

## Reducing the Cost of Production by Using the Product Life Cycle technologie

<sup>1</sup>prof.Ass.Dr. Ali Abbas Kareem, <sup>2</sup> Hashim Abd Zaid Saud

<sup>1</sup>Accounting Department, College of Administration and Economics Al-Qadisiyah Universit- Iraq

<sup>1</sup>[ali.kareem@qu.edu.iq](mailto:ali.kareem@qu.edu.iq)

<sup>2</sup>Accounting Department, College of Administration and Economics Al-Qadisiyah Universit- Iraq

[acc.post010@qu.edu.iq](mailto:acc.post010@qu.edu.iq)

### Abstract:

*The aim of the study is to reduce product costs in Al-Diwaniyah tire factory, through the use of product life cycle technique. The researcher resorted to applying the time-oriented product life cycle steps (TD PLCC) in order to achieve the research objectives. The researchers concluded that using production efficiency as a measure of good manufacturing and as a tool for analyzing production activity, will contribute to discovering value-added activities to be reduced or canceled. The study recommended the necessity of using strategies that will develop business, to speed up operation to gain customer satisfaction, which contributes to providing a better product that competes with the rest of the products in the market.*

### Introduction:

Companies have realized the importance of global competition by paying attention to the time that has become a necessity to meet the challenges. The importance of times plays a role in achieving success in light of changes in the internal environment, which reduces the downtime for the company. Therefore, it contributes to reducing the cost of the product, quick response to the customer and thus customer satisfaction. In order to provide the best for the customer, many points of view emerged, whether with regard to production, marketing or the customer, in order to provide the best services and support by paying attention to production from the stage of research and development to the stage of product presentation. All of this is done by using the basic steps of the time-guided product life cycle (TD-PLCC), starting with the identification of resource groups associated with the product life cycle, and ending with calculating the total cost of the stages of the product life cycle. The steps will be dealt with in detail in the theoretical aspect of the research.

The research came in four chapters, the first chapter dealt with the methodology and previous studies. The second chapter dealt with the theoretical side of the research. The third chapter dealt with the practical side of the research. The research concluded with the fourth chapter, which dealt with the most important conclusions and recommendations

### First :Study methodology and previous studies

#### 1. Study methodology

##### 1.1 : The problem of the study

The main problem in the Iraqi industry is getting lost in time. Because there is a group performance such as non-value-added activities and steps, which increases the period of manufacture of the product and thus is reflected in the cost of the product and the rapid response of the customer.

##### 1.2: The objectives of the study

The objectives of our article are to use Product Life Cycle technique to reduce the cost and timely delivery of the product through the following points:

- 1- Reducing non-valuable time, which contributes to a quick response to the customer..
- 2- Providing unconventional information that helps companies introduce products. Hence, they are able to compete according to clients' requirements. Competition according to customer requirements.
- 3- Communicating with the modern business environment by providing products in a timely manner based on customer expectations of the potential price.

### **1.3 :research importance:**

The importance of research lies through the important and vital role of cost accounting systems in the environment. Modern manufacturing by allocating indirect costs accurately to products, which in turn leads to a reduction in the cost of those products, which helps industrial economic units to compete and improve profitability.

### **1.4 :The hypothesis of the study**

It is the use of the Product Life Cycle technique, which leads to reducing the cost of the product, and providing it in a timely manner.

### **1.5 : Limits and Sample of Research:**

- 1- Spatial boundaries: The General Rubber Company represented by Al-Diwaniyah Tires Factory was chosen to represent the research sample. Where the Product Life Cycle was applied in the said plant. Al-Diwaniyah Tires Factory was one of the most important factories in Iraq and the Middle East. This is to meet the needs of the local consumer.
- 2- Temporal limits: The data and information in 2016 were relied on to represent the temporal limits of the research.

### **1.6 : Sources of data and information collection:**

- 1- The theoretical aspect: The various sources, references and periodicals, whether local, Arab or foreign, were used. Several methods were relied upon for the purpose of obtaining the information.
- 2- The practical aspect: through frequent field visits to the factory, and personal interviews, which were conducted with the cost accountant, engineers, technicians, employees and workers in the factory.

