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USING PROCESS RE-ENGINEERING TECHNIQUE TO REDUCE COSTS AND QUALITY IMPROVEMENT

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Abstract:

The Iraqi economic units suffer from high product costs and a decrease in the level of quality, which led customers to prefer the foreign product in the local market as a result of its low costs and high quality, and thus contributed to the Iraqi economic units' attempt to search for methods and techniques that help reduce production costs and improve its quality, among these techniques is the process re-engineering, through which work can be done to improve the quality of the product and reduce its costs so that the Iraqi economic units can return to the competitive market.
The Iraqi economic units suffer from high product costs and a decrease in the level of quality, which led customers to prefer the foreign product in the local market as a result of its low costs and high quality, and thus contributed to the Iraqi economic units' attempt to search for methods and techniques that help reduce production costs and improve its quality, among these techniques is the process re-engineering, through which work can be done to improve the quality of the product and reduce its costs so that the Iraqi economic units can return to the competitive market.

Keywords: process re-engineering , reduce costs , Quality improvement

INTRODUCTION

The economic units seek to continue in the competitive market by providing products that are of acceptable quality to customers and the cost that the customer can pay for the acquisition of the product, and as a result of the openness of the local market to foreign products that are characterized by low cost and high quality, the role of Iraqi economic units declined and became unable to continue, because High production costs and low product quality, and as a result of the great technological progress witnessed by the contemporary manufacturing environment, these units had to search for modern ways and methods that would enable them to return to the competition of the foreign product and to survive and continue in the competitive market, and among these techniques is the process re-engineering technology, which is one of Technologies through which it is possible to try to reduce the cost of products and work to improve quality in a way that contributes to meeting the desires and tastes of customers so that the Iraqi economic units can play their role in providing products with low cost and high quality.

The first topic: research methodology and previous studies

First: research methodology

1. Research problem

The research problem can be stated through the following questions:

a. Is it possible to apply process re-engineering technology in the economic unit of the research sample?

b. Can the application of process re-engineering technology in the economic unit of the research sample contribute to reducing costs and improving product quality?

2 .The importance of research

The importance of the research is evident as follows:

a. The application of process re-engineering technology can contribute to reducing product costs and improving its quality to meet the expectations and needs of customers, by providing appropriate information in a timely manner to assist management in carrying out its functions, which makes it able to face the changes and challenges in the contemporary manufacturing environment.

b. Helping the industrial economic unit (the research sample) to reduce product costs, improve its quality, and make optimal use of available resources and energy through the application of process re-engineering technology.

3 .Research Objectives

This research aims to:

a . Statement of the knowledge foundations of process re-engineering technology.

b . Cost measurement at the level of specifications in the industrial economic unit of the research sample.

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c . Clarify the role of using process re-engineering technology to reduce costs and improve quality.
4 .Research hypothesis
The research is based on testing a basic hypothesis:
"The application of process re-engineering technology can help the management of the economic unit, the research sample, to provide appropriate information that contributes to reducing the cost of products and improving their quality, in line with the requirements of the contemporary business environment".
5 .Research boundaries
a. Spatial boundaries: The spatial boundaries of one of the Iraqi industrial economic units (Fayd Al-Qassim Company for Metallurgical Industries as a research community and Al-Qassim Factory for the production of refrigerants, which is located in the center of Najaf Governorate as a research sample)
b. Temporal limits: The temporal limits are represented by the data of the economic unit, the research sample for the year (2020).
Second: previous studies
The study (Zainab, 2019) titled "Process Reengineering and its Effectiveness in Quality Improvement" addressed the role played by process re-engineering in achieving excellence in performance and customer satisfaction, in addition to helping the economic unit to maintain its survival and continuity.
As for (Abdul Qadir, 2019), his study entitled "Using the green value chain to reduce costs and improve product quality" concluded that in light of the rapid developments in the contemporary business environment (economic, manufacturing, and technological) that represent challenges facing the managements of economic units It necessitated the adoption of modern technologies, including the re-engineering of operations based on customer orientation as the influencing factor in the competitive market.
As for the study by Ling Chen Hoe & Mansori Shaheen (2018) tagged"
The Effects of Product Quality on Customer Satisfaction and Loyalty: Evidence from Malaysian Engineering Industry.
It focused on the fact that the quality of products can be improved by designing a product that differs from competing products in terms of serviceability, durability, aesthetics, and perceived quality.
The second topic: the knowledge foundations of process re-engineering technology
First: the concept of process re-engineering technology

