



USE CLEANER PRODUCTION TECHNOLOGY TO REDUCE COSTS AND ACHIEVE PRODUCT SUSTAINABILITY STRATEGY/ APPLIED STUDY AT YOUR PUBLIC COMPANY IN DHI QAR

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Article history:	Abstract:
<p>Received: 18th October 2022 Accepted: 18th November 2022 Published: 28th December 2022</p>	<p>The production of cleaner production from concepts and modalities requiring by the economic and industrial units in particular for its prominent and important role in reducing costs and reducing environmental effects and achieving sustainable development strategy, because continuing and staying on traditional methods makes it difficult for the economic unit to stay and continue In a long-term competition environment, because of its high costs as well as the difficult processes as well as the difficulty of meeting the needs and desires of customers because most of customers are not aimed at getting goods and services that meet their needs only but seeking the environmental impact of environmental impacts for being They have become more awareness, so economic units should be aware and seeking to use modern technicals, methods and means that enable sustainable product strategy if cleaner production is one of the best ways and means that enable industrial economic units to provide sustainable products Toxic and reduce energy consumption, waste materials and reduce emissions and help to Waste ware, as well as the role of cleaning production in reducing costs incurred by Economic Unity during its full work and in particular environmental costs.</p>

Keywords: cleaner production technology, cleaner production, reduction costs, sustainable product strategy, sustainable products.

INTRODUCTION

Economic units have realized that reducing costs, addressing environmental problems and preserving the environment and society have become challenges to be faced and overcome in order to achieve sustainable development, as it is necessary to use technology, technologies and modern and advanced tools to achieve the strategy of sustainable product, and in order to keep up with the changes and developments that have occurred in most countries of the world, as well as to abide by the instructions, regulations and laws issued by many affiliates and international bodies that aim and guide units Economic in all countries of the world to achieve sustainable development and provide products and services that preserve the environment and society and enable the economic unit to reduce costs and achieve excellence and excellence in the competition environment by providing products and services that reflect a positive image among customers, which increases their demand for these

products and services, thereby enhancing the position of economic unity and its work within the market.

Attention to achieving, improving, developing and upgrading the sustainable product strategy has also become an urgent necessity in today's world, because most countries of the world have realized that staying and continuing on traditional roads in economic units in various sectors, whether industrial, agricultural or service, makes it difficult to survive and sustain the lives of future generations, so modern technology must be used to enable sustainable products and services.

Cleaner production technology is an important component and method in the industry because it has a prominent role in reducing costs and achieving a sustainable product strategy as it enables the provision of products free of environmental impacts and helps to improve environmental performance and achieve an appropriate level of environmental management, which helps to protect the environment and society, as well as the role of cleaner production in reducing



production costs during the operations of the entire economic unit.

The idea of this research came on the role of cleaner production technology in providing products that meet aspects of sustainability (economic, environmental, social), as it became clear that there is a weakness in previous research and local studies in attention to the technology of cleaner production as well as neglect and lack of interest in sustainable product strategy, it has to divide this research into four investigations, where the first research addressed the methodology of research and previous studies (local, Arab, and foreign), while the second research addressed the identification of the nature of the technology of cleaner production and its role in evaluating, reducing and reducing waste and environmental effects, the third research dealt with achieving the strategy of sustainability of the product through the technology of cleaner production, while the fourth research addressed the practical aspect represented by the sample of research (Your General Company in Dhi Qar), while the fifth research may draw the first conclusions and recommendations.

First research: research methodology and previous studies

Research methodology

First: The problem of research: lies the problem of research with the presence of neglect and lack of interest in modern and advanced methods as a result of staying on traditional methods and this led to the depletion of large quantities of natural resources in production processes in light of their scarcity and difficulty in obtaining them at present, as well as the lack of provision of environmentally friendly products, which reflected on the generation of large quantities of waste and environmental effects and this is what most economic units suffer in various sectors, especially industrial, It makes it difficult for these units to continue in the competition environment for as long as possible, and there is an urgent need at present for industrial economic units to adopt the use and application of modern and advanced accounting, cost and management technology that enables to keep pace with contemporary changes in the business environment through which environmental problems can be addressed and the costs of production processes reduced and help to provide products that meet the needs and desires of customers. In addition, most economic units around the world have become one of their main objectives in achieving a sustainable product strategy, by providing products or services that achieve the dimensions of sustainability (economic, environmental, and social).

In light of the above, a number of questions are asked that researcher Bawad A seeks solutions to and address in this research, which are as follows:

1. What are the variables, requirements and means of cleaner production technology?
2. What are the variables, requirements and means of product sustainability strategy?
3. Is there an impact of cleaner production technology on reducing costs and achieving a product sustainability strategy?

Second: The goal of the research: In the research problem and the questions raised, the research aims to overcome and address many problems, by achieving a set of goals, which are as follows:

1. Study, presentation, analysis and identification of the nature of variables, requirements and means necessary for cleaner production technology.
2. Study, view, analyze and learn about the nature of the variables, requirements and means necessary for the product sustainability strategy.
3. Study, present, analyze and identify the impact of cleaner production technology on reducing costs and achieving a product sustainability strategy.

Third: The importance of research: The research derives importance considering the technology of cleaner production from the modern and advanced trends of the present in most countries of the world as a result of economic, environmental and social problems that have increased significantly as a result of the expansion of the size of industries in various sectors, especially the industrial sector, as it is the technology of cleaner production that can achieve the strategy of sustainability of the product, as it enables to reduce the consumption of natural resources and emissions and reduce liquid and solid waste and work on recycling, It works to use environmentally friendly materials and energy and reduces the use of toxic substances, which will enable compliance with the instructions, regulations and laws issued by the adherents and global bodies that guide and commit economic units to provide sustainable products and services, which will enable cost reduction and increased demand for environmentally friendly products.

Fourth: The research hypothesis: the research is based on some of the basic hypotheses of my agencies:

1. **"The use of cleaner production technology has reduced costs and reduced waste and environmental impacts."**
2. **"The use and application of cleaner production technology enables the**



achievement of a sustainable product strategy in Iraqi economic units."

