Applying Material Flow Costing Technology to Achieve Sustainable Performance

MOHAMMED ALIWI KANOA

mohammed.kanoa@qu.edu.iq

BSHAEER NAJEH, ASSI

bashaerassi23@gmail.com University of Al-Qadisiyah

Corresponding Author : BSHAEER NAJEH, ASSI

Abstract : The research aims to enhance the cognitive foundations of the material flow cost accounting technique and how to measure the cost according to this technique in the research sample, and to show the benefits of the information it provides, and to study and analyze sustainable performance and clarify its economic, environmental and social pillars, as most Iraqi industrial economic units suffer from high rates of environmental pollution, waste and emissions and a shortage of available resources and energy, which led to an increase in their costs, in addition to the openness of local markets to various foreign products with low prices, and thus contributed to a decline in the sales of our products, so it is necessary to apply cost-effective techniques that help reduce environmental impacts and work on the optimal exploitation of available resources and energy, and among these techniques is the material flow cost accounting technique, which is one of the environmental management accounting techniques that works to separate and identify environmental costs as hidden costs within the total cost of the product, which gives a clear picture to the unit's management about it, and thus facilitates the possibility of reducing it, which in turn contributes to reducing waste, emissions and environmental impacts to achieve sustainable performance in its economic, environmental and social dimensions to produce environmentally friendly products with low environmental impacts and high quality.

To achieve the objectives of the research, the researcher applied it in one of the Iraqi industrial economic units, which is the Southern Cement General Company - Kufa Cement Factory as a sample for the research, and based on data for the year 2022, and through field visits and personal interviews with employees, the researcher reached a set of conclusions, the most important of which are: The application of material flow cost accounting improves the use of raw materials and energy, which leads to increased efficiency and reduced costs. This method also helps improve product quality and customer satisfaction, by making it more sustainable and reducing its environmental impact during use and upon final disposal. The application of material flow cost accounting requires the economic sector in the study sample to classify and measure environmental costs using environmental management accounting methods, as this enables management to know the size and value of waste, increased pollution rates, and inefficient use of available resources and energy, so that it can make decisions that lead to reducing the overall environmental impact.

Keywords: Material Flow Cost Accounting, Sustainable Performance

Introduction: Introduction: Interest in improving environmental performance has recently become a main focus in accounting research and studies as a result of many pressures and motives, including the increasing demand of stakeholders for the need for companies to commit to paying attention to environmental issues and the harmful effects they can cause to the surrounding environment and society. Applying the material flow cost accounting technique is one of the ways that can contribute to reducing environmental impacts, pollution, waste, emissions, and optimal exploitation of available resources and energy. The global openness of markets has led to the invasion of local markets with large numbers of foreign products with low prices compared to local products, which exposes Iraqi economic units to many pressures for various reasons, the most important of which is the high cost of their products and the low level of their quality. The matter needs to apply environmental management accounting techniques, which contributes to Reducing costs and optimal exploitation of resources, energy and environmental opportunities to achieve the sustainability of its products

The research includes four main sections, as follows:

The first section: research methodology.

The second topic: The theoretical framework. Section Four: Conclusions and recommendations.

The first topic

Research Methodology

Firstly. Research problem: The major changes and challenges witnessed in the business environment are a result of rapid technological progress, increased competition intensity, and global openness to markets, which has led to markets being flooded with low-priced products, which has a negative impact on the local product, which suffers from high production costs as well as high levels of pollution. waste, emissions, and misuse of available resources and energy Consequently, the harmful effects on the environment and society increase. Therefore, Iraqi economic units must apply techniques that contribute to reducing costs by identifying and measuring environmental costs and trying to reduce them and prevent their resulting effects in order to achieve sustainable performance. Since traditional cost systems are unable to separate and identify environmental costs and give a clear picture of their amount and how to address them, the problem can be formulated through the following questions:

1- Is it possible to apply material flow cost accounting in the economic unit of the research sample?

2- Does measuring cost according to the material flow cost accounting technique contribute to reducing costs and providing high-quality products?