## **2. -Previous studies**

### **2.1 - (Hussein , Jasim 2017)**

(Using Product Life Cycle costs technique to improve the accounting measurement process for intangible assets)  
 This study aims to test the effect of using Product Life Cycle costs technique in improving the accounting measurement process for intangible assets. The study problem is: Does the Product Life Cycle cost technique help in improving the accounting measurement process for intangible assets in the Iraqi enterprise environment? The study was applied to the Diyala State Company for Electrical Industries. One of the most important findings of the study is that there is a positive role for the Product Life Cycle cost technique in improving the accounting measurement process for intangible assets. The most important recommendation is the need for the company to use the study sample the Product Life Cycle costs technique to calculate the product cost. Because it contributes to providing information for accounting measurement to evaluate intangible assets.

### **2.2 : (Khader 2010)**

(Reducing costs using the Product Life Cycle cost method)

The study aimed to reduce the cost in economic units. These units are considered successful when they achieve a decrease in cost to the lowest level and an increase in value to the highest level in all the activities they perform.

While maintaining quality requirements and customer satisfaction. The problem of the study is that the traditional cost accounting tools focus on cost centers to determine production costs, without paying attention to collecting the costs of activities associated with the product life cycle. The study was applied to the laboratory (S) for the manufacture of kibbeh. One of the most important results is that the use of the cost method resulting from the life cycle of the product works to reduce costs during the stages of the Product Life Cycle by applying special methods for this purpose. One of the most important recommendations is the importance of the economic units applying the comprehensive cost method of the product life cycle.

## Second : The theoretical side of the studies

### 2.1 The concept of the product life cycle (PLC Product Life Cycle)

The concept of the product life cycle, there are many points of view in this regard, whether it is related to production, marketing or the customer. The product life cycle, as far as production is concerned, is defined as the time period in which the product passes from the stage of research and development to the stage in which services and support are provided to the customer (Datar & Rajan, 2018: 560).

### 2.2 Steps to Apply Time-Driven Product Lifecycle Costing (TD-PLCC)

1. (Dejnega, 2011:8), (Rich & Hellweg, 2000:19) and (Rayburn, 1996:620) indicate that the steps of TD-PLCC technique can be as follows if time is used as a guide in its application:

2. Define resource groups related to the product life cycle

In this step, the resource groups associated with the stages that the product passes through during its life cycle are identified.

3. Determine the total resource cost for each stage of the product life cycle

The cost of resources is represented by direct and indirect costs, as direct costs include wages and salaries of workers, while indirect costs include indirect industrial costs with the exception of direct materials.

4. Determine the working capacity of each of the resource groups

The practical energy includes the working hours or the time required to produce the product, as (80%) of the theoretical energy was adopted, as a result of excluding the time of downtime, repair and maintenance of machines or guiding workers and other things that are not related to the actual work of performance (Szychta, 2010:55).

5. Determine the unit time cost of each resource group related to product operations

This step is accomplished by dividing the total operating costs represented in direct and indirect costs by the operational capacity.

Defining and grouping activities related to the stages of the product life cycle and the time required for each activity

In this step, the time equation for the activities of each resource group is prepared. Its formula is as follows: (Dejnega,2011:9)

$$T_{j,k} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_p X_p$$

Since:

$T_{j,k}$  = time required to complete event j for activity k

$\beta_0$  = amount of time constant for activity k

$\beta_1$  = time consumed for one unit of time wave x1

X1 = time wave 1 , time wave 2 , ..... XP = time wave P

P = number of time vectors that determine the time required to perform the activity K

6. Multiply the unit time cost of each resource group by the times of the activities

In this step, the unit time cost of each group is multiplied by the product of the time equation for each activity, so that the product of the multiplication process represents the operational cost of each activity.

7. Calculating the total cost for the phases of the product life cycle.

It is the last step in applying the technical steps in which the total cost of the stages that the product passes through during its life cycle is calculated after adding the input materials and other costs to the operational costs.

As for the product life cycle from the point of view of the market, it is defined as the sequence of the life stages of the product in the market, which begins with the introduction of the product to the market, then the stage of growth in sales, and finally the stage of maturity, decay and withdrawal of the product from the market (Blocher., al., 2010:549). From the point of view of the customer, the product life cycle is defined as the period that the product

goes through, starting from the purchase stage, then the operating stage, followed by the support and services stage, and finally the stage of product disposal (Emblemsvag., 2003: 17)

The time is so important rather currently, than on the past time, whether in the management of productivity processes or in the introduction of a new product. The customer access has become faster than competitors, and then the importance of time comes to be ( Nijam, 22, 1992 ) .

