

The possibility of accounting measurement of the costs of environmental performance of Iraqi industrial companies: Application study at National Company for Chemical and Plastic Industries 2018-2020

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Abstract

The aim of the study is to identify environmental costs and types in industrial companies, particularly the company in question, and to identify the accounting measurement of environmental costs and constraints facing the company in measurement. The study found that some environmental costs can be measured in accounting, environmental liability in the company is limited to the Industrial Protection Department and the Maintenance Department through the distribution of work to its subdivisions (Safety, Control, Civil Defense and Environmental Health), and so on difficulty in identifying and identifying environmental costs and the absence of adequate information provided by the accounting system on environmental activities. The study recommended that care should be taken to enact laws and legislation that protect the environment and disclose the harmful environmental impacts, take care to measure environmental costs and set up a specialized unit in the company to help in measuring them, minimize environmental damage resulting from the company's work and help in selecting suitable alternatives and taking appropriate decisions.

Keywords: accounting measurement, costs of environmental performance.

Introduction

The service entity faces difficulty when allocating the indirect industrial costs and determining the cost of the product accurately because these costs contain cost elements, some of which are variable, some are semi-fixed, and others are not related to attributes, meaning that the entity bears, whether in operation or in a state of discontinuity. The traditional methods of allocating indirect costs have faced many continuous criticisms, which led to the fact that some have presented new methods of allocating indirect costs to production units to reach more accurate cost data. One of these methods is the Attribute-Based Costing Approach (ABC11). The new approach is increasingly used in the western world because of its benefits in providing more accurate and appropriate data for making administrative decisions, improving performance measures and rationalizing production costs. The researcher was interested in this approach because of the absence of a causal relationship between the cost of products and the user of resources in light of the traditional methods of allocating indirect costs which led to inaccuracies in determining the cost of products. Several studies indicated that the cost system in its traditional form has failed to reach the reality of the product's cost and this resulted in wrong decisions for management, especially in the field of pricing, control and decision-making. Therefore, this research came to clarify the concept of the attribute-based costing approach and identify the advantages of this approach and the extent to which it can be applied in Iraqi commercial banks and to identify the obstacles to the application of this approach and the validity of its outputs.

Research Methodology:

First: Study problem: The increase of industrial companies in the world has led to an increase in the dangers of environmental pollution due to the work of those companies in providing goods and services to the society, which results in pollutants and harmful substances that affect the health of workers in these companies in particular and the members of the society in general. Despite the world's tendency to achieve development and implement comprehensive quality management in the environmental field, most Iraqi industrial companies have insufficient measures to protect the environment. The National Company for Chemical and Plastic Industries is one of the most important companies in the Iraqi industrial sector that contributes to the service of society through its products, but it has caused an increase in environmental pollution, and the company has worked to reduce the negative effects resulting from it through its public safety offices in monitoring and reducing the environmental pollution from it. This is why the main problem of the study lies: Can the environmental costs be measured by the National Company for Chemical and Plastic Industries? The elements of the study problem may be limited to the following questions:

1-What constraints make measuring environmental costs difficult?

2-What is the availability of the appropriate accounting methods for measuring environmental costs to NPCO?

Second: Objectives of study: The study aims at identifying environmental costs and their types in industrial companies, especially the company in question, and identifying the accounting measurement of environmental costs and obstacles facing the company in measuring environmental costs and environmental commitments and the possibility of measuring and reporting about them in the National Company for Chemical and Plastic Industries.

Third: The importance of study: The importance of research in examining the problems and constraints faced by industrial companies lies in the accounting measurement of the environmental costs and performance of the company in question, and the efforts made by the company in protecting the environment by allocating the necessary financial resources in its budget to different environmental activities.