3- What is the role of applying material flow cost accounting technology in achieving sustainable performance?

secondly. The importance of the research:

The importance of the research comes from the importance of the material flow cost accounting technique and demonstrating the impact of this technique in reducing environmental costs, waste, and emissions for the economic unit by providing quantitative and monetary information produced by the technique. Which motivates departments and units to search for opportunities to achieve sustainable performance of economic units. The material flow cost accounting technique is an effective administrative and accounting tool to be used in providing information about the amount of waste, materials, energy and emissions in order to reduce or eliminate them and helps economic units to be able to compete in the markets, improve the product and provide environmentally friendly products.

.Third: The Research Objectives:

The research objectives can be defined as follows:

1- Explaining the cognitive foundations of the material flow cost accounting technique and how to measure cost according to this technique.

2- Identify the quantitative and monetary information produced by the material flow cost accounting technique and its importance in achieving sustainable performance.

3- Study and analyze sustainable performance and clarify its economic, environmental and social aspects

4- Applying the material flow cost accounting technique in the economic unit of the research sample.

Fourth: The Research hypothesis:

The research is based on a basic hypothesis stating the following: Applying the material flow cost accounting technique can contribute to reducing costs and achieving sustainable performance in the economic unit sample of the research

Fifth: The hypothetical research model: The research model explains the nature of the relationship between its basic variables and the results that result from them, as shown in Figure (1) below, in which the researcher presented the techniques that were used in the applied aspect only.

Figure no.(1) Structure Search



Source: prepared by researcher

The second topic: The theoretical framework(Cognitive foundations of material flow cost accounting technology)

First: The concept of material flow cost accounting technology.

Material flow cost accounting, which was developed in Germany in the late 1990s and has been widely adopted in Japan since then, focuses on tracking waste, emissions, and negative products (393: Schmidt & Nakajima, 2013). It helps in enhancing the economic and environmental performance of the economic unit (192: 2023Dhahi & Abdullah). One of the main tools of environmental management accounting (EMA) is a set of procedures used within economic units to link environmental considerations with economic objectives. At present, economic units cannot ignore the environmental aspects of their activities, and therefore economic units search for administrative tools to link concern for the environment with their final results (328 : Mousa & Aziz, 2023).

(Mishelle Doorasamy, 2015:71) indicated that it is an administrative tool that works to promote the most efficient use of materials, which contributes to reducing waste and emissions and increases the transparency of the flow of materials, which is the key to the successful solution of problems. It enables economic units to increase the productivity of their resources and improve the performance of the economic unit in its aspects. Environmental, social and contribute to the sustainability of the product. It also provides a great incentive to reduce materials and costs. (12: Talha et al., 2022) believe that increasing resource efficiency and improving the use of resources enhance sustainable consumption and production.

They serve as a new accounting approach by providing information that helps economic units obtain a better understanding of the financial and economic impacts of practices and operations related to the consumption of materials and energy. This approach includes tracking and evaluating the flow of physical materials within the unit and allocating the appropriate costs associated with this flow. Through the information provided by this approach, decisions can be made that help economic units introduce appropriate changes to these practices and processes, thus enabling the required improvements. This, in turn, helps the management of these economic units identify opportunities to achieve financial savings and reduce negative impacts associated with resource consumption practices (Prox, 2015: 486). Material flow cost accounting facilitates the decision-making process to improve material and cost efficiency by integrating economic objectives. This is achieved by ultimately increasing transparency in the physical and financial aspects of material flows, which contributes to more efficient use of materials

The main concept of the material flow cost accounting technique depends on the inputs: materials, energy, water, and other inputs. Either the outputs: the main products or by-products, and solid, gaseous, and liquid waste (-642021:63Rachmawati). The aforementioned process of calculating costs requires understanding the parts of material flow cost accounting, which are shown in Figure (1), which represents the parts of material flow cost accounting

Figure no.(2) Material flow cost accounting technique

Source Astuti, R. S. D., & Astuti, A. D. (2018). Preliminary Design of Industrial Symbiosis of Smes Using Material Flow Cost Accounting (MFCA) Method. In E3S Web of Conferences (Vol. 31, p.3 04008). EDP Science



Second: Technical objectives of material flow cost accounting Material flow cost accounting;

is an accounting method that tracks the flow of materials through the supply chain from supplier to customer and provides information on the costs of materials, waste, energy, and the environmental impact of operations. The purpose of material flow cost accounting is to help economic units achieve a number of objectives, including

1. Material flow cost accounting for improved efficiency can help economic units identify areas in which they can improve the efficiency of material and energy use.

