

## THE MEASUREMENT OF NOISE POLLUTION AND IT EFFECT ON THE INCREASE OF COSTS AND DECREASE OF PROFITS

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### ABSTRACT

The importance of this research is through the study of the means of measuring the noise pollution costs and how to resolve it and show its effect on the profits of economical units and the protection of the health of workers.

As well as showing the effect of using the devices and equipments that are necessary to limit the noise pollution and measure its costs and its effect in increasing the production efficiency and decreasing costs and the increase of profits in the economical units.

The research has concluded the necessity of urging the increase the attention by the economical units towards measuring the noise pollution costs and show its effect on the increase of costs and to find the optimum methods to reduce it.

**KEYWORDS:** Costs, Profits, Noise pollution.

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### Introduction

The noise pollution is considered one of the types of environmental pollution that is caused by the interaction of a group of loud and annoying sounds that causes a lot of diseases to the workers in the economical units such as Nervous tension and heart and digesting system diseases and high blood pressure and decreasing of productivity and increase of costs.

So that the issue of this research is represented by the lack of attention of the economical units in the Iraqi environment in measuring the costs of noise pollution and show its effect on costs and profits and measuring the cost of limiting it and its effect on increasing the profits and decreasing the costs in economical units through delivering scientific accounting standers.

And the research aims to explain the method of measuring the costs of noise pollution in the economical units and explaining the effect of

measuring the cost of limiting noise pollution in decreasing the costs and increasing the profit.

### First aspect: Research methodology

Research methodology is divided into the following clauses:

First: research problem: the research problem is represented by the lack of attention by the economical units in Iraq's environment in measuring noise pollution costs and its effect in increasing the costs and decreasing the profits that requires providing scientific accounting standards that contribute to determine the cost of noise pollution and its effect on the increase of costs and measuring the costs of limiting noise pollution and explain its effect on decreasing the costs and increasing the profits in economical units.

**Second: Research Importance:** the research importance is represented through the attention to the measurement of noise pollution and the method to treat it and show its effect on the profits of the economical units and protect the health of workers and its result of having a clean environment that doesn't contains any pollution which contributes effectively to the Sustainable Environment development.

**Third: the objectives of the study:** can be specified as the following:

- a) Measuring the costs of noise pollution in the economical units
- b) Show the effect of measuring the costs of reducing pollution in reducing the costs and increasing the profit.

**Fourth: the hypothesis of the study can be specified as the following:**

- a) Noise pollution contributes to the increase in the costs of the economical units
- b) Measuring the costs of reducing pollution contributes to the decrease in the costs and increases the profit in the economical units.

**Fifth: the field and period of the study:** one of the industrial Iraqi units suffering from noise pollution as the field of study and the data available in 2017 was used.

The second aspect: measuring the costs of noise pollution:

Noise is defined as the interference of a group of undesired loud and sharp sounds that cause unrest

and agitation to human and its effects manifests in several diseases such as Nervous tension, cardio and gastrointestinal diseases (Shahatah, 2000, 82).

Noise has different sources, such as transports means, construction, electrical devices, factories, thunder, explosions and volcanic eruptions and others, noise causes and several different other diseases such as blood hypertension, headaches, Palpitation, general weakness and agitation and others.

There is strong relation between the noise severity and the damage it causes to human such as the type of noise and is it continuous or temporary and the nature of work practiced.

In a study published by the Jordanian Occupational Safety and Health Institute to measure the sound levels that causes noise emitted by machines in different ten industrial sites that represents the biggest category in the Jordanian industries, it was revealed that the levels of acoustic pressure of noise emitted by machines that are permissible by the Arab Labor Organization regarding health and occupational safety, it set the level of normal noise at 85 decibels. (Al-Hayali, 2004, 96).

Three main standards are used to measure noise pollution: (Al-Hayali, 2004, 151).

- a) Decibel (db) the unit of measuring the sound intensity, it is a virtual logarithmic gauge equals 1/10, the table 1 reveals the permissible noise intensity inside the production sites.

Table 1: the permissible noise intensity inside the production sites

	Specifying the location and its type	Max. limit permissible (db)
1	Sites with one shift 8 hours	90
2	Sites that require hearing sound signals and good verbal reception	80

3	Work room with high requirements for the follow up and measure and control the operation	65
4	Work rooms for activities that require mental focus.	60

Source: (Shahatah, 2000, 85)

In the case of noise intensity exceeding 90 decibels then exposure to noise should be reduced as shown in table 2 that represents the

relationship between noise intensity and work hours.

Table 2: The relationship between noise intensity and work hours.

	noise intensity - decibel	Period of exposure to noise during work - hour
1	95	4
2	100	2
3	110	Half an hour
4	120	One quarter of an hour
5	85	8

Source: (Al-Khwaladah, 1993, 50)

- b) Pressure measuring scale mm/ mercury: it is a unit for measuring Systolic and diastolic blood pressure for human that ranges between 100-140 mm/ mercury for Systolic blood pressure and 60-90 mm/ mercury for diastolic blood pressure and any increase or decrease from these readings causes damage to human and the deterioration in health that causes absence from work and getting sick leaves.
- c) Monitory measure: used to specify the value of the measured item and is represented by monitory units such as Iraqi dinar.

