



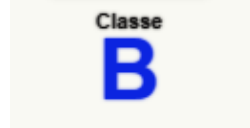
# Reducing Quality Costs: Is the Key to Minimize the company Costs – Case Study of Khantar Company-

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## Reducing Quality Costs: Is the Key to Minimize the company Costs – Case Study of Khantar Company-

دور تكاليف الجودة في تخفيض تكاليف المؤسسة الصناعية  
– دراسة حالة شركة خنثر –

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**Abstract:** This study aims to highlight the importance of measuring and analyzing quality costs, as they can be important source for a significant reduction in company costs. Through the study of kantar's quality costs for the year 2016, we found that the company is incorrectly investing in quality costs, spending more on failure after it has occurred rather than spending against causes of it occurring, which it incurred - additional costs that could have been avoided. In the end, we suggest that it take advantage of the hypothetical case that we presented in this study.

**Key words:** Costs; Quality Costs; Reducing.

**JEL classification:** M 49.

ملخص: تهدف هذه الدراسة إلى إبراز أهمية قياس وتحليل تكاليف الجودة، حيث يمكن أن تكون مصدرا مهما في تخفيض تكاليف المؤسسة الصناعية. توصلنا من خلال دراسة وتحليل تكاليف الجودة لشركة خنثر في سنة 2016، أن الشركة تستثمر بشكل خاطئ في هذا المجال، حيث تنفق على الفشل بعد وقوعه بدل الانفاق ضد أسباب وقوعه، وهو ما حمل الشركة تكاليف إضافية كان بالإمكان تجنبها. في الأخير نوصي الشركة بالاستفادة من الحالة الافتراضية التي قدمناها في هذا البحث.

كلمات مفتاحية: تخفيض؛ تكاليف؛ تكاليف الجودة.

تصنيف JEL : M49.

(\*) corresponding authors

## INTRODUCTION

In light of the intense competition experienced by business companies, the best way to increase profit margins in manufacturing companies is usually to reduce the costs of the product rather than increasing the price of the product while preserving the quality of the product.

Many companies focus more on reducing costs overall. At the same time, they overlook the cost of quality, which may be a major source of cost reduction.

Also most of the studies have focused on how to achieve quality in manufacturing, but did not focus on the relative cost of quality, and even fewer discussions were about how to optimize costs while achieving quality goals.

Khantar Company is one of the successful private companies in Algeria, which produces electronic components for cars. The company works on applying a total quality management system by applying many principles of this system, and calculates the quality costs in a detailed report, but what we have noticed through our field study and after checking the quality reports that this company suffers from high quality costs because of its Mismanagement of these costs.

- **Question of research:** How can Khantar Company reduce their costs of quality?
- **Hypothesis of research:** Khantar Company can lower their quality costs by doing things right from the beginning and reducing the number of defects.
- **Methodology of research:** The researchers used the descriptive analytical method and the case study, by trying to process the collected data in order to test the validity of the study hypothesis.
- **Importance of research:** This research has a great importance, It deals with the concept of quality costs and how to measure it; it explains how to reduce it through Spending more on prevention costs which will allow reducing the company costs.

### 1. Theoretical framework

Every company has costs, the costs are all the money business spends to make and sell goods or services (office s.d., p.10). any company must know the costs associated with achieving quality, since their goals is not only to satisfier customers, but also to do it with the lowest costs; these costs are called quality costs and it became an important proportion of a company's total costs (about 20% - 40% of sales revenues in manufactures companies), Therefore it must be measured and analysed and know the reasons for their occurrence.

Cost of Quality is a methodology used to define and measure where and what amount of a company's resources are being used for prevention activities and maintaining product quality as opposed to the costs resulting from internal and external failures; the Cost of Quality can be represented by the sum of two factors: The Cost of Good Quality and the Cost of Poor (one 2020),

We can be briefly defined as costs associated with preventing, finding, and correcting defective work (Cem Kaner n.d.); as represented in the basic equation below:

$$CoQ = CoGQ + CoPQ$$

Quality costs include:

- **Costs of good quality:** that also called conformance costs; which includes appraisal and prevention costs;
- **Costs of poor quality:** or costs of non-conformance, they also called failure costs; they include internal and external failure costs.