Brocess re-engineering technology is one of the important concepts in contemporary management accounting, as its importance is evident in that it seeks to work radically in order to achieve the level of improvement in (cost, time, quality and service), and works to rethink basic operations, information technology, job contents and increased work speed, and thus achieve Productivity improvements (Susanto, et.al, 2019:99), defined as the method that allows analyzing those optimizable activities within organizations' processes in order to streamline, modernize, and perform efficient workflows and integrate other processes of the organization, always striving to satisfy internal customers and outsiders (Álvarez, et.al, 2020:4) .
Second: Process Re-engineering Requirements:

There are a set of requirements that must be followed in order to achieve the desired results. For each of the management accounting techniques, a group of researchers concluded with a list of process re-engineering technology requirements, which are as follows: (FarajAllah et.al, 2018: 9) (BAKO & BANMEKE, 2019: 6) & (Mekonnen , 2017:111) (Harb & Abazid, 2018:101-102)

1 .Organizational requirements: They are the organizational dimensions that coordinate and link the elements of the economic unit to enable it to achieve its objectives as a source of strength through which it can work to link and unify everything in the economic unit, including organizational restructuring, participation in evaluating the performance of the economic unit, reviewing systems internal economic unit.
2. Technological requirements: Emphasis is placed on the importance of using modern information technology to support the implementation of the re-engineering process through the use of the workers record model, as the economic unit cancels the old operations and starts from scratch, by building the best ideal model for operations, as the work is done with dynamism, speed and flexibility And transparency and help in the integration and integration between the parts of the work to form meaningful operations (Álvarez, et.al, 2020:5) (Mohapatra, 2013: 17)
3. Human requirements: By creating more efficient, effective, and quality human resources that help them compete through rapid market response, providing products and services of high quality, as well as through modern technological innovations. Figure (1) shows the process re-engineering technology requirements

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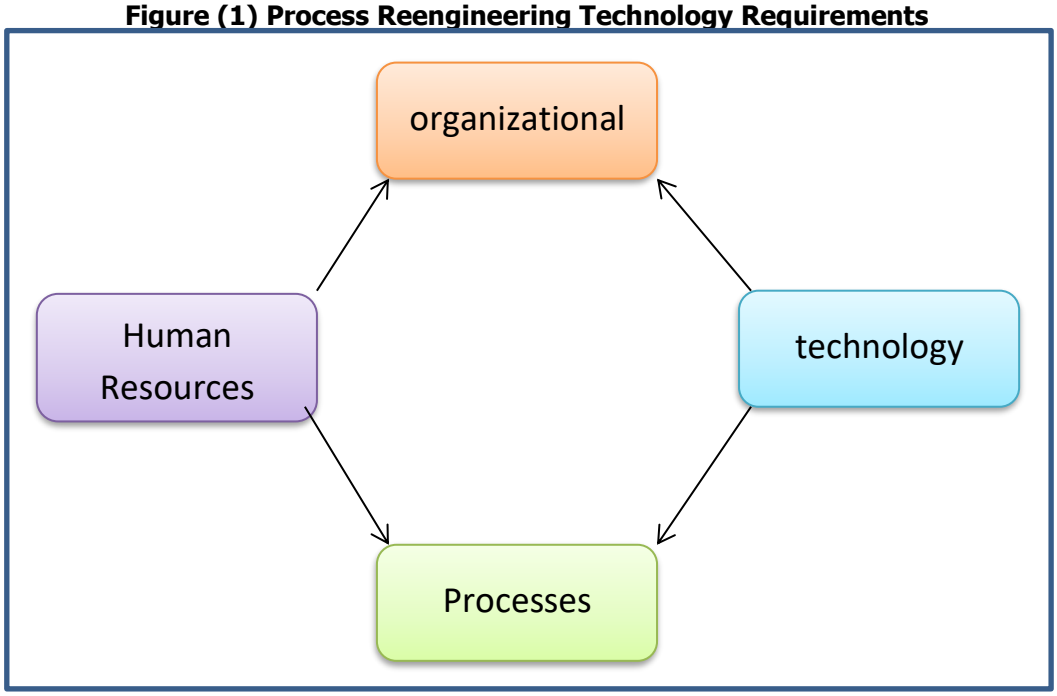
Figure (1) Process Reengineering Technology Requirements