Fourth: Imposition of the study: Based on the study problem, the imposition of the study can be determined as follows: The capacity of the accounting system of the National Company for Chemical and Plastic Industries to provide data and information that contribute to the rationalization of environmental performance through measuring environmental costs and commitments

Part One: Theoretical framework

The first: concept and importance of environmental costs

I. the concept of environmental costs:

Environmental costs can be defined as " cash or non-cash effects on an installation as a result of its environmental activities, including traditional costs such as buildings, equipment, materials, wages and industrial supplies, potential hidden costs (charged to indirect industrial expenses) and little tangible costs (Such as the costs of a potential commitment or improvement of the business image and can be difficult to measure). (Environmental Protection Agency Offices of Prevention:2000:P4)." as a comparison between external and internal costs as one of the components of the entire cost system of the establishment arising from its relationship to environmental protection or environmental damage, Dwinata, 2019:P25, defined it as" the sacrifices that an economic unit has incurred in its operational activities related to its environmental performance.

[illegible]

Second: Eco-cost trimings: Environmental performance costs can be divided into four groups (Masruhainah2017:P22-24.) And (Abd Al-Barr, 199:p. 245-263)

The costs of prevention: These are the sacrifices of the activities carried out to prevent the production of wastes or wastes that can harm the environment.

The costs of identification and evaluation: The sacrifices of the activities carried out to determine whether the products, processes and other activities of the economic unit have met the applicable environmental standards.

3- the costs of control activities: These are the costs that arise when following up the implementation of laws, legislation and standards related to the environment, including the costs of the treatment of reusable and recyclable hazardous wastes and others.

The costs of failure: These are the costs arising from the misuse of the resources that are involved in industrial processes, as well as the misuse of natural resources, such as fines and environmental compensation.

Third /accounting measurement of environmental costs: The difficulty in accounting for environmental costs lies in the nature of the environmental activities to be measured because they are difficult to quantify monetary values, which causes the accountant to ignore them sometimes, and also in determining the scope of these activities. They are widely published in departments and departments of industrial companies and are included in all these sectors, but these reasons were not sufficient justification for accountancy researchers to ignore such commitments, especially as they are increasing rapidly year after year. The accountant was obliged to perform the measurement after the development of his understanding by scientists, and the possibility of applying quantitative measures to intangible activities in the facility, including environmental costs and liabilities (Marzouki, 2004:81). Therefore, the researcher saw the possibility of accounting measurement for Iraqi industrial companies and the study was made on the National Company for Chemical and Plastic Industries and for the years (2018, 2019, 2020) for the data available and listed on the Iraqi Stock Exchange.

Part Two/ measuring environmental costs during the years of study (2020, 2019, 2018):

The quantifiable environmental costs at the company level are defined by the cost of avoiding damage and according to the tab (Abd Al-Barr, op. cit.) which clearly identifies the elements and components of environmental costs including losses incurred by the company in the event of its failure to prevent, assess and control various environmental damage; This tab helps track and inventory the various elements of environmental costs, and the researcher will follow this tab to complete this study, measure the environmental costs of the years mentioned above, consider 2018 as the base year and estimate the environmental costs (prevention, assessment, control, failure).

First: the costs of prevention: The costs of prevention consist of the following items:

1. Costs of industrial protection management: These are the costs that the company spends on the industrial protection department, which are considered to include the costs of salaries of the department's staff, overtime, depreciation expenses, training courses that the employees of the prevention department participate in, and other expenses (publications, stationery, water and electricity wages, 000 etc.).

A- salaries of employees in the Department: The salaries of employees in the Department were calculated from the detailed calculation of the Department of Protection and the following: Number of employees × average salaries of employees in the Industrial Protection Department monthly in Iraqi dinars × 12 months

Average cost of salaries of employees of the Industrial Protection Department = Total salaries of employees of the Environmental Protection and Protection Department, Safety Department and fire Department of the Industrial Protection Department / number of employees.

B- additional work for employees in the administration: Counting overtime work for employees in the administration from the detailed calculation of the prevention department.

C- **Official mission expenses inside and outside Iraq:** Training courses and official missions inside and outside Iraq.
D. stationery and office equipment and publications.