1.2 Previous studies

Study	Researcher's name	Study title
Local studies	(Ismail, 2013)	"Management of overall environmental quality and its impact on technology practices except the product of the clean-up - a study that drew on a sample of employees in the General Company for the manufacture of medicines and medical supplies in NinoY"
	(Srouf and Mohammed, 2021)	"Integration between TkaLin cleaner production and quality costs to improve product quality "
Arab Studies	(Ben Mansour and Ben Abbas, 2017)	Future strategic cleaner production of Algeria's industrial environment: BCR case complex study
	(Rahman and Qahham, 2018))	" Cleaner production as a strategy to support the dimensions of sustainable development: actual examples of cleaner production activities in Egypt "
Foreign Studies	(Ahmad et al., 2018)	" Sustainable product design and development: A review of tools, applications and research prospects"
	(Neto et al , 2019)	" Cleaner Production in the textile industry and its relationship to sustainable development goals"
	(Deng et al., 2020)	" Effects of supply chain competition on firms' product sustainability strategy "

Source: The table is prepared by the researcher based on the sources found in the C-Countries.

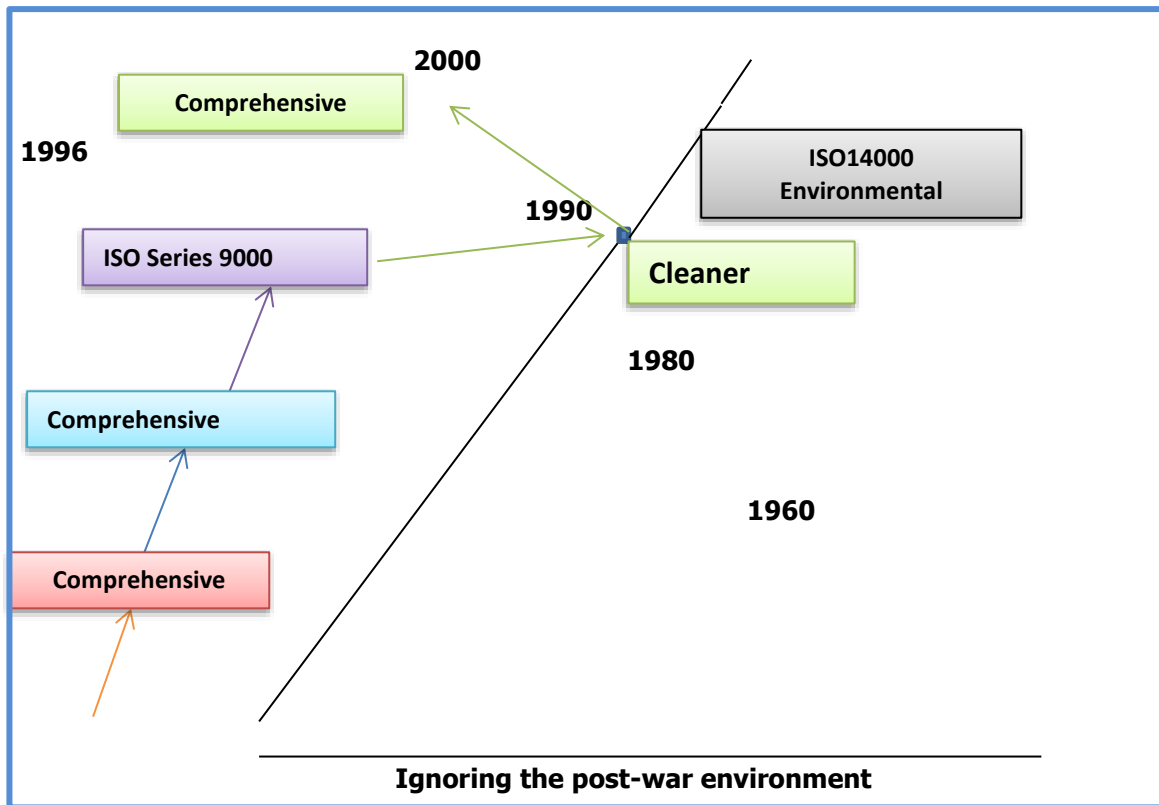
The second topic: identifying the nature of the technology of cleaner production and its role in assessing, reducing and reducing waste and environmental effects

First: The historical development of cleaner production technology and its concept

In the 1950s as a result of the development and expansion of the size of industries in all sectors, most countries and global affiliates began to face great pressure as a result of the increase in the volume of waste and environmental influences and in order to prevent damage to the lives of future generations, so the United States of America went in the late 1960s to highlight the effects of pollution and work to prevent it, so in the 1990s it sought to issue (pollution prevention law) and then the cleaner production center was established (CPC, through which natural resources that are largely wasted can be upgraded and conserved, resulting in the generation of large amounts of waste and environmental effects (Silva & Gouveia, 2020: 16).

How much cleaner production technology has been reached after many stages and historical developments, Figure 1 illustrates these stages and historical development.

Figure 1 shows the historical stages and development of access to cleaner production technology



Source: Silva, F. J. G., & Gouveia, R.M. (2020). Cleaner Production, Springer International Publishing, <https://doi.org/10.1007/978-3-030-23165-1>.

The concept of cleaner production technology is a modern and advanced technology that includes many ways, means and policies that enable effective management and efficiency of materials and energy in order to achieve sustainable development, through which production processes can be improved from the purchase of materials until the completion of the manufacture and use of the product, which enhances customer satisfaction with the products (Giannetti et al. , 2020:3. The Organization for Economy, Cooperation and Development (OECD) considers the technology of cleaner production to be the choice of the best resources, use and preservation during production processes in order to manufacture high quality and efficiency products free of environmental damage affecting the environment and society at all stages of their lives for the purpose of preserving air, water and soil during the manufacture and use of the product, and if quantities of waste and waste are generated, they must be recycled and not thrown for the purpose of utilizing the materials and energy inside them.) (Ah-You et al. , 2000:14. The concept of production technology can also be seen as a set of environmental and preventive strategies for the

delivery of products and services that help address the environmental problems and risks of reducing the use of toxic substances, reducing the amount of emissions and recycling liquid and solid waste generated during production processes (Neto et al. , 2019:1).