1. Reduce product manufacturing cycle time .
2. Reduce cycle time of new produce offering by shortening the product life cycle.
3. Reduce customer response time .

Moreover, (Robert, 1997:2) shows the time is the important elements of the competition in this period, and on the level global markets, as confirmed that time, management is a skill increasing continuously importance. The total time represents the whole time whether adding or non-adding value. (Kaplan & Atkinson, 1998: 601).

Shows the time is non-adding value, which is the examination, moving, waiting, and storage time. This time represents a lost time, which is non-value generated for customer.

The inefficiency of manufacturing process leads to an increase this time. There are many factors leading to increasing the time, that represents non-perform maintenance , and suddenly stopping machines , where as the host value time is the process time. (Garrison , et al , 2012 : 483 ) show that the emphasis is on concreate efforts to eliminate non-host activities of value.

In addition, the time of production process reduce parts of the pervious level, but it helps to reduce the cycle time.

( saftiana, 2007 : 20 ) shows the manufacturing cycle effectiveness that it an analytical tool for production activity . The aim is to measurement and analysis time which takes starting from the treatment of materials in production processes to be a perfect product (time cycle ) . Therefore, it is increasing production processes efficient performance and them it is achieving efficient in costing as shown in figure (2): it shows the steps achieving manufacturing cycle effectiveness .

Our Hypothesis is to use the manufacturing cycle efficiency leading to reduce product cost, and introduce in an appropriate time. The importance problem in Iraq industry is to in loss in time because of there are a group performance such as activities and steps non-added value, which are increasing the period of product manufacturing thus reflected on the product cost and fast response to the customer.

Cycle time takes from weeks or days to hours , if they put the best perspective on the way to calculate manufacturing cycle effectiveness.

(Hornngrem, et al., 2015 : 745-746) companies need to the measurement of time for purposing to this administration properly, as the most companies look at the time and the time and the speed of the response, which is very important , so the speed of ,The speed of response increases customer satisfaction, and achieves this goal, which is the demand in service between the time of delivery and response. Certainly, some companies evaluate efforts to improve the response time for customer using measurement manufacturing cycle efficiency to show the range of efficient to use the time (Saftiana, 2007:5) refers to the measurement of PRODUCT LIFE CYCLE leading to quality moving, to using (PRODUCT LIFE CYCLE ) by costing side to using PRODUCT LIFE CYCLE by time side. Therefore, (PRODUCT LIFE CYCLE ) is a percentage of activities included manufacturing cycle that contribute to maximize the value customers. (Mulyadi, 2003: 16) that is a percentage of activities added value to the total of them measured by the reduction and removed in activities no-added value of the prones , A making the product.

(Kaplan & Atkinson , 1998 :600) it is the most important measuring the tie in Modern Manufacturing cycle efficiency it represents the process from starting to finishing the manufacturing . There are many companies using the measurement of production process efficiency as follows :

$$\text{Product Life Cycle} = \frac{\text{Process Time}}{\text{Cycle Time}}$$

### Thrid :practical side of the studies

Diwaniya elastic Lab is considered on of the parameter competent in the area industry tires various types which was the most prominent products in the markets. This Laboratory has been almost needed for the local market since the establishment 1976 unit 2003. It has product some tires such that (750-16A) (28-14-1609) (900-20)(1000-20) (1100-20) (1200-20) (1200- 24 ) .But the open on global market limited taxes on imported products and finally lack of government support because of the political conditions principle, making all these factors to work dumping

local markets products and competition affecting negatively categorize the production of plant and poor performance . Therefore, all these factors has made recession production and large drop energies productivity.

### 3.1 We will attempt to solve this problem using:

#### 1. Calculation of the cost for the product and suggest sell price:

The first stage is a pricing process that is starting from the receipt cost division, which includes the quality and quantity of materials needed for the production. Then we will determine the model cost (the type and size for the tire). Under some related elements cost for producing and preparation of detection costs of the total for products and then sending the board of directors. Table (1) shows the material and assistance for tire production.

Table (1)  
The material and assistance for tire production.