E- depreciation expenses during the year: Includes the expenses of the depreciation of buildings, cars, furniture, machinery and equipment (the company follows the fixed installment method in calculating the consumption installments).

And other expenses: Includes all expenses spent during the year, such as water, electricity, insurance, etc..

G- Spare parts and consumables: Includes all expenses spent during the year, such as mechanical and electrical spare parts, accessories and others.

2-General Safety Committee costs: The amount of bonuses paid by the members of the company's Safety Committee, which amounted to: Number of members x monthly bonus value x 12 months

3- Training costs for employees in the administration and factories.

Table 1 shows NPCO's prevention costs for the years (2018-2019-2020)

NO.	Cost item	2018	2019	2020
1-	Costs of industrial protection management	The value is in Iraqi dinars	The value is in Iraqi dinars	The value is in Iraqi dinars
-	Salaries of employees of the Industrial Protection Department	285684000	303408000	340200000
-	Overtime for management staff	4560000	6048000	5859000
-	Official mission expenses at home and abroad	200000	50000	25000
-	Depreciation expenses	27160000	26400000	27750000
	Other expenses	1800000	195000	268000
-	Spare parts and consumables	6250000	3500000	7750000
-	Stationery and prints	3150000	285000	185000
-	Total costs of industrial protection management	325969000	339886000	372037000
2-	Cost of the company's Public Safety Committee	4800000	8100000	10800000
3-	Training costs for employees of the plant protection department	850000	1100000	950000
	Total prevention costs	331619000	349086000	393787000

From table 1, the total costs of prevention for the years listed in the table are shown to be respectively. The reason for this is the high salaries of employees in the Industrial Protection Department and the high value of spare parts and consumables. The cost of safety increased in 2020 over other years, and the company sought to improve environmental protection, which required additional expenditure through awareness-raising and increased safety interns.

Second: Costs of identification and assessment (discovery): These are the costs resulting from the activities undertaken by the facility to measure and monitor potential sources of environmental damage, including the following activities (Mars:1996:P20-24), monitoring of pollution levels in materials used in the factory, monitoring of pollution levels from operational waste, monitoring of environmental audits, and monitoring of the obstruction between the plant and various environmental devices).

It is measured by the following items:

1-Cost of industrial protection management for factory workers:

These are the direct costs that the company has been paying to employees of the Industrial Protection Department in the factories from the salaries of employees, extra wages and employees of the inspection and follow-up department as a result of their work and their follow-up of public safety measures, environmental protection, and occupational health in order to meet the requirements of safety conditions, observe unsafe work, and take the necessary measures to avoid them. Keep the company clean, machinery and equipment consumables and all other expenses.

A- salaries of employees of the Industrial Protection Department who are responsible for inspection and follow-up work inside the factories. Number of employees × average salaries of employees of the Industrial Protection Department per month in Iraqi dinars × 12 months

B.additional work for employees of the Industrial Protection Department who are responsible for inspection and follow-up work inside factories.

Number of employees × average cost of overtime for employees of the Industrial Protection Department per month in Iraqi dinars × 12 months

C- Official mission expenses inside and outside Iraq: Training courses and official missions inside and outside Iraq.

D. stationery and office equipment and publications.

E- depreciation expenses during the year: Includes the expenses of the depreciation of buildings, cars, furniture,

machinery and equipment (the company follows the fixed installment method in calculating the consumption installments).

Other expenses: Includes all expenses spent during the year, including water, electricity, insurance, etc.

This is the first time that a person is able to make a payment on the basis of a payment.