2. Material flow cost accounting helps units identify areas where costs can be reduced.

3. Provides information to management about opportunities to reduce the use of materials and improve the organization's financial performance (Huang, 2019: 7).

4. It aims to support economic units to improve their environmental, economic and social performance simultaneously and can be used to attract businessmen, especially those who always seek to achieve profit and have their main goal (2: Sulong et al., 2015).

5. It aims to reduce material inputs by analyzing all input materials equal to the amount of final product (positive product) and waste (negative product) (Huang, 2019). This equation represents the determination of the physical equilibrium when the number of positive products is constant and the number of negative products is decreasing, which reduces the environmental impact and waste generation (25: Kawalla et al., 2018).

6. It improves the transparency of material flows and energy consumption in the economic unit and provides the information necessary to make decisions that take environmental impacts into account.

7. As a tool to support decision-making and control, the decision-making process requires appropriate information about the positive and negative consequences in the economic unit (567: Möller, 2010).

Third: The basic principles of accounting for material flow costs. The principles include the ability to enhance transparency in the flow of materials and energy use, as well as considering the associated costs and environmental and economic impacts. The information obtained from cost accounting can support the decision-making process in companies and this can be achieved by adhering to the four basic principles of MFCA, which are, as indicated by a number of researchers (100: Pranata & Adhariani, 2023).



Figure no.(3) Principles of material flow cost accounting

Source: Tachikawa, H. (2014). Manual on material flow cost accounting: ISO 14051. Tokyo: Asian Productivity Organization.

Fourth: The benefits of using material flow cost accounting. Material flow accounting technology has many benefits that can help economic units improve economic, social and environmental performance, as indicated by (Al-Jalaihawi, 2020: 53) (3: Nakkiew & Poolperm 2016).

1. MFCA helps in recognizing the existence of economic losses that were hidden under the traditional cost accounting system, highlighting material losses and identifying options for reducing them.

2. The possibility of accurately evaluating the costs of the production process, and reducing waste costs by making changes in current product designs and the type of raw materials used.

3. Material flow cost accounting encourages improvements in supply chain management, by achieving cooperation between the supplier and the buyer to reduce environmental impacts.

4. The MFCA plays an effective role in defining responsibilities for different sections and departments with regard to waste generation and emissions.

5. The material flow cost accounting technique is an effective technique in determining the quantity and costs of products by calculating the costs related to raw materials and the in-process production of those products.

6. Material flow cost accounting promises to improve the decision-making process and reduce waste as well as a decrease in the cost of economic units to improve resource efficiency through the adoption of material flow cost accounting technology (192: 2023, Dahi & Abdullah). As in Figure (3), accounting for material flow costs.



Figure no.(4) The concept of material flow cost accounting

Source : prepared by researcher

The third topic: Sustainable performance and the role of material flow cost accounting in achieving it. First: The concept of sustainable performance. The contemporary idea of sustainability stems from the United Nations Conference in Stockholm on the Environment in 1972, which was the result of the crystallization and escalation of the pace of economic development and its consequences. From draining resources. Environmental pollution and emissions threaten the entire ecosystem (Aziz, 2021: 86). The 1990s saw an important increase in scientific research on sustainable business strategies and practices and the tools of relevant economic units in achieving this (Herzig & Schaltegger, 2011:303), After the emergence of the concept of sustainable development, the economic and environmental sector faced a number of challenges, including the integration of the dimensions of sustainable development, especially the social and environmental dimensions, into the practices of the economic sector, and then new areas and sections of performance emerged that go beyond profit, market share growth, and productivity to other areas related to the environment and responsibility. Social (Al-Ayeb, 2011: 22), and therefore the concept of sustainable performance is a combination of environmental, economic and social performance that benefits the natural environment and society alike, as well as providing economic sustainability and competitive advantage for the economic unit. Environmentally sustainable performance is the positive impact that a unit has on the internal and external natural environment as a result of its sustainable activities, which requires reducing air pollution and the use of energy and resources in order to comply with environmental standards (Mokbel et al., 2024:3).

In the same context, sustainable performance is a criterion for effective management in the long term, through achieving short- and long-term goals and the constant need to improve strategies and ensure the sustainability of current performance through creativity and innovation (Velasco, 2015: 1), and sustainable performance is an important activity that compares Expected and actual results, looks into deviations from the plan, evaluates individual performance and tests progress made towards achieving annual and long-term goals. The criteria for evaluating strategies should be easy to research and measure. One of the most important criteria for predicting results is the ability of the economic unit to create value for stakeholders and the extent of its ability to achieve a balance between... Various economic, social and environmental aspects (Roussel, 2007:1),Sustainable performance is practices in the unit that are committed to meeting the needs of the present without compromising the ability of future generations to meet their needs (55: Kamble et al., 2020) Sustainable performance is related to improving the quality of life while living within the limits of the carrying capacity of ecosystems, which is a participatory process of creating... And to pursue a vision of a society that respects all individuals and uses natural, human, social, cultural and scientific resources wisely, In addition, sustainability aims to maintain the integrity of ecosystems on which all life and all forms of production depend, while bearing responsibility towards future generations and providing economic stability (Henao et al., 2019:1-2).

(Permatasari et al., 2023.5) indicated that sustainable performance is an effort to meet the needs of current generations without compromising the needs of future generations, in addition to the aspects of economic, social and environmental performance. To achieve sustainable performance, the economic sector needs a strategy that combines

these aspects, and in While the main goal of sustainable performance is a positive impact on the environment and society as well as profits, failure to perform sustainably can lead to environmental problems and social damage.

Second: The importance of sustainable performance

1. Sustainable performance contributes to determining the ability of the economic unit to change or adapt to practices and opportunities that can be effective enough to help the economic unit become functional and developed (Kilintzis et al., 2020:2).

2. Through sustainability, economic units can transform the challenges they face into job opportunities, that is, they can transform external threats into opportunities, and internal weaknesses into strengths. In addition, units that participate in sustainability measures give themselves viability for their social, environmental and economic position, and that It is necessary to clearly define and plan sustainable strategic change actions in order to avoid confusion (Burmeister&Eriksson,2019:11-12).

3. The importance of a unit's sustainable performance is highlighted by its ability to clearly demonstrate its responsibility with regard to environmental protection, social well-being and long-term economic value (Emeka&Ngozi, 2022:61).

4. Sustainable performance is the responsibility of economic sectors and an opportunity to take action to ensure that their products and operations are safe for individuals and the environment. This creates opportunities to meet new consumer needs, reduce costs, and enable employees to provide value to society and stakeholders in general (Tourani & Khatibi, 2021:48).

5. The need for sustainable performance emerged through recognition and awareness of the negative impact of organizational development on the ecosystems needed to care for society and economies (Burmeister & Eriksson, 2019:7).

6. Sustainable performance contributes to achieving openness and transparency in dialogue with relevant parties, whether internal or external, for the purpose of achieving results at the level of the economic unit (Mohammed et al., 2024: 594



Figure no.(5) The importance of sustainable performance

Source: Pluchart, J. J. (2011). Le management durable de l'entreprise Les performances de l'entreprise socialement responsable. Vie & Sciences de l'Entreprise, (188), 96.p14.

Third: Dimensions of sustainable performance is measured through several dimensions, namely (the economic dimension, the social dimension, the environmental dimension) and my agencies: (Al-Kinani, 72: 2022); (Al-Mawajda, 2019:56);

1- Economic dimension: The economic dimension is an important element that describes how scarce resources are allocated to produce goods and services and distribute them to various segments of society. The economic dimension is defined as meeting the different needs of customers by creating value for them according to the requirements of cost, time and quality. To achieve the economic aspects, it can be noted that customer requirements must be met by seeking to increase productivity, reduce costs and provide the necessary capabilities to create a competitive environment. Market share can be increased by Gaining an advantage that other competing units do not have (Niesten et al., 2017: 2), and this dimension is measured using the reports and financial statements published by the economic units. Through this dimension, they seek to achieve an appropriate return on their money and gain competitive advantages that enable them to stand up to their competitors. Staying ahead is the dimension through which it seeks to achieve wealth and satisfy the desires of shareholders, customers, and suppliers (Fawzi, 2014: 80). Interest in the concept of sustainable economic development has increased one unit after another in recent years, along with interest in the concept of economic development, due to the great social and environmental consequences of economic development, as individuals are very concerned about pollutants in the water, air and soil, in addition to the consumption of natural resources due to the negative impact of growth. Especially emissions and waste resulting from industrial units have social and environmental impacts. Therefore, these units are required to limit the impact of economic growth, protect and preserve the environment, provide elements or components of protection, stability, organization, knowledge, capital, and protect the rights of future generations by increasing the degree of individual efficiency and effectiveness.

2- The social dimension: This dimension focuses on human factors, relationships between individuals, groups, and units, the efforts they contribute, and the pressures they exert on the economic and political system. This includes good governance represented by rules, policy approaches, and the degree of responsiveness between the main sectors of government, the private sector, and civil society. Civil society is not only limited to educating individuals and mobilizing their energies to contribute to building the future, but it is also integration and partnership to create a society united in its goals and united in its responsibilities (802: Shee et al., 2021). Which focuses on the ability of the economic unit to make its human resources effective players. The units also work through this dimension to achieve economic and social well-being, social justice, and provide equal opportunities for work for all segments of society (Pluchart, 2011:2). Systemic impacts on the system must be considered when developing sustainability strategies, such as the development of sustainable and safe products and the working conditions of partner units in the supply chain. To achieve a sustainable future, it is important to take a broader view (Baumgartner 2014:1). Doing this by looking at the whole system, the unit can be seen as an integral part of the market, society and nature as a whole (Hjorth and Bagheri 2006).

3- Environmental dimension: This dimension focuses on protecting the environment and its safety through the optimal use of natural resources and harnessing them for the benefit of humanity. This requires attention to biological diversity, which is a broad term that includes the diversity of technologies, tools, systems, and skills used in various fields that include humans and plants, in addition to that. Paying attention to discovered and latent wealth and resources in their various forms and renewable sources, as well as the environmental impacts to which the environment is exposed, with everything in it. This dimension focuses on the effective contribution of economic units to the development of the environment through the activities of the units responsible for protecting humans and plants, such as reducing or limiting the damage of pollution and disposal. of waste (Fawzi, 2014: 81). Focusing on the environmental impact, and reduce harmful environmental waste, as sustainable performance is the satisfaction of bringing together stakeholders, as environmental performance can protect natural resources, and on the other hand. Economic performance is the satisfaction of shareholders, customers, and suppliers (594: Mohammed et al., 2024), as in Figure No. (5) below:

Fourth: The role of material flow cost accounting technology in achieving sustainable performance. Material flow cost accounting technology is a powerful tool that economic units can use to improve their efficiency and effectiveness. By tracking the flow of materials through the production process, unit material flow cost accounting can identify areas of waste and optimize resource use. This can lead to reducing costs and improving profitability. Developments that have occurred in the contemporary business environment have led to the need for economic units to provide accurate and relevant information to make decisions in the face of the challenges they face. Cost estimation systems are no longer appropriate to the nature of the information required to make various decisions in the contemporary business environment. The units are no longer able to compete in light of current changes (Tachikawa, 2014:11). Cost accounting technology plays an important role in reducing costs. By identifying areas of waste,

companies can reduce the use of materials and energy and improve product quality. Material flow cost accounting can help companies identify and improve production processes that affect product quality and enhance environmental sustainability. Material flow cost accounting can help For units in reducing their environmental impact by tracking waste and reducing the use of harmful materials as well as improving decision making Material flow cost accounting provides companies with valuable information that can be used to make better decisions on production, pricing and storage (Hjorth and Bagheri 2006).

