World Economics & Finance Bulletin (WEFB)
Available Online at: https://www.scholarexpress.net
Vol. 30, January, 2024
ISSN: 2749-3628,

USING GREEN VALUE CHAIN AND VALUE STREAM TECHNOLOGIES TO REDUCE COSTS

Mithal Kreem Kadhim AL- Zubady
Babylon University, College of Management and Economics.
mithalkarim@uobabylon.edu.iq
Ahmed Hassan Ali AL –Mamoori
Babylon University, College of Management and Economics. ahmedha.almaamory@uobabylon.edu.iq
Ibrahim Abed mousa alsabary
Al-Mustaqbal University, College of Administrative Sciences, accounting department
dr.ibrahemabedmoosa@mustaqbal-college.edu.iq
Hussein thamer alkhafagi
Husseinalkhafagi908@gmail.com

Article history:

Received: 3th November 2023
Accepted: 4th December 2023
Published: 4th January 2024

Abstract:

This research aims to shed light on the basic concepts of the sustainable value chain and Value Stream Technologies and to explain their role in increasing productivity, rationalizing costs and time, improving quality, enhancing sustainability, conserving energy, providing a safe and clean environment for workers and reducing the waste of the production process by identifying and analyzing activities and drawing a value stream map of the current situation in an attempt to identify the most important problems suffered by the economic unit to identify the areas available for development and address the shortcomings in the current situation value stream map and drawing a future value stream map.

The deductive approach was used in the theoretical aspect of the research to reach the latest findings of the world in the field of the sustainable value chain and the value stream and their relationship to reducing the costs of economic existence. The inductive and analytical approach was used to research its practical side by using the statistical side to study the relationship of impact and correlation between the sustainable value chain and the value stream and cost reduction.

Among the most important conclusions reached in this research is that There is a strong correlation between the green value chain, the value stream and the value stream method can make a positive contribution to achieving environmental sustainability as the value stream highlights the environmental waste arising from the unnecessary use of resources or materials released into the air, water or land that can harm human health and the environment. this means that the value stream makes significant contributions to achieving good results in environmental performance and the performance of operations.

Keywords:

INTRODUCTION

In light of the developments represented by gas emissions to the atmosphere, high costs, low quality of products, lack of modern technological equipment necessary to recycle productive waste and manufacture traditional products harmful to human health and dangerous to the environment, traditional costing techniques have become useless in solving the problems of environmental pollution, as these techniques do not provide appropriate information in alleviating the problems of waste and loss of natural resources, gas emissions and the exacerbation of global warming.

From this standpoint, the trend has been towards the use of the green value chain and the value stream to help the management of the economic unit in the manufacture of environmentally friendly green products by correcting the main

World Economics & Finance Bulletin (WEFB)
Available Online at: https://www.scholarexpress.net
Vol. 30, January, 2024
ISSN: 2749-3628,

activities necessary for the manufacture of the product towards environmental requirements, controls and standards, achieving the optimal use of energy, natural resources and raw materials, recycling production waste and moving from traditional production to cleaner production, to enhance the value of the economic unit and add value to the customer, The green value chain reduces costs through its activities, starting with green research and development activity and ending with recycling activity or green reverse supply by converting production waste into raw materials for manufacturing activities, as well as eliminating environmentally friendly activities that have a negative impact on the environment that the customer is not willing to pay for and replacing them with environmentally friendly green activities, which leads to improved product quality.

RESEARCH METHODOLOGY

1-1 Research problem

Economic units suffer from an increase in the quantities of waste and loss of natural resources and raw materials, which reflects negatively on the pollution of the environment through the introduction of these resources to the atmosphere as well as the manufacture of traditional products of low quality harmful to human health and dangerous to the environment, and on the other hand these units suffer from achieving large losses as a result of high costs within all stages of manufacturing and marketing of the product and in light of this has been identified the problem of research through the following two questions:

1. Does the use of the green value chain contribute to helping the management of the economic unit reduce costs and improve product quality?
2. Does the use of the power stream technology contribute to helping the management of the economic unit in recycling waste and production emissions, especially gaseous ones, as well as manufacturing green products?

1-2 research importance

The importance of the research is represented by the sustainable value chain and simultaneous engineering technologies of economic units to achieve their objectives, which are as follows:

1. Provide a general knowledge framework on the concept and activities of sustainable value chain management on the one hand and clarify the concept and dimensions of sustainability on the other.
2. Value stream technology helps the economic unit conserve resources and energy, eliminating losses in production processes, and protecting the environment from pollutants resulting from industry.

1-3 Objectives of the study

Through his research, the researcher seeks to achieve the following objectives:

1. Assist the management of the economic unit to reduce product costs according to the analysis of the green value chain as well as improve quality according to marketing specifications.
2. Develop a value stream map for the current situation by following the flow of materials and information, identifying opportunities for organizational and technological improvements to address the shortcomings in the current value stream map, and mapping the future value stream.

1-4Research hypothesis

The main hypothesis of research

The research is based on a basic hypothesis divided into four parts to facilitate its proof or denial in the applied side of the research:

((The use of green value chain and value stream technology helps to reduce costs)).

1-5 Research sources and data collection methods

1. Sources related to the theoretical aspect:

- Arabic and foreign books are available in libraries of colleges of administration and economics.
- Arabic and foreign theses, theses, research, periodicals, and articles available in libraries or obtained from websites and Internet pages.

2. Sources related to the applied aspect:

- Applied coexistence of the research sample.
- Personal interviews with officials and specialists at the Central Refineries Company/Al Doura Refinery

GREEN VALUE CHAIN

2-1 The concept of the green value chain

World Economics & Finance Bulletin (WEFB)
Available Online at: https://www.scholarexpress.net
Vol. 30, January, 2024
ISSN: 2749-3628,

Achieving corporate sustainability requires taking into account social, economic, and environmental factors, all of which have a direct impact on each other (Chari, et.al, 2014: 544), and the green value chain has been defined as a modern concept addressed in the field of strategic cost management. He defined it (JNR, 2019:381) as a sequential series of industrial processes in which environmentally friendly initiatives are adopted throughout the entire process, focusing on reuse, recycling, and regeneration to reduce waste. The term green value chain as noted by Knoll & Jastram (2019: 2) also includes a set of tools that are involved when attempting to address societal, humanitarian, environmental, and economic issues along the value chain of the company, and these tools include social, environmental and economic norms and standards, codes of professional conduct, implementation strategies, monitoring and evaluation tools such as audits, and communication tools such as reporting.

2-2The importance of the green value chain

Academics, governments, and NGOs encourage industrial companies to adopt environmentally friendly practices in their operations, deliver products as well as provide a strategic pathway that will provide them and society with economic and environmental benefits. (Darmawan et al., 2014: 202), environmental aspects have been integrated into traditional value chain management activity as green value chain management. It covers areas such as supplier selection, material supply, manufacturing processes, delivery of finished goods to consumers, end-of-use, and redemption processes (Chari, et.al, 2014: 544).

Therefore, the green value chain addresses every stage from the supply of raw materials to manufacturing and then to the consumer to the disposal of the product after use, thus delivering increased value to consumers at the lowest possible cost (JNR, 2018: 383). The use of a green value chain management tool also brings many benefits to businesses, such as: increasing the amount of information available, providing support for decision-making, and improving the effectiveness of production and sales planning, in addition, the green value chain in business has a significant impact on dynamic capabilities, in the face of market environments in which companies carry out their activities. Companies strategize through the green value chain in the social, economic, and environmental dimensions of their services, to meet the demands of their customers. The results reveal that dynamic capabilities-based green value chain management in SMEs is interspersed with their resource relationships with the environment, through which readjustments are created in activities, opportunities are explored and processes are improved. (Moura & Saroli, 2020)

3-2Advantages of the green value chain

The use of a green value chain brings the following advantages to an economic unit (Tan& Zailani, 2009: 239)

1. Achieving a sustainable competitive advantage (SCA) and reducing costs by reducing waste, gases, and toxic fumes that lead to reducing green fines and taxes, and continuing for as long as possible in the market as a result of compliance with the environmental legislation and laws in force and meeting the requirements of customers by providing sustainable products that are safe for human health and reducing pollution rates.
2. Reducing costs by reducing waste, gases, and toxic fumes, which leads to reducing fines and green taxes, as well as reducing handling and maintenance costs as a result of the use of clean engineering techniques.
3. Improving the quality of products by contracting with suppliers who take into account environmental requirements and controls, as well as improving the quality and efficiency of production processes through the use of cleaner production techniques.
4. Improving the reputation of the economic unit as a result of its contribution to reducing pollution rates and manufacturing green products.
5. Conservation of natural resources and optimal consumption of energy by reducing the amount of raw materials used in production that are recyclable and bio-disposable.
6. Reduce waste by designing recyclable and bio-disposable products.