2- The cost of the General Safety Committee in the company: Represented in the value of the rewards that the members of the company's Safety Committee charge, which amounted to: Number of members x the value of the monthly reward x 12 months

3- Control team costs: Represented by the value of the inspection and inspection work that the control team charges for the services they provide. It is calculated by the number of members x reward x 12 months

Table 2 shows the costs of the company's identification and evaluation activities for the years (2018-2019-2020)

NO.	Cost item	2018	2019	2020
1-	Costs of industrial protection management at factories	The value is in Iraqi dinars	The value is in Iraqi dinars	The value is in Iraqi dinars
-	Salaries of employees in the factory	526260000	534576000	599500000
-	Overtime for factory workers	4200000	10656000	10323000
-	Official mission expenses at home and abroad	50000	60000	25000
-	Stationery, tools and prints	400000	375000	290000
-	Depreciation expenses	17600000	22850000	28460000
-	Other expenses	280000	220000	360000
-	Spare parts and consumables	1850000	2650000	3250000
	Total costs of industrial protection management at the plant	550640000	571387000	602208000
2-	The cost of the company's safety inspection committee	14400000	5400000	21600000
3-	The cost of the control team	8400000	1350000	16200000
	Total identification and valuation costs	573440000	590287000	640008000

Table 2 shows that the cost of identification and assessment in 2020 is higher than in other years (2018, 2019) due to higher salaries for employees in the Industrial Protection Department, higher cost of depreciation, spare parts and consumables in the year, and the company's training of a group of its employees in the field of safety and environmental protection.

Third: Control costs: These include the following activities

The cost of using pollution control organizations: Their costs were zero because they were charged to the costs of the plant as a whole, as they were introduced in 2000 with a consumption rate of 5%.

This is the work of the factory maintenance team, which includes all the maintenance work of machines, equipment and any maintenance work, hence the cost of maintenance management can be considered at the company level (maintenance work costs for all parts and components of the company).

A - Maintenance management costs:

Schedule(3) company maintenance management costs for years(2018-2019-2020)

NO.	Cost item	2018	2019	2020
1-	Salaries of Iraqi employees	812164139	762891791	794044308
2-	Salaries of non-Iraqi employees	11550000	11073000	11268000
3-	Overtime work for Iraqi workers	34080650	24662000	37532500
4-	Incentive rewards	205178245	243928690	299839810
5-	Official mission expenses	100000	175000	150000
6-	Other expenses	200000	135000	1650000
7-	Stationery and prints	190000	450000	850000
8-	Consumable materials and spare parts	1800000	1550000	1750000
9-	Destruction	16250000	19750000	32650000
	Total maintenance management costs	1081513034	1064615481	1178241618

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In order to achieve the maintenance of pollution reduction systems, an estimated percentage of the total maintenance costs was taken based on the efforts and resources allocated by the maintenance department to perform the maintenance work on the pollution reduction systems, and it was revealed that the time for maintenance during the day is 8 hours. This is equivalent to (2.5%) hours of the total day, or 31.25% of the total maintenance time.

B- The cost of spare parts for pollution control systems: The costs of pumping fumes, dust, and oil scraping are represented by reference to the stored insertion document, and therefore the cost of maintaining pollution control machines can be calculated:

Pollution abatement maintenance cost = pollution abatement machine share of total maintenance management + parts cost of pollution abatement systems

3- costs of cleaning and removal of violations: These consist of: (A) salaries of employees in services and are calculated from the number of workers in the average and their salaries in 12 months.

B- Financial Covenant: From the financial records.

4- Health care costs: Include

The costs of the medical clinic include (nursing staff salaries, overtime, other expenses, spare parts and consumables) and are calculated from the total of those costs.

B. Treatment costs of hospital staff: Calculated by reference to the records.

The cost of lost days is calculated by reference to the reality of the records and the following: First: The average salary during the year = the total salary of the company/number of employees in the company). And then he counts Average daily wage = average salary during the year/number of days of the year and in the last step the cost of lost days = number of lost days x average wage. After we calculate the cost of lost days, we calculate

Healthcare costs = Medical Clinic costs + Hospital staff treatment cost + lost days cost

Costs of guarding and storing harmful and hazardous materials: Includes costs of A. Salaries of workers in the storage material are calculated by whom (and number of employees 8x average salaries x 12 months).

B- Insurance premiums calculated by reference to the records.