We show the components of quality costs with great more detail and some example in the following table:

**Table 01: Quality Costs Components**

		Description		Some examples
Cost of conformance (good quality)	Prevention costs	. Design, implementation and maintenance of the TQMS . Activities planned and designed to guarantee good quality and prevent poor quality. <b>“Before operation”</b>	Prevention cost is an investment of an organization to do things right the first time.	.Quality management . Product design . Process improvement . Preventive maintenance . Knowledge management .Documentation & training . Quality audits/supplier rating .Risk management
	Appraisal costs	. Measuring and inspecting activities related to quality/ ensuring conformance to quality requirements. <b>“During operation”</b>		Appraisal and failure costs are avoidable
Costs of non – conformance ( costs of failure or poor quality)	Internal failure costs	.Remedy defects discovered before delivering the product or service <b>“Before the customer receives the product or service”</b>		
	External failure costs	. Remedy defects discovered by customers which causes customer to be dissatisfied <b>“After the customer receives the product or service”</b>		.Complaints .Repairing goods/ redoing services .Warranties/ penalties .Returned products /customer’s

Source: (Company n.d.).

The table above describes all types of quality costs, and shows the time when that occurred and gives several examples for each type; and we notice through it that the costs of failure and appraisal are avoidable costs,

unlike the prevention costs are an investment to do things right from the beginning.

### 1.1 Quality costs models

The model of quality costs the most using is PAF, where that classify quality costs into three categories: - prevention costs, - appraisal costs - failure costs. The same approach is advocated by Juran (1985) and Juran and Gryna (1993), the only difference being that they divide the failure costs into internal and external failure costs (Dubravka Pekanov Starcevič 2015, p.236).

Quality costs model according to Crosby – Crosby’s model- (1979) include costs of conformance and costs of non-conformance. This model is similar to PAF (prevention- appraisal- failure) model, Costs of conformance include costs of prevention and appraisal, while the costs of non-conformance related with failure costs (Dubravka Pekanov Starcevič 2015, p.236).

The above models are widely accepted by the quality practitioners. But they are confined to tangible and directly measurable costs, and have failed to address many cost areas: such as loss of sales, loss of goodwill to the customer, loss due to low morale of the workforce ...etc. (A Sailaja 2015, p.490).

For these reasons a new model has been created, where this model adds costs opportunity to quality costs; and following table shows these models in a brief form:

**Table 02: Quality costs models**

Quality cost model	How to calculate it
PAF Model	Quality Costs = Prevention Costs + Appraisal Costs + Failure Costs
Crosby’s Model	Quality Costs = Costs of Conformance + Costs of non-Conformance
Opportunity Cost Model	Quality Costs = Prevention Costs + Appraisal Costs + Failure costs + Opportunity Costs

**Source:** Prepared by the researchers based on: (Dubravka Pekanov Starcevič 2015, p.236).

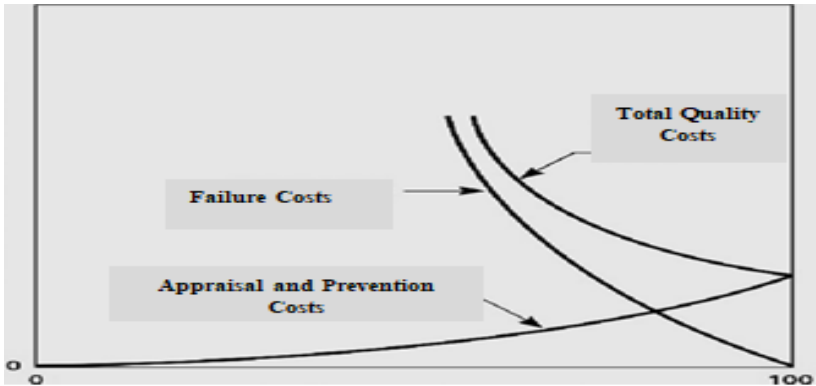
What we can say briefly is that each model added something to the previous model and there is no criticism of the model that came before it.

### 1.2 Reducing costs of quality

In traditional views of improving the quality: high quality means high costs, and the result are rise in the prices of products, but in total quality management system: high quality doesn't mean high costs; this is achieved by raising the costs of prevention to reduce the costs of failure and the trend towards zero defect philosophy, How is that?

We start with the famous saying of Crosby Philip: *"it's cheaper to do the job right the first time than to recover from an error"* (Berte n.d.); it means failure will cost more than failure prevention, for further clarification, we present the following figure:

**Fig 01: Reducing the Total of Quality Costs**



**Source:** (Behnam Neyestani 2017).

Well the pervious figure shows that the curve of failure costs are coming down when the curve of prevention and appraisal costs rise, this caused the quality cost curve to come down.

This is explained that prevention and appraisal costs have a positive impact on the level of quality, the more a company invests in prevention and appraisal, the higher the level of quality. In contrast, the failure costs have a negative impact on the level of quality, which means the lower the product quality, the higher the failure costs, regardless when they were detected (Dubravka Pekanov Starcević 2015, p.236).

