

**Macro Sustainability Accounting: A New Way to Prepare Value Added Statement****Mohammed Ataallah Ali****University of Baghdad- College of Administration
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This work is licensed under a [Creative Commons Attribution-NonCommercial 4.0 International \(CC BY-NC 4.0\)](https://creativecommons.org/licenses/by-nc/4.0/)**Abstract:**

Traditional accounting takes only one dimension (economic) in calculating the value added of the company, and all other aspects (including environmental and social) are neglected, and despite the emergence of Sustainability Accounting and the interest of companies in preparing sustainability reports, these reports are suffering from many problems, including multiple metrics used in measuring companies (cash, quantity and lavish). In addition, these reports may reach dozens of pages in some companies and this causes the problem (information overload) which affects the qualitative properties of accounting information such as appropriate and relative, which requires the need to find a tool that can measure the Sustainability Unit of standard measurement, so easy to understand and use in comparison with standard reference (benchmark).

The problem of research is the neglect of the cost of non-sustainability borne by society and the planet as a result of companies exercising their activities inefficiently, where these costs do not appear in the records of the companies causing them because of the common saying (that what cannot be measured cannot be managed and therefore cannot be held accountable) and this encourages companies to neglect sustainability.

As a result, the research aims to find an objective way to measure the cost of non-sustainability incurred by society and the planet as a result of the inefficiency of these companies in the management of their activities, therefore, these costs can be charged to the companies that cause them, as this will play a significant role in changing the perception of corporate managers towards sustainability.

The research led to a set of results, including the palaces of accounting tools (all branches) in measuring the cost of non-sustainability in cash.

The research presented a set of recommendations, the most important of which is the need to take into account macro sustainability accounting by the stakeholders of this profession, and develop value-added statement using the technologies developed by the researcher (SVA\$) because of its role in measuring the cost of non-sustainability critically, which will have a significant role in changing the corporate view for neglecting sustainability.

Keywords: Macro Sustainability Accounting, Sustainable Value Added, Value Added Statement, Non-Sustainability Costs.

1-Introduction:

The importance of macro accounting is highlighted in the light of the modern trend of sustainability as it is not possible to evaluate companies on a partial basis and ignore the economic, social, and environmental impacts that companies have in the national environment, as this cannot give a full picture of the efficiency and effectiveness of the company, the company may be winning from a partial, but it is (losing) from a macro point of view because of the losses it causes to the economy, the environment and society and resulting from inefficiency and effectiveness in the use of available resources. The research shows that sustainable value-added is an appropriate tool for such a task, which will be clarified in this research, where the concept of sustainable value-added will be addressed and the extent to which this concept can be developed and accommodate sustainability issues will be discussed.

2. The concept of sustainable value added

The Sustainable Value Added model (SVA) is a relatively new method that takes into account the sustainable value (SV) of a company, defines sustainable value-added as the wealth created while maintaining a stable level of environmental and social impacts, and is a new approach to measuring companies' contributions to sustainability where it takes into account both the efficiency and effectiveness to use available resources (Figge & Hahn, 2002, 1).

Miljenović believes that sustainable value-added only arises if the company achieves positive value-added compared to other companies in the same industry, where positive value-added arises when the total consumption of all resources is maintained at the level of the previous production period (base year) while increasing productivity at the same time (i.e. constant amount of inputs with increased output). This explains the Integrative measure of a company's efficiency in managing the three aspects of sustainability through sustainable value-added (Miljenović, 2018,164).

3. The importance of accounting for sustainable value added

What is the importance of accounting for sustainable value-added in the presence of sustainability reports dedicated to measuring and disclosing sustainability? To answer this, the difference between micro-level Sustainability Accounting and macro-level Sustainability Accounting should be identified as follows: (Belkaoui, 2019, 29) (Figge & Hahn, 2004,174)

3.1 Macro-level Sustainability Accounting

Belkaoui believes that the macro-level accounting will be the first to assist states in measuring and reporting National Economic Performance, and it will also be useful in measuring social indicators to assess the adequacy of planning performance in all areas of interest to the country, including education and health.