The consumption premium of buildings used for storing oils, fats and chemicals is calculated by reference to the financial statements.

The cost of protective materials and equipment: The cost of protective equipment given to workers in the factory to protect them and to minimize the environmental impacts and risks that may be incurred by gases, emissions and high sounds, and is calculated by reference to the financial statements.

7- costs of treating harmful waste: These are the costs of transporting harmful waste to the areas of landfill and are calculated through reference to the financial statements.

Table(4) showing control costs for years (2018-2019-2020)

NO.	Cost item	2018	2019	2020
1-	The cost of using pollution abatement systems	000000	00000	-----
2-	Cost of maintaining pollution reduction systems	341572823	335292338	373727521
3-	Costs of cleaning and removal of irregularities	99558500	78180000	67300000
4-	Health care costs	14036576	23758385	35725655
5-	Costs of guarding and storing harmful and hazardous materials:	40791385	173806529	80689885
6-	Costs of protective materials and equipment	13750000	576300	2420000
7-	The costs of treating harmful waste	148542000	12850000	5527016
	Total control costs	658251284	624463552	565390077

Table 4 shows that the total costs for the year (2018) (IQD 65825,1284) are the highest of the year (2019-2020) due to the high cost of expenses (costs of protective materials and equipment, waste treatment costs, cleaning and waste removal costs), and the high salaries of maintenance personnel.

Fourth: The costs of failure in the company are represented in the following items:

Legal expenses: (A) employees' salaries include 0, overtime, stationery, and depreciation charges, and are calculated according to the methods adopted in the above research.

B. Lawyer's fees: Calculated by reference to the financial statements.

The cost of expert remuneration: Calculated by reference to the financial statements.

Compensation and fines paid for work injuries and environmental damage are calculated by reference to the financial statements.

3- taxes paid to the State as a result of the exploitation and depletion of natural resources, calculated by reference to the financial statements.

Table(5) showing failure costs for years (2018-2019-2020)

NO.	Cost item	2018	2019	2020
1-	Legal expenses			
-	Workers' salaries	19200000	18500000	18500000
	Overtime	350000	500000	400000
	Stationery	400000	250000	120000
	Depreciation expenses	1150000	1200000	1800000
	Lawyer's fees	4000000	2500000	700000
	Costs of expert remuneration and remuneration	6500000	1500000	300000
	Total legal expenses	31600000	24450000	21820000
2-	Damages and fines	2600000	-----	2500000
3-	Taxes	851800	2091500	222287
	Total failure costs	35051800	26541500	24542287

Table (5) shows that the cost of failure for the year 2018 has risen to (3,5051,800), compared to other years, because of fines paid to the affected people for damages, and that legal expenses have increased over other years.

Table(6) showing the environmental costs report for years(2018-2019-2020)

NO.	Cost item	2018		2019		2020	
		The value is in Iraqi dinars	%Of total costs	The value is in Iraqi dinars	%Of total costs	The value is in Iraqi dinars	%Of total costs
	Total prevention costs	331619000	20,75%	349086000	21,95%	393787000	24,25%
	Total identification and valuation costs	573440000	35,88%	590287000	37,11%	640008000	39,42%
	Total control costs	658251284	41,18%	624463552	39,27%	565390077	34,82%
	Total failure costs	35051800	2,19%	26541500	1,67%	24542287	1,51%
	Total costs	1598362084	100%	1590378052	100%	1623727364	100%

Table 6 shows a model of reports on environmental costs that meet the needs of the internal and external beneficiaries through the provision of environmental information to the company through which monitoring, environmental performance assessment and appropriate decisions can be achieved, as well as an aggregate value of the types of environmental costs, a summary of the data of the environmental costs and the relative importance of each species. Prevention costs (20.75%, 21.95%, 24.25%), determination and evaluation costs (35.88%, 37.11%, 39.42%) and monitoring costs (41.18%); We note from the table that the rates of failure costs are lower than those of other types of environmental costs due to the lack of adequate resources and mechanisms for monitoring and inspection provided by the state. Failure to comply with environmental protection laws result in compliance with these standards by these companies, and also because some claims fail to resolve them as a result of environmental damage generated by these companies, fines may be suspended even partially until such cases are resolved.