2-4 Green value chain activities

Many researchers have proposed a set of activities for the green value chain, which often consists of six or seven main stages, which can be summarized as follows:

First: Sustainable R&D: Sustainable R&D is defined as a set of principles, tests, and foundations necessary to assist engineers in designing green products and green technologies represented in developing and testing products throughout their lives. (Kung & huang, 2016:114) Recent research shows that human progress and well-being are closely linked to green development, especially environmental capital (renewable and non-renewable resources), and more research on modern economic models is still needed, as human growth cannot be achieved without economic growth because the problematic aspects of economic growth not only stem from negative impacts on the environment

World Economics & Finance Bulletin (WEFB)
Available Online at: https://www.scholarexpress.net
Vol. 30, January, 2024
ISSN: 2749-3628,

but there is a need to redistribute wealth and income within and outside countries to Promote the transition from a physical community to a participatory society, so in-depth analysis must take into account the full range of environmental and social aspects of well-being and quality of life. (Filho, et.al, 2018 :134)

Second: Sustainable design: Sustainable environmental design seeks to provide an appropriate framework for the ecosystem by integrating both environmental and human values, and the main goal of environmental design is to meet environmental sustainability by finding ways to manufacture goods and provide services while reducing resource consumption and avoiding environmental damage to a reasonable degree. (Actas, 2013:58)

Third: Sustainable Industrialization: Sustainable manufacturing practices are one of the most important initiatives to confront the effects of the expansion of industrial activity, not only at the level of environmental performance but also to improve economic, environmental, and social performance in manufacturing practices. Sustainable industrialization is evaluated as the integration of social, environmental, and economic aspects that are also recognized as the triple dimensions of sustainability (Dwivedi, et. al, 2019: 2.

Fourth: Sustainable marketing: Sustainable marketing is a type of management process that identifies, anticipates, and meets the requirements of consumers and society. This process can be profitable and sustainable. (Kung & huang, 2016:114) Sustainable marketing has three dimensions: environmental, social, and economic, as the goal of community-oriented marketing is social benefit and equality, while environmentally-oriented marketing aims to obtain a healthy environment, and consumer-oriented marketing aims to obtain green products. (Kayikci et al, 2019:85)

Fifth: Sustainable distribution: Among the actions that can be taken in the green value chain about the sustainable distribution policy to protect the environment, the necessary measures must be taken to ensure that the product is distributed using less fuel, and the points of sale are placed in a way that customers consume as little time and fuel as possible. In sustainable distribution, actions such as environmental sensitivity, less carbon emissions with less fuel, and highlighting partial transport are important, for this purpose companies that prioritize green marketing either carry out their environmental distribution activities, work with environmentally sensitive distribution companies, or give importance to online marketing.

Sixth: Sustainable disposal and recycling: Manufacturing companies return their products, parts, and materials from consumption sites to reuse, recover their residual value, or dispose of them (Grant, 2013, 151), in other words, the flow of surplus or unwanted materials, goods or equipment to the company through its logistics chain for reuse, recycling or disposal in a safe manner that does not affect the environment. (Business Dictionary, 2016),

VALUE STREAM

1-3The concept of value stream

The value stream is not only manufacturing processes, but the manufacturing processes necessary to create value for customers are one of the parts included in the value stream, so the value stream in the facility that applies the agile approach is inclusive of all activities practiced by the enterprise, including suppliers and customers, and therefore the facility must be managed through value streams. The traditional enterprise is divided on a functional basis and therefore the flow of value stream through all these departments will be an obstacle to the smooth flow of value therefore the organization must be divided based on value streams instead of sections. In agile thinking, Womack & Jones defined the value stream as all the specific activities required to complete a particular product through the following three management tasks: Göransson & Fritzell 2012:13)

1. Problem-solving task.
2. The task of information management, system management, and detailed scheduling from the first stage to the last stage, which is delivery to the customer.
3. The task of physical transformation from raw materials to the final product.

2-3Value stream management:

It is visual management that is a means of communicating organizational goals and documenting the relationships between production scheduling and production information and represents the alternative value stream management to traditional management, which has recently emerged as the preferred way to plan and implement the change required to achieve the agile approach, the essence of value stream management consists in clarifying, understanding and mapping the current state and the map of the future state (Bonaccorsi, et al, 2011: 429). Value stream management must change the organizational structure of an economic unit, change the information used to guide decisions and evaluate performance, and change the content, format, and frequency of management accounting information to support a customer-centric system. As well as changing the content of the information from being mostly financially

World Economics & Finance Bulletin (WEFB)
Available Online at: https://www.scholarexpress.net
Vol. 30, January, 2024
ISSN: 2749-3628,

focused to including non-financial data that supports day-to-day decisions such as customer-centric measures from raw material receipt to final shipment. Kennedy & Maskell, 2006:19) The value stream approach brings several benefits to organizations if they adopt the agile approach, including Göransson & Fritzell, 2012:23)

1. Improving product quality, increasing value for customers, and on-time deliveries.
2. Reducing production cycle time, reducing inventory, and reducing the use of space.
3. Improving the use of labor and better use of machines.
4. Provides correct, understandable, easy, and timely financial information.
5. Ensures that process elements that affect cost are measured financially and shows visually how cost is generated throughout the process.
6. It helps improvement by displaying relative risks and potential benefits by finding process bottlenecks.

3-3The concept of losses

Holmdel defines waste as "consuming resources without creating value." Hines & Rich considered the losses to be the early stages of value stream maps. Researchers and practitioners are trying to identify losses in value streams, thus finding the appropriate way to eliminate them or at least minimize the impact of losses. Seth & Gupta have shown that losses take many forms and can be found anytime, anywhere, and can be found hidden in policies and procedures. The types of losses will be discussed in detail:

1. Muda: Any activity that does not add value to the product or service increases the time consumed by the product or service but does not create value for the customer, the first seven losses are defined by Toyota's production system and have been accepted as major waste in the manufacturing environment. Later an eighth type of loss was identified as "unused human talent" by Womack and Jones. Soliman, 2017:6+8, and the lowest types fall within the first type of loss, called Muda.

- Transportation: The movement of materials and information that does not add value to the user and involves all physical movements and information from the supplier to the customer, what creates losses in the manufacturing process is the movement of parts between the process lines such as movement to the next processing that is not located next to the processing that precedes it.
- Unnecessary motion: related to the areas in which the work takes place, we often see an excessive distance during which workers move and unnecessary steps caused by the improper organization of the factory, as the operator needs to have his tools available and at hand.
- Waiting time: It involves the following activities: waiting for materials, waiting for spare parts, waiting for the quality inspection process, waiting for maintenance service, waiting due to low machine performance or speed, waiting due to machine downtime, repairs, preventive maintenance, waiting for operators to get tools or spare parts, waiting for changes from one product to another, waiting for CNC software to load the machine, and waiting for instructions. A root cause analysis of each problem should be carried out above.
- Over-processing: means taking more steps in the process than is required or taking steps that are not required to allocate process waste In any process, some questions should be considered while mapping the process: Why are we doing this step? Is this step necessary? Why are we doing it now? Why do we do it this way? Is there an easier way to do this? Do we need this step? Can we eliminate this step? Or can it reduce its time?
- Over-production: It is the production regardless of what is required by the customer, which is the worst form of MUDA because it causes the other six types of losses. (Pienkowski, 2014:3).

2. Unused Human Talent: The eighth type of loss. It results from the lack of exploitation of human creativity that exists in any economic unit that does not value its people and expends a lot of effort or investment in the process of training and guidance. Toyota is the best example of an economic unit that values its employees. When Toyota invests in its leadership, it expects them to develop other leaders using the skills and knowledge they have learned through the Toyota Production System Self-Driving Program.
3. Muri (Overburden): It means (activities that increase the burden) and this type of loss occurs due to pressure on employees and machines when production increases or inactivity and stagnation of employees and machines for a long time when production decreases.
4. Mura: (Unevenness) Mura means unevenness or inconsistency in the volume of production and one of the main reasons for Mura is batch production, which may take two different forms:

- Variability in production scheduling.
- Workload and work pace vary.

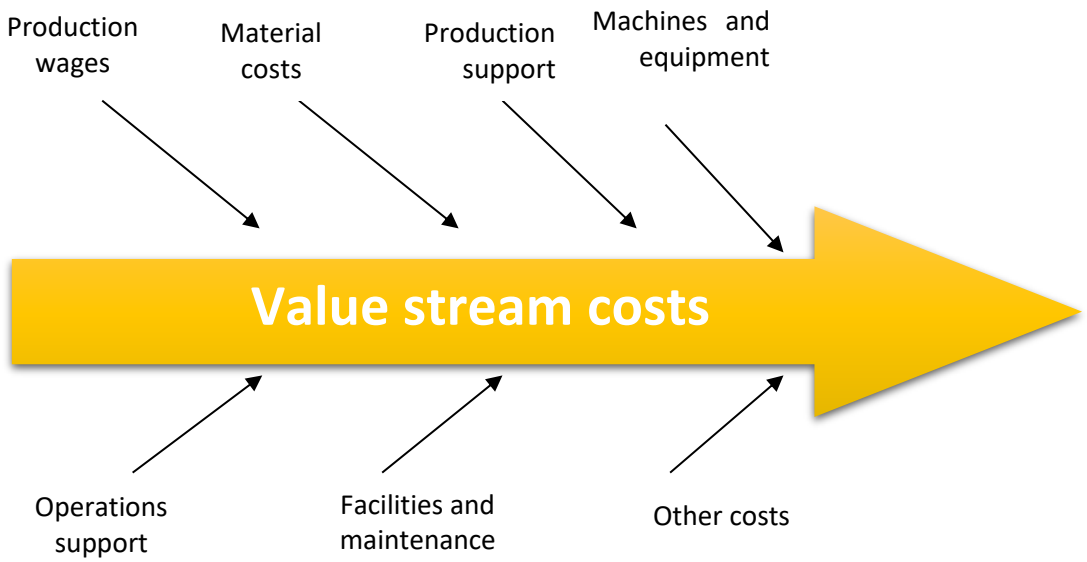
World Economics & Finance Bulletin (WEFB)
Available Online at: https://www.scholarexpress.net
Vol. 30, January, 2024
ISSN: 2749-3628,

Understanding all three types of waste enables us to fully understand the principles of the Toyota Production System (TPS) and the implementation of the JIT system. To achieve this, there is a need to understand a hidden common relationship between these types, all three types of losses are related to each other, where Mura causes Muri and both together cause Muda. Mura and Muri are the root causes of Muda (Pienkowski, 2014:5)

3-4 Value stream costs

The cost of the value stream is usually calculated weekly, monthly, or quarterly and takes into account all costs in the value stream Figure (2) shows the costs that make up the total cost of the value stream. (Gracanin.2014:1227)

Figure (1) Value stream costs



Source: ofileanu, Dimi. (2015) "Value Stream Cost Analysis In The Romanian Footwear Industry." SEA-Practical Application of Science 2.8:50

Each element of the value stream costs shown in Figure 1 is as follows:

- Labour Production costs: Productive work includes all employees working in the value stream regardless of the type of work performed (planning, product design, production, material transportation, maintenance, sale, maintenance of machinery, production plan, accounting, etc.) (Bahadir,2011:33)
- Production Materials: Value stream materials costs are calculated based on the actual material used in the value stream. The actual materials used by the value stream can be based on the actual materials purchased or the actual materials released to the value stream from the raw material inventory, the costs of value stream production materials are calculated from the week's purchases and allocated to the value stream cost center. (Ofileanu, 2015:47)
- Machine & Equipment costs: These represent the expenses of the demise of machinery, as well as maintenance costs such as spare parts, repairs, and supplies. The extinction expense can be calculated from the fixed assets of the economic unit and the extinction system. Costs for operating machines such as spare parts, repairs, and supplies can be charged to the value stream if these costs are easily identifiable by the value stream in the general ledger, and in some cases, maintenance of machines cannot be easily recognized by a specific machine or by the value stream in the general ledger.
- Support costs: Support costs, such as spare parts and soft tools, are often purchased for the value stream using the purchase credit card dedicated to the value stream.(Maskell&Baggaley,2004:180) (
- Facility costs: i.e. costs related to the use of space (such as loss or rental expenses for space, heating, electricity, security, building maintenance, insurance, etc.), which are the only indirect costs that can be systematically divided between value streams using an appropriate allocation basis generally allocated based

World Economics & Finance Bulletin (WEFB)
Available Online at: https://www.scholarexpress.net
Vol. 30, January, 2024
ISSN: 2749-3628,

on the square foot occupied of each value stream taking into account not only the production area, but also the stores and offices of employees directly engaged in the service of value streams. Cesaroni&Sentuti,2014:4)

- All other costs: It includes all other costs that can be borne by the value stream.

The role of the value stream and green value chain technologies in reducing costs

4-1 Definition of cost reduction

Cost reduction is one of the most prominent functions assigned to cost management systems, which is an integrated system that performs all the functions related to the costs borne by the economic unit, and these functions include several activities including forecasting future costs, estimating the necessary financial allocations for items of materials, wages, indirect industrial costs, preparing estimated budgets, ending with cost control and preparing the necessary reports for the management of the economic unit, including deviations of all cost elements. (Selvan,2017: 145)

The above shows that cost reduction is part of a requirement for the success of cost management systems and is applied in the early stages of cost management activities.

Kjellander also defined it as "minimizing costs through physical changes to a product component by changing its design by removing unnecessary parts and using the costs recovered to develop existing products or develop new projects, offer products at a lower price to customers, and increase profits." (Kjellander,2017:3)

Akeem sees "a planned approach represented in the use of more acceptable and efficient means and techniques than previous technologies and standards to control operating costs and ensure that the cost does not exceed a certain amount by eliminating wasted time and waste and achieving increased production." (Akeem, 2017:19) Several concepts associated with cost reduction should be distinguished, such as (Al-Zamili, 2017: 86-87):

1. Fake reduction and real cost reduction: Phantom cost reduction refers to jobs and activities that aim to maximize the profits of the economic unit by reducing the cost of one unit of a product or service through economies of scale, while the concept of real cost reduction refers to the exclusion of jobs and activities that do not add value to the economic unit and increase its costs.
2. Kinetic reduction and static reduction of costs: Kinetic reduction of costs refers to the multiple levels of production, whose conditions and factors affect them vary from one level to another, while the static reduction of costs indicates in the event of a single production level with the stability of internal and external conditions and factors surrounding the economic unit.
3. Cost reduction and avoidance: The concept of cost avoidance refers to getting rid of costs that do not have a tangible impact on the activities and functions of the economic unit or have no impact on its operations or improve the quality of its products, for example, if there are spare parts the first at a reduced price and the second at a higher price and with the same quality, the economic unit to buy cheap spare parts does not mean reducing costs, but rather avoiding them by not buying high-priced spare parts.
4. Cost control and cost reduction: A distinction should be made between cost control and cost reduction, as the former refers to procedures for controlling materials, wages, and indirect industrial costs, recording their data, and taking corrective measures to address deviations and work to avoid them in the future (Groothuis, 2014: 41).

From the above, the researcher notes that the process of reducing costs is mostly through increasing the units produced, which leads to reducing the cost of one unit.

4-2 Principles of cost reduction

The following aspects should be taken into account by cost accountants and technicians when carrying out cost reduction: (Ali, 2018: 66).

1. The focus should be on activities in which there is a greater opportunity to reduce costs compared to other activities and functions.
2. Taking into account the cost-benefit criterion when studying proposals and using the necessary techniques to reduce costs. In other words, the benefits resulting from the use of these techniques should be higher than the costs incurred in applying them.
3. Do not compromise the quality of the service or product when reducing costs.
4. The process of reducing costs should not affect the future decisions of the economic unit, such as the decision to dispense with a fixed asset that could be used in future operational operations.

World Economics & Finance Bulletin (WEFB)
Available Online at: https://www.scholarexpress.net
Vol. 30, January, 2024
ISSN: 2749-3628,

5. The process of reducing costs should not affect the morale of workers because it reflects negatively on increasing productivity and product quality.

4.3The importance of reducing costs and the factors affecting their achievement

The importance of reducing costs is summarized as follows (Kazim, 2019: 58-59)

1. Avoid unnecessary costs now and in the future as well as improve product quality by eliminating activities that do not add product value.
2. The economic unit's reduction of its costs reflects positively on the reduction of the selling prices of its products or services to customers, which in turn leads to the unit obtaining government support.
3. The process of reducing costs leads to supporting the competitiveness of the economic unit and its progress through selling at moderate prices for its products or services, depending on the efficiency of production processes, which is positively reflected in cost reduction.
4. . Reducing costs leads to the rationalization of production elements (materials, wages, and indirect industrial costs), which in turn leads to improving the quality of production processes.
5. Opening up to new horizons through expansions in the activities of the economic unit as well as the development of new products and the development of existing products through the use of profits resulting from cost reduction to enhance its current investments and support future projects.
6. Reducing costs leads to the continuity of the economic unit in competition and the development of its capabilities.
7. Increasing the sales of the economic unit, as the process of reducing costs leads to reducing the selling prices of products or services, which in turn leads to an increase in sales.
8. Increasing the revenues of the economic unit by generating additional revenues that were not included in its calculations before the cost reduction process.
9. Eliminate sources of damage, waste, and waste in factors of production. The researcher also notes that high-quality imported products played a prominent role in the need for economic units in the Iraqi environment to reduce their high costs for their survival and continued competition as a result of the presence of many of these foreign products in the local markets, as well as the spread of electronic commerce and electronic exchange of products and services, which in turn led to customers resorting to buying these products as a result of their high specifications and acceptable prices.

4.4The role of the value stream and green value chain techniques in cost reduction

The value stream and green value chain technologies aim to exclude activities and processes that do not add value to the product or service, as well as other activities and processes that cause environmental pollution and harm humans and other living organisms.

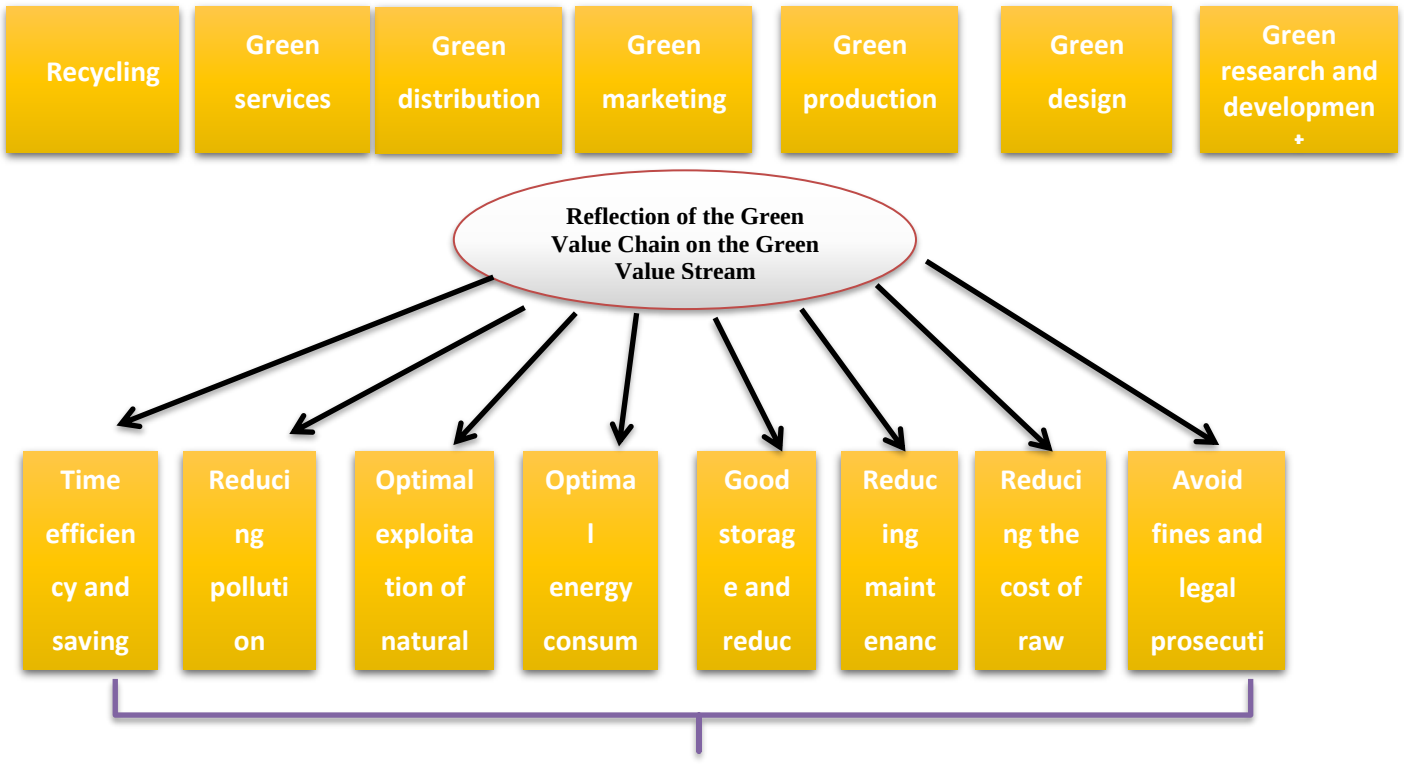
1. Green R&D: Green R&D aims to propose solutions, mechanisms, and technologies to reduce carbon and toxic gas emissions, reduce negative environmental impacts, and improve the value of the economic unit (Lee & Min, 2015: 7) and also contributes to improving the functioning of other activities of the green value chain by promoting environmental sustainability and developing green products (Ganda,2017:1).
2. Green design: Green design analyzes the life cycle of a product to know the environmental impact at each stage of the life cycle to select green raw materials, the quality of manufacturing processes, packaging, transportation, and ending with waste disposal (Kung & Huang, 114: 2016) Green design reduces costs by engineering products with a less negative impact on the environment than similar products, adhering to environmental government legislation and laws, replacing hazardous materials with environmentally friendly green materials, and reducing the consumption of electrical energy and fuel during Manufacturing processes and during the use of the product by the customer, as well as the design of recyclable or biodegradable products, which reduce the future purchases of raw materials, and the parts of the product are installed easily and easily, which leads to easy fragmentation and reduction of maintenance costs (Tawil and Abadi, 2016: 49)
3. Green manufacturing: The success of the green manufacturing process starts from the raw materials purchased, as the global economic units take a set of green standards when making purchase decisions because it contributes to reducing environmental impacts and reducing costs by reducing the volume of waste and toxic gases, saving energy and optimal consumption of resources, and these units often resort to avoiding the violation of legal legislation (Varna¨s, et al., 2009: 1215). The process of green manufacturing is not satisfied with green purchase, but extends to green technologies, machinery and equipment with environmental dimensions because of its role in providing raw materials used better than traditional techniques and equipment and reducing the steps of the production stages and achieving

World Economics & Finance Bulletin (WEFB)
Available Online at: https://www.scholarexpress.net
Vol. 30, January, 2024
ISSN: 2749-3628,

efficiency and effectiveness in the consumption of energy and mineral resources In one of the experiments conducted on a cement factory in France, it was noted that 90% of energy was saved when using these techniques (Arsene, et al,2018:3).Green marketing: Green marketing plays a major role in the transition of customers towards green brands by providing environmentally friendly products and packaging, taking into account the reduction of damage and achieving safety, which in turn leads to reducing costs by avoiding legal prosecutions and paying fines and compensation, and green marketing also leads to the continuity of the economic unit in conducting its business through the development of traditional products into green products that are characterized by reducing health and environmental damage and energy consumption by a smaller amount than traditional products Which in turn leads to an increase in the volume of sales and market share of the economic unit, which is reflected positively on maximizing profits and reducing costs (Momani, 2015: 19-20).

4. Green distribution: The environmental aspects should be taken into account in the places designated for the sale of the product, as well as reducing noise levels and proportionality between the internal space of the sales outlets and the product and improving the functional behavior in dealing with customers, which in turn leads to increasing sales, improving the image of the economic unit, maximizing profits and reducing costs, and the transition to alternative energy sources in the transport of products leads to reducing the costs of gasoline purchases (Abzari, et al,2013: 645–646)
5. Green services: Green services lead to increased customer satisfaction by providing after-sales services that take into account environmental requirements, achieve sustainable competitive advantage, increase sales volume, achieve profits, and reduce costs (Cocca & Ganz, 2015: 194).
6. Recycling: Recycling leads to the preservation of natural resources such as mineral resources, water, and wood and reduces greenhouse gas emissions that cause an increase in global warming and climate change, which in turn leads to avoiding legal prosecutions, and the process of reducing costs is done by reducing landfill and combustion processes and reducing the land used for this matter, as well as achieving environmental and economic balance in obtaining a green environment and recycled materials at a lower price (sahuki, 2017: 33-34). Figure 3 illustrates the role of the green value chain in reducing costs.

Figure 2:
The role of the Green Value Stream series in cost reduction



World Economics & Finance Bulletin (WEFB)
Available Online at: https://www.scholarexpress.net
Vol. 30, January, 2024
ISSN: 2749-3628,

Reduce costs

Applying the role of green value chain and value stream technologies in reducing costs and improving products in Al Wasat Refineries Company

1-4A brief history of the Middle Refineries Company / Dora Refinery

The Central Refineries Company, based in the Baghdad / Dora region, includes all refineries in the central regions of Iraq and the Middle Euphrates, and these refineries are:

1. Al-Dora Refinery, located in the Al-Dora area, south of Baghdad.
2. Al-Samawa refinery in Al-Muthanna Governorate.
3. Najaf Refinery in Najaf Governorate.
4. Diwaniyah Refinery in Al-Qadisiyah Governorate.
5. Karbala refinery in the Holy Karbala Governorate (under construction).

The refinery of the session is under the general supervision of the General Manager of the Central Refineries Company while the rest of the refineries are under the supervision of the Director of the Foreign Refineries Authority associated with the Director General of the aforementioned company, and the refinery of the session was chosen as a place for the applied study of the activities of research and development, design and manufacturing (green) and the refinery Dora is located in the south of Baghdad on the banks of the Tigris River with an area of about 250 hectares, It is one of the oldest large refineries in Iraq and represents the real beginning of the advancement of the oil industry in Iraq and was the start of the construction of the refinery in 1953 with the contribution of international companies such as (Foster Wheeler) and (M. W. Kellogg) and (Exxon Research & Engineering)

4-2 Production bodies of the Middle Refineries Company / Dora Refinery

The refinery receives crude oil from several sources, the most important of which are Kirkuk stations (North Oil) and Basra stations (South Oil), and is stored in crude oil stores where it is withdrawn and transferred to the production sections It comes out in the form of final products and with different properties in terms of composition, use and beneficiaries of products The production bodies are divided into two main parts:

A. Light Derivatives Authority: An operational body that deals with crude oil through receipt, pumping, filtering, and converting it into base products, improving its specifications, and pumping it to external parties (distribution, lines, civil laboratories, and gas bottling) and consists of the following sections:
B. Refining Department: The manufacturing process is carried out by withdrawing crude oil from crude oil stores and the primary processing process (initial warm-up) is the most important stage being the main responsible for equipping all refinery units with oil derivatives in their final form and at this stage leakage operations occur in crude oil discharged to the soil or sewage network prepared for this purpose and the accompanying emission of gases from storage places. After the initial warm-up, the crude oil goes to the thermal heating furnaces of the crude oil to 340 ° C using hydrogen sulfide gas or hydrogen sulfide. Black oil and naphtha are extracted from the associated gas after heat separation, and then the crude oil turns after being in distillation towers, which is the process of separating or dividing crude oil into its main components, as other materials are extracted from it, including light naphtha outputs, heavy naphtha, kerosene, heavy gas oil, light gas oil.

- Hydrogenation Department: After the reduction process, the products of the refining process are withdrawn to the condensing units to obtain the products with the required specifications using chemical treatment (hydrogenation) Dealing with materials with hydrogen to improve the shape and properties of the product and remove gum deposits, sulfur deposits and elements that cause color change during the storage process, and it produces (liquid gas, jet fuel, gas oil, diesel oil, and reduced crude oil). It also includes "refinement units" and a white oil hydrogenation unit. This phase includes five important modules as shown below.
- Gasoline improvement unit No. (1) to convert heavy naphtha into reforman (gasoline).
- Gasoline improvement unit No. (2) to convert heavy naphtha into Reforman (gasoline).
- Naphtha hydrogenation unit to convert white oil into heavy hydrogenated naphtha and light hydrogenated naphtha.
- White oil hydrogenation unit to convert it into hydrogenated white oil and jet fuel.

World Economics & Finance Bulletin (WEFB)
Available Online at: https://www.scholarexpress.net
Vol. 30, January, 2024
ISSN: 2749-3628,

- Gas extraction unit to convert gases and liquids into liquid gas.
- Mixing unit.

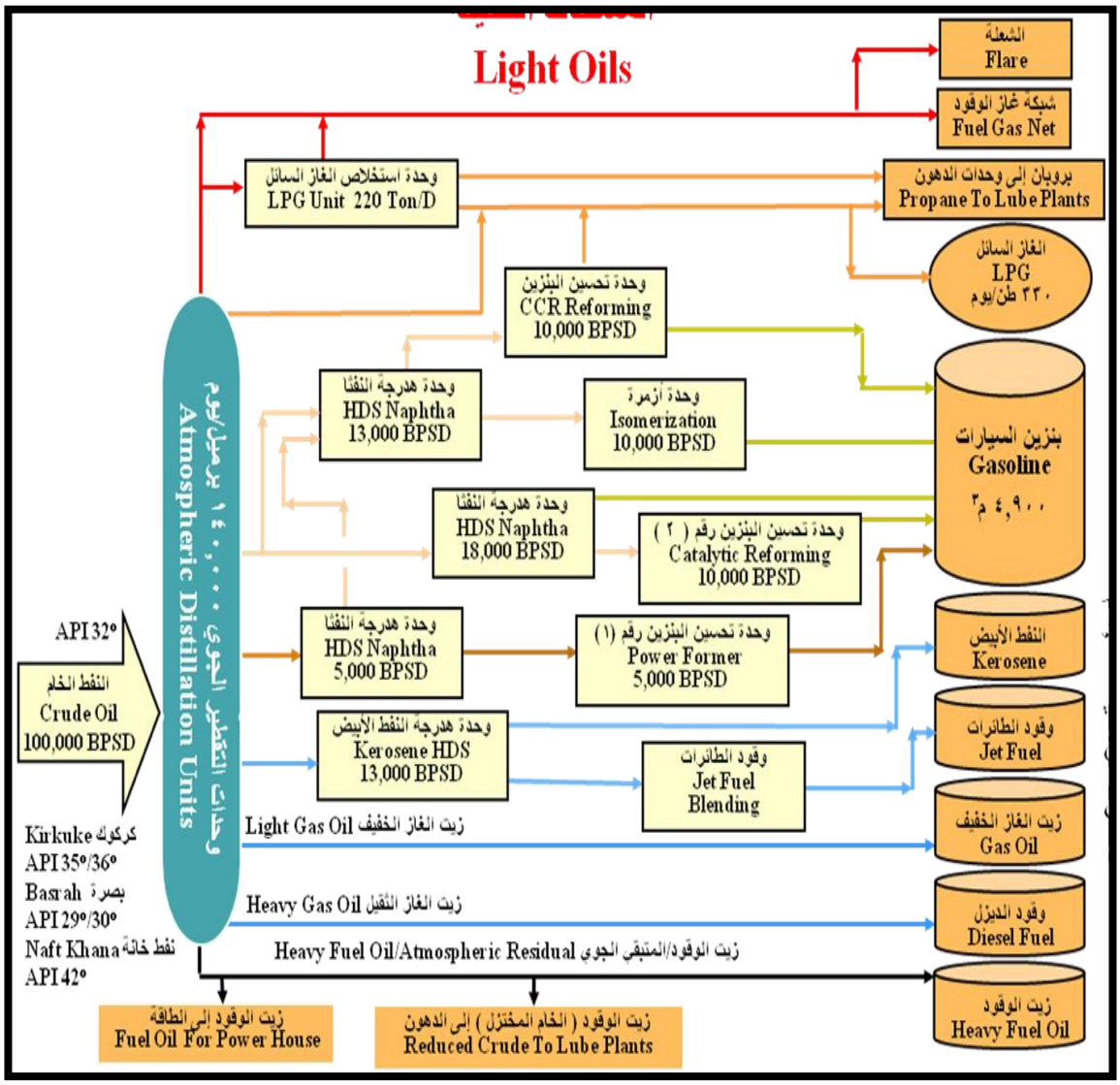


Figure (3) Production Processes of Light Derivatives Authority

Source: Dora Liquidator / Training and Development Department

2-Fats Authority: The Authority receives crude oil from the Light Derivatives Authority to the operational units for the production of types of oils, greases, wax, and filling containers and consists of the following sections:

- Fats Section (1): Production of base oils 150, 60, 40 involved in the production of ready-made oils, asphalt 40-50, and Reuters oil.
- Fats Section (2): Production of base oils, crystalline wax, and liquid asphalt.
- Fats Section (3): Production of hydrogenated base oils, transformer oils, paraffin wax, liquid asphalt, oxidized 20-30, and medical petroleum jelly.
- Blending and packaging section: Production of all kinds of ready-made and special oils in general, packages, barrels, the grease of all kinds, wax filled with drums and molds of 5 kg.

4-4Application of Value Stream and Green Value Chain Technology in Al Wasat Refineries/Dora Refinery Company

First: Set the value stream

World Economics & Finance Bulletin (WEFB)
Available Online at: https://www.scholarexpress.net
Vol. 30, January, 2024
ISSN: 2749-3628,

The first step in the implementation of the value stream method and the drawing of the value stream map is to set the value stream by determining the product family, which represents the group of products that go through similar production processes and in the selected research sample no products are going through the same production processes, so a value stream map will be drawn for the gasoline product only as an independent family, and then a value stream manager must be identified with high efficiency and extensive experience in production processes. There must be more than one manager of the value stream because of the specificity of this industry, as this industry is characterized by the abundance and complexity of production processes, so it is proposed that there be a manager of the value stream of the main and two secondary managers, namely:

1. Value stream manager for refining activity: The activity that receives crude oil from the receiving, pumping, and storage activity, and in this activity the derivatives of crude oil are separated by thermal cracking.

2. Value stream manager for gasoline hydrogenation and improvement activity: It is the activity that receives naphtha from the product of the refining process to hydrogenate and optimize it to result in a gasoline product .

Second: Drawing a current current value map

The value stream map of the current situation is drawn by collecting information on the customer's requests, sources, and costs of the raw material, knowing the activities of the production process, the nature of the work, how the materials, information, and resources consumed flow in each activity, the cost of each activity, the time required for each activity, as well as the number of workers and the number of machines for each activity, determining the storage activities between operations and at the beginning and end of the production process and the activities supporting each activity and all other information related to the production process. Through interviews and field visits, all production processes were identified from the moment crude oil entered the process of delivering products to the customer, as shown below:

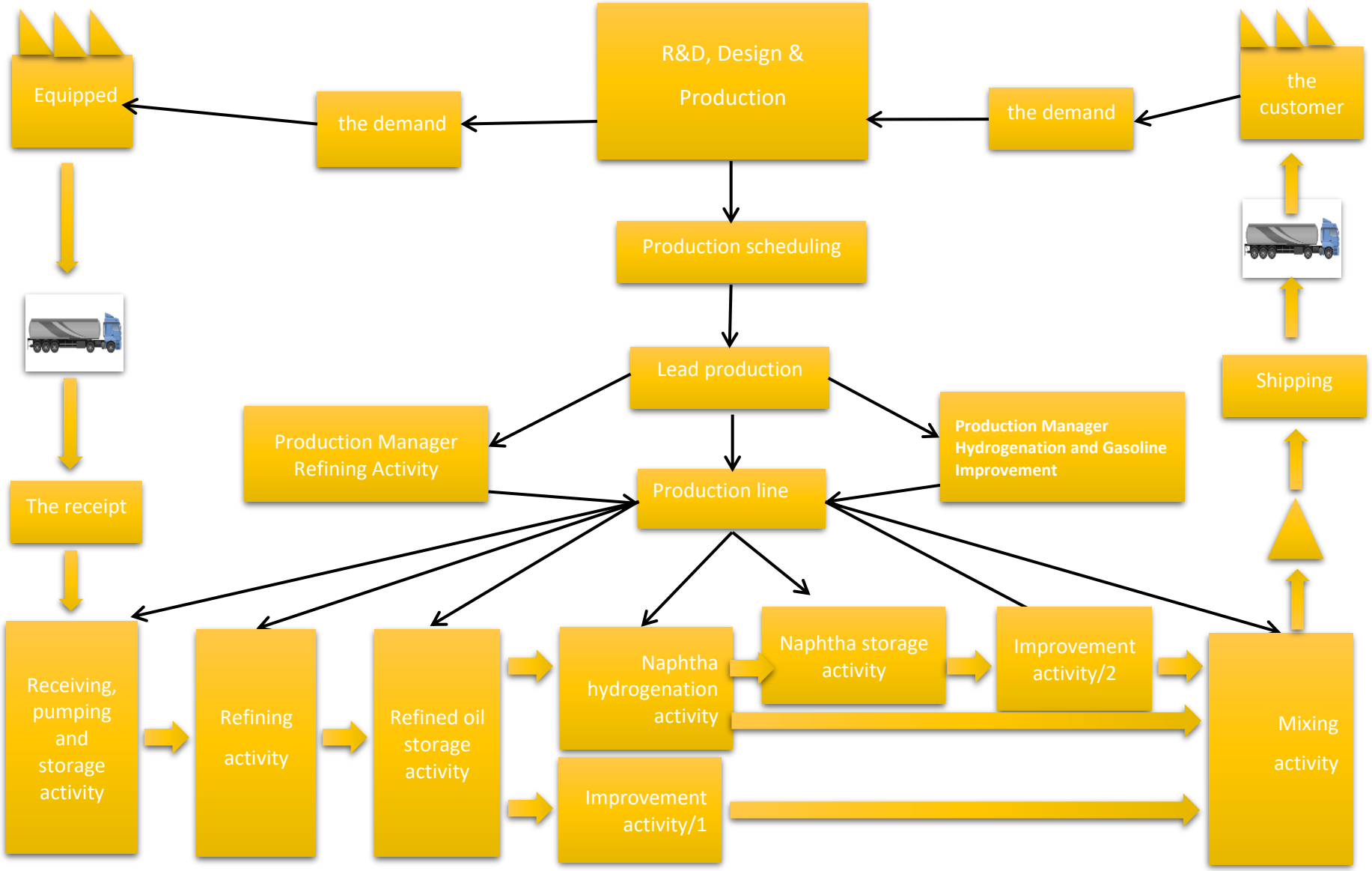


Figure (4) Current Value Stream Map

Third: Analysis of the current situation value stream map

Green research and development

The course refinery seeks to improve its reputation in front of the community by reducing the rates of environmental pollution issued by the units of the refining department and the hydrogenation department, as well as the units of the fat body, so the studies department has a set of studies and research related to this regard, which aims to protect the community from the risks of these emissions and the risks of products when used by the customer, and the course refinery wants to apply the Klaus technique, which has been applied in the developed countries of the world and is also called the sulfur recovery unit from Hydrogen sulfide gas (H2S) and sulfur dioxide gas (SO2), and this technology recovers sulfur from gases, especially gas (H2S) and other secondary gases that contain sulfur compounds, which are emitted from refining and hydrogenation units, as well as gasoline improvement units, liquid gas unit and fat units, This unit is one of the environmentally important units because of its contributions to reducing environmental pollution by converting sulfur acid gases into free sulfur (S) and the costs of purchasing Klaus technology are prevention costs (costs of preventing the occurrence of environmentally harmful products and manufacturing gas in accordance with global marketing requirements, prevention costs for the environment) lead to improving the quality of liquefied petroleum gas and adds value to the economic unit and the customer by removing the risk of the product during use (as a result of the presence of sulfur compounds) and maintains the quality of the environment through Eliminate gas (H2S)

Green design

The engineers of the Environment Department of the Technical and Engineering Authority believe that the refining units in the refinery and the units for improving gasoline, liquid gas, fat and hydrogenation units issue thousands of tons of various toxic and carcinogenic gases daily, and that the refinery is able to recover up to 5% of the total of these gases, and in light of the increase in the number of cars and the high number of production factories in the country and the high population increased the demand for crude oil products, which in turn led to an increase in the quantities of crude oil entered into units Refining and gasoline improvement units, which reflected negatively on the environment and living organisms as a result of the high quantities of refining gases and the improvement of gasoline, and that these units are unable to import these gases, which were created in the previous century (sixties, seventies and eighties decades), Engineers in the Department of Environment believe that the recovery of these gases emitted and wasted to the atmosphere will lead to reducing environmental pollution and improving the quality of the environment as well as increasing the quantities of production of liquefied petroleum gas and that the recovery of these gases in all refineries in the south, north and middle Euphrates will lead to the operation of unused electric generators in the Ministry of Electricity, which works with gas energy, which leads to meet the country's needs of electrical energy and reduce the quantities of white oil production (heater fuel), which Large quantities of it are produced and consumed, especially in the cold winter, as a result of providing electrical energy to citizens and other state ministries through generators that run on gas energy, as well as mitigating the negative environmental effects of kerosene-powered power plants, as (LPG) has a low impact on the environment compared to kerosene due to the low carbon content in it.

The application of this system leads to reducing the costs of the Environment Section, this section consists of four divisions, namely the Air Pollution Control Division, the Soil Pollution Control Division, the Environmental Studies Division, and the Follow-up Division, and the costs are reduced through the Air Pollution Control Division, which is concerned with following up on gaseous emissions and their impact on atmospheric air pollution, and the total total costs of this section, distributed to (LPG), are about (34,512,000 dinars), equivalent to 3.17% of the costs of this section, and 90% of the Total quantities of gases emitted, as well as the application of Klaus technology, it is possible to reduce the costs of this division, and after calculating the costs of the Air Pollution Division, Table (1) shows these costs for the year 2017

Table (1) Total Air Pollution Division Costs / Within Design Activity

no	Cost components	Statement	Amount/dinar
1	raw materials	Costs of raw materials used to reduce pollution	105,387,000
2	Wages	Salaries of Environmental Department employees	195,000,000
3	Direct costs	Purchases of used inspection equipment and machines	106,583,000
4		Emissions inspection costs	138,740,000
5		Extinctions	112,650,000
Total(1+2+3+4+5)			658,360,000 dinars

Source: Preparation of the researcher after counting the costs of the Air Pollution Division.

There is a possibility to reduce the costs of the division after the application of the gas recovery system to a quarter (according to the opinions of experts in the engineering body and the financial department) represented by the costs of examination, raw materials, tools and machinery, but the costs of salaries and extinctions can not be reduced because the company bears them in the event of large gas emissions or not, and the following calculations show the amount of total reduction at the level of the company and the product sample research.

Green Manufacturing

Klaus technology and the gas recovery system are engineering means and techniques to achieve green manufacturing in the Middle Refineries Company / Dora Refinery, as the first eliminates the emission of hydrogen sulfide gas (H2S) while the second recovers gases instead of burning and wasting them to the atmosphere, and green manufacturing can be achieved through the integration of these two techniques and the production elements will be addressed before and after the application of green manufacturing, Note that the production elements of liquefied petroleum gas are:

1. raw materials
2. Wages.
3. Direct expenses include (laboratory costs, energy, chemicals, extinction, and maintenance).
4. Administrative and engineering costs, which were calculated as R&D, design, and supporting activities, as explained earlier in Table (39), and the following are the calculations of the costs of production elements before and after the application of the green value chain.

LPG quality after green value chain application

The purchase of the sulfur recovery unit, which was referred to in the green research and development activity and linked to the gas recovery system, which was referred to in the design activity, leads to increasing production quantities and improving the quality of liquefied petroleum gas by getting rid of hydrogen sulfide gas and sulfur impurities in the product, and as we mentioned earlier, the costs of purchasing and installing Klaus technology and the gas recovery system are costs to prevent the occurrence of failed quantities in the gas. The first eliminates gases and sulfur impurities in the product and thus reduces the costs of correction and failure, while the second recovers 90% of the gases emitted and thus is considered as environmental prevention costs that maintain the quality of the environment and living organisms from gaseous emissions and reduce the costs of evaluation and environmental failure. Table (2) shows the analysis of quality costs of gas.

Table 2
Quality Costs of LPG After Green Value Chain Implementation

no	Quality costs	Statement	Amount/dinar (Loaded on the product)	Notes
1	Prevention costs	Quality Management	4,682,625	Didn't change
		Environmental courses	570,000	Increase the number of cycles from 69 to 72 cycles
		Gas quality courses	1000,000	Didn't change
		Environment Department expenses	26,173,870	Reducing the expenses of the Environment Department by 8,338,130 IQD
		Engineering inspection expenses	58,036,000	Didn't change
		Contracts with suppliers	11,926,125	Didn't change
		Maintenance expenses	153,378,000	Didn't change
		The cost of Klaus technology	35,460,000,000	In the first year, the cost of the technology is taken as prevention costs, but in the coming years, the extinction expense is relied upon.
		Cost of gas recovery system	2,364,000,000	
		Extinction of Air, Water and Soil Pollution Testing Devices (Safety Section)	6,945,000	Didn't change
Total prevention costs			dinars 38,086,766,620	

2	Evaluation costs	Laboratory expenses and quality control	38,852,000	Reduced to a third due to the Klaus application, which cancels the sulfur content
		Laboratory courses	225,000	Didn't change
Total evaluation costs			dinars 39,077,000	
3	Internal failure	Wastage in production	0	Retrieve all gases entered into the liquid gas unit more than once to avoid losses
		Water wastage	6,160,000	Didn't change
Total internal failure costs			6,160,000	
4	External failure	Returned quantities of the product from the distribution and packaging companies	0	The absence of external failure of the product due to the application of Klaus technology, which eliminates the sulfur content in the product
0			Total costs of external failure	
dinars/year 38,131,948,620			Total quality costs	

Source: Prepared by the researcher based on the data of Table (1).

It is noted through Table (2), which contains the categories of quality costs (prevention costs, evaluation, internal failure, and external failure), the increase in prevention costs by adding the costs of Klaus technology and the cost of the gas recovery system, and this led to reducing the evaluation cost from (116,802,000 dinars) to (39,077,000 dinars) with a decrease of (66%) as well as the increase in prevention costs led to a reduction in the cost of internal failure from 237. 654,000 IQD to 6,160,000 IQD with a decrease of 97.5% Also, the increase in prevention costs led to a reduction in the cost of external failure from 92,750,000 IQD to zero JOD and a decrease of 100%, the decrease in the cost of correction and the cost of internal failure and external failure is an indicator of improving the quality of liquefied petroleum gas Table (3) shows the average monthly components of liquefied petroleum gas after the application of the green value chain

Table 3

Average monthly LPG-producing ingredients after green value chain use

the month	C1	C2	C3	C4	C5	H2S	CO2	Sulfur impurities + water
January	3,7%	1,6%	51,2%	42,1%	0,7	0	0,7%	0
February	3%	1,8%	56,3%	38,2%	0,2%	0	0,5%	0
March	5,2%	4%	53,08%	36,8%	0,1%	0	0,9%	0
April	5,4%	4,3%	44%	42%	0,1%	0	1%	0
May	2,4%	4,8%	57,7%	34,2%	0,1%	0	0,8%	0
June	4%	2,4%	61%	32%	0,3%	0	0,3%	0
July	6,5%	2,3%	48%	42,6%	0,2%	0	0,4%	0
dad	5%	3,3%	50%	40,8%	0,1%	0	0,8%	0
September	3,4%	7,3%	51,1%	37,3%	0,2%	0	0,7%	0
October	4,5%	2,1%	48,2%	44	0,5%	0	0,7%	0
November	5%	2,5%	47,3%	44,2%	0,3%	0	0,7%	0
December	5,4%	5,8%	55%	33,3%	0,1%	0	0,4%	0

Source: Prepared by the researcher

It is noted in Table (3) above the cancellation of the sulfur content of the product after the application of the Klaus technique, leads to the manufacture of a product free of dangerous and toxic sulfur compounds, which can lead to damage to the environment and harm to customers, and therefore despite the presence of some unwanted product components such as methane, ethane and a few particles of pentane and carbon, but the quality of the product has been improved by eliminating one of the most dangerous gases entering the product, which Masafi Company seeks The middle in the elimination. Based on what is stated in Table (2) and Table (3), which is the elimination of sulfur in gases, which causes risks to humans and the environment through explosions that may be caused by gas cylinders due to the

interaction of iron with sulfur, which leads to environmental pollution and endangers human life, and then the research problem was solved through the manufacture of environmentally friendly green products represented by desulfurized green gas, as well as solving the problems of low product quality by not achieving marketing specifications The research objective of using the green value chain to help management improve product quality was achieved, and then the main hypothesis of the research was achieved ((The use of green value chain leads to cost reduction and product quality improvement))

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

1. Value stream maps are the most powerful agile tool that can provide a comprehensive view of how work flows as visualizing invisible work is the first step in knowing how work is done, and therefore further analysis can be done to see where the losses are.
2. The shift towards the adoption of the VSC value stream costs system needs intellectual and cultural changes at the level of all members of the refinery, which requires effort, time, and costs such as the costs of hiring experts, the costs of training employees, and others, and the management of the value stream represents the alternative to traditional departments, which have recently emerged as the preferred way to plan and implement the change required to achieve the agile approach.
3. There is a strong correlation between the green value chain, and the value stream, and the value stream method can contribute positively to achieving environmental sustainability as the value stream highlights environmental waste arising from the unnecessary use of resources or materials emitted into the air, water or land that can harm human health and the environment, and this means that the value stream makes significant contributions to achieve good results in environmental performance and process performance.
4. The use of the green value chain leads to an increase in productivity at the Dora refinery from 62,193 tons/year to 1,135,747 tons/year and a reduction in the cost per cubic meter of liquefied petroleum gas from 157,930 dinars/m3 to 133,873 dinars/m3.
5. The use of the green value chain leads to an increase in the prevention costs represented by the costs of Klaus technology and gas recovery system from 271,025,750 IQD to 38,086,766,620 IQD, reducing the costs of correction from 116,802,000 IQD to 39,077,000 IQD, reducing the costs of internal failure from 237,654,000 IQD to 6,160,000 IQD, as well as eliminating the costs of external failure, which is an indicator of improving product quality.
6. Eliminate hydrogen sulfide gas emissions after using Klaus technology and reduce the rate of emissions of other gases to 10% of the total emissions.

