

The role of Target Cost Technology and Value Stream in Reducing Costs

Ass. Pro . Dr. Mohammed Abdul Wahid Flayyih (1)
Accounting Department , College of Administration and
Economics. Iraqi University. Baghdad , Iraq
Mohammed.hilf@aliraqia.edu.iq

Ass . Lec . Shaymaa Majeed Saeed (2)
Ass.Lec. Hadeel Ahmed Badr (3)
Accounting Department , College of Administration and
Economics, Al - Farahidi University.Baghdad, Iraq
Shaimaa.majeed79@gmail.com
Hadel199494@gmail.com

Abstract

The research aims to clarify the knowledge bases of target costing and value stream technology, and explain how to reduce costs after applying target costing and value stream techniques in the research sample company. Where the target cost and value flow technology was used to reduce the costs of the specialized diesel oil product MG 154, as the economic units were adopted on traditional methods and techniques in determining selling prices, which depend on adding a margin after calculating the costs, which are not in line with the developments taking place, in addition to the high Production costs, which is based on traditional concepts that stand as an obstacle to achieving the objectives of the unit, and the findings of the researchers in the practical aspect when applying. With the target costing technique, costs were clearly reduced, as the percentage of total annual production decreased by 2.5%, i.e. by 226,734,828 dinars. However, when applying the value flow tool, workers' wages costs were reduced (23,285,603.6) dinars, while waiting time costs were reduced (253,663,200) dinars, which was reflected as a result of cost reduction

Keywords: target cost, value stream, cost reduction.

1. Preface :

In light of the global openness of trade, our market today are witnessing sharp and strong competition, and producers in the industrial sector seek to continue in the market and ensure their survival by trying to market their products and ensure a market share that provides them with this survival and continuity, and this goal is achieved by providing products with specifications that meet the requirements and expectations of the customer To achieve this, it is necessary to start using contemporary accounting and administrative techniques that contribute to providing information that helps economic units to provide products that meet customer requirements. In light of what industries are witnessing at present in terms of the

invasion of imported goods, industrial units face great challenges to stay ahead of competitors, which necessitates a reconsideration of the use of contemporary technologies that contribute to the advancement of local industries and increase their size. Competitiveness. The most important techniques that help the economic units to determine the target price of the product and determine the target cost through the target costing technique and eliminate waste through the value flow technique and then reduce costs, which in turn contribute to achieving a competitive advantage in the market and meeting the customers' need for goods.

In light of what industries are witnessing at the present time from the invasion of imported goods, the industrial units face great challenges to stay ahead of competitors, which necessitates them to reconsider the use of contemporary technologies that contribute to the upgrading of local industries and increase their competitiveness

2. View the Literature

Table (1) reviews some of the literature related to the research variables.

Table (1) Literature review

T	Researcher's name and year	Study Title	its results
1	(Shahrabi & Ashouri, 2011)	Target Costing and its relationship to Value creation .	All economic units focus their ability on marketing and profits. To achieve this important goal, managers must use appropriate methods to manage human resources, increase creativity, improve the efficiency of their units, and focus on value creation and customer orientation.
2	(Al-Rubaie and Obaid, 2019)	Determine product cost using value stream	Adopting the method of calculating product costs according to the value stream because it has an active role in determining the cost of the product and providing information that contributes to reducing the cost and selling price of the product.
3	(Hamed,2019)	Cost reduction using a six-sigma green diffraction input	The application of the lean hexagonal diffraction approach helps in providing products that meet the customer's desires by reducing product costs and delivering them in a timely manner.