Source: Bako, Y., & Banmeke, M. (2019). the impact of business process re-engineering on organizational performance (a study of commercial banks and micro-finance banks in ilaro). *journal of management and technology [jormatech*, *5*(1), 1-14. p.6

Third: The importance of process re-engineering technology:

(Moreno & Bofill, 2017: 135), (Αθανασόπουλος, 2018:21),(Naveeda, 2014:131)

1 .It is considered one of the contemporary techniques to perform a fundamental and radical improvement in the performance of strategic activities directed towards meeting the desires and needs of the customer.

2. Combine steps to improve operations and their requirements and achieve regular coordination between production process flows and costs and their information systems.

3 .The effective linkage between parallel flow processes was achieved (by applying simultaneous engineering) to ensure the elimination of re-work, the reduction of costs, and the reduction of delays in achieving the final outputs of each process and the speed of their submission to the market.

4 .Helps eliminate or reduce non-value adding activities (such as warehousing, purchasing, inspection and handling) that represent substantial opportunities for cost reductions without a potential reduction in product support services to the customer.

5. It helps to shift from the traditional functional arrangement of the factory to the arrangement of product manufacturing cells under the (JIT) system, and to adopt its philosophy due to its importance in cost management applications and performance evaluation reports.

6 .Ensure the speed of coordination between the activities of the customer-oriented value chain and the immediate response to his desires and needs.

7 .The strategic importance of process re-engineering technology comes from the fact that it aims to increase the added value of the economic unit and the customer and achieve tangible distinction in the quality of its products and prices.

The researcher believes that the technology of process re-engineering works to reduce non-value-adding activities, which contributes to reducing production costs while increasing the added value of the economic unit and customers, and thus achieving excellence through cost and quality.

Fourth: Steps to application process re-engineering technology:

The application of process re-engineering technology is based on a set of steps that regulate how to apply it effectively, as follows:(Brito, 2014:17) (Sujová et.al, 2019:108) (Καψάσκη, 2018:26)(Bahramnejad et.al, 2015: 28).

1 .Determine a re-engineering team:

When applying process re-engineering, a multidisciplinary team is required as a result of the different processes, which is able to transform the process re-engineering project into a practical reality through the renewal and innovation of work systems that contribute to the success of this project.

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2 .Determining customer requirements and evaluating the competitive situation: It includes information related to translating customer requirements into engineering or technical characteristics expressed in the engineer's voice, such as what does the customer want? What are his needs and requirements? What are the technical means to achieve its requirements ?
3 .Comparing the specifications of the local product with the competing product
After collecting information about the product to improve its quality, as well as information about the competing product, which was identified in second Step (2), a comparison will be made between them with the help of the work team for the purpose of identifying some fundamental differences in terms of product specifications and choosing the most competitive products for the factory that have high specifications. In terms of size, performance, safety, shape, aesthetics, and suitability for use, they will be selected as a comparison with the research sample product.
4 .Determine the processes to be re-engineered:
After comparing the specifications of the local product with the competing product, at this stage, the engineering characteristics of the product will be determined in light of the customers' requirements that were identified in the previous stage, and the processes that will be re-engineered in the light of those requirements, which positively affect the product specifications, will be determined.
5 .Implementation of process re-engineering:
Before the implementation phase, a re-engineering team will conduct a detailed analysis to find out the parts of the cooler, their cost, and the exchange rates for each part in order to indicate the specifications that it possesses in terms of size, performance, safety, shape, aesthetics, and suitability for use. Based on the information that will be available about the competing product, re-engineering will be carried out. Product operations in a way that achieves the engineering characteristics and specifications required to improve product quality.
6. Review: All previous stages are reviewed in order to ensure their compatibility with the vision and strategy of the economic unit, which aims to improve the quality of the product and achieve the desired results, and the compatibility of the product operations with its specifications that meet the requirements of the customer.