Figge & Hahn believe that the concept of Sustainable Development has been developed mainly at the macroeconomic level and that the main objective of this concept is to achieve the well-being of the individual without harming the right of present and future generations. There are different forms of capital to describe sustainability, for example, physical capital (such as productive goods), human capital, natural capital, and social capital. Sustainable development is achieved at the macro level when all capital is kept constant, and sustainability at the macro level rejects the idea of possible substitution between different capitals.

In other words, sustainability at the macro level refuses to compensate for the loss of a certain capital with a profit in another. For example, a company that releases harmful pollutants to the health of the community distributes humanitarian aid to the surrounding community, the damage to some capital cannot be compensated in monetary form or replaced, and sometimes the cost of repair or replacement is expensive or is not possible for the damaged capital.

3.2 Micro-level Sustainability Accounting

According to Belkaoui, at the micro-level, the accounting will first be useful for companies and small government units (such as the tax service) in measuring and reporting their financial situation and performance, and will also be useful in collecting and converting economic and social data and disseminating data appropriate for decision-making by the company itself.

Figge & Hahn argue that although the concept of Sustainable Development appeared mainly at the macroeconomic level, the concept of sustainability can be applied at the micro-level as well, but the difference will be the degree of flexibility in capital replaceability since sustainability at the macro level rejects the idea of the possibility of substitution between different capitals.

The researcher believes that this can be explained by taking a simple example: as companies can determine the number of direct injuries among employees on the job, but they cannot measure indirect injuries among members of the community as a result of the company's activities, so it does not appear in the partial sustainability indicators.

4. The method of calculating sustainable value added

This is done by the following equation:- (Figge&Hahn,2002,5)

Sustainable value added (SVA) = value added – non-sustainability cost (opportunity cost) + sustainability returns (if applicable).

The equation can be formulated as follows:

Sustainable value added (SVA) = value added – {cost of non-sustainability (opportunity cost) - returns of achieving sustainability (if any)} .

From the above equation, it is clear that (SVA) takes into account the cost of non-sustainability (opportunity cost), and as an indicator monetary sustainable value-added will measure the residual value after adjusting the company's value-added for the external environmental, social, and economic cost which represent

the opportunity lost as a result of the company's inability to improve its operational efficiency and productivity.

Bini & Bellucci defined sustainable cost as the hypothetical cost of restoring the planet to the state it was before the impact of the company, in other words, the amount that the company has to spend at the end of an accounting period to return the biosphere to the state it was at the beginning of the accounting period, subtracting sustainable cost from traditional profit enables companies to assess the degree of non-sustainability in monetary terms (Bini & Bellucci, 2020, 58-59).

The concept of opportunity cost under sustainable value-added means: in traditional financial analysis, the alternative cost reflects the amount of return that would have been achieved if capital had been invested in another alternative, and therefore this idea could be developed to include the opportunity cost of environmental, social and economic capitals. The concept of opportunity cost becomes the number of returns that would have been achieved if these resources (environmental, social and economic) had been invested in another project (or other company), so positive (or negative) sustainable added value refers to the value created (or lost) due to the allocation of resources in a particular project rather than investment in other projects (Figge & Hahn, 2008, 261-262).

5. The problem with measuring the cost of non-sustainability

Absolute sustainable value-added considers the efficiency and effectiveness of all three dimensions of sustainability simultaneously, i.e. SVA\$ must answer two questions, the first question is whether the company achieves greater returns than internal and external costs (If-question), and the second question is where resources should be allocated to achieve the highest possible degree of sustainability compared to other companies (Where-question). Investors regularly face a similar decision situation where they have to determine whether the benefit of the investment opportunity exceeds its costs and whether it yields more returns than other investment opportunities and we can learn from investment decision-making, and for this purpose, we must distinguish between direct costs and the cost of opportunity lost, where investments are made only if the return covers its direct costs and exceeds the missed opportunity that can be achieved if capital is invested in another alternative, and this decision situation can be expressed in the matrix described in figure (1) :

If- and Where-matrix. Figure (1)

		Benefit > Cost? (If-question)	
		Considered	not considered
Maximum benefit? (Where-question)	considered	absolute Sustainable Value Added	relative Sustainable Value Added
	Not	Net or Green Value Added	Value Added

(Figge & Hahn, 2002, 5)