The concept of cleaner production technology can be achieved through a range of methods, namely Ah-You et al. : (al. , 2000:14

1. **Use of the best processes:** use processes that use the lowest inputs (materials and energy), produce the best products, generate the least possible emissions, defective products and waste and reduce waste during production processes.
2. **Use of environmentally friendly materials and energy:** Cleaner production technology enables the use of the best materials, renewable energy and environmentally friendly energy that do not generate large amounts of emissions and do not help to waste and lose them during production processes and are free of toxic substances, helping to produce products at an appropriate level of quality.



3. **Reducing the volume of waste and environmental effects:** The use of cleaner production technology enables to reduce the spread of pollution through processes such as waste and waste materials as well as materials used for cleaning that can affect air and soil.
4. **Waste treatment:** By treating waste and not dumping it in sanitary landfills and working to treat and recycle it for the purpose of utilizing its components by inserting it into production

processes or working to burn it in order to take advantage of the parts and components inside it.

The opinions of writers and researchers also differed in the definition of cleaner production, some viewed it as technology and others viewed it as a technique and others emerged as strategic, but most writers and researchers expressed cleaner production as a technology aimed at achieving sustainable development and table 2 shows a sense of tariffs on the technology of cleaner production agencies:

Table (2)
 Definitions of cleaner production technology

to	Definition	source
1	An integrated preventive strategy in which all systems, equipment and equipment used in previous production processes are replaced and modern and sophisticated systems, tools and equipment are used to reduce the volume of pollutants and environmental hazards and preserve materials and energy.	(Schaltegger et al. , 2008:7)
2	One of the concepts of environmental management that enables the economic unit to achieve continuous improvement of all production processes, for the purpose of addressing the problem of waste, reducing environmental risks and reducing costs.	(Hoof & Lyon, 2012:4)
3	Technology that provides state-of-the-art integrated production systems that address aspects that generate environmental damage and help provide an environment conducive to the lives of future generations.	(Huang et al. , 2013:115)
4	Technology enables the use of many activities that help to use renewable materials and energy in production processes and enables the recycling and use of products, materials and energy, thereby improving environmental management systems and reducing costs.	(Khalili et al. 2014:2)
5	One of the best systems that enables sustainable development, enabling environmental protection by addressing environmental problems throughout the entire product life cycle.	(Dong et al. , 2018:55)
6	Technology includes a set of rules, methods and methods aimed at protecting the environment from the harmful effects of products during production processes.	(Silva & Gouveia, 2020:15)

Source: Prepared by the researcher based on the sources in the table.

Second: the importance of cleaner production technology and its objectives

The technology of cleaner production has become very important because it is one of the best ways to address contemporary problems related to the environment and society, and because most of the economic units went to it after the great pressures faced by the adherents and international institutions, several laws, regulations and instructions were issued directing economic units to reduce waste and reduce the use of hazardous materials, including when the World Committee on Environment and Development

By passing the Law on our Common Future, which was aimed at economic units to preserve the lives of future generations by manufacturing products with the least possible materials and energy and generating the lowest volume of environmental waste, the ISO 14000 standard was issued, which obliges economic units to provide efficient, quality, user-friendly products and free of environmental waste (Silva & Gouveia), 2020:8

Cleaner production technology has also been used in most countries of the world, with studies and research proving that cleaner production technology achieves



about 40 percent reduction in waste, effluent, solid waste, wasted materials and emissions, and yields an estimated 200 percent of the revenues compared to the traditional methods used in economic units. (Mu'lholland & Delaware, 2006 :1).

The importance of cleaner production technology is the economic unit that achieves three aspects: Silva & Gouveia, 2020:7:

1. Increase production of the same inputs by improving regulatory efficiency and this will reduce costs.
2. Cost management which means increasing the profitability of products by reducing costs.
3. Planning and coordination by measuring the quantity produced according to the required quality level.

Therefore, cleaner production technology has become very important because it achieves many of the objectives of economic unity, including Schaltegger et al. ,2008:7) :

1. Reduce abuse by reusing or recycling products and materials, as well as reducing hazardous materials, waste and life-threatening emissions in society.
2. Achieving efficiency in the use of materials and energy by reducing the amount of inputs entering production processes and reducing waste of materials by addressing the weaknesses and imbalances that cause waste of materials and energy.
3. Develop production methods and reduce the risks faced by workers during production processes in order to manufacture sustainable products of quality and efficiency that do not affect the environment and society.
4. Make profits by manufacturing as many products as possible with the lowest used amount of materials and energy.

While many writers and researchers believe that the main objective of cleaner production technology is to provide products and services that contain no residues during the entire product life cycle by relying on a set of steps:

1. Identify products that cause the most environmental pollutants and residues.
2. Addressing the causes that led to the generation of environmental waste.
3. Cooperation between workers in the economic unit by providing all information about pollutants and their causes.
4. Replace bad materials and energy and replace them with new environmentally friendly materials and energy.

Third: Steps to implement the technology of cleaner production and the constraints it faces

Economic units in all countries in general and in developing countries in particular should be concerned with providing the means and systems necessary to implement cleaner production technology, as research and studies have shown that developing countries consume about 75 percent of natural resources and global energy, which has led to the loss of large amounts of natural resources, causing major environmental problems that make it difficult to survive in the coming years (Ghazinoory), 2005: 757), and then the implementation of cleaner production technology in economic units is in five stages: (Severo et al., 2015:119).

1. Planning, strategic organization and the provision of possibilities that help to provide products free of environmental impacts.
2. Providing and evaluating means, activities, equipment and equipment, as well as providing efficient and experienced manpower.
3. Evaluating programs and infrastructure, quality and efficiency.
4. Providing economic systems and techniques that conserve natural resources during production processes and work on environmental feasibility study.
5. Implementation and work to follow up operations from time to time.