Source: Preparation of researchers

3.The Theoretical Side

3.1 The concept of target cost

Target costing technology began to be used in Japan from 1960 to 1980 as a major factor in supporting the competitive position of economic units. (Genka kikaku,) which has been translated into English as "Target Costing" (TC), and the target costing technique is not only a cost-reduction technique but a management style directed towards reducing product life-cycle cost and profit planning (Ganey, 2008:42). In 1980, the target costing technology was recognized as an important factor in the development of Japanese companies, because it allowed to enhance their competitive position in global markets, which led to the widespread

spread of this technology in Western companies in order to improve their cost management and thus increase their competitiveness (Mendes & Machado ,2012: 793)

There are several definitions of the target costing technique (Garrison, et al, 2011:723) as "a process to determine the maximum allowable cost of a new product by developing a prototype that can provide the maximum target cost" and Hilton believes that target cost is one of the cost tools that contribute to reducing the total costs of production on Throughout the product life cycle, with the help of production, design, marketing and accounting engineers (Hilton, 2005: 987) as defined by(Bahar, 2015: 65), it is a market-oriented system to reduce costs, and focuses on cost management in the development and design stages of the product.

It was also defined as "a tool designed to design and plan activities for new products, which provides the basis for controlling the later stages of manufacturing that ensure that products achieve their profitability goals at all stages of their life" (Park, 2016: 831).

The researchers believe that the target cost is a technique that aims to reduce the costs of the product over its life, starting from the design stage until the product reaches the customer.

3.2 Characteristics of Target Costing:

The most important characteristics that characterize the target cost are the following: (Kocakulah & Austil, 2006: 61) (Dimi & Simona, 2014: 46-47).

1. It is a technique concerned with the interaction between the external and internal environment of the company, by identifying the needs and requirements of the customer and then creating the conditions and possibilities to achieve them.
2. This technique is a means of identifying which products achieve the highest profits, and this means that the target cost is useful in the analytical aspects and making investment decisions such as: decisions to make or abandon as well as the aspects that lead to the generation of added value to the product.
3. An integrated and continuous process, as it includes all functional areas of the company and continues throughout the life cycle of the product.
4. Once the acceptable selling price is determined in the market, the target cost is determined after subtracting the target profit, which is determined by the management during the company's strategic planning process.
5. The implementation of the target cost represents a distribution of the costs incurred by the product, and this distribution takes place between the different cost centers of the economic unit, and then each center details the costs for each component or material that falls within the scope of its responsibility.
6. It represents a dynamic system that allows and stimulates the creativity of the multifunctional team members to find alternatives to reduce costs.
7. Focuses on quality and functionality first to achieve the target cost as a last measure
8. A technique that provides a basis for control in the later operational stages

3.3 Elements of applying the target costing approach

The target cost method has several basic components, including: (,Horngren et.al , 2011 : 219)

- 1.Target selling price leadership.
- 2.Focus on customers

- 3.Focus on the product design process.
- 4.Multiple teams overlapping tasks.
- 5.Life cycle costs for a product.
- 6.Directing and managing the value chain

3.4 steps of applying the target costing technique

There are several steps through which the target cost can be determined: (,EIKelety , 2006 : 404 - 407) (Ax, et al , 2008 : 7-10) (Salman et al., 2012: 221) (Jacob and Saleh, 2013: 254) (Al-Samarrai, 2017: 596).

Step one: Determine your target selling price

The target sale price is the starting point in the application of the target cost technology, and it is determined during product planning and when determining the characteristics of the product. Therefore, the target selling price is determined by the following:

A- Determining it on the basis of the value perceived by the customer, and the customer determines this value on the basis of the functional characteristics that the product possesses and the benefits it provides or the satisfaction of purchasing power that he can give up in exchange for this satisfaction.

B - Determining the price on the basis of the prices and functional characteristics of competitors that achieve value for the customer.

Step 2: Determine the target profit margin

The management determines the desired profit margin by calculating the target gross profit in light of medium-term profit plans covering a period of 3-5 years, then this total (target gross profit) is divided over all the products that will be in the market in the future

Step Three: Determine your target cost

Sakurai (1998) developed has three main methods for determining the target cost which are (the summation method (from the bottom up), the subtraction method (from the top to the bottom), and the integration method, which combines the method of subtraction (which is based on the market) and the method of collection (which is based on the existing technology and capabilities) to set target costs

Step Four: Determine the target reduction

The current costs represent all the costs of the operations necessary to produce and deliver the product. These costs are often greater than the target cost, due to the pressures of market forces that require the company to reduce the costs of its products. The difference between the target cost and the current cost is called the target cost reduction, and therefore the pressures Competitiveness makes the target cost a general goal that must be reached through the use of a combination of tools and methods.

4. Stream Value

4.1 The concept of value stream

The value stream is one of the most important tools of agile accounting, as it provides actual and accurate information in a timely manner, as it provides financial and non-financial measures on an ongoing basis, as these measures are used in continuous improvement processes (Al-Mashrawi, 2015: 64).

The value stream includes all activities in the economic units, starting from the issuance of purchase orders through the activities of design, development, production, marketing, selling and delivery, as well as after-sales services (Kannedy & Huntziner, 2005: 32)

So the value stream is an understanding of the flow of materials from the supplier to the customer and does not focus on the current state of operations only, but also focuses on identifying the processes that add value and that do not add value to all steps of the production process, which includes all activities, including the process of storing production and raw materials used in the production process. So, through the value stream, waste and loss processes and unnecessary steps can be identified (Wafa et al., 2019: 30)

Known (Bahadir, 2011: 7) "Value stream is a set of procedures required to create a product, starting from receiving the order from the customer up to the final delivery of the product, provided that these procedures permeate the production processes and many support processes for the product." As for (Andersch, 2014: 225) has The value stream is defined as "a group of activities that work jointly in making a finished product, from the stage of purchasing raw materials to the stage of delivering the product to the customers."

4.2 Objectives and benefits of applying the value stream in economic units

There are several objectives that economic units seek to achieve when applying the value stream, and they can be summarized as follows: (Abdin & Rashwan, 2018: 568)

1. Measuring the extent to which the planned results are implemented.
2. Evaluate the necessary factors to implement and accomplish what has been planned.
3. Develop plans and treatments related to critical success factors
- 4 Achieving effective oversight of continuous improvement initiatives.
5. Amending the necessary plans related to continuous improvement processes as appropriate.

The application of the value stream tool in economic units has a set of benefits, including: (Kannedy&Huntziner, 2005:32) (Bojana, 2016:267)

1. Highlight the links between activities and depict the flow through the pathways of the value stream.
2. The value stream tool contributes to giving a detailed understanding of the production process.
3. Improving the decision-making process related to addressing the problems that exist within the paths of the value stream.
4. Create a common language among the value stream team members.
5. Separate value-adding activities from other non-value-adding activities and direct the organization toward a culture of continuous improvement
6. Provide a means to identify waste in production and get rid of it.

4.3 Steps to Determine Value Streams:

The process of determining value streams in economic units goes through several steps.

(Kannedy&Huntziner, 2005: 32-33) , (Hansen & Maryanne 2009: 565),

(Maskell& Baggaley,2004: 94 - 103)

Step One: Identify Value Streams in the Economic Unit

As the identification of the value stream is one of the first tasks, and some mention that there are three main types of the value stream that can be explained as follows:

1. The value stream (related to meeting the requirements of the current customer) as it focuses on providing current products to customers.
2. The value stream (related to the development of new products) focuses on developing new products for new customers and includes marketing, design, production, and process engineering activities.
3. The value stream (special in marketing and sales) focuses on presenting existing products to customers and new products to new customers.

Step two: Determine the size of the value stream

If an economic unit produces 10 products, this does not mean that it does not have 10 value streams as it may have 10 or less value streams. It is possible to create a value stream for each product, but it is more common that a group of products that use common processes are grouped into one value stream. Some products are very large and require a team of people to work on them, while others are smaller and can be handled by one person and thus It turns out that they need to be assigned to different value streams.

step third: Determine the number of value streams and determine the number of individuals within each stream

The value stream should contain between 25 to 150 people, since if the number is more than 150 people, the required concentration will be lost within the value stream, and if it is less than 25 people, this means that the economic unit does not have enough people to carry out operations efficiently within the value stream. It should be emphasized that it is not desirable to increase the value streams and ensure that each value stream is a very important part of the functioning of the economic unit.

Step Four: Mapping the Value Flow Path

The fourth and most important step comes after learning about the value streams, their size and number. The value stream is mapped and includes simple illustrations illustrating the movement within the value stream. Although there are programs to perform this task; However, it is better for the team responsible for the value stream to participate in preparing these maps, which leads to enhancing the learning process and ensures that the inputs are from a variety of members in the economic unit, and starts designing the value flow map according to the original data from the reality of the production process in the economic unit as well as identifying The production time for each stage, and later the process of flow of parts and raw materials is planned in order to verify the process of moving raw materials between the different production stages and calculate the productive time and inventory and some indicators that help define the features of the production process and show the areas of possible improvements.

5.The Practical Side

5.1 : A brief overview of the Dora Refinery

This refinery is considered one of the oldest refineries in Iraq, and it specializes in the oil industry and the oils extracted from it. The refinery was built in 1953, and work began in 1955. The refinery is located in the Dora region, southeast of the Iraqi capital, Baghdad, on the banks of the Tigris River, with an area estimated at approximately 250 hectares. The name of the refinery came from the area in which it was built.

The measurement of production costs in the refinery depends on the elements of the product cost for the purposes of preparing the financial statements, as the product costs are direct material costs, direct wage costs, indirect industrial costs and administrative costs, in addition to measuring the costs of environmental pollutants that result from emissions generated from factories during the production process .

Table (1) shows the list of costs of the specialized diesel oil MG 154 for the year 2018

Table (2) Cost of MG 154 Specialty Diesel Oil

T	cost elements	Total
1	direct materials	7,509,071,877
2	Direct labor cost	400,089,008
3	indirect manufacturing costs	454,099,486
4	Administrative costs	725,094,200
5	environmental costs	1,351,725
Total costs		9,089,706,296
The cost of a liter of oil		3,046 dinars / liter

Source: prepared by the researcher

5.3 Determining the actual selling price of the relevant diesel oil product MG 154

After determining the total (actual) cost of the specialized diesel oil product MG154 for the year 2018 As shown in Table (1), the selling price is determined based on costs, as the method followed by the company in pricing products is the excess cost method, as the selling price is determined on the basis of the total cost plus the profit margin, as it represents a margin Profit is a percentage of the total cost ranging between (10% - 15%), and the actual selling price is determined by the equation below:

Selling price = total cost + (total cost×profit margin ratio

$$= 3,046 + (3,046 \times 10\%)$$

$$= 3,046 + 305$$

$$= 3,351 \text{ dinars / liter}$$

5.4 Application of Target Cost Technology and Value Stream Technology in Al Wasat Refineries Company / Dora Refinery

5.4.1 Application of the target costing technique in the research sample company

The process of applying the target costing technique includes several steps, as explained below:

The first step: identify competing products and their prices

The target selling price of the MG 154 diesel oil product is determined by determining the selling prices of competing products in the market and making a comparison. In order to determine the target selling price, this is shown in Table (3)

Table (3) Prices of competing products

T	product name	Competition type	Competitive prices	average market prices
1	German Icon Diesel Oil	Foreigner	4,200	3,300 dinars / liter
2	diesel oil American Mobil	Foreigner	4,000	
3	diesel oil Malaysian Petronas	Foreigner	2,500	
4	Diesel oil 154	Sweetened	2,500	
the total			13,200	

Source: Sales Division Responsible

It is clear from the above table that the average market price of the specialized diesel oil product MG 154 is (3,300) dinars / liter.

Step 2: Determine the target profit margin

In this step, the target profit margin for the relevant diesel oil product is determined MG 154, if the profit margin desired by the company ranges between (10% - 15%), and accordingly, the target profit margin is determined and calculated as a percentage of sales through the equation below:

$$\begin{aligned}
 \text{Target profit margin} &= \text{Target selling price} \times \text{Desired Profit Margin Ratio} \\
 &= 3,300 \text{ dinars / liter} \times 10\% \\
 &= 330 \text{ dinars / liter}
 \end{aligned}$$

Step 3: Determine the target cost at the product level

In this step, the target cost of the specialized diesel oil product is determined MG 154, based on the previous steps in which the target selling price and target profit margin were determined, as in the equation below:

$$\begin{aligned}
 \text{Target cost} &= \text{target price} - \text{target profit margin} \\
 &= 2,550 - 330 \\
 &= \mathbf{2,970 \text{ dinars / liter}}
 \end{aligned}$$

Step Four: Determine the target reduction for the relevant diesel oil product MG 154

In this last step, the target reduction is determined by comparing the actual cost with the target cost, and this is clarified through the equation below:

$$\begin{aligned}
 \text{Target Reduction} &= \text{Actual Cost} - \text{Target Cost} \\
 &= 3,046 \text{ dinars / liter} - 2,970 \text{ dinars / liter}
 \end{aligned}$$

= 76 dinars / liter

So the total target reduction for a product = 76 dinars / liter × 2,983,353 liters
= 226,734,828 dinars

4-3-2Applying the value stream technique in the research sample company

Measuring waste sources

At this stage, the waste was calculated through the treatment time (C / T) and the number of workers for each stage of production, as shown in Table (4):

Table (4) Calculating working time, the number of employees, for each stage of production

T	machine type	Work time	productive stages	(C/T)	Number of employees
1	tank / bag	8 hours	blending phase	8 hours	18 workers
2	plastic box making machine	20 seconds = 0.3 minutes	container making stage (making plastic boxes + making metal barrels)	12.1 minutes	18 workers
3	shredding	2 minutes			
4	welding	1 minute			
5	punching	20 seconds = 0.3 minutes			
6	assembly	5 minutes			
7	Laundry	3.5 minutes	Filling stage: (Filling plastic boxes + barrels)	3.16 minutes	18 workers
8	plastic box filling machine	10 seconds = 0.16 minutes			
9	drum filling machine	3 minutes			
10	-	-	storage stage	9 hours	9 workers
Total				17 hours 15.26 minutes	63 workers

Source: Prepared by the researchers

Table (4) shows that the total production cycle time is (17 hours and 15.26 minutes), as shown in Figure (1) the current value stream map

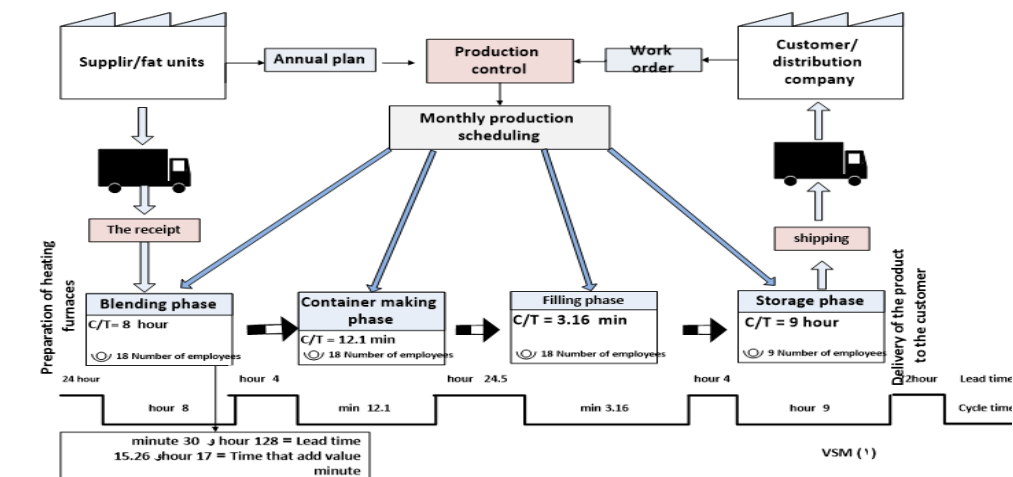


Figure (1) Current Value Stream Map

5.4.2.2 Wastes

It turns out that there are two types of waste within the company, namely:

1-The number of workers : This type of waste is represented by an increase in the number of workers, where the workers' wages are calculated for each stage by calculating the number of workers for each stage of production multiplied by the average monthly wage per worker, which amounts to (529,218,264) dinars for the specialized diesel oil product MG 154, as shown in Table (5).