For example, many researchers who have dealt with the topic of sustainable value-added (Figge & Hahn, 2004, 175) (Strakova, 2015), (Miljenović, 2018) and (Jankalová & Kurotová, 2019) have tried to answer only the second question (Where-question), i.e. they chose the tool (relative Sustainable Value Added) and, despite the importance of their efforts to develop this tool, they have left the answer to the question (If-question), i.e. they left the tool (absolute sustainable value-added) which can answer both questions. Due to the inability to objectively measure external sustainability costs (Figge & Hahn, 2004, 175), the inability to objectively measure external costs has led to neglect and a setback in this area (macro Sustainability Accounting) despite its importance in measuring corporate efficiency in an integrated manner (Bini & Bellucci, 2020, 59), Brunelli & Di Carlo believe that the lack of any attempt to critically translate climate-related impacts into account raises doubts about the consistency of international efforts by relevant actors to promote accountability for climate change and environmental issues (Brunelli & Di Carlo, 2020, 89).

6. The proposed method for measuring non-sustainability cost

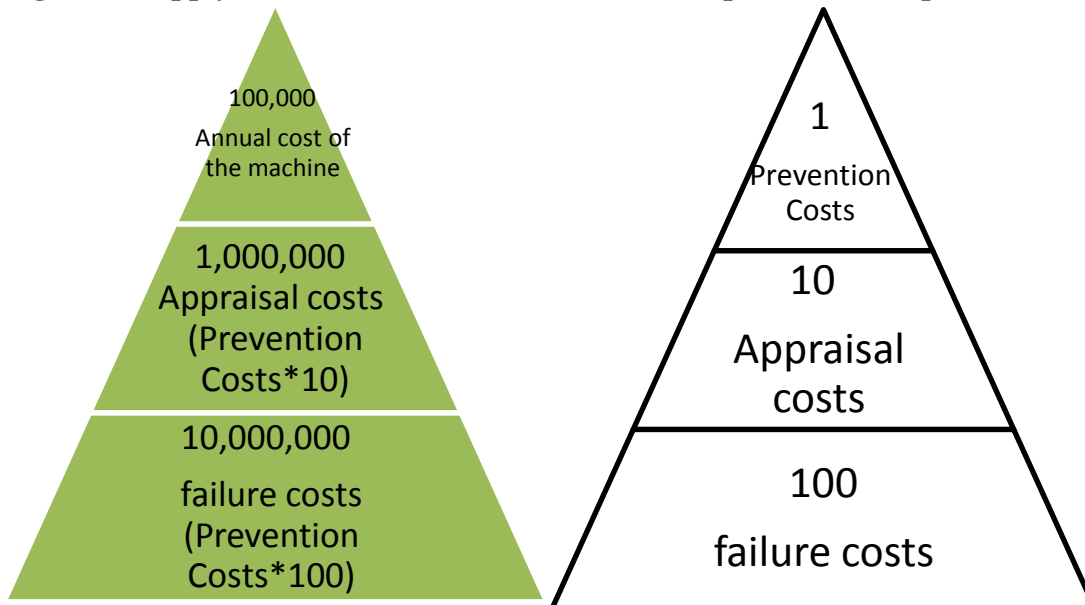
After what was presented in the previous paragraph, it is clear that there is an urgent need to measure the external costs borne by society and the planet to be loaded on to the companies causing them. The researcher proposes to use the Omachonu & Ross rule (1-10-100) to measure overall quality cost, which means that spending \$1 on prevention cost will save \$10 from valuation cost and \$100 in internal and external failure cost and that if the company wants to reduce the cost of internal and external failure, it should invest in prevention cost (Omachonu & Ross, 2004, 210).

The researcher agrees with (Al-Shirazi) considering the cost of indirect non-sustainability (internal and external failures) are the cost of preventing (Al-Shirazi, 353, 1990), and by developing this idea and applying it to the rule (1-10-100) can be reached to estimate the cost of internal and external failure (non-sustainability cost). To illustrate this, the following example will be assumed: a company from which it emits polluting gases estimated at (10 tons CO₂) per year, as the cost of the emitted gas processing unit (which will prevent the emission of

contaminated gases) is estimated at (\$1 million) and the estimated production age of the machine (processing unit) is 10 years.