The third topic: the cognitive foundations of quality

First: the concept of quality:

The concept of quality is one of the central and accompanying concepts for every product or service in any economic unit, which can be clarified through the following entries: (Sorour, 2019: 249)
1 .Customer Approach
Juran believes that quality is appropriate for use, as it is considered closer to the customer, while Evans indicated that quality, whether for a product or service, should meet or exceed the needs and expectations of the customer (Hanaysha & Abd Ghani,2016:5).
2 .Producer Approach:
Crosby finds it conforming to the requirements. This indicates that quality seems closer to production, and that it means conformity to specifications, and specifications are either goals (representing the ideal value of the product) or tolerances (representing acceptable deviations from this value). (Atiyah, 2016:60-61)
3 .The Transcendent Approach
According to this approach, quality is viewed as an innate privilege that can be recognized through experience, and cannot be measured or determined, but can be identified through its vision.
4 .Value Approach:
According to this approach, it is the degree of distinction through the acceptable price and achieving control over its variables at the acceptable cost. (Sorour, 2019: 249).
5 .Social Approach:
Quality is represented by how much the economic unit contributes to the performance of social activities, due to its production of high quality products that lead to the satisfaction of society. Therefore, the concept of quality, according to this approach, is the degree of acceptance or satisfaction that society obtains as a result of obtaining high-quality products. (Ghali and Al-Shammari, 2016: 281.)
6 .Environmental Approach:
Quality is viewed through this approach as the amount of the economic unit's contribution to the performance of environmental activities and the preservation of natural resources through the optimal use of the available resources as well as the reduction of pollution. Therefore, it represents the avoidable loss caused by the product to society, such as the failure of the product to meet the needs of the customer, as well as the resulting negative effects such as pollution.
7. Strategic Approach:

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According to this approach, quality is defined as a competitive advantage that enables the economic unit to achieve its set goals and in harmony with the multiple and successive changes accompanying its internal and external environment, which enables it to continue and grow in the markets. (Sorour, 2019: 249.)

From the aforementioned, the researcher believes that the concept of quality is not concerned with commitment and meeting the requirements and expectations of customers only, but also means achieving exceeding their expectations on an ongoing basis, by identifying customer satisfaction on the one hand, and overcoming defects and gaps on the other hand.

Quality is the general characteristics of the product or service that show and reflect the product's ability to meet the apparent and implicit needs of the customer (Abdullatif et.al 2020:60), and it is the continuous development of the product that meets the customer's needs at the lowest costs (Kalyvitis & Katsim, 2020:1).

Second: Product quality dimensions:

There are several dimensions or features of product quality through which the needs and desires of customers can be satisfied, which is the basis for comparison with competitors (Buntak et.al, 2012:273). Some writers and researchers show these dimensions or features through the following:

1 .Performance: It represents the different main and operational characteristics of the product. (Nafie et al., 2019: 166).

2 .Features: They represent the secondary or additional characteristics of the product, and they are necessary for the functioning of the main characteristics. (Marcal et.al , 2020: 2)

3 .Reliability: It refers to the degree of customer confidence that the product will work without interruption or failure for a certain period of time. (Teryima, et al., 2016:48-49).

4 .Conformity: It means the degree to which the product conforms to pre-determined specifications. This means that high-quality products strictly meet the specified standards. (Ho & Mansori, 23:2018)

5 .Durability: Refers to the benefit that the customer gets from the product during its lifetime and before it is replaced or repaired (Hanaysha, 2016: 393

6 .Serviceability: it refers to the speed, efficiency, and ease in repairing the product when it is exposed to malfunctions. (Halim et al., 2014: 160).

7 .Aesthetic: Refers to the sensory characteristics of the product, which lead to an aesthetic addition to it. (Barfield et al, 2001: 307).