Third aspect: measuring the costs of noise pollution in the company subject of the study and the cost of reducing it and its effect in reducing costs and increasing profits according to the data acquired from the company subject of the study there are 25 work sites, of them 23 sites where the sounds emitted from them exceed the permissible level which is 85 decibel, no. of workers in the

company are 1152 workers, of them 114 workers are using sound protectors regularly therefore they don't get expose to sound pollution and the rest of the workers 1038 workers are exposed to loud noise that exceeds 85 decibel without using sound protectors.

The rate of the workers' salary in the company subject of the study is 900,000 Iraqi dinars, and according to the acquired data, the cost of noise pollution is measured and decreasing it is measured by following steps:

First: calculating the cost of the sick leaves as follows:

- a) Sick leaves for the workers exposed to noise pollution 85 decibel or less, their number is 114 who are not using sound protectors and it is done by dividing the no. of sick leaves.

480 leaves during the year on their no. 114 workers so the rate of sick leaves shall be 4.21 day for each worker.

b) Sick leaves for workers who are exposed to noise intensity more than 85 decibel, their no. is 1038 worker, their annual sick leaves were 5772 sick leaves during the year, thus the rate of sick leaves acquired by dividing no. of leaves on the no. of workers is 5.51 day for each worker during the year.

c) The deviation in sick leaves is specified by subtracting the (the deviation of workers sick leaves who use sound protectors) from (the workers who are exposed to loud noise and don't use sound protectors).

Sick leaves deviation =  $5.54 - 4.21 = 1.33$  days for each worker annually.

5. Specifying the daily wages rate of the worker by the following:

Wages rate of the worker = monthly salary / 30 days

=  $900\,000 / 30$

= 30 000 dinars daily

d) Specifying the annual cost of sound pollution for one worker calculated by:

Annual cost of noise pollution = deviation of sick leaves X rate of daily wages of the worker

=  $1.33 \times 30\,000$

= 9900 dinars for each worker

e) Specifying the total cost of noise pollution of workers by:

Annual cost of noise pollution = noise pollution cost for one worker X no. of workers exposed to noise intensity more than 85 decibel.

=  $39900 \times 1038$

= 41416200 dinars

Second: cost of decreasing the productivity of workers because of noise pollution:

After research and queries it is proved that there is loud noise from the machines that caused a lot

of diseases suffered by workers who are working in poor conditions that led to decrease in their morale and decrease in production quality the thing that was proved by a specialized committee consists on the production manager and a group of specialized engineers and the costs manager and this committee specified the ratio of decrease in productivity by 10 % because of noise pollution that shows the lost efforts in the salary paid to workers.

Thus, the lost wages because of the decrease of production quality because of noise intensity by multiplying the sum of workers' salaries by the ratio 10 %

And the cost of decreasing the productivity by the following steps:

a) Cost of productivity decrease of one worker = annual wages of a worker X ratio of productivity decrease

= (monthly worker salary X 12) x productivity decrease ratio.

=  $(900\,000 \times 12) \times 10\%$

= 1080,000 dinars

b) Cost of productivity decrease of all the company's workers = Cost of productivity decrease of one worker x no. of workers.

=  $1080\,000 \times 1152$

= 1 244 160 000 dinars.

Third: total cost of noise pollution: produced by the following:

Total cost of noise pollution = cost of noise pollution because of sick leaves + workers decrease in productivity.

=  $414\,162\,00 + 1\,244\,160\,000$

= 1 285 576 200 dinars

Thus, cost of noise pollution of 1 285 576 200 dinars contributed clearly to the increase in the costs of the company subject of the study beside the diseases suffered by the workers in the pulmonary and gastrointestinal system and high blood pressure and other diseases the thing that proves the first theory.

Fourth: cost of fixed assets used in decreasing the noise pollution:

The tangible fixed assets used in decreasing the noise pollution are considered the type of assets that are added to the company's fixed assets in condition that its depreciation in the periods they are being made use of according to the accrual basis of accounting, and the depreciation installment is considered an important part of the production cost.

The company may buy sound protectors that reduces the sound intensity by 30 decibels, they are available in the market and its price is estimated to be about 90 000 dinars and its useful life is about five years and they are within the tangible fixed assets of the company that can be used for workers who are exposed to loud noise more than 85 decibel, their no. is 1038 worker who don't use sound protectors.

Thus, depreciation can be calculated for these fixed assets and adding them to the financial year by the following steps:

a) Buying Protectors cost = no. of workers exposed to noise x cost of one protector.

b)

$$= 1038 \times 90\,000$$

$$= 93\,420\,000 \text{ dinars}$$

c) