and G-ABC of Kufa cement factory. The activities of the factory must be classified according to the traditional classification into (primary and supporting) and G-ABC with regard to what harmonizes with the competitive requirements of the contemporary work environment, to allocate activities costing and classify them as follows:

a- Primary activities: They are activities connected directly with production **(Table 1)**.

Table 1. Primary activities: They are activities connected directly with production

No	Activity name	Nature of the activity	Utilized resources
1	Breaking activity	Preparing the raw materials such as limestone and gypsum stone that constitute the production materials	Work and machinery
2	Grinding activity	Grinding the raw materials from 70% to 30% from stone to mud	Work and machinery
3	Clinker production activity	Heat processing of the raw materials treated in the prior steps	Work and machinery
4	Final grinding activity	Final grinding of materials treated previously to the final product	Work and machinery

b- Supporting activities: Activities that provide support to the primary activities **(Table 2)**.

Table 2. Supporting activities: Activities that provide support to the primary activities

No	Activity name	Nature of the activity	Utilized resources
1	Maintenance activity	Continuous maintenance of the machinery, equipment, and tools	Work and materials
2	Quality control activity	Sample testing in the laboratory to ensure adherence to the specifications	Work and materials
3	Human resources management activity	Personnel affairs within the unit	Work
4	Administrative expenses activities	Administrative services of the factory departments	Work and machinery
5	Marketing services activity	Services concerning marketing and sales management	Work and machinery

c- G-ABC, which are a series of activities that take into consideration the environmental dimensions and limiting pollutants **(Table 3)**.

Table 3. G-ABC, which is a series of activities that take into consideration the environmental dimensions and limiting pollutants

No	Activity name	Nature of the activity	Utilized resources

1	Waste treatment activity	Using ovens for waste disposal	Machinery and tools
2	Recycling activity (Managing oven smoke ashes)	Mixing waste types for recycling	Work and machinery
3	Emission filtration activity	Using environmentally friendly precipitants	Machinery

Treatment in G-ABC is as follows:

1- Treatment of waste: due to the greater dependence on black oil. Working on improving the burning efficiency to reduce the use of black oil (reducing actual costs by burning waste products and using the result of burning as a fuel to reduce costs).
2- Recycling smoke ashes: collecting emitted smoke ashes from chimneys and recycling within the production process and utilizing the engineering applications to reduce materials waste.
3- Filtration of emissions: Replacing electrostatic filters with fabric filters, which are more efficient in trapping fine smoke ashes.

Second step: identifying groups within specific sets related to the needed materials for each activity; here it's a costing-based groups (main, supporting and green) **(Table 4)**.

Table 4. Allocating indirect costs on the main activities

Account name	Distribution bases	Breaking activity	Grinding activity	Clinker activity (burning)	Final grinding activity	Total
Fuel and oil	1*	35% 6322230172 IQD	%20 3951393857 IQD	%25 4741672629 IQD	%20 3951393857 IQD	100% 15805575431 IQD
Varieties	2*	%25 66347451 IQD	%25 66347451 IQD	%25 66347451 IQD	%25 66347451 IQD	265749807 IQD
Water and electricity	3*	%1.5 891478747 IQD	%2.5 14857797912 IQD	%3 1782957495 IQD	%1 594319165 IQD	%8 18126553319 IQD
Total		7280065370	18875539220	6590977575	4612060473	34197878557

1* Adopting an environmentally friendly guide represented by smoke, ashes and gases produced by machine operations, which is calculated for every ton used and for each group and according to the locations and emissions.
2* Depending on the amount of waste adopted in the production department for actual production and distributed evenly between activities.
3* Depending on the precipitants, which represent 8% of the production quantity with waste, and are distributed among activities according to the allocated activity portion based on the production department's data.

Distribution of the indirect industrial costs based on supporting activities **(Table 5)**.

Table 5. Allocating indirect costs on the supporting activities

Account name	Distribution bases	Maintenance activity	Quality control activity	Human resources management activity	Administrative expenses activities	Marketing services activity
Spare parts	Maintenance department only	642132230 IQD				
Filling and packages	Marketing department only					1092483245 IQD
Variety	Workers number (number percentage)	%30 79724942 IQD	%10 26574980 IQD	%10 26574980 IQD	%25 66437451 IQD	%15 39862471 IQD
Workers equipment	Administration department only					86973136 IQD

Maintenance services	Maintenance department only			61934500 IQD		
Invites and hospitality	Human resources management only			95940275 IQD		
Transferring fees	Human resources management only			12409575 IQD		
Other expenses	Human resources management only			137417 IQD		
Total		721857172	26574980	196996747	66437451	1219318852

Source: Data from Kufa Cement Factory for the year (IQD).

Third: G-ABC:

Analyzing G-ABC:

1- Waste treatment activity (burning waste products)

Using the waste products produced from burning activities as a replacement for fuel. It is used in most modern cement factories, through burning in cement ovens to reach up to (2000 ˚C), which provides the possibility for the complete destruction of organic materials without emissions, using ovens as a waste recycling plant, as these waste products are not burnt to be cleared but to be recycled through using as fuel. This saves, according to the data gleaned from the specialized departments of the factory,15% of the used fuel cost, which amounts to a total of (15805575431 IQD) in 2022, and the reduced cost resulting from the fuel resulting from burning the waste was 15%, equal to (2370836314 IQD) **(Table 6)**.

Table 6. Fuel cost reduction based on G-ABC

Green activity name	Breaking activity	Grinding activity	Clinker activity (burning)	Final grinding activity	Total
Waste treatment activity	%35 829729710IQD	%20 4741672626IQD	%25 592709078IQD	%20 4741672626IQD	%100 2370836314IQD

2- Recycling activities: Represent an integral basis for recycling ashes in the Kufa cement factory. The purpose is to transform pollutants from a harm to the environment into economic value that enhances the value of the economic units. It is concerned with achieving value from energy costs of precipitants and workers' fees in the systems concerning recycling, as well as the value of alternative raw materials returned from recycling and reducing and ending the ecological costs that will be avoided. Determining the economic value that can be achieved on the main activity levels based on the estimates of the experts in Kufa cement factory, according to factory tests comparison.

a- Breaking activity: it is the most beneficial activity, as the returned ash is a ready raw material that cancels the costs of mining, represented by reducing the costs of blasting in quarries, transportation fees from the quarries, and initial breaking fees.

b- Grinding activity: can be reduced through workers' fees, as well as reducing the costs of electricity in the grinding centers, which can extend the production lifespans of the steel balls through use reductions. The reduced costs based on the expert forecasts are up to 5% of the total activity costs.

c- Clinker activity (burning): one of the activities in the Kufa cement factory that benefits most, and achieves a reduction in resource depletion utilized in burning and providing high heat power. It is known that this energy is very costly; thus, the benefit achieved is reducing fuel consumption by 3% based on expert projections.

3- Emission filtration activity: a central activity within the chain of G-ABC. It may appear to generate extra costs, yet it achieves the opposite, as it enhances the operational processes by aiding in material retention. The modern filters support more than just preventing ash emission and recycling ash as a ready resource to be used in furnaces (providing an economical alternative for limestone and clay), which reflects positively on the production lifespan for machinery and tools, and based on the experts' opinions in the factory and analysis of the comparable factories' experiments worldwide, this will aid the main activity levels as follows:

a- Primary grinding activity: the recycled materials such as ash are extremely fine powder materials. The collected ash is pushed directly to the silo without the need for grinding. This will reduce the energy costs

while extending the production lifespans of steel balls utilized specifically for grinding, with expected reduction up to 5% based on the factory experts' opinions.

b- Burning activity: assists in preserving the heat within the furnace, as the active filtration will reduce heat leaks from the rooms and recycle the hot ash, which will enhance the chemical reactions and reduce fuel costs used in burning. The achieved reduction in comparable green factories equals 3%.

Effects of G-ABC-based cost management in reducing costs:

Active management of costs based on G-ABC, based on research and analysis such as:

1- Academic researchers' opinions and dissertation conclusions.
2- Experts' notes and factory specialists in the research factory sample.
3- Experiments of comparable factories in production that implemented green approaches in cement production. The reduction in cost management based on activities is as follows **(Table 7)**.

Table 7. G-ABC implementation's cost reductions

Green activity	**Main activities**				
	Breaking	**Grinding**	**Clinker (burning)**	**Final grinding**	**Total**
Waste treatment (Burning waste products as a replacement for fuel), reducing fuel costs by 15%	(35% of the total cost reduction for the activity) 829792710 IQD	(20% of the total cost reduction for the activity) 474167262 IQD	(25% of the total cost reduction for the activity) 592709078 IQD	(20% of the total cost reduction for the activity) 474167262 IQD	2370836314 IQD, 15% of the total fuel costs
Recycling activity	Returned ash as a resource (6% of the materials reduction) (6160840276 369650416 =	Reduction in fuel costs=%5-- = %5* 3951393857 197569692	Reduction in fuel costs= %3-- =%3* 4741672629 142250178		Reduction in material costs= 369650416 Reduction in fuel costs- 339819870
Emission filtration activity		Reduction in fuel costs=%5-- = %5* 3951393857 197569692	Reduction in fuel costs= %3-- =%3* 4741672629 142250178		Reduction in fuel costs- 339819870
Total	1199443126	869306646	877209434	474167262	

After clarifying the adjustments in activity costs resulting from adopting active management through G-ABC, the above-mentioned reductions will be applied to the main activities, and then will be applied in the third step by utilizing cost waves.

Third step: Distributing indirect industrial costs on the main and supporting activities on the cement product utilizing environmentally friendly guidelines as available.

Fourthly: achieving G-ABC in synchronization with materials flow

Adopting a G-ABC-based costing system based on materials flow has enhanced the capabilities of the economic unit in producing environmentally friendly products while reducing the negative environmental effects that traditional production processes and activities have on the environment. The adoption of materials flow has aided in:

1- Supporting positive and green products through an empowering manual. Materials flow costing can reflect on it with regard to the environmentally friendly products and the negatively affecting products; it is considered one of the positive environmental evaluation systems.
2- By adopting materials flow costing accounting, it became possible to analyze material flow data and make the environmental cost calculation processes possible. This will enhance transparency regarding the effects of pollutants and emissions and how these flows transform into production features, which will achieve a G-ABC-based costing system.

3- Achieving flow and complementation between the traditional system and the modern green trends, represented with product flow, which aids in the possibility of continuous achievement of goals while providing the possibility for enhancements with continuous comparison. The results will be efficient material flow, protecting the environment, and supplying customer demands, and walking with SD towards one direction.

Fifth: Green approach for activities costs and achieving SD:

adopting a G-ABC-based costing system based on materials flow in enhancing the capabilities of the economic units in performing their role actively in providing the best resource management and achieving efficient cost management, leading to a reduction in costs and transforming the activities and processes that contaminate the environment to environmentally friendly activities, thus adding value on many levels throughout activities and processes, as follows:

1- Achieving SD through adopting waste treatment activities: treatment of waste with burning in the cement factory furnaces will aid in the complete elimination of organic waste to a new form of production. In other words, instead of burning materials to eliminate them, and what the pollutant materials emitted from the activity of burning in a scope of recycling these wastes to turn to fuel that will achieve efficient management of costs, and reduction in fuel costs, while simultaneously achieving the high values of eliminating pollutants and preserving and sustaining the environment.
2- SD through adopting recycling activities of ash, which aids in empowering the SD and preserving the environment, through changing the effects of the pollutants from environmental damage to an economic value of the economic unit, as well as supporting the flow of raw materials from ashes collected through precipitants that supports SD. Taking into account the possibility of reducing the costs of electrical energy usage and gaining growth with the monetary savings through reducing fuel consumption.
3- SD through utilizing emission filtration activities: to attain the needed SD needs and preserving the green environment, filtration of emissions will aid in retaining the materials using an advanced filter with actual work efficiency that surpasses ash emissions blocking, as well as recycling the ash as a fine ground resource ready to be used. This reflects positively on efficient management of materials flow and best usage of available resources, while simultaneously achieving economical savings represented by retained raw materials and reducing costs usually paid for grinding and burning. The result is achieving a cost SD and environmental preservation management.

Conclusion

After investigating the research variables, the research reached this set of conclusions:

1- The concept of green activity-based CY is based on the background of environmental preservation principles and the integration of environmentally friendly G-ABC into traditional costing activities, thus achieving effective cost management.
2- Green activity-based CY maximizes value on multiple levels, perhaps the most important of which is the economic unit level, through organizing their savings, as well as the societal level by preserving the environment and reducing waste.
3- Materials flow accounting enhances the possibility of achieving optimal resource utilization and reducing waste and loss, while simultaneously supporting the recycling of pollutants and waste as new materials through recycling.
4- The Kufa Cement Plant suffers from problems in allocating traditional and indirect industrial costs according to the adopted methods, in addition to the high level of waste and loss due to these methods, as well as the high amount of pollutants, emissions, and waste.
5- Adopting a green activity-based CY in the Kufa Cement Plant will support and enhance the achievement of SD requirements through eliminating waste positively (recycling) and utilizing it as fuel, which contributes to cost savings.

Recommendation

In light of the conclusions underlined, the most important recommendations are as follows:

1- The importance of adopting green activity-based CY and benefiting from the features provided in managing waste and pollutants, as well as achieving economic savings within costs.
2- The importance of supporting the green activity-based CY in accounting and value flow to enhance optimum usage of available resources and reduce the levels of waste and loss, including environmental damages.
3- Taking care to achieve SD on multiple economic levels and dimensions through effective management of costs and reducing the pollution levels of the environment through waste recycling and preserving the environment.
4- The management of Kufa Cement Factory must show concern to improve the CY through adopting G-ABC and the suggestions shown in the theoretical part, represented by waste recycling, burning and transforming to fuel, as well as usage of environmentally friendly filters to collect all the resulting ash of the factory activities and redirecting it to the main production activities.

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