In this example, the cost of the machine per year ($\$1,000,000/10$ years = $\$100,000$) represents the costs of prevention and application on the basis (1-10-100) so the costs of internal and external failures (environmental, social, and economic) to emit 10 tons per year of CO₂ gas are equal to ten million dollars a year, as in the following figure:

Figure (2) Apply a rule (1, 10, 100) to the data of the previous example



From figure (2), we note that the costs of internal and external failures (costs of non-sustainability) can be measured if prevention costs are determined by this rule. At first, the amount may seem substantial, but that is the truth. These costs are not borne by the company, but only a fraction of them (for example, workers' health insurance, social contributions, and environmental fines). The other part is borne by the state through the obligation to increase spending on the health sector as it is responsible for this. If the government is unable to afford those costs, it is the members of society who will bear these costs through self-treatment. This affects the well-being of the individual that sustainable development seeks to achieve. The last part of sustainability costs is outside the country and has an impact on the planet, as these emissions have an impact on the ozone layer as well as contribute to the problem of climate change and global warming.

7- The reality of sustainability in the company sample research

The Iraqi Midland Refineries Company will be taken as a sample for research and its sustainable value-added will be measured as explained, where the company suffers from a range of problems including (Report of Federal Board of Supreme Audit, 2020, 2).

A- Obsolescence of operational units: Most of the company's operational units are obsolete and have not been replaced or developed, causing sub-problems, including:

- Increased maintenance periods (hence increased maintenance costs and increased downtime)
- Reduced product specifications due to inefficiency required for operational units.
- Increased environmental pollution caused by the operation of these obsolete units.

B- The use of heavy fuel (fuel oil) in the operation of production units and support: This fuel has significant damage to the environment due to the number of emissions resulting from burning in addition to reducing the productive life of the machines.

C- The delay of investment projects: - Where many projects are owned or stopped despite the completion of large amounts of money, due to many reasons, including poor planning and management of these projects.

D- Lack of financial allocations for projects of a sustainable nature: Many important projects support sustainability (in its three environmental, social, and economic dimensions) but it is not a priority in Iraqi oil companies, where the researcher believes that the priority in these companies, in general, is to increase production to increase revenues and meet domestic demand. It is a good trend but the effort must be similar (if not greater) in increasing outputs as inputs stabilize by increasing the productivity efficiency of these companies.

From the above, it is clear that there is a clear lack of efficiency in the company's performance and neglect to keep sustainability away, as this has significant implications for the environment and society in addition to the economic losses resulting from the low productive life of machinery and equipment due to the low quality of products and increased maintenance costs.

However, by looking at the result of the company's activity and financial position, it is clear that the financial statements show that the company is a winner and that it has a strong financial position and achieves added value to the Iraqi economy, where the result of the company's business shows a net profit of (529,711,089,077 Iraqi dinars). The added value of the Iraqi economy is shown at (778,203,396,663 dinars, followed by an offer to reveal the added value prepared by the company.

Midland Refineries Company (Public Company)

Gross value added statement for the year ended December 31, 2019

Account name	2019 Iraqi Dinar
1- Resources	
Commodity activity revenues	1,320,899,585,584
Service activity revenues	1,214,623,112
	1,322,114,208,696
2- Supply	
Commodity Supplies	529,887,333,188
Service supplies	14,023,478,845
	543,910,812,032
Gross value added	778,203,396,663

Midland Refineries Company final accounts for 2019

Based on what was presented in the previous statements, we note that the traditional presentation method is not in line with sustainability trends, which requires taking into account the costs of non-sustainability, which the previous paragraphs have indicated their importance to users.

8. Application of the proposed method in measuring non-sustainability cost

The costs of non-sustainability represent the costs incurred by society and the planet due to the inability of the company to reach the maximum possible operating and production efficiency compared to other companies in the same sector, and the maximum possible efficiency in the refinery sector can be determined by relying on the Nelson complexity index, which measures the complexity of the refinery by operational units in the refinery (Kaiser, 2016, 4). The reports of the Financial Supervisory Office specialized in scrutinizing the company's industrial activity have also been used in the research sample, and the researcher will add the supporting operational units in the refineries also because of their great impact on the dimensions of sustainability, especially the environmental and social dimensions despite its low economic returns (or lack thereafter) as follows:

Table (1) Operational Units Required for Sustainability at Midland Refineries Co.

Operational units required	Number of units	Design Capacity	Cost estimate-dollars	Virtual Age - Year	Annual depreciation premium (annual cost of projects) (1)	Costs of non-sustainability (missed opportunity cost) (1)*100
Atmospheric distillation (a)	5	220000 barrels / day	-	-	-	-
Hydrogenation Unit (b)	4	40000 barrels / day	320,000,000	30	10,666,667	1,066,666,700
Isomerization unit (c)	4	40000 barrels / day	200,000,000	30	6,666,667	666,666,700
Fluid catalytic cracking (d)	1	30000 barrels / day	42,000,000	30	1,400,000	140,000,000
Lubricating oil blending unit (e)	1	40 m3/h	90,000,000	30	3,000,000	300,000,000
Industrial water treatment (f)	1	850 m3/h	750,000	30	25,000	2,500,000
Torch Gas Recovery Unit (g)	1	10 mcfs	65,000,000	30	6,500,000	650,000,000
Total	-	-	717,750,000	-	28,258,334	2,825,833,400

Prepared by the researcher based on the reports of Federal Board of Supreme Audit

(a) **Atmospheric distillation:** It is not calculated among the costs of non-sustainability, as it is not considered a sustainable project, so specialists are advised to cancel simple refineries consisting of distillation units only because of the significant damage they cause (and mentioned to identify the design capacity of the refinery).

(b) **Hydrogenation Unit:** The company needs 4 units of this type, one at Al-Dora Refinery, the second at Samawah Refinery, the third in Najaf Refinery, and the fourth at Diwaniyah Refinery, which absorb the quantities of a jet produced in those refineries, as well as reduce the amount of jet produced in those refineries.

(c) **Isomerization unit:** The unit increases the octane number of car gasoline, thereby increasing combustion efficiency and reducing emissions and pollutants.

(d) **Fluid catalytic cracking:** This project has economic and environmental returns as it produces highly efficient and valuable products and leads to the treatment of heavy residuals.

(e) **Lubricating oil blending unit:** Lubricating oil units suffer from many problems, including the age of technology in which the operational units for the production of Lubricating oil in the course refinery depend on solvents (Solvent refinery) while modern units in the world adopt new technologies such as high-grade (Sever Hydroprocessing). The old technology used in the course refinery causes greater environmental damage than modern technologies. The researcher does not have a source indicating the cost of modern technology so it will not be mentioned in the table and only to calculate the cost of the automatic Lubricating oil blending unit Eco-friendly.

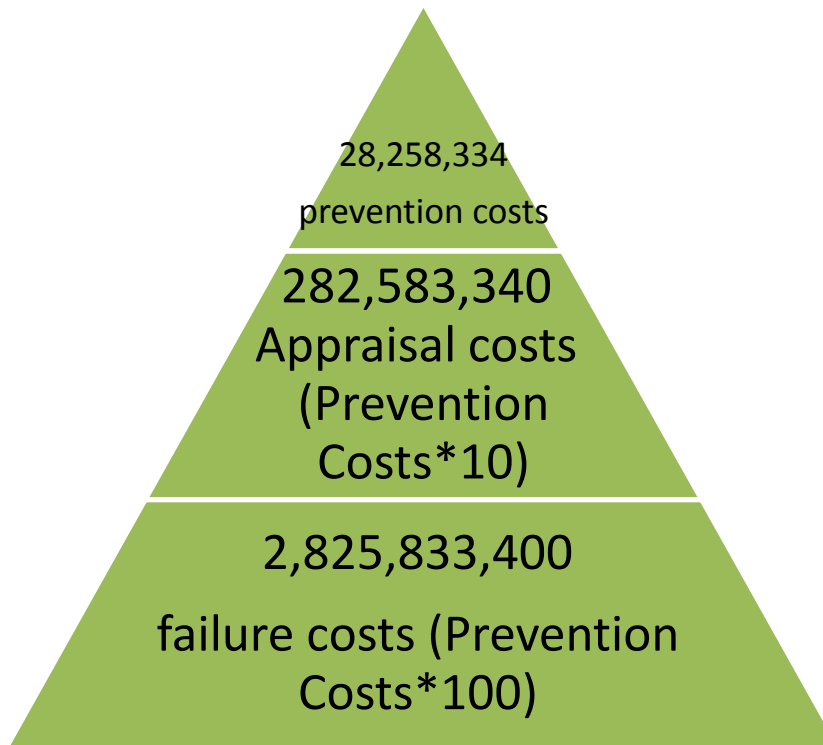
(f) **Industrial water treatment:** Although there is a treatment unit, it suffers from maintenance stops and lack of water absorption during flood periods and is unable to accommodate future expansions in the course refinery. According to the site (www.samcotech.com), the cost of the industrial water treatment unit ranges from 500,000 to more than 1,000,000 dollars depending on the capacity and specifications required and has been adopted average.

(g) **Torch gas recovery unit:** It has environmental and economic returns as well and can be created at Aldora Refinery.

The above-mentioned units, if implemented and effectively operated, will play a major role in reducing emissions and various pollutants from the refinery, increasing performance efficiency, reducing the import of petroleum products, and producing high-quality products that are more environmentally friendly. Therefore, the costs of these operating units are prevention costs and by applying to the rule (1-10-100) the costs of the company's non-sustainability are calculated annually by taking the total annual costs of these projects (annual consumption cost) using the rule (1-10-100) as follows:

Figure (3) application of rule (1-10-100) on the total annual cost of sustainable projects

Prepared by the researcher based on table (1) data



From figure (3), the costs of internal and external failure (non-sustainability costs) are approximately (\$ 2,825,833,400) include both economic losses (direct and indirect), social losses, and environmental losses at the company, society, and planet levels. For its application in the main equation of calculation (SVA\$) it must be converted into Iraqi currency and as follows (2,825,833,400*1,200 dollar exchange rate for 2019= 3,391,000,080,000) Iraqi dinars annual non-sustainability costs in the research sample company.

9. Measure sustainable value added (SVA\$)

After the costs of non-sustainability of the company were measured (SVA \$) for 2019 as follows:

Sustainable value added (SVA \$) = total value added - non sustainability costs (opportunity cost).

Sustainable value added (SVA \$) 2019 = 778,203,396,663 - 3,391,000,080,000 = -2,612,796,683,337 ID

The sustainable added value (negative value) means that the value of the additional costs incurred by society and the planet as a result of the company's practice is not larger than the total value added (traditional), and this requires the investment of larger amounts and achieving more projects to reduce non-sustainability costs and thus achieves the research hypothesis (the costs of non-sustainability can be measured in monetary terms).

It can be said that the company achieves the maximum sustainable value added (positive) when the company reaches the maximum efficiency possible at the sector level, and to shift from negative to positive value-added, the company must at least pass the average costs necessary to achieve the average efficiency at the sector level.

10. Development of value-added statement using (SVA\$)

The value-added disclosure can be developed to accommodate the costs of non-sustainability currently borne by society and the planet, thus showing these costs in the company records as they are responsible for their occurrence, and thus the desired benefit of this disclosure is greater since the main objective of this disclosure is to show the value-added at the macroeconomic level and to achieve this goal consideration must be given to the costs that are not visible in the company's records and that are affected by the overall economy as follows.

Midland Refineries Company (Public Company)

Sustainable added value statement for the year ended December 31, 2019

Account name	2019 Iraqi Dinar
1- Resources	
Commodity activity revenues	1,320,899,585,584
Service activity revenues	1,214,623,112
	1,322,114,208,696
2- Supply	
Commodity Supplies	529,887,333,188
Service supplies	14,023,478,845
	543,910,812,032
Gross value added	778,203,396,663
The costs of non-sustainability	(3,391,000,080,000)
Revenue to achieve sustainability (if any)	-
Sustainable added value (SVA\$)	(2,612,796,683,337)

Midland Refineries Company final accounts for 2019

In the above statement, event accounts appear for the development of value-added detection and make it absorb sustainability issues, which are (non-sustainability costs) and returns of sustainability "if any" and (sustainable value-added), which was calculated in the preceding paragraph and therefore becomes. This detection is more appropriate in measuring value added by the company for macroeconomics.