Table (5) Calculation of workers' wages of the specialized diesel oil product MG 154

T	Stage	Number of Workers	The average monthly wage per worker	employee wages
1	blending phase	18	529,218.264	9,525,928.75
2	container making stage	18	529,218.264	9,525,928.75
3	Filling stage	18	529,218.264	9,525,928.75
4	storage stage	9	529,218.264	4,762,964.38
Total employee wage costs				33,340,750.6

Source: Preparation of researchers

2-Waiting Time:

(Waiting times) were determined by (128 hours) and (30 minutes) during one month, and the costs related to wasting time are calculated by calculating the cost per minute, through the following equation:

The cost of one minute = (9,089,706,296 dinars / 102,900 minutes / year)

88.335 = dinars / minute

Waiting time cost = minutes of waiting time * cost per minute

= (128 hours * 60) + (30 minutes * 88.335) dinars / minute

= 88,335 * 7,710

Waiting time cost = 681,062,850 dinars per minute

5.4.2.3 Eliminate Wastage**1- Waste in Employees:**

Waste in workers is eliminated by determining the daily required quantity of products, as the required quantity per day is (5.5) m3. Accordingly, the required energy is determined in terms of the number of workers for each stage of production through the following equation:

The number of workers for each stage = (time required to produce one unit * required amount per day) / available time after deducting the energy reserve.

$$\text{Mixing phase} = (240 \text{ min} * 5.5 \text{ m}^3) / (80/420) / 336/2640$$

$$= 7.8 \text{ rounded to 8 employees}$$

$$\text{The stage of making containers} = (3.16 \text{ minutes} * 5.5 \text{ m}^3) / 336$$

$$= 66.55 / 336$$

$$= 0.19 \text{ rounded to 8 employees}$$

$$\text{Filling stage} = (3.16 \text{ minutes} * 5.5 \text{ m}^3) / 336$$

$$= 17.38 / 336$$

$$= 0.05 \approx 1 \text{ employee}$$

$$\text{Storage stage} = (540 \text{ minutes} / 5.5 \text{ m}^3) / 336$$

$$= 2,970 / 336$$

$$= 8.8 \approx 9 \text{ employee}$$

Then the difference between the number of employees is determined to determine the amount of reduction

$$\text{Blending stage} = (18-8) * 529,218.264 \text{ dinars}$$

$$= 2,645,292,180 \text{ dinars}$$

$$\text{The stage of making containers} = (18-1) * 529,218.264 \text{ dinars}$$

$$= 8,996,710.488 \text{ dinars}$$

$$\text{Filling stage} = (18-1) * 264.529,218 \text{ dinars}$$

$$= 8,996,710.488 \text{ dinars}$$

Thus, the difference between costs is clarified as shown in the table below:

Table (5) Comparison between wages in the event of waste and without waste for the specialized diesel oil product MG 154

T	Stage	Workers' wages before reducing costs	Employee wages after reduction	Reduction amount
1	blending phase	9,525,928.75	4,233,746.11	2,645,292,180
2	container making stage	9,525,928.75	529,218.264	8,996,710.488
3	Filling stage	9,525,928.75	529,218.264	8,996,710.488
4	storage stage	4,762,964.38	4,792,964.38	0
the total		33,340,750.6	10,055,147	23,285,603.6

Source: Prepared by the researchers.

2-waiting time :

The waiting period has been set (70 hours). The disposable costs are as follows:

The amount of cost savings = the amount of time removed * the cost per minute

The cost per minute is calculated after the reduction, meaning that the total costs of the product are (6,214,776,500) dinars / per year.

$$\begin{aligned}\text{cost per minute} &= (\text{total costs} / \text{number of minutes per year}) \\ &= (6,214,776,500 / 102,900 \text{ minutes}) \\ &= 60396 \text{ dinars / minute}\end{aligned}$$

$$\begin{aligned}\text{The amount of cost savings} &= (70 \text{ hours} * 60 \text{ minutes}) * 60.396 \text{ dinars / minute} = 60.396 \\ &= 4200 * \text{dinars / minute} \\ &= 253,663,200 \text{ dinars}\end{aligned}$$

Thus, costs were reduced by eliminating wasteful work, as well as wasted waiting time. Figure (3) shows a future value flow map after eliminating the two types of waste.