8 .Perceived quality: It is related to the reputation and image of the product and the responsibility of the economic unit towards customers (Malik, 2012:69).

(Karanikas, 2014:54) indicated the possibility of adding a ninth feature to the quality of products, namely:

9. Safety: It is meant to ensure that the customer is not exposed to danger while using the product.

Third: Improving the quality of products:

Quality improvement projects began when the economic units wanted to reduce losses and deviations and achieve quality goals to the fullest. Reducing quality costs requires more attention and care for problems and work to solve them. The quality improvement process can be understood as the measures taken. In the organization in order to increase the effectiveness of activities and processes with the aim of obtaining additional advantages for the sake of the organization and for the sake of customers in general, (Hossain et al, 2017:50) and in order to create an appropriate climate for improving quality, it is necessary to take into account the encouragement of a management style that supports initiatives And it strengthens it in the economic unit, and the values of improvement, attitudes, individuals and their behavior that lead to the improvement of products must be encouraged, and clear goals must be set in terms of improvement, as well as encouraging real communication, teamwork spirit, and team support, as well as qualification and training with the aim of improvement (Buntak et al, 2012:271) , and quality improvement processes can be considered as that group of activities that are carried out in the economic unit in order to increase the effectiveness of activities and events to obtain greater characteristics of the economic unit and its products. (Neyestani, 2017:33) , and improvement is not limited to a specific aspect, but includes work methods, equipment, materials, and production methods by encouraging individuals to present suggestions and good ideas to the economic unit , and the concept of improvement refers more broadly to meeting the expectations of customers that are constantly changing and searching for opportunities for improvement. Through the improvement process, workers are involved in preparing and implementing quality plans, as the role of each individual is determined in coordination with other individuals, through what is called a cycle. (plan, work, examine, implement) cycle (Hossain et, al, 2017:54).

The fourth topic: the application of process re-engineering technology to reduce costs and improve quality in the Al-Qasim factory

In this research, the technology of process re-engineering will be applied in the Qassim plant through the following:

1. Determine customer requirements and evaluate the competitive situation

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Table (1) Prices of competing products

sequencing	Refrigerant name	selling price	production entity
1	Barfab	222757	foreign
2	Almateen	215000	local
3	Aabsal	210000	foreign

2 .Determine the processes to be re-engineered:

The most important main characteristics that can affect product specifications are limited to the following processes:

1 -The design process

2 -The cutting process

3 -Tempering process

4- The assembly process

3. Implementation of process re-engineering:

Table 2: Cost and selling price of competitive reefers (Barfab) according to standard exchange rates for cost components

sequencing	Material name	Quantity (1)	cost per unit (2)	Total cost (1×2)
1	Plate(0.8&1.0)cm	6.30 M	12881.8	81155
2	motor	1	41500	41500
3	waterbump	1	3250	3250
4	selvage with sim installed	3	1000	3000
5	Water foundations	-	3000	3000
6	Electric foundations	-	2500	2500
	-	-	المجموع	134405
7	Sarps group	-	--	--
8	Sarps	1	18600	18600
9	Poly M + Poly S	2	875	1750
10	Shift Busha	2	500	1000
11	block	2	425	850
12	a lock	1	500	500
13	Shift sarps	1	1750	1750
	-	-	المجموع	24450
14	tunic nail	20	25	500
15	Bush bricks	1	1250	1250
16	raft	1	4000	4000
17	Label the water out	1	100	100
18	trademark	1	500	500
	Total			6350
Cost of raw materials				165205
direct labor costs				15000
primary costs				180205
indirect manufacturing costs				18021
manufacturing cost				198271
Administrative and marketing costs 5%				9913

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The total cost per unit of the product	208184
The profit margin is 7% of the cost	14573
Product price	222757

Source: The researcher based on market prices and for each part of the refrigerated