No.	Raw Materials	Assistance Materials
1.	Bona Rubber	Castor oil
2.	Newerin Rubber	Anocox
3.	Butyl Rubber	Calcium carbons
4.	RBS Rubber	Ankors
5.	Normal Rubber	Hiksakons
6.	Riklim Rubber	Sulfur
7.	FEF Carbon	
8.	GPN carbon	
9.	HAF Carbon	
10.	ISAF Carbon	
11.	SRF Carbon	
12.	BY1402 F1500	
13.	Iron Wires	
14.	Paraffin oil	
15.	Paraffin wax	
16.	Deuterx Oil	

We have calculated materials cost according to the desired type from production tires. We have sampled from the tires in our paper that is currently produced in this laboratory . Table (2) shows production cost for factory products on 2017 the working cost is 100% tire type 20-1200.

Table (2)  
production cost for factory products on 2017

Fixed cost	Working cost	Exhaustion	Another	The total fixed cost
	36298	1444	377	38199
Changed cost	Raw materials	Back up	Another	The total changed cost
	165049	628	2198	167875
Spared production cost				205994
Marketing cost				1130
Management cost				7222
<b>The total cost</b>				<b>214346</b>
Sell price with profit margin 10%				252000
Preparation of researcher based on the records of the planning division in the laboratory in 2017 .				

In second stage , we determine an initial sell price by directors board with adding profit margin around ( 8-10%) from estimating cost, sending to marketing department for studying possibility of selling the

product at this price. Then, it will introduce some suggestions for modifying the price based on the actual market price.

The third stage, the final price will be authentication by director board after studying the suggestions marketing department. To determine the changing between production laboratory cost and competitor products, and their prices. It requires to know the competitor and similar products price in the market, using the survey for local market. Table (3) shows the competitor products price and its cost for 20-1200 Indian original 2017

Table (3)  
The competitor products price and its cost

Data	The price (dinars)
Sell price in the market	230
<b>Research based on the records of the information in marketing department and selling agents in Al-Qadisyah and Baghdad</b>	

The Indian product is the most competitive product laboratory as well as being turn out of costumers according to the information of some selling agents. Then, the objective selling price of laboratory products (20-1200) type is closed for competitor price product. If we assume that the profit margin is 1090, then the Indian original product is (207) thousand dinnars. It is clear that there are a big gap in the cost between competitor and laboratory product, limited 7324 dinnars. From the above m there is a big different in laboratory product cost. We have seen that there is an important role of measuring Product Life Cycle (to reduce the cost getting ride of the activities cost which is non-added value. Therefore the next step includes, the changing analysis which will happen in applying this measurement.

### 3. 2 Application of PRODUCT LIFE CYCLE measurement:

PRODUCT LIFE CYCLE measurement depends on studying the activities and translations to added value and non-added value, that is the added value. The beginning from preparation to completed full product is assumed that the PRODUCT LIFE CYCLE measurement is related series of the added activities value and the non-added activities value. The steps are as follows :

#### First-Activities Measurement :

The determination of activity or process time includes the role of tires production starting on acceptance for the requirement specific type to the final stage and ready to sell we have follown the activities and processes for measuring the actual time to get the times in the version. The quantity the represents average for 80 tires. Table (4) shows PRODUCT LIFE CYCLE :

Table (4)

Department (section)	Activity type	Meal time		Total time	
		Minute	Hour	Minute	Hour
Stock Department	Organize the material entry document	15	2	15	2
	Organize the material output	15	2	15	2
	Preparing the document of withdrawal and of materials and obtaining approval		2		2
	Transfer materials from the stored to the factory	45		45	
<b>Total time for stock department :</b>		<b>15</b>	<b>7</b>	<b>15</b>	<b>7</b>
Preparation Section	Material receipt and its weight		3		3
	Sending material to pellets	20	-	20	
	Preparing the required dough	-	5	-	5
	Sending the products and its checking up	30	-	30	-
<b>Total time for preparation department :</b>		<b>50</b>	<b>8</b>	<b>50</b>	<b>8</b>
Formation Section	Receipt of semi-finished parts	-	1	-	1
	Formation of semi-finished parts		7		7
	Send the product for inspection		1		1
<b>Total time for Formation department :</b>		<b>9</b>		<b>-</b>	<b>9</b>
Construction Section	Receiving the frame parts and its summation	20		20	
	Perforation and coating process	20	-	20	-
	Sending the product and it checking up.	30	-	30	-
<b>Total time for Construction department :</b>				<b>20</b>	<b>53</b>

PRODUCT LIFE CYCLE :

Installation Section	Receiving the half-product tire	40	26	40	26
	Pressing Tire	-	80	-	80
	Rubber vessel press	-	40	-	40
Total time for Installation department				40	146
Quality Central Section	Checking the final validating product	-	1	-	1
Total time for Quality Central department				-	1
Stock Department	Ready frame storage	-	-	-	-
Total time for Stock Department:				-	1
Total time for Product Life Cycle :				35	226
Preparing the researchers based on the observations and interviews with the factory officials					

Table 4 shows the calculation shows PRODUCT LIFE CYCLE which is collection the summation of activities processes for 20-1200 type based on computing the first paid. It contains 80 tires. In some sections , it computes the product time because there are a special machine for type or part from the product parts.