Thus, there are many obstacles to overcome that make it difficult to implement this technology, including Silva & Gouveia, 2020: 270:

1. **Cultural constraints:** So most economic units suffer from a weak culture among workers in how to implement this technology, as well as the weak culture of the departments made it difficult to implement this technology, so it requires acquiring knowledge of modern and advanced technology in order to continue and stay in the competitive environment.
2. **Financial constraints:** Cleaner production technology needs to equip economic units with modern and advanced equipment, equipment and systems in order to provide quality and efficient products.
3. **Technical constraints:** Requires the provision of efficient and experienced working hands that can provide products free of waste and environmental effects , so it requires training workers and workshops that make workers able to adapt and keep up with this technology.
4. **Restrictions on government policies:** There are no strict government policies that force

economic units to go to modern and sophisticated systems and technologies, so fines and taxes must be imposed on products that waste large amounts of materials and energy, as well as generate a large volume of waste and environmental impacts.

5. Restrictions on production processes: Many economic units are committed to traditional methods and techniques that do not help to provide products that achieve sustainable development, and do not try to change their processes and production methods, so it is necessary to upgrade and develop production processes in order to go to implement and implement cleaner production technology.

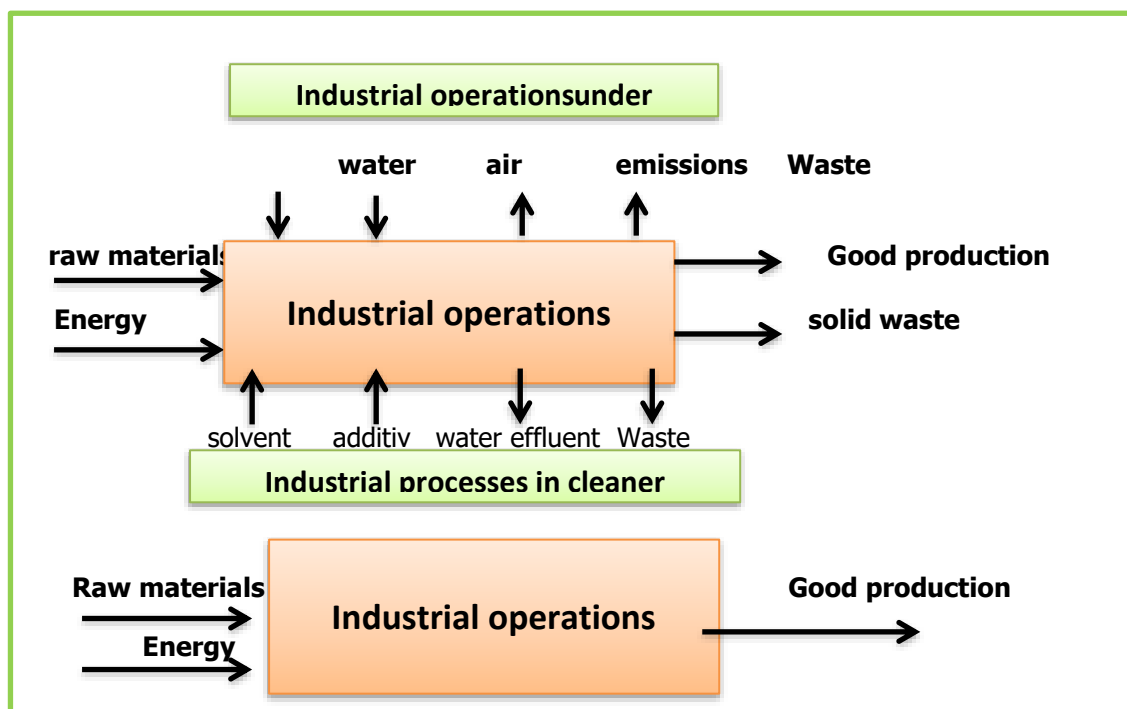
Fourth: The role of cleaner production technology in reducing waste and environmental impacts

The application of cleaner production technology helps economic units to process and reduce the negative environment more effectively and in order to provide a safe environment that guarantees the lives of future generations, and to keep pace with contemporary developments aimed at achieving sustainable development through the design and manufacture of environmentally friendly products (Almeida et al., 2015:1).

Cleaner production technology is also one of the best technologies that help achieve environmental management because it has enabled the provision of waste-free products and wasted materials and enables the use of environmentally friendly materials that do not contain certain toxic ingredients, as well as the provision of products that consume as little materials and energy as possible during production processes as well as during use by customers, It helps to deliver products at the lowest possible cost, it also helps recycle and use during a fully productive life cycle, and cleaner production technology provides a vision for the future of how to survive and face competition in the business environment because staying on traditional systems and methods at present makes it difficult to survive and continue in the competitive environment (Fan et al., 2019:1)

Thus, there is a difference between the survival of traditional roads, techniques, systems and technology used in industrial economic units with cleaner production technology, so there is a clear difference between the volume of liquid and solid waste, emissions generated and form (2) explains the impact of cleaner production technology in reducing waste and environmental impacts.

Figure (2) Impact of cleaner production technology in reducing waste and environmental effects



Source: Mulholland, K.L. (2006), "Identification of cleaner production improvement opportunities", John Wiley & Sons.



From figure 2, the fundamental difference in traditional methods of production processes is evident compared to cleaner production technology, as cleaner production technology reduces the amount of environmental waste and waste that may reach "zero waste" and this enables economic unity to preserve the environment and society and achieve sustainable development, reflecting a significant reduction in the costs incurred by the economic unit due to the waste of large quantities of materials and energy, The use of cleaner production technology will also generate a positive perception of the products of the economic unit and the quality and efficiency during use because it enables recycling or use as well as being free of hazardous materials containing some toxic ingredients, which will increase the demand for products because most customers now have environmental awareness, so their demand for these products will increase profits and expand the market share of the economic unit, This will enable them to survive and continue in the competitive environment as well as keep pace with changes and developments as they will achieve sustainable development.