(:12015 Crist & Burritt). Cost reduction is an accounting system that provides information to support analyzes that guide material and energy flows and decision-making to improve resource efficiency and cost reduction processes. It integrates environmental and economic goals into one goal in order to contribute more accurately and efficiently by using less materials and energy (363 Schmidt & Nakalma 2013). Providing all information on the quantity and cost of negative products and checking balances for each process can provide management with information about the main inputs for each process, the number of products produced by these inputs, and the amount of waste generated by the manufacturing process (Fakoya & Van der pol, 2013: 136). (Fakoya & Van der pol, 2013:) Within economic units and their integration with resource planning systems and the availability of sufficient information about waste quantities and costs, enabling unit managers to make appropriate decisions to reduce or eliminate waste. Cost accounting focuses on allocating production costs to the flow of materials, calculating environmental costs, waste disposal, and comprehensive prevention or management. Environmental, in addition to measuring positive and negative product costs, which enables unit management to reduce or limit environmental costs and impacts. Enables unit managers to gain an advantage in reducing or minimizing environmental costs and impacts (Hyrslove 2011:16). It focuses on reducing the amounts of materials and energy consumed in the manufacturing process, which will reduce the volume of waste and emissions that affect the environment, and then the environment will be preserved from pollution as a result of reducing waste and emissions and producing products free of negativity (Hyrslove 2011:16).

Section Four: Conclusions and Recommendations

First Conclusions;

1- The use of material flow cost accounting technology helps in reducing waste, emissions, and environmental pollution rates and moving towards the optimal exploitation of available energy and resources.

2- The material flow cost accounting technique contributes to improving the environmental and social performance of the economic unit. The unit can also improve environmental performance through the use of renewable energy or recycling waste.

3- Sustainable performance contributes to determining the ability of the economic unit to change or adapt to practices and opportunities that are effective.

4- The unit's sustainable performance contributes through its ability to clearly demonstrate its responsibility related to environmental protection, social well-being, and long-term economic value.

Second: Recommendations:

- The government and organizations encourage economic units in their efforts to reduce environmental impacts and make better use of resources and energy,
- Develop workers' expertise and competence and train them on modern systems and technologies in order to increase their environmental awareness.
- Holding conferences concerned with increasing awareness of environmental and social issues.
- Taking advantage of the information provided by the material flow cost accounting technique to reduce the amount of waste and environmental pollution rates.

Arabic sources

1. Fawzi, Abdel Razzaq, (2014), The role of intellectual capital in improving the sustainable performance of the institution, a case study of some institutions, Farhat Abbas University. College of Economic, Commercial and Management Sciences. Algeria . Master Thesis . p. 80

2. Al-Ayeb, Abdel Rahman, (2011), Controlling the comprehensive performance of the economic institution in Algeria in light of the challenges of sustainable development, doctoral thesis, Faculty of Economics, Commerce and Management Sciences, Farhat Abbas University – Setif

Foreign sources

1_Talha, M., Wang, F., Maia, D., & Marra, G. (2022). Impact of information technology on accounting and finance in the digital health sector. *Journal of Commercial Biotechnology*, 27(2).

2_ Aziz, F. (2023). Data analytics impacts in the field of accounting.

3_ Mousa, A. B., & Aziz, P. S. M. (2023). The Role of Material Flow Cost Accounting in Reducing Waste Losses: An Applied Study in the" Rasan Steel Factory" for the Manufacture of Steel Structures. *Migration Letters*, 20(S5), 325-345

4_ Sygulla, R., Bierer A., Götze U., (2011), "Material Flow Cost Accounting – Proposals for Improving the Evaluation of Monetary Effects of Resource Saving Process Designs", Proceedings of the 44th CIRP Conference on Manufacturing Systems, 1-3 June 2011, Madison, Wisconsin, USA.

5_ Heywood, S., Layton, D., & Penttinen, R. (2010). A better way to cut costs. McKinsey Quarterly, 1, 64-5.

6_ Dhahi, H. N., & Abdullah, H. S. The Use of Material Flow Cost Accounting in Supporting the Cost of a Sustainable Product to Achieving Green Productivity1

7_ Nguyen, D. T. T. (2018). Is Japanese Material Flow Cost Accounting useful to Vietnam? A case study of a Vietnamese seafood processing company. *Accounting for Sustainability: Asia Pacific Perspectives*, 237-258.