1. The time for getting one tire is 20 minutes  $\times$  80 = 1600 minutes
2. Adding 20 minutes  $\times$  1600 for perforation .
3. Adding the checking time 30minutes that will be the total is 53 hours.
4. The time for one tire will get 20 minutes  $\times$  80 tires = 1600 minutes and adding 1 hour  $\times$  80tire =80 hours for FI/ca process , as well as we will add one hour for two tires in rubber process = 40 hour. The summation is 146 hours and 40 minutes.

## Second : determination the added and non-added activities for computing PRODUCT LIFE CYCLE

After determining the time activities in the first stage, Now we will divide the activities to added and non-added value. The aim is to measure added value activities to help for calculating the percentage Product life cycle. Table (5) includes the determining of Product life cycle

Table (5)  
The determining of Product life cycle

Department (section)	Activity type	Time adds value		Time non- adds value	
		Minute	Hour	Minute	Hour
Stock Department	Organize the material entry document	-	-	15	2
	Organize the material output	-	-	15	2
	Preparing the document of withdrawal and of materials and obtaining approval	-	-		2
	Transfer materials from the stored to the factory	-	-	45	-
Total time for stock department :				15	7

Preparation Section	Material receipt and its weight		-		3
	Sending material to pellets	-	-	20	
	Preparing the required dough	-	5	-	-
	Sending the products and its checking up	-	-	30	-
Total time for preparation department :				50	3
Formation Section	Receipt of semi-finished parts	-	-	-	1
	Formation of semi-finished parts		7		-
	Send the product for inspection		-		1
Total time for Formation department :				-	2
Construction Section	Receiving the frame parts and its summation	-	-	40	26

	Perforation and coating process	40	26	-	-
	Sending the product and it checking up.	-	-	30	-
Total time for Construction department :				10	27
Installation Section	Receiving the half-product tire	-		-	
	Pressing Tire	-	80	-	-
	Rubber vessel press	-	40	-	1
Total time for Installation department				40	26
Quality Central Section	Checking the final validating product		1		
Total time for Quality Central department				-	1
Stock Department	Ready frame storage	-	-	-	1
Total time for Stock Department:				-	1
Total time for Product Life Cycle :		35	158	55	67

To calculate Product Life Cycle Ein the laboratory using our sampling , we will apply

$$\text{PRODUCT LIFE CYCLE} = \frac{\text{PROCESSING TIME}}{\text{TIME CIRCLE}} = \boxed{\%}$$

Where

The processing time is the added value , and the circle time = added value time + non-added value time

$$\frac{9520 \text{ Mintues}}{13595 \text{ Minutes}} = \boxed{= 70\%}$$

The result have pointed out in table (5) . The time percentage that is added value 70%, while the remain time represents non-added value for costumer. It can be reduce and stop it the effect on the total production time that is important to respond the costumer.

#### ❖ Analysis of non-adding value:

After determining the actual time for activities and process, we will analyze activities and determine the activities and process which are non-added value . Moreover, we will attempt to increase the capacity for the added value time activities reducing the processing time particularly least percentage for affecting on costumer requirement. This is determine in the processing planning stage the quality job .