Research 3: Achieving product sustainability strategy through cleaner production technology

3.1: Learning about sustainability and its concept

Interest in sustainability by most economic units in general and industrial in particular, as demanded by unesco , in 1967, directed economic units operating in various sectors (industrial, commercial or service) when they conducted their work that they should take care of and take into account and raise environmental aspects in a way that does not affect On the lives of individuals in the future, the concept of sustainability should develop widely in the 1980s, particularly when the World Committee on Environment and Development (WCED) presented and published a report entitled "Our Common Future", also called the Brundtland Report, which describes The meaning of sustainability is to protect the lives of individuals in society by working to meet their needs in the present without compromising the lives of future generations (pimon et al, 2020:2).

The concept of sustainability is also seen as making changes in economic and social aspects when using natural resources in productive processes by coordinating aspects of investment with technological progress and making changes in many aspects within processes for the purpose of preserving the environment, and then to meet the needs of the current generation and not Harming the lives of future generations (Orooan et al., 2018:101). Most economic units have become interested in the concept of sustainability, as a study has shown that nearly 95 percent of major companies in the United States of America and Europe seek to achieve sustainability in all its environmental, economic and social aspects, as well as nearly 150 major economic units throughout the world. The world, in various sectors such as banking and financial services, oil and gas, chemicals, automobiles, and logging.... Others, they work for the World Business Council for Sustainable Development (Berzengi & Lindbom, 2007:9). Economic units that strive for sustainability are therefore required to address and prevent the problems they face in their operations by carrying out many treatments, including Ballestar et al., 2020:3:

1. Change policies, regulations and methods.
2. Reducing the huge amount of waste and environmental impacts.
3. Work to find new ways and innovations.
4. The use of new environmentally friendly systems that help design and manufacture environmentally friendly products.

In the light of the above, it is clear that the concept of sustainability is useful to the economic unit because it will enable it to achieve many environmental, economic and social benefits as well as the role of sustainability in giving the image among customers that economic unity is on track in accordance with global changes and developments , and because the survival of traditional methods and systems makes economic unity difficult to continue in its working environment due to large competition and in the shadow of global developments that guide the economic units to for a concern for sustainability.

Sustainability aims to achieve three basic dimensions and form (3) makes this clear.

Figure (3)
 Sustainability dimensions



Source: Johnson, A. (2003), "Accounting for Sustainability-Guidance for Higher Education Institutions. Forum for the future, Higher education partnership for sustainability", The sustainable economy programme, London. p(15).

From figure 3, it is clear that sustainability aims to achieve three dimensions (environmental, economic and social) if these dimensions are overlapping and inseparable, so the economic unit must follow a technology or system that enables it to achieve these three dimensions in one when manufacturing products and presenting them to customers.

3.2: The concept of a product sustainability strategy.

There is now a clear focus by economic units on the provision of sustainable products, although the emergence of the concept of sustainable products does not go back to a long period of time, but when sustainability emerged, the attention was quickly paid by economic units and researchers due to the social responsibility of the economic units, as most departments of economic units in various sectors, especially the industrial sector, were well aware that the survival of old systems, techniques and means will affect significantly On the environment, which threatens the lives of future generations, it is necessary for economic units at present to seek to provide sustainable products that help protect the environment and society and give a positive image to customers about their performance and processes, and therefore the provision of sustainable products is a strategy that works on the use of technology and integrated methods and methods to help make different decisions including how to use environmentally friendly materials and learn how to design and manufacture green products, As well as the required level of quality, the amount of costs required and the amount of profits that can be earned

from the introduction of green products (Deng et al., 2020:2).

The product sustainability strategy is therefore seen as the ability to provide products that enable economic benefits in particular as well as environmental and social benefits in general, in the sense of providing sustainable products that enable profits that satisfy the owners and managers of the establishment while taking social responsibility by providing environmentally friendly products and preserving society) Dyllick & Rost, 2017:1).

The concept of product sustainability strategy is also a general strategy not only for workers in the economic unit and its management, but also a responsibility of the community, especially customers who care about social responsibility and environmental protection, according to a study that about 86% of customers seek environmentally friendly products because they feel psychologically comfortable when using them. They order these products even if they cost higher than other alternative products, as demand for sustainable products has increased in recent years (Yang & Dong, 2017:1:3).

3.3: The advantages of a sustainable product compared to a traditional product

The approach to designing and manufacturing sustainable products through the use of cleaner production technology will bring many advantages to economic unity and to customers who have become environmentally conscious, table 3 shows the advantages that can be achieved if sustainable products are manufactured.



Table (3)
 Benefits of sustainable products

to	Advantages	Details
1	Rapid expansion of markets	The entry of the economic unit with sustainable products makes the economic unit superior to competitors and has a good reputation in the markets
2	Reduces regulation	The provision of sustainable products makes the economic unit comply with environmental laws, instructions and regulations, and this satisfies the government, customers and its employees.
3	Increased demand	Access to sustainable products will increase customer demand for these products rather than traditional products.
4	Maintaining the health and safety of employees	The manufacture of sustainable products will enable social sustainability through the use of green machinery and equipment and toxic substance-free raw materials, as well as the role of the economic unit in maintaining the health and safety of employees.
5	Reducing raw material and manufacturing costs	Ordering environmentally friendly materials and ordering manufacturers capable of making environmentally friendly products will create competition between suppliers and manufacturers and this will enable the economic unit to obtain resources and manufacture products at the lowest possible cost.
6	Delivery of value-added products to customers	Sustainable products are more value added than traditional products due to lower raw material and manufacturing costs as well as continuous improvement of manufacturing processes.

Source: Ghadimi, P., Yusof, N.M., Saman, M. Z.M., & Asadi, M., (2013), "**Methodologies for measuring sustainability of product/process: a review**", *Pertanika Journal of Science and Technology*, 21 (2), p (309).

In light of the above, it is clear that the use of cleaner production technology will enable the manufacture of sustainable products and therefore the economic unit will be able to achieve many competitive advantages, including improving the reputation and image of economic unity in the markets, and the satisfaction of workers in manufacturing these products, as well as the possibility of making improvements and addressing the defects to reduce waste and environmental waste, and other advantages, It is clear that the most important advantage that the economic unit can gain in the event of the use of cleaner production technology is the provision of environmentally friendly products free of environmental influences and does not generate any environmental residues from the entry of raw materials into the production process to the marketing and sale of products.