4 .Compare the specifications of the factory cooler with the competing product

Table (3) Comparing the specifications of the factory refrigerated with the competing product

sequencing	specification	**local refrigerated**	**competition refrigerated**	**Competing product vantage**
1	size	0.85 cm3	0.91cm3	Better
2	Performance	Single speed motor. less air volume	Multi-speed motor and larger air volume	Better
3	Safety	Plate(0.7-0.8)cm. The water pump and the motor work together	Plate(0.8-1.0)cm. The water pump and the motor work separately	Better
4	shape(aesthetic)	Medium	High	Better
5	appropriate to use	Easy to use and consumes 1.5 amps of .electricity	Easy to use and consumes 1.5 amps of .electricity	Equal

Source: The researcher based on the company's reports and field experience

5 .Re-engineering of refrigeration processes for the research sample factory:

A. Re-engineering the design process:

Table (4) Refrigerant specifications after re-engineering the design process

sequencing	The name of the part/assembly	proposed development		The effect
1	Plate	Replacing the regular Plate of thickness (0.7 & 0.8) with galvanized iron of thickness (0.8 & 1.0)		It is stainless steel and corrosion in addition to greater durability
2	Almotor, sarbs and all its accessories	Sarbs and motors have been replaced with an electric fan, in addition to a protective window, which .adds safety		The fan has multiple speeds, which gives it greater efficiency and effectiveness in work, in addition to being more safe and aesthetic, as well as excluding many accessories for se

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3	Doors with selvage	The doors were replaced with the selvage to a fixed selvage . (paper cells)		Which increases .1 the amount of air entering the cooler, which increases the outside air space and is cooler and more pure, in addition to reducing the amount of the inside pallet by making doors and reducing the weight of the cooler
4	refrigerated structure	The -1 extern al metal structu re of the new cooler is charac terized by the followi :ng 1.Good durability 2.aesthetic 3. Safety		Reducing the cost, as the cost of the used pallet is greater than the currently used pallet

Source: Prepared by the researcher based on the data of the Research and Development Division.
Table (5) illustrates the refrigerated product design process before and after process re-engineering

sequencing	**Process name**	**before Process RE-Engineering**			**After process Re-engineering**			**The cost difference (2-1)**
		The replaced part	**disbursed Quantity**	**Cost (1)**	**material type**	**Quantity**	**Cost(2)**	
1	Replace the regular Plate (0.7-0.8cm) with the galvanized Plate (0.8-(1cm	-a base roof -Your sleeve is refrigerated the doors	5.84m	75230	galvanize plate	3.35m	51489.5	(23740.5)

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	Total cost of the Plate		5.84m	75230		3.35m	51489.5	(23740.5)
2	Sarps	--	1	17648	electric fan	1	65000	7352
	electric motor		1	40000				
3	selvage		3	3000	selvage (cartoon)	3000	**15000**	12000
4	other extensions			18450			**16050**	(2400)
Total				154328			147539.5	(6788.5)

Source: Prepared by the researcher

Through table (5), we notice a decrease in the total cost of the cooler during the re-engineering of the design process by (6788.5 dinars) in addition to improving the quality of the product by increasing durability, performance and suitability for use.

B- Re-engineering the production process:

1. The cutting stage:

Table (6) shows the process of reducing the time required for the slicing stage of a chilled product

sequencing	**Process name**	**before Process RE-Engineering**			**After process Re-engineering**			**The cost difference**
		material type	**time in minutes**	**Cost (1)**	**material type**	**time in minutes**	**Cost (2)**	
	Shredding time/min	**The base**	**20 minutes**	**1000**	**The base**	15 minutes	**750**	(250)
		ceiling	**20 minutes**	**1000**	**ceiling**	15 minutes	**750**	(250)
		muzzle	**15**	**750**	**muzzle**	**10**	**500**	(250)
		doors	**15**	**750**	**selvage base**	**10**	**500**	(250)
Total			**70**	**3500**		**50**	**2500**	(1000)

Source: Prepared by the researcher

It is clear from table (6) that the amount of reduction in the cost of the time required for the cutting stage is (1000) dinars for one cooler , in addition, the use of these machines has reduced the number of workers from 7 workers in the cutting department to 4 workers per refrigerator

Workers' wages for one chiller after process re-engineering = 2500 dinars (50 minutes x 50 dinars/minutes)