#### ❖ Stores Department Section :

As we have shown in theoretical side, ever store and import activity are non-added value , we notice that the particular side transfer the materials from the store to a small on payment . In the case of vehicles the provision of large vehicles and the arrangement of stores in a manner that facilitates the transfer of materials . It will lead to increase the transfer to materials only first time and reduce times for reducing time. It will enter for the computer then reduce the time for materials existence statement as shown in table 6 :

Table (6)

Materials existence statement

Department (section)	Activity type	time	
		Minute	Hour
Stock Department	Organize the material entry document	15	2
	Organize the material output		1
	Preparing the document of withdrawal and of materials and obtaining approval		1
	Transfer materials from the stored to the factory	45	
<b>Total:</b>		45	4
Preparing the researchers based on the observations and interviews with the factory officials			



❖ **Preparation Department ( Section ):**

Here, we receipt the materials and its weight , then send them to perineum. There are a different types of perineum. In addition to we control all processing of perineum. It will take place in the perineum, following up the adding the materials and certain from the occasion operational condition such as heating, pressuring time. Then, we will send some models of mastication to laboratory for writing a report about the expiration to use it in the work. We talked with an engineering about the production for increasing efficiency time in the department and he showed that a long experience have been a worker to add the materials and types mastication that are very important role to reduce added materials time. Therefore, it can use of experienced workers and enter a new workers in training courses for developing their skills . Then , it can help to the process for organization reception, and weights to reduce the necessary time. The study and analysis of the process include to improve the efficiency time after asking the engineer. It is clear that it is impossible to change the time in a machine , so we can reduce some the previous materials as shown in table 7 :

Table (7)  
The previous materials in Preparation department

Department (section)	Activity type	time	
		Minute	Hour
Preparation Section	Material receipt and its weight	-	2
	Sending material to pellets	15	-
	Preparing the required dough		5
	Sending the products and its checking up	20	-
<b>Total:</b>		<b>35</b>	<b>7</b>
Preparing the researchers based on the observations and interviews with the factory officials			

❖ **Information Department :**

This department works on control of some parts to make a tyre as requirement dimension and measurement . As specifications under the quality control, to production lines. The measure, weight , and neglecting some parts which is not corresponding to quality control points. The engineer must have an enough experience and skills to reduce the time for process as shown in table 8:

Table (8)  
The time for process in Information department

Department (section)	Activity type	time	
		Minute	Hour
Formation Section	Receipt of semi-finished parts	30	-
	Formation of semi-finished parts	-	7
	Send the product for inspection	45	
<b>Total:</b>		<b>15</b>	<b>8</b>
Preparing the researchers based on the observations and interviews with the factory officials			

❖ **Construction Department :**

This department works on compilation the parts of tyres on construction machines with a different sizes and their specifications . Where it control on the alboktit dimension , layers , and preventing of overlap the different parts sizes with each other. In this department all works are by hand , the worker is the process of drilling manually and the process of painting that is the process of added value for a costumer .A big question is to possibility reduce the time for improve time efficiency of this department . In the sense, the process can be done by a skill worker about 15 minutes for one tyre, and organize delivery process fro half product parts about 10 minutes for one tyre, in the some place, as shown in table 9 :

Table (9)  
possibility reduce the time for improve time efficiency of this departmen in Construction Department

Department (section)	Activity type	time	
		Minute	Hour

Construction Section	Receiving the frame parts and its summation		20
	Perforation and coating process	20	13
	Sending the product and it checking up.	30	-
Total time for Construction department :		50	33
Preparing the researchers based on the observations and interviews with the factory officials			

❖ **Installation Department :**

Here, it will compress the tyre in a special template by sizes , control temperatures and the required pressing for the tyre. The process is added-value for costumer that takes some measurement , working the machines, The capacity of each machine two is able to be two tyries and taking two hours to complete the work. Therefore, it can not reduce the time, where as it is reception for half-making some parts. The important issue is top make some training courses for workers, to develop their skills , so the time will be reducing to 10 minutes as shown in table 10 :

Table (10)  
The process is added-value for costumer In Installation Department

Department (section)	Activity type	Time	
		Minute	Hour
Installation Section	Receiving the half-product tire	20	13
	Pressing Tire		80
	Rubber vessel press		40
Total		20	133
Preparing the researchers based on the observations and interviews with the factory officials			

We will compute a particular time for size and the get out the tyre and write the expiation production.

**Fourth :Calculate PRODUCT LIFE CYCLEafter reducing for time in non-adding value activities.**

It is computed PRODUCT LIFE CYCLEfor actual present laboratory. Then the PRODUCT LIFE CYCLERule applied some suggestion process for reducing the activities time is that is non-added value. Then PRODUCT LIFE CYCLEwill be increasing added-value as shown in table 11 :

Table (11)  
Reducing for time in non-adding value activities.