3.4: Comparison of sustainable and traditional products

At present, there is a tendency by economic units to keep pace with changes and technological developments and to abide by the laws and instructions imposed by the regulations, regulations and laws by environmental associations, as well as the imposition of fines by governments on economic units for irregularities affecting the environment and society, and this prompted most economic units to use modern technologies and technologies in the product industry, primarily cleaner production technology, for the purpose of achieving the three dimensions of economic sustainability. Environmentally, and socially, there is also a difference between the provision of sustainable or traditional products, table 4 explains these differences.



Table (4)
 The difference between sustainable and traditional products

t o	Statement	Traditional products	Sustainable products
1	Net sustainability performance	<ul style="list-style-type: none"> Adds negative value to sustainability 	<ul style="list-style-type: none"> Positive value adds sustainable value
2	Impact of products and processes on the environment	<ul style="list-style-type: none"> Natural resources are used excessively, affecting the environment. Greatly affects the environment during manufacturing, distribution and use. Consume large amounts of renewable natural resources. Natural resources are consumed without restrictions or limitations. 	<ul style="list-style-type: none"> Preserves the environment while using natural resources. Provides high levels of environmental efficiency. Do not consume natural resources excessively. Natural resources are consumed in accordance with laws, instructions and regulations.
3	Economic impact	<ul style="list-style-type: none"> Contributes negatively to net economic profits due to fines imposed on the economic unit due to the impact on the environment and on workers. 	<ul style="list-style-type: none"> Contribute positively due to interest and conservation of the environment and workers.
4	Reputation	<ul style="list-style-type: none"> Reflects a negative reputation for economic unity 	<ul style="list-style-type: none"> Reflects a positive reputation for economic unity
5	Risks admission of	<ul style="list-style-type: none"> Activities and practices become increasingly unacceptable from time to time. 	<ul style="list-style-type: none"> Activities and practices become accepted by all stakeholders
6	Technological risks	<ul style="list-style-type: none"> Using technologies and technology that are threatened with rejection in the future 	<ul style="list-style-type: none"> Based on technologies and technology is one of the best technologies and technology used, primarily cleaner production technology
7	The importance of products within the market	<ul style="list-style-type: none"> Poor knowledge of their products, so people's turnout is low. 	<ul style="list-style-type: none"> It is an acceptable and well-known product, as the demand for people is very high

Source: Charter, M., & Clark, T., (2008), "Product sustainability: organisational considerations", International Journal of Product Development, V. 6, NO.(3-4), p(255).

From table 4, the difference between the use of traditional and sustainable products is shown, as there are many differences, it is clear that the economic unit that works to provide sustainable products will be able to achieve a distinct competitive position within the markets and can continue in its working environment for an unlimited period of time, as one of the best of these differences, which enabled customers to become popular with sustainable products is that sustainable

products preserve the environment and reduce the generation of waste and environmental effects, including (reduction) Emissions, the use of renewable materials, reducing the use of certain toxic substances, reducing waste generation, recycling environmental waste and waste, and manufacturing products that can be recycled or maintained for use again), and thus achieving these aspects will reduce costs and preserve the workers in the economic unit and customers who



use these products as well as preserve the lives of society as a whole, This proves the validity of the first hypothesis that the use of cleaner production technology can reduce costs and reduce waste and environmental impacts. Therefore, it is necessary to use modern systems, techniques and technology, primarily cleaner production technology.

THE THIRD TOPIC: THE PRACTICAL ASPECT

This research deals with an explanation of the research sample represented by (Your General Company) affiliated with the Ministry of Industry and Minerals of Iraq, where your company in Dhi Qar is one of the important economic units at the level of the province and the country, because it works to manufacture products characterized by efficiency and quality and help to achieve excellence in its products, and He was able to improve aspects of sustainability (environmental, economic, social), as this industrial economic unit is one of the causes of environmental pollution due to the increasing volume of emissions in the air, the accumulation of waste and waste, and does not maintain the flows of materials and energy and this reflected on the waste of large quantities of them, as the industry affects individual workers in the factory, and on the residential houses that surround the company, and then this research will be addressed according to the following paragraphs:

First: The date of the emergence of your public company and the stages of its development

Orr General Company was established after its merger with both the aluminium and wire manufacturing facility and the 222nd-largest midwifery manufacturing facility, in light of the decision of the Revolutionary Command Council (dissolved) on the date of 6/3/1988 number 222, which became called or general engineering industries facility, and then became called Or General Engineering Industries Company. 506,000 one hundred and fifty-four million, five hundred and six thousand dinars. The company specializes in the production of multiple types of low-pressure electrical midwives, air wires made of aluminum and copper, suspended bromine and transformers, and other types of midwives, this company has two facilities and each facility includes several first factories called the general facility for midwives and wires and includes the mechanisms:

1. Power and electrical wiring plant
2. Midwifery and telephone wires laboratory
3. Winding wire lab
4. Field Wire Lab
5. Wood Pulley Factory

The second facility is called the General Aluminium Section Manufacturing Facility and includes the mechanisms:

1. Plumbing plant
2. Al , Darfla Factory
3. Parcel and oxidation plant
4. Chip Lab
5. Parcel factory \2
6. Oxidation and coloring work

Therefore, the focus will be on cleaner production technology in order to achieve product sustainability, as cleaner production technology achieves the three aspects of sustainability (environmental, economic, and social).