2. Re-engineering the tempering process:

Table (7) shows the process of reducing the time required for the tempering stage of the chilled product

sequencing	**Process name**	**before Process RE-Engineering**			**After process Re-engineering**			**The cost difference**
		material type	**time in minutes**	**Cost (1)**	**material type**	**time in minutes**	**Cost (2)**	
	Tempering time/min	**The base**	**15 minutes**	**750**		10 minutes	**500**	(250)
		ceiling	**15 minutes**	**750**		10 minutes	**500**	(250)
		muzzle	**15**	**750**		**10**	**500**	(250)

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		doors	**10**	**500**	selvage (cartoon (	**4**	**200**	(300)
Total			**55**	**2750**		**34**	**1700**	(1050)

Source: Prepared by the researcher

It is clear from Table (7) that the amount of reduction in the cost of the time required for the hardening stage is (1050) dinars for one cooler, and the use of new machines has reduced the number of workers from 6 to 4 workers

Table (8) The effect of process re-engineering on both the cutting and tempering process

sequencing	The name of the part/assembly	proposed development		the effect
1	machina	Replacing old machines with modern ones in the cutting phase, number (5)		It is instructed through a computer that connects it directly and according to the necessary measurements for the design, which makes this machine characterized by the accuracy of the cutting measurements of this machine, which leads to a reduction in the time required, as well as a reduction in the number of workers and a reduction in the percentage of damage and waste from 7% to .3%
2	old machines	The old machines were replaced in the hardening process (3)		It combines the punching and bending activities into one activity, as this machine is programmed and the relevant information and measurements are entered, after which it performs the work itself. Thus, the use of this machine led to a reduction in the time required for the punching and bending activities, as well as a reduction in the number of workers at this stage, in addition to what this machine is characterized by its accurate measurements. on previous machines.

3. Re-engineering the assembly process:

Table (9) Process re-engineering for the assembly stage:

sequencing	Process name	before Process RE-Engineering			After process Re-engineering			The cost difference
		material type	time in minutes	Cost (1)	material type	time in minutes	Cost (2)	

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1.	Assembly time/min	Base, ceiling and sleeve	30	1500	Base, ceiling and sleeve	20	1000	(500)
		doors	15	750	selvage (cartoon)	10	500	(250)
		Sarps set with motor and water pump	30	1500	electric fan	20	1000	(500)
		Water foundations	8	400	Water foundations	8	400	0
		Electrical foundations	5	250	Electrical foundations	5	250	0
					thermochromic dye	8	400	400
Total			88	4400		71	3550	(850)

Source: Prepared by the researcher

It is clear from Table (9) that the reduction in the cost of the time needed in the assembly phase was (850 dinars) for one cooler

Table (10) shows a summary of changes in the cost and time required to produce one refrigerator

sequencing	Stage	Cost reduction			percentage	Time reduction			percentage
		before PRE	after PRE	reduction		before PRE	after PRE	reduction	
1.	design	154328	147540	(6788)	4.398 %	-	-	-	-
2.	Chipping	3500	2500	(1000)	%28.5	70	50	(20)	%28.5
3.	tempering	2750	1700	(1050)	%38	55	34	(21)	%38
4.	Assemble	4400	3550	(850)	%19	88	71	(17)	%19
5.	Examination	950	950	0	%0	19	19	0	%0
Total		165928	156240	(9688)	% 6	232	174	(58)	%25

Source: Prepared by the researcher

From table (10), we note that the reduction in the costs of refrigeration operations after re-engineering operations is (9688) dinars, at a rate of 6%. As for the reduction in time, it was 25%

C.Calculating the cost of refrigeration after re-engineering operations

Table (11) standard exchange rates after applying process re-engineering

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sequencing	material Name	Quantity	cost per unit	Total cost
1.	**galvanized plate (0.8-1)**	**3.35**	**15370**	**51489.5**
2.	**fan**	**1**	**65000**	**65000**
3.	selvage (cartoon)	**3**	**5000**	**15000**
4.	**Water foundations**	**-**	**3750**	**3750**
5.	Electrical foundations	**-**	**2000**	**2000**
6.	**tunic nail**	**11**	**100**	**1100**
7.	**raft**	**1**	**3000**	**3000**
8.	**Label the water out**	**1**	**100**	**100**
9.	**Dye**			**5000**
10.	**window**			**2000**
11.	**trademark**	**1**	**100**	**100**
Cost of raw materials				**147539.5**
direct labor costs				**8700**
Initial cost				**156239.5**
Indirect manufacturing costs				**24940**
manufacturing cost				**181179.5**
Administrative and marketing costs				**9059**
The total unit cost of the product				**190238.5**
Profit margin is 7% of cost				**13316**
Product selling price				**203554**