RECOMMENDATIONS

1. Informing the concerned engineering and technical authority and the financial department on the green value chain analysis technique in analyzing product activities into main and supporting activities and correcting the company's activities towards environmental requirements
2. Forming a specialized team of engineering, financial, legal, and regulatory cadres to conclude the necessary contracts with international companies in the purchase of sulfur recovery technology (Klaus) and gas recovery systems.
3. Attracting engineers from the specialties of production, metals, materials, and chemicals to work in the sulfur extraction unit and training them on how to operate and sustain this technology.
4. Supporting innovation and the deployment of low-emission and low-energy technologies to increase energy efficiency and move away from the traditional approach to pollutant treatment, which treats pollutants after they are generated and replaced by green value chain technology, which ensures that pollutants are treated at the source.
5. Calling for the adoption of the concept of a green value chain in the medium term by supporting the state and economic institutions in providing the necessary resources and technology, as well as providing specialized teams and training other teams to be ready to absorb advanced technologies, as well as educating the consumer about the importance of adopting technologies that ensure the safety of humans and the environment.

SOURCES AND REFERENCES

Arabic sources

1. Al-Zamili, Ali Abdul-Hussein Hani, (2011), "Total Quality Costs and their Impact on Strategic Performance Evaluation," unpublished master's thesis submitted to the College of Management and Economics/University of Baghdad, Iraq.
2. Al-Sahuki, Sada Medhat Majeed, (2017), "Waste Recycling and its Role in Improving Production Efficiency," unpublished research submitted to the Higher Institute for Accounting and Financial Studies/University of Baghdad to obtain a doctorate.
3. Al-Taweel, Akram Ahmed & Al-Abadi, Shehla Salem, (2016), "The possibility of adopting green design activity in pharmaceutical manufacturing companies in the city of Mosul: a comparative study," Journal of Management and Economics, Volume 39, Issue 107.

4. Kazem, Elham Nima, (2018), "The complementary relationship between transformation costs, perceived value, and customer satisfaction and their impact on customer commitment: an analytical study in private banks operating in Al-Diwaniyah Governorate," Journal of the College of Administration and Economics for Economic, Administrative, and Financial Studies, Volume 10, Issue 3.
5. Al-Mousawi, Ali Hadi Rasham (2019) "A proposed model for building a green value chain following sustainability accounting standards to achieve competitive advantages," a master's thesis submitted to the University of Wasit / College of Management and Economics / Iraq, which is one of the requirements for obtaining a master's degree in science. Accounting.
6. Al-Momani, Sami Abdel Karim, (2015), The impact of applying green marketing on marketing performance (a field study on the household electrical appliances sector in the city of Amman / Jordan), a published master's thesis submitted to Zarqa University in Marketing Sciences, Jordan.

ENGLISH SOURCES

1. Abzari, Mehdi & Shad, Faranak Safari & Sharbiyani, Ali Akbar Abedi& Morad, Atefeh Parvareshi,(2013)," Studying the effect of green marketing mix on market share increase", European Online Journal of Natural and Social Sciences, vol.2, No.3.
2. Akeem, Lawal Babatunde, (2017)," Effect of Cost Control and Cost Reduction Techniques in Organizational Performance", International Business and Management, Vol. 14, No.3.
3. Aktas, G. G. (2013). "Design parameters and initiatives for ecological and green design in interior architecture". WSEAS Transactions on Environment and Development, 9(2), 57-67.
4. Arsene B& Pascariu, G Pasca &, Sarbu, F A & M Barbu M & Calefariu, G (2018), " Green manufacturing by using organic cooling-lubrication fluids", IOP Conf. Series: Materials Science and Engineering 399 (2018) 012001 doi:10.1088/1757-899X/399/1/012001.
5. Bahadir, Ayca.(2011): "The role of management accounting systems in implementing lean business strategies." Erasmus University.
6. Blocher, Edward J., Chen, Kung H. & Lin, Thomas W, (2002), " Cost Management: A Strategic Emphasis ", 2nd ed., McGraw-Hill Irwin, New York.
7. Chari, N., Diallo, C., & Venkatadri, U. (2014). "State Of The Art On Performability Across The Sustainable Value Chain", International Journal Of Performability Engineering, 10(6).
8. Cocca, Sabrina & Ganz, Walter, (2015)," Requirements for developing green services" The Service Industries Journal, Vol. 35, No. 4,.
9. Darmawan, M.A., Putra, M.P.I.F. and Wiguna, B. (2014), "Value chain analysis for green productivity improvement in the natural rubber supply chain: a case study", Journal of Cleaner Production, Vol. 85 No. 1, pp. 201-211.
10. Dwivedi, A., Agrawal, D., & Madaan, J. (2019). Sustainable manufacturing evaluation model focusing leather industries in India: A TISM approach. Journal of Science and Technology Policy Management, 10(2), 319-359.
11. Göransson, Gustav, and Fritzell, Ingrid.(2012): "Value stream mapping in product development-adapting value stream mapping at Ascom wireless solutions."
12. Gracanin, Danijela, Buchmeister, Borut and Lalic Bojan. (2014): "Using cost-time profile for value stream optimization." Procedia Engineering 69, 1225-1231.
13. Jnr, B. A. (2019). "Sustainable value chain practice adoption to improve strategic environmentalism in ICT-based industries". Journal of Global Operations and Strategic Sourcing.
14. Kayikçi, P., Armağan, K., & Dal, N. E. (2019). "Sürdürülebilir Pazarlama: Kavramsal Bir Çalışma". Bucak İşletme Fakültesi Dergisi, 2(1), 77-93.
15. KJELLANDER, MICHAELA (2017)," Redesign for cost reduction of cars interiorIdentification of opportunities and development of concepts" Master Program Department of Product and Production DevelopmentCHALMERS UNIVERSITY OF TECHNOLOGY.
16. Knoll, H. O., & Jastram, S. M. (2019). "A pragmatist perspective on sustainable global value chain governance–the case of Dr. Bronner's". Society and Business Review.
17. Kung, Fan-Hua & Huang, Cheng-Li,(2012)," Assessing the green value chain to improve environmental performance", International Journal of Development Issues Vol. 11 No. 2,
18. Leal Filho, W., Azeiteiro, U., Alves, F., Pace, P., Mifsud, M., Brandli, L., ... & Disterheft, A. (2018). Reinvigorating the sustainable development research agenda: the role of the sustainable development goals (SDG). International Journal of Sustainable Development & World Ecology, 25(2), 131-142.
19. Lee, Ki-Hoon &Min, Byung,(2018)," Green R&D for eco-innovation and its impact on carbon emissions and firm performance" Journal of Cleaner Production.
20. Maskell, Brian H., Baggaley, Bruce and Grasso, Larry. (2004): "Practical lean accounting: a proven system for measuring and managing the lean enterprise". CRC Press.
21. Moura, G. B., & Saroli, L. G. (2020). "Sustainable value chain management based on dynamic capabilities in small and medium-sized enterprises (SMEs)", The International Journal of Logistics Management.
22. Ofileanu, Dimi. (2015): "Value Stream Cost Analysis In The Romanian Footwear Industry." SEA-Practical Application of Science 2.8 45-52.

23. Pieńkowski, Maciej. (2014): "Waste measurement techniques for lean companies." Int J Lean Thinking 5.1.
24. Radhakrishnan, S. & Selvan, K G,(2017) " COST MANAGEMENT TECHNIQUES PRACTICES BY BUILDING CONTRACTORS NETWORK IN TAMILNADU", International Journal of Pure and Applied Mathematics, Volume 117 No. 9.
25. Soliman, Mohammed Hamed Ahmed. (2017): "A Comprehensive Review of Manufacturing Wastes: Toyota Production System Lean Principles."
26. Tan, C. L., & Vonderembse, M. A. (2006). Mediating effects of computer-aided design usage: From concurrent engineering to product development performance. Journal of Operations Management, 24(5), 494-510.