In the same context, Studies have also found that investment in prevention save costs in appraisal and failure, and they gave the rule 1-10-100, and the following figure show that:

Fig 02: 01-10-100 Rule



**Source:** (COMPANY n.d.).

We notice from the figure that the rule says: 1 dollar spent on prevention is safe 10 dollars on appraisal and 100 dollars on failure.

We should also focus more on the costs of external failure, as TQM leaders believe that any activity that prevents external failure is an effective cost, because this type of cost carries hard-to-measure enterprise costs, such as lost opportunity cost, which have a major impact on an organization's reputation.

## 2. Methods and Materials

The field study we conducted at Khantar Company, KCA (Khantar-Composants-Automobile) is a private Algerian company, produces electronic automotive components, established in 1987 by Mr. Khantar Ali, and it became a share company in 2003 (you can find a general Information about Khantar Company in appendix n° 01).

This company applies many principles and techniques in the framework of the trend towards the application of total quality management system.

We collected the amounts and information necessary for Khantar quality costs from the company reports that we obtained through a personal interview with the director of the Quality Management Department.

We will only be exposed the quality costs of Khantar Company in 2016, because after we analyzed these costs in the period 2012-2016 , we found that their amounts are almost the same during this mentioned period, as the company suffers from high failure costs, especially the internal failures.

We relied on descriptive analysis to make this study; and we have used in this analysis: percentages and graphics in Excel.

### 3. Results and discussion

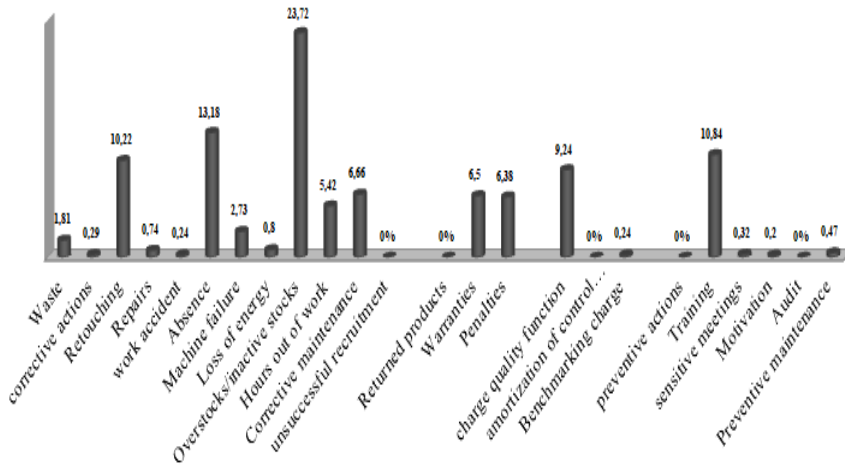
#### 3.1 Khantar quality costs in 2016

Khantar Company uses the common method to calculate quality costs, which we have mentioned in the Theoretical Framework:

**PAF method: Quality costs = prevention costs + appraisal costs + failure costs (internal and external failure costs)**

Khantar quality costs in 2016 -shown in appendix 02- are presented in the following figure

**Fig 03: Khantar Quality Costs in 2016**



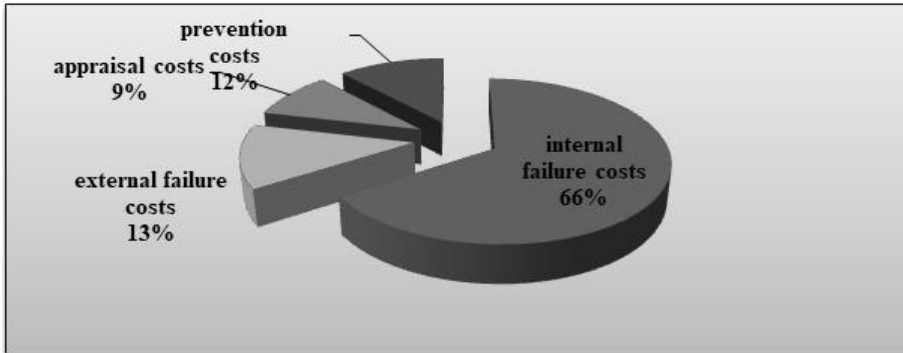
Source: Prepared by the researchers based on: (K. Company, 2018).