Second: Achieving product sustainability based on cleaner production technology

Your Public Company owns some of the people that help to address the environmental, economic and social aspects, including the Division of Qualitative Control as well as the Engineering Inspection Division and the Division of the Competent B.B. and other people, but in fact it became clear that these people do not disclose and do not display any information in the company's lists and statements, **Therefore, the researcher sees the possibility of gaining many competitive advantages for Your by improving the dimensions of sustainability (environmental, economic, and social)**, by relying on the technology of cleaner production, this will enable the reduction of costs and achieve excellence in products and keep up with all the laws and instructions adhered to by most economic units in different countries of the world, and the use of cleaner production technology will enable the economic unit to be able to disclose all costs related to the environment and disclose all environmental answers, It will be applied to the cleaner production technology in your public company through the following:

1. Controlling greenhouse gas emissions in order to maintain air safety

Your General company will operate many equipment, machinery and machinery in production processes, and the company also owns many modes of transport that transport products and distribute them to customers in sales centers, as many emissions are generated from these equipment, machinery, machinery and cars such as carbon dioxide gas (CO₂), as well as carbon monoxide gas (CO, and many other polluting gas, as these gases affect the residents of the neighboring city and the highest employees of the company and the environment in general, so the emissions generated in



the company are contrary to the instructions and standard ratios specified in the relevant global affiliates, as the Kyoto Protocol specified the specified standard ratios that cannot be approved by the factory, as the acceptable standard emission ratios are

set at about (1500) metric tons, while the emissions generated in the company exceeded the allowable limit, reaching about (3000) metric tons in the year (20-18), and table (5) shows the difference between the standard and actual ratios:

Table (5)
 Emission ratios according to standard and actual ratios

Type of gas	Total emitted gases (metric tons)	Carbon dioxide gas ratio	Carbon monoxide gas ratio	Methane gas ratio	Nitrogen fluoride gas ratio	Other gases
2019 emissions	3000	88%	4%	0%	0%	8%
Globally accepted standard ratios	1500	76%	1%	14%	8%	1%
Deviation	1500	12%	3%	(14)	(8)	7%
Type of deviation	Not preferred	Not preferred	Not preferred	Preferred	Preferred	Not preferred

Source: Prepared by the researcher based on the company's data, and on the standard ratios of

In light of table 5, the economic unit will be fined for exceeding the actual ratios of the standard ratios set by the Kyoto Protocol, as the World Bank Group of the United States has set a fine of about \$100 per metric ton exceeding the standard ratios set, and therefore the exchange rate of the dollar is currently equivalent to about (1,460) dinars (dollar price on 2/1/2022)

This means that the fine imposed on the economic unit for each ton exceeding the specified ratios is estimated at about (146,000) Iraqi dinars per metric ton has exceeded the permissible ratio, and therefore the financial fine imposed on your public company will be calculated as follows:

$$1500 \text{ (metric tons)} \times 146,000 \text{ (JD/mt)} = 219,000,000 \text{ dinars}$$

From the above it is clear that your company bears a large fine because of the lack of interest in environmental aspects, and most of the processes that occur in the company are combustion in most factories, which generate large quantities of carbon dioxide gas, and most equipment, machinery and cars are old, as well as the survival of traditional systems and the failure to introduce modern systems and technology in the industry all reasons why the plant generates large amounts of emissions, Technology and modern systems must be used, primarily cleaner production, which delivers modern machinery, equipment and manufacturing systems that reduce waste generation, and this will help avoid the fine imposed on the economic unit and achieve satisfaction

with senior management and reflect a positive picture of the work of the economic unit.

2. Wastewater conservation in the company

The company uses large quantities of water in the production processes for cleaning and for use by employees, so it is necessary to pay attention to the quality of the water entering the plant and to know its quality as well it is necessary to focus on water that is discharged out of the economic unit in order not to affect the environment, soil and rivers because the water used in your company is discharged to the Euphrates River for disposal. This water contains many liquid and solid wastes inside it and this greatly affects the river water and soil and the community living near the company, table 6 shows the amount of



water entering the plant, the ratio used and the proportion of water coming out.

Table (6)

Amount of wastewater within the company

Details	Unit of measurement	2018	2019	troupes
Total water drawn and entered the plant	Mt	3500	4000	(500)
Total water consumed in the plant (cleaning, cooling, evaporation, etc.)	Mt	350	440	90
Percentage of water consumption within production processes	%	10	11	1
Total water out of the plant	Mt	3150	3560	(410)
Percentage of water coming out of the plant	%	90	89	(1)

Source: Prepared by the researcher based on

Table 6 shows the amount of water entering the plant used in production processes and wastewater outside operations for cleaning and use by employees, noting that the amount of wastewater in 2019 has increased due to the expansion of production processes in the company, and most of the water entering the production processes has increased in the plumbing plant because it needs large quantities for purposes Refrigeration, noting that the amounts of water coming out of the factory are large quantities as there is no recycling of water and there is no process of filtering water before filtering it into the river as this water contains large quantities of liquid and solid

waste and this greatly affects the environment and the population surrounding the company, as well as the impact of these wastes on the agricultural land surrounding the company.

Therefore, the ratios of water in and out and the proportion of contaminated water can be determined by comparing the actual ratios of the company with the standard specifications that have been relied upon in accordance with the instructions and regulations of the World Health and Safety Organization, the following table shows the actual ratios and their conformity to the standard specifications.

Table (7)

The proportion of actual water entering and leaving compared to international specifications

Details	Actual 9,201	Normative	Deviation	Type of deviation
Percentage of matching the aesthetics of the water entering compared to the standard health and safety standards.	80%	92- 100%	(12%)	Not preferred
Percentage of contaminated water coming out of total outgoing water.	40%	13% and less	27%	Not preferred
Percentage of hazardous substances discharged into outwater.	10%	2% and less	8%	Not preferred
The ratio of matching the water outgoing with instructions, laws and regulations.	60%	95-100%	(35%)	Not preferred

Source: Prepared by the researcher based on data from the factory and on the international specifications of water quality in accordance with international standards and specifications.



From table (7) it is found that your company violates the instructions, regulations and laws, although in the recent period the company has become concerned with the amount of water and the adequacy of its discharge without affecting the environment and society, it requires the company to work to install treatment units before draining water to the river in order to keep pace with the global changes and the standard ratios of health and safety standards and in order to reduce the contaminated percentages of water outgoing, Thus¹, the outwater will carry the factory an estimated fine of 1,294 euros per ton that exceeded the standard ratios set by international standards, which is equivalent to² (2,104,898 Iraqi dinars per metric ton), so the fine imposed on your public company will be calculated due to water pollution as follows.