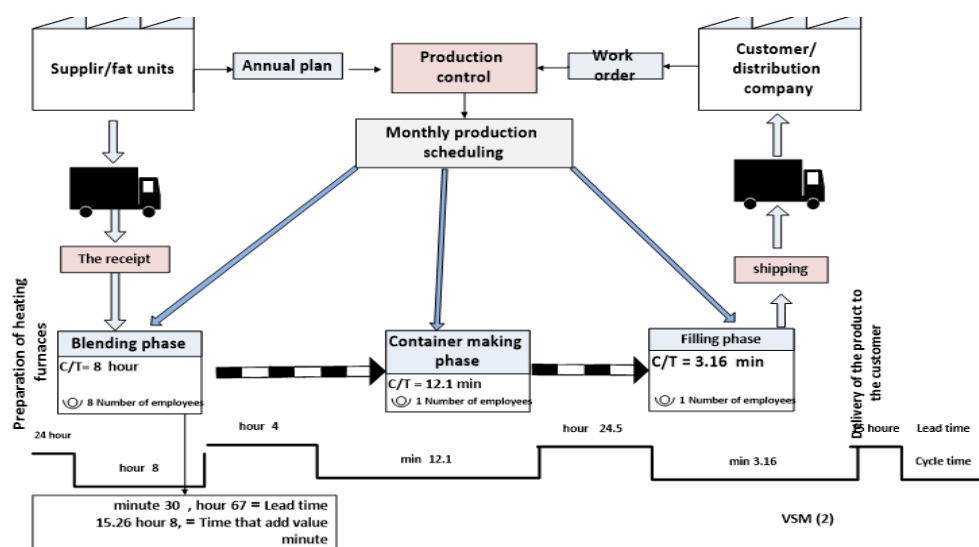


Figure 3 Future Value Stream Map

6. Conclusions and recommendations

6.1 Conclusions

- 1- The use of traditional methods in the production of diesel oils leads to high costs and then low profits are achieved because they do not determine the selling price at the beginning of the production process, but rather work on determining the cost and then adding a simple profit margin, so when the price is higher than the market price, you cannot The economic unit sells the product in the market, which forces it to reduce the selling price in order to fit the market prices and thus its profits are low.
- 2- The value stream tool works to continuously improve the production process, which helps economic units to get rid of activities that do not add value and that consume resources and time, which leads to reducing their costs.
- 3- The results reached by the researchers on the practical side show that when applying the target costing technique, costs were clearly reduced, as it showed the percentage of reducing the total annual production by 2.5%, by 226,734,828 dinars.
- 4- When applying the value stream tool in the company, it was found that there are two types of waste, namely the waste of workers and the waste of waiting time, as the reduction in the

costs of wages for workers amounted to (23,285,603.6) dinars, while the reduction in the costs of waiting time amounted to (253,663,200) dinars.

6.2 Recommendations

- 1- The researchers recommend the use of contemporary techniques and tools instead of the traditional methods used in the production process in order to produce high-quality and competitive products for the market at a low cost, thus achieving higher profits for the economic unit.
- 2- The researchers recommend the need to use the target cost technique because of the great benefits it achieves when used in economic units as it determines a target cost that the economic unit should achieve to achieve cost reduction and higher profits.
- 3- The use of the value-stream tool in economic units has a significant impact on the production process by eliminating waste, which leads to reduced costs, and this is what researchers recommend for the necessity of using the value-stream tool.
- 4- When using several contemporary techniques and tools, this contributes significantly to reducing costs in all activities of the production process, starting from the design stage until the product reaches the customer.

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