It is very clear from the figure that the higher quality costs components of Khantar Company in 2016 are in order: over stocks/inactive stocks: 23.72% (F.I); absence: 13.18 % (F.I); training: 10.84 % (PRE); retouching: 10.22% (F.I); charge of quality function: 9.24% (APP); corrective maintenance: 6.66% (F.I); warranties: 6.50% (F.E); penalties: 6.38% (F.E); hour out of work: 5.42% (F.I); machine failure: 2.73% (F.I); waste: 1.81% (F.I).

What we can notice: is that the majority of the higher components quality costs are costs of internal failure; and the third component of high quality costs is training, which belongs to prevention costs. We also see two higher components of external failure costs (warranties and penalties). And to show which types of quality costs are the most increase, we present the following figure:



Fig 04: Khantar's types of quality costs in 2016



**Source:** Prepared by the researchers based on: (K. Company, 2018).

It seems clear from the figure that the higher costs is internal failure costs (66%), followed by external failure costs (13%), this means that the failure costs represented 79%, then the prevention costs are 12%, and finally, the appraisal costs are 9%. What we can say briefly is that Khantar Company invested less in prevention and appraisal costs, which incurred it more failure costs.

### 3.2 Analyzing and discussion

We will present in the following hypothetical case, which we will assume that what the company spent in reality on repairing and retouching, we will direct it to preventive measures such as preventive action and Incentives for workers... etc.

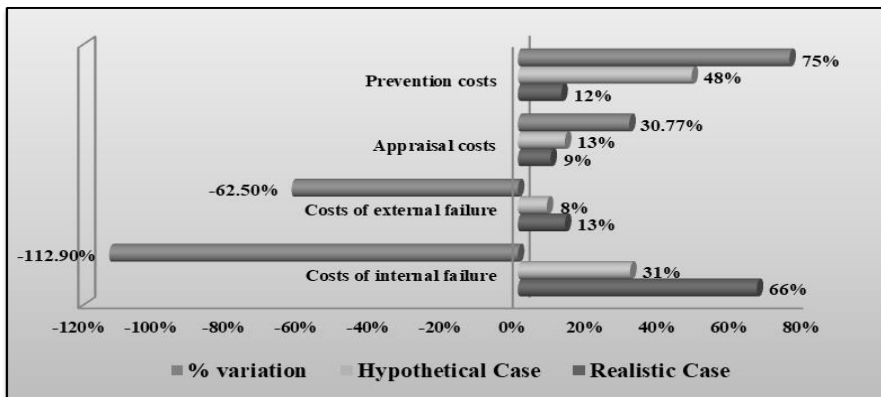
where we will assume that the company spent it on corrective maintenance (internal failure): 499182.56 da spent on preventive maintenance (prevention) And that the burdens it bore as a result of absenteeism and hour outwork (internal failure): 986890.12 da and 405921.43 da respectively, it provided as incentives for workers (prevention), and what it gave as guarantees on the product (external failure): 486556 da it spent on training workers (Prevention), and this would have saved the costs of each of the machines failure: 204367.37 da, repair: 55451 da, retouching: 765568.19 da and corrective actions: 21466.64 da Consequently, the totals and percentages of quality costs will be as shown in the following table :

**Table 03: Hypothetical case of Khantar's quality costs based on 2016 data**

Quality costs	Realistic Case		Hypothetical Case		% variation
	Amount	%	Amount	%	
Costs of internal failure	4929214.65	66%	1797367.34	31%	-112.90 %
Costs of external failure	964556	13%	478000	08%	-62.5 %
Appraisal costs	710175.95	09%	710175.95	13%	+30.77 %
Prevention costs	886152.59	12%	2778146.58	48%	+75 %
<b>Total quality costs</b>	<b>7490099.19</b>	<b>100%</b>	<b>6058791.2</b>	<b>100%</b>	<b>-23.62 %</b>

**Source:** Prepared by the researchers based on: (K. Company, 2018).

What we notice from the above table is that the quality costs decreased from 7.490.099.19 d.a to 6.058.791.2 d.a, meaning by 23.62% from the realistic case to the hypothetical, and for more explanation, we show the following figure:

**Fig 05: Hypothetical case of Khantar's quality costs based on 2016 data**

**Source:** Prepared by the researchers based on: (K. Company, 2018).

The last figure shows it from the realistic case to the hypothetical:

- The internal failure costs decreased from 66% to 39%, meaning by: - 112.90 %.
- The external failure costs decreased from 13% to 08%, meaning by: - 62.50 %.

- The prevention costs increased from 12% to 48%, meaning by: +75.00%.
- The appraisal costs decreased from 09% to 13%, meaning by: +30.77 %.