Here, it should be noted that the implementation of sustainable projects should be chosen by priority and not according to the company's desire, and this is done by preparing the risk matrix to determine priority sustainable projects through its impact on sustainability indicators. In general, the priority is oppositely in the refinery sector, for example, if the company wants to increase the production of the refinery, it must first add industrial water treatment unit, which is the last operational unit in the refinery operations and not vice versa.

11. Conclusion

In this article, a new way has been proposed to measure the costs of non-sustainability that the community and the planet currently bear because there is no objective way to measure those costs and load them on the companies causing them, and this method has also been applied effectively in the Midland Refineries Company to verify the validity of the proposed method and the extent to which it can be applied. Solving the problem of measuring external costs can lead to the development of the concept of "macro sustainability accounting" and increase interest in it because of its importance in evaluating the performance of companies in an integrated manner. In addition, the application (SVA\$) can create an atmosphere of competition between companies to introduce new technology in the industry and thus develop the efficiency of industries in general.

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محاسبة الاستدامة الشاملة: طريقة جديدة لإعداد كشف القيمة المضافة

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المستخلص:

تأخذ المحاسبة التقليدية بعدا واحدا (الاقتصادي) فقط في حساب القيمة المضافة للشركة، ويتم اهمال جميع الجوانب الأخرى (بما في ذلك البيئية والاجتماعية)، وعلى الرغم من ظهور محاسبة الاستدامة واهتمام الشركات باعداد تقارير الاستدامة إلا ان هذه التقارير تعاني من مشاكل عديدة منها تعدد المقاييس المستخدمة في قياس استدامة الشركات (نقدية وكمية ووصفية)، بالإضافة الى ان هذه التقارير قد تصل الى عشرات الصفحات في بعض الشركات وهذا يسبب مشكلة (Information Overload) والتي تؤثر على الخصائص النوعية للمعلومات المحاسبية كالملائمة والاهمية النسبية، مما يتطلب ضرورة إيجاد أداة تستطيع قياس الاستدامة بوحدة قياس موحدة، لكي يسهل فهمها واستخدامها في المقارنة مع معيار مرجعي (benchmark).

وتتمحور مشكلة البحث في اهمال تكاليف عدم الاستدامة والتي يتحملها المجتمع والكوكب نتيجة ممارسة الشركات لأنشطتها بشكل غير كفوء، حيث لا تظهر هذه التكاليف في سجلات الشركات المسببة لها بسبب القول الشائع (ان ما لا يمكن قياسه لا يمكن ادارته وبالتالي لا يمكن المحاسبة عنه) مما يؤدي الى تشجيع الشركات على اهمال ابعاد الاستدامة.

نتيجة لذلك يهدف البحث الى إيجاد وسيلة موضوعية لقياس تكاليف عدم الاستدامة والتي يتكبدها المجتمع والكوكب نتيجة عدم كفاءة هذه الشركات في ادارة أنشطتها، وبالتالي إمكانية تحميل هذه التكاليف على الشركات المسببة لها، حيث سيكون لذلك دور كبير في تغيير نظرة مدراء الشركات تجاه ابعاد الاستدامة. وقد توصل البحث الى مجموعة من النتائج أهمها قصور أدوات المحاسبة (بكافة فروعها) في قياس تكاليف عدم الاستدامة بشكل نقدي، وقدم البحث مجموعة من التوصيات أهمها ضرورة الأخذ بعين الاعتبار محاسبة الاستدامة الشاملة (Macro sustainability accounting) من قبل الجهات المعنية بهذه المهنة، وتطوير كشف القيمة المضافة باستخدام الاداة المطورة من قبل الباحث (SVA\$) لما لها من دور في قياس تكاليف عدم الاستدامة بشكل نقدي والتي سيكون لها دور كبير في تغيير نظرة الشركات لتبعات اهمال الاستدامة.

المصطلحات الرئيسية للبحث/ محاسبة الاستدامة الشاملة، القيمة المضافة المستدامة، كشف القيمة المضافة، تكاليف عدم الاستدامة.

*البحث مستل من رسالة ماجستير