Department (section)	Activity type	Meal time		Total time	
		Minute	Hour	Minute	Hour
Stock Department	Organize the material entry document	15	2	15	2
	Organize the material output	-	1	-	-
	Preparing the document of withdrawal and of materials and obtaining approval		1		-
	Transfer materials from the stored to the factory	45	-	-	-
Total time for stock department :					
Preparation Section	Material receipt and its weight	-	2	-	-
	Sending material to pellets	15	-	-	-
	Preparing the required dough	-	-	-	5
	Sending the products and its checking up	20	-	-	-
Total time for preparation department :					
Formation Section		30	-	-	-
		-	7	-	-

		45	-	-	-
<b>Total time for Formation department :</b>				-	-
<b>Construction Section</b>	Receiving the frame parts and its summation	20	-	-	-
	Perforation and coating process	-	-	20	13
	Sending the product and it checking up.	30	-	-	-
<b>Total time for Construction department :</b>				-	-
<b>Installation Section</b>	Receiving the half-product tire	20	-	-	-
	Pressing Tire	20	-	20	-
	Rubber vessel press	30	-	30	-
<b>Total time for Installation department</b>				40	146
<b>Quality Central Section</b>	Checking the final validating product	-	1	-	1
<b>Total time for Quality Central department</b>				-	1
<b>Stock Department</b>	Ready frame storage	-	-	-	-
<b>Total time for Stock Department:</b>				-	1

$$\text{PRODUCT LIFE CYCLE} = \frac{8720}{11340} \times 100 = 76\%$$

The process, for reducing time is non-added value, and increased the efficiency the process time that is valuable in adding the percentage PRODUCT LIFE CYCLE to 76%. This percentage reduces the total production time and positively effect to speed of responding customer.

We have seen that the laboratory shall work too hard to increase the PRODUCT LIFE CYCLE percentage it can be arrived to the speed of responding optimal customer by raising the PRODUCT LIFE CYCLE percentage to 100% and reducing the gap between the verified percentage on the real fact, and 100%.

Thus, it is increasing for responding customer so it is verified satisfaction. It is clear that the time is main role for strategic dimension for verifying satisfied customer.

On other hand, the use of time circle is analytical tool to achieve production which contributes for knowing non-add value activities, to be reducing or removing. Moreover, he increasing of time efficiency is added value which is reflected on the production cost affects. Therefore, the production cost does not lead to the customer. The non-added value cost is caused on non-added value activities or non-activated performance for added value. So, the increasing PRODUCT LIFE CYCLE reduces the production cost. Therefore, we can compute that this lab is verified the PRODUCT LIFE CYCLE 76%.

#### **Fifth : The effect of increasing PRODUCT LIFE CYCLE on tyre cost**

Based on, the procedure is reduced the time including the previous steps. It can be searching effectiveness by cost as shown in table 12: Calculating the cost using PRODUCT LIFE CYCLE:

Table (12)  
the cost using PRODUCT LIFE CYCLE:

The total production cost	Time minutes	Cost minutes	The time after reducing	The time cost after reducing
214346	13595	15,767	11340	178798

Table (12) shows the reduce of one tyre cost and affects on PRODUCT LIFE CYCLE on the production cost. The reduce of tyre cost changes from 214346 to 178798.

From this point, it is certainly the important role of increasing PRODUCT LIFE CYCLE on the production cost. The big salary is caused by the too many workers which is greater than the capacity of laboratory without verified the desired cost.

## 4 : Conclusion and Recommendations:

### 1.1.4 Conclusion :

1. The use of measurement efficiency certainly is the manufacturing as a tool to analyses the activity's of production, and contribute the find out activities which is added value to reduce them or removed.
2. It seeks companies to innovation and development al process that will affect the customer's satisfaction and access to fast delivery product better than the competition information cost.
3. The information cost can account for product costs and ignore other accept that focus on the speed of delivery of a new product and as a result loss of customers .
4. The result has shown that the waste time spent workers in the lab (sampling date ) . It is non –added value for the product.
5. The use of practiced steps for the time has contributed to increase the time efficiency by 70% to 76% as a result to the speed of responding customer.

### 1.2.4 Recommendations:

1. It is very important to pay attention to the element of time to ensure the continuity of ability of the product reflected to wishing of customer. Particularly the delivery in time.
2. It will use strategies that will develop and speed work to win customer satisfaction . Therefore, it will offer a product that competes strangely with competing products, in the markets.
3. It will use some models that contributes to reduction of the manufacturing cycle efficiency , leading to lower cost and more rapid response to the customer.

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