These results confirm that “Investing more in prevention reduces failure costs in particular, and quality costs in general”, and this is what makes us prove the validity of the study hypothesis (Khantar Company can lower its quality costs by doing things right from the beginning and reducing the number of defects).

Khantar quality costs, as mentioned in the data of appendix n° (02), suffers from an increase in the costs of internal failure (especially in the elements: Overstocks – Absence- Retouching- Corrective maintenance - Hours out of work) and some elements of the costs of external failure (Warranties - Penalties).

#### 4. Conclusion

Controlling quality costs is one of the most important ways towards reducing companies’ costs, as this cost has become an important part of the total costs. So companies have to measure and analyze it.

Reducing quality costs is achieved by spending more on prevention work, this would allow to reduce failure costs in particular, and costs of quality in general.

- **Results of study:**

Through this study, we reached the following results:

- Khantar quality costs, as mentioned in the data of appendix n° (02), suffers from an increase in the costs of internal failure (especially in the elements: Overstocks – Absence- Retouching- Corrective maintenance - Hours out of work) and some elements of the costs of external failure (Warranties - Penalties).
- Khantar Company registered a high percentage of failure costs (79%) in 2016, this is because the company has not invested much in prevention and appraisal (21%), which has caused it high costs of failure (79%).

- **Recommendations:**

Finally we recommend the company to:

- Benefit from the hypothetical case that we presented in this study, and this through spending more on prevention (learning – motivation,

incentives ...), which will allow reducing failure costs, quality costs, and production costs.

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## APPENDICES:

### Appendix n° 01: Information About Khantar Company

<b>Trade Name</b>	<b>KCA : Khanteur Components Automobile</b>
<b>Legal form</b>	shares company
<b>The company's capital</b>	80 billion Algerian dinars
<b>Social headquarters</b>	Industrial zone Sidi Bel Abbes – Algeria
<b>General Manager</b>	Khanteur Ali
<b>The purpose goals</b>	Production, development and marketing of automotive components
<b>Number of Workers</b>	94 Workers
<b>Quality system</b>	ISO 9001 Quality Management Certificate
<b>market share</b>	80 % in the local market
<b>Number of patents</b>	08 patents
<b>Company growth rate</b>	15 % annually

### Appendix n° 02: Khantar quality costs in 2016

<u>Element</u>	<u>Amount</u>	<u>% of type of quality costs</u>	<u>% of total quality costs</u>
Waste	135748.88	2.75 %	%1.81
corrective actions	21466.64	0.44%	0.29 %
Retouching	765568.19	15.53%	10.22 %
Repairs	55451.00	1.12%	0.74 %
work accident	17681.50	00.36%	0.24 %
Absence	986890.12	20.02%	13.18 %
Machine failure	204367.37	04.15%	2.73 %
Loss of energy	60000.00	1.22%	0.80 %
Overstocks/inactive stocks	1776936.96	36.05%	23.72 %
Hours out of work	405921.43	8.23%	5.42 %
Corrective maintenance	499182.56	10.13%	6.66 %
unsuccessful recruitment	00.00	00%	00%
<b><u>Costs of internal failure</u></b>	<b><u>4929214.65</u></b>	<b><u>100%</u></b>	<b><u>65.81 %</u></b>
Returned products	00.00	00%	00 %
Warranties	486556.00	50.44%	6.50 %
Penalties	478000.00	49.56 %	6.38 %
<b><u>Costs of external failure</u></b>	<b><u>964556.00</u></b>	<b><u>100%</u></b>	<b><u>12.88 %</u></b>
charge quality function	692175.95	97.47 %	9.24 %
amortization of control equipment	00.00	00%	00 %
Benchmarking charge	18000.00	02.53%	0.24 %
<b><u>Appraisal costs</u></b>	<b><u>710175.95</u></b>	<b><u>100%</u></b>	<b><u>9.48 %</u></b>
Training	811871.86	91.62%	10.84 %
sensitive meetings	24083.50	2.72%	0.32 %
Motivation	15000.00	1.69%	0.20 %
Audit	00.00	00%	00 %
Preventive maintenance	35197.23	3.97%	0.47 %
<b><u>Prevention costs</u></b>	<b><u>886152.59</u></b>	<b><u>100%</u></b>	<b><u>11.83 %</u></b>
<b><u>Total quality costs</u></b>	<b><u>7490099.19</u></b>	<b><u>/</u></b>	<b><u>100%</u></b>
<b><u>% COQ/CA</u></b>	<b><u>/</u></b>	<b><u>27.33 %</u></b>	