Table(7) showing the percentage of environmental costs from the company's sales revenue over the years(2018-2019-2020)

NO.	Cost item	FY 2018		Fiscal period 2019		Fiscal period 2020	
		The value is in Iraqi dinars	%Of total costs	The value is in Iraqi dinars	%Of total costs	The value is in Iraqi dinars	%Of total costs
1-	Total prevention costs	331619000	1,98%	349086000	1,75%	393787000	4,66%
2-	Total identification and valuation costs	573440000	3,42%	590287000	2,95%	640008000	7,58%

3-	Total control costs	658251284	3,93%	624463552	3,12%	565390077	6,70%
4-	Total failure costs	35051800	0,21	26541500	0,13%	24542287	0,29%
	Total costs	1598362084	9,54%	1590378052	7,95%	1623727364	19,23%

It is to be noted that the value of sales (internal and external) during the years of study in Iraqi dinars is as follows:

1-Sales during 2018 =(167532135 IQD)

2- Sales during 2019 = (1999,977,000ID)

3-Sales during 2020 = (84429451)

The company's total sales for the years mentioned above amounted to 54.9%, 7.95%, 19.27%. The ratios and figures in the table show the importance of measuring environmental costs through access to environmental activities to a degree that can contribute to environmental performance assessment and appropriate decision-making.

After the completion of the measurement of the environmental costs of the company and for the years mentioned above, it was noted through the measurement that there were problems and difficulties in determining and separating costs in the company because there were no objective rules that could be referred to in separating environmental activities from non-environmental activities. The difficulty of separating the part that represents the environmental aspect of industrial costs and the spread of such costs in the company's departments and departments, in addition to the lack of proper accounting methods for measuring such costs in the company in question. In addition to the fact that the pollution control systems in the company have not been listed as fixed assets and have no cost center. The company's existing information system cannot provide sufficient information on the activities taking place in the company, making it difficult to account for those costs. **Based** on the hypothesis of the study, which is the capacity of NPCO's accounting system to provide data and information that will contribute to the rationalization of environmental performance by measuring environmental costs and liabilities, it was found that the NPCO accounting system is unable to provide full data on environmental costs. There is also some information or data that is interlinked between the departments and departments of the company that is difficult to accurately separate or understand.

Part Three/findings and recommendations

First: Conclusions:

1- the study concluded that it is possible to account for some environmental costs and internalization the environmental responsibility in the company is limited to the industrial protection department and the maintenance department through distributing works to its departments (the safety department, the control department, the civil defense department and the environmental health department.

2- The study found the difficulty of identifying and determining environmental costs and the lack of sufficient information provided by the accounting system on environmental activities.

3- Financial and accounting information plays an important role in the decision-making process and financial statements are the main source of such information.

4- The study concluded that reaching and measuring environmental costs in a quantitative or monetary way helps to make comparisons between available alternatives to choose the least expensive alternative.

5- Environmental costs help to tighten control over the environmental impacts of industrial firms' activities by providing useful and appropriate information for spending planning, attempting to minimize those impacts and working to improve the environment.

Second: Recommendations:

1-The need to enact laws and legislation that deal with environmental protection and the disclosure of harmful environmental impacts.

2-the need to encourage industrial companies to produce environmentally friendly products in order to help reduce the negative environmental damage that affects individuals working in companies and members of society.

3- To introduce the latest information technology and governance of all the company's financial and non-financial activities to access information as quickly as possible and without effort.

4-The need to pay attention to the measurement of environmental costs and to establish a specialized unit in the company in order to help calculate them and reduce the environmental damage caused by the company's work, as well as to help in selecting suitable alternatives and making appropriate decisions.

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