Source: Prepared by the researcher

Table (12) Comparison of product quality between the competing product and the local refrigerated product according to the basic specifications

sequencing	specification	**competing product**	**local product**	**local product vantage**
1	size	0.91 cm^3	1.01 cm^3	Better
2	Performance	Multi-speed motor, doors that block the entry of air, and a coil to cool the air, 3 cm thick	A fan with multiple speeds and a cartoon circle of a larger capacity, 7 cm thick, that does not hinder the entry of air, which leads to more cooling than before	Better
3	Safety	Plate is 0.8-1.0 cm. The water pump and the motor work separately	Plate(0.8-1.0)cm. The water pump and the motor work separately	Equal
4	shape(aesthetic)	High	more beautiful	Better

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5	appropriate to use	Easy to use and consumes 1.5 amps of .electricity	Easier to use The electric fan consumes 1.0 amp	Better

Source: Prepared by the researcher

The technology of process re-engineering led to the improvement of product specifications and in accordance with the requirements and needs of the customer, which leads to an improvement in its quality in addition to reducing the price of the product , and this is what the research objective and hypothesis seeks.

The fifth topic: conclusions and recommendations

FIRST: CONCLUSIONS

1. The research sample factory suffers from increased production costs and low quality of its products, which led to a decrease in demand for them and the lack of adequate support and protection from competing products, which led to a weakening of its competitive position.
2. The weakness of the costing system applied in the factory, the research sample, and its failure to accurately monitor and inventory cost elements during the product's life cycle, and the lack of interest and awareness of management in applying contemporary costing techniques and their role in improving the quality of its products in a way that achieves their survival and continuity.
3. The factory sample of the research seeks to develop its production equipment in the factory departments because of its impact on increasing production, reducing the labor force used in production processes, and reducing waste and loss of its resources resulting from its activities, as well as a decrease in operating time, which leads to reducing costs and improving product quality.
4. Increasing the structure of the cooler, which reached 1.01 cm3, up from 0.88 cm3. This increase in size leads to an increase in the amount of air inside the cooler, thus increasing the air package coming out and cooling a larger area of space compared to the cooler before applying process re-engineering.
5. The performance of the cooler became better than before, so the total percentage of change in performance specification costs was 67%. This is reflected in the improvement of the cooler's performance, as the motor was changed with a lighter electric fan with multiple speeds that gives greater flexibility than before, in addition to changing the doors and sash with a cardboard sash with a thickness of 10 cm. Which leads to greater cooling of the air entering the cooler.
6. The change in the total percentage of suitability for use costs was 0.420%, as the refrigerator became easier to use, lighter in weight, and consumed less electrical energy.

SECOND: RECOMMENDATIONS

1. The company's management must form a multidisciplinary work team with high skills and experience to undertake the tasks of continuous improvement of product quality through the use of contemporary cost and administrative techniques.
2. It requires the management of economic units in accordance with the requirements and desires of the customer to use more than one method, such as process re-engineering technology, which achieves the desired goal efficiently and effectively, which is improving the quality of the product.
3. Paying attention to the cost system applied in the company and seeking the assistance of experienced specialists, such as Iraqi university professors, to update it so that it meets the requirements of management and its needs for information that helps it make its various decisions.
4. The researcher calls on government agencies to activate the customs tariff and quality control law in order to protect local products, protect the consumer, encourage the local product, and not flood the markets with inferior products at low prices.
5. The researcher believes it is necessary for the company to prepare accounting records at the factory level separately and not at the company level as a whole, which leads to ease in identifying each product of the company that is the research sample and providing cost data in a timely manner for the purpose of making decisions.

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