8_ Pranata, M. W., & Adhariani, D. (2023). Analysis of the potential implementation of Material Flow Cost Accounting (MFCA) in muslim fashion SMEs Y. *International Journal of*

Financial, Accounting, and Management, 5(1), 97-111.

9_Mokbel Al Koliby, I. S., Abdullah, H. H., & Mohd Suki, N. (2024). Linking entrepreneurial competencies, innovation and sustainable performance of manufacturing SMEs. *Asia-Pacific Journal of Business Administration*, *16*(1), 10-Permatasari, A., Dhewanto, W., & Dellyana, D. (2023). The role of traditional knowledge-based dynamic capabilities to improve the sustainable performance of weaving craft in Indonesia. *Journal of Enterprising Communities: People and Places in the Global Economy*, *17*(3), 664-683.

11_ Tachikawa, H. (2014). Manual on material flow cost accounting: ISO 14051. Tokyo: Asian Productivity Organization

12 - Shee, H. K., Miah, S. J., & De Vass, T. (2021). Impact of smart logistics on smart city sustainable performance: an empirical investigation. *The International Journal of Logistics Management*, *32* (3), 821-845.

13_ Pluchart, J. J. (2011). Le management durable de l'entreprise Les performances de l'entreprise socialement responsable. Vie & Sciences de l'Entreprise, (188), 96.

14_. Hyršlová, J., Vágner, M., & Palásek, J. (2011). Material flow cost accounting (Mfca)-tool for the optimization of corporate production processes. Business, Management and Economics Engineering, 9(1), 5-18

15_Schmidt, M., & Nakajima, M. (2013). Material flow cost accounting as an approach to improve resource efficiency in manufacturing companies. Resources, 2(3), 358-369.

16_ Schmidt, Mario & Nakajima, Michiyasu (2013), Material Flow Cost Accounting as an Approach to Improve Resource Efficiency in Manufacturing Companies, Resources, Vol. 2, pp. 358 - 369.

17_Fakoya, Michael Bamidele and Van der poll, Huibrecht Margaretha, (2013), Integrating ERP and MFCA Systems for Improved Waste - Reduction Decisions in a Brewery in South Africa, Journal of cleaner production, Vol. 40, pp. 136 – 140.

18_ Niesten, E., Jolink, A., de Sousa Jabbour, A. B. L., Chappin, M., & Lozano, R. (2017). Sustainable collaboration: The impact of governance and institutions on sustainable performance. *Journal of cleaner production*, *155*, 1-6

19_Kamble, S. S., Gunasekaran, A., & Gawankar, S. A. (2020). Achieving sustainable performance in a data-driven agriculture supply chain: A review for research and applications. *International Journal of Production Economics*, 219, 179-194

20_Mohammed, A. S., Faisal, S. R., Abd, H. A., & Muhammad, A. K. (2024). The possibility of applying cloud auditing and its impact on achieving sustainable performance and its reflection in attracting customers in commercial banks (An exploratory study in some commercial banks registered in the Iraq Stock Exchange). *Iraqi Journal For Economic Sciences*, 22(80. S).

21_ Dheyaa Al-Kanani. (2022). Evaluating the sustainable performance of the

economic unit. Al-Reyadah Journal for Finance and Business, 67-83.

22_ Herzig, C., & Schaltegger, S. (2011). Corporate sustainability reporting. *Sustainability communication: Interdisciplinary perspectives and theoretical foundation*, 151-169.

23_ Velasco, Lea Veera Mea. The Impact of Corporate Sustainability Development Guidelines and Managerial Motivations on Corporate-NGO Strategic Partnership in Bangkok.Diss. Bangkok University, 2015.

24_ Mokbel Al Koliby, I. S., Abdullah, H. H., & Mohd Suki, N. (2024). Linking entrepreneurial competencies, innovation and sustainable performance of manufacturing SMEs. *Asia-Pacific Journal of Business Administration*, 16(1), 21-40