**Total amount of water coming out of the plant = 4000 (metric tons) × 90% =
3600 (metric tons)
3600 (metric tons) × 27% = 972 (metric tons)
972 (metric tons) × 2,104,898 dinars (metric tons) = 2,045,960,856 dinars**

¹ The exchange rate of the euro is equivalent to (.661,626) JD, dated January 28, 2022.

² Calculation is done by hitting 1,294euro × .661,626, For every Euro and equal(2,104,898)) JD.



It should be noted that there will be a fine to be imposed on your company for not caring for the discharge of water out of the factory, as the discharge of this water will have a negative impact on the population surrounding the plant and on the land and on the river water where the water is discharged, the factory must be equipped with treatment units that include many environmentally friendly equipment, equipment and machinery that enable the discharge of water without affecting the environment and society, Any discharge of water without waste and liquid waste.

3. Recycle products by disassembling and repairing them.

Most economic units in different countries of the world are working to repair and maintain products and work to reuse them, while most economic units operating in Iraq in general and Or in particular do not work on recycling and do not work on the maintenance and repair of products after the completion of their use or malfunction, and therefore the European Parliamentary Research Service has proven German textile and midwifery companies were able to return 70 percent of their products after being consumed by customers, and they were able to return the products after they were dismantled for repair and reuse or for the purpose of dismantling them in order to bring them into the manufacture of products again, while Orr does not repair and dismantle the products after their use, but they are thrown as residues affecting the environment and society. Therefore, the factory must work to dismantle the products and re-maintain, repair and use them, which will reduce the costs of the company and enable it to preserve the environment and society.

4. Quality and efficiency of products and reduction of toxic substances.

The quality of products is an important aspect and represents one of the important aspects in the industrial units in the world, so it is necessary to achieve quality in the products provided by your public company by providing products to customers that can be used easily and can be maintained and repaired easily without environmental effects and residues, so set the standard (ISO 9001) there is a set of costs that require spending on products and disclosing them in financial statements, These costs enable customers to increase customer satisfaction with products, as these costs are as follows:

a) **Prevention costs:** Costs include quality planning, design and system development, production process control costs, quality worker training

costs, quality assurance costs at suppliers, quality data review and analysis costs, costs related to quality improvement programs.

b) **Evaluation costs:** Costs for inspecting raw materials and semi-manufactured products, testing and inspection costs during production processes, costs of test and inspection equipment, costs of materials consumed through inspection and testing, analysis and reporting of test and inspection results, include costs related to inventory evaluation.

c) **Internal failure costs:** Costs include re-inspection and testing of products, costs of improving products into defective and repairable categories, and irreparable defective, restart costs, error processing costs, injury costs and compensation for workers.

d) **Costs of external failure :** Costs for processing employee complaints include replacement costs for defective returned products, concessions, sales losses, costs of paying guarantees and compensation, costs of liability for accidents.

5. Marketing and advertising products

Advertising and promotion are important aspects that require attention, development, improvement and upgrading in your public company, as through marketing and advertising can improve the image and reputation of the company in customers, by providing appropriate promotion, advertising and displaying products in detail and clearly to customers in order to know all the pros and facilities that can be achieved when using products by customers, What are the discounts and offers made to customers if the company is continuously dealt with, as it requires your company to follow many promotional means of products including: providing advertisements through social media, television, newspapers, and displaying some regulations and pasteurization in some places in order to bring in the largest number of orders, and requires the allocation of larger amounts to promote products, So by looking at the financial statements it is clear that the advertisement and promotion are allocated very small amounts that are not up to the required level.

There are also many aspects that your company requires attention to, including attention to the health and safety of workers and work to reduce the waste generated and reduce the hazardous materials that are used in production processes and work to allocate a place isolated from residential and agricultural land in order to reduce the risk of waste and environmental effects on the population surrounding the plant, he



said that all that was addressed in the paragraphs above in this research can be developed, achieved and upgraded through cleaner production. This reflects on a significant reduction in commissioning and achieving the three dimensions of sustainability (environmental, social, and economic), thus proving the validity of the second hypothesis that the use and application of cleaner production technology enables the realization of a sustainable product strategy in Iraqi economic units. By continuing in the competition environment for a long time, it will enable it to achieve customer satisfaction and increase their demand for products because the products are in accordance with international standards and can be used easily and have eliminated environmental effects

THE FOURTH TOPIC: CONCLUSIONS AND RECOMMENDATIONS

First: Conclusions

1. The technology of cleaner production emerged after the major problems affecting the environment and society, and this prompted most economic units to go to the technology of cleaner production, as many writers and researchers have proven that the technology of cleaner production is one of the best ways in which to preserve the environment and society.
2. Cleaner production technology is one of the best ways to help deliver high quality and efficient products, as many studies have shown that customers have become environmentally conscious and seek to buy environmentally friendly products.
3. Manufacturing and offering products free of waste and environmental effects can be easily used and provide safety, health and safety during use, enhancing customer demand and increasing their confidence in these products and this helps the economic unit gain many competitive advantages in the business environment.
4. Excellence and excellence in the business environment can be achieved over competitors by reducing costs, upgrading and improving sustainability dimensions (environmental, social, and economic) based on cleaner production technology.
5. The technology of cleaner production enables the health and safety of workers, through which the economic unit must provide environmentally friendly machinery, equipment and equipment and provide raw materials that have been abandoned from toxic components and parts.

Second: Recommendations

1. Work on many studies and research through which to identify the technology of cleaner production and how to apply it in economic units.
2. Reduce the use of toxic substances and focus on the use of environmentally friendly substances for the purpose of providing products that maintain human health and do not cause any harm during use.
3. Using modern equipment, equipment and systems that reduce the generation of waste and environmental effects, and enable the health and safety of workers to be maintained.
4. Based on a system, technology or method that can help the economic unit to provide products easily without complexity and enable satisfaction to customers, as the technology of cleaner production is at the forefront of the methods and systems used in industrial economic units in most countries of the world.
5. Attention to the ways of marketing and displaying products by following many modern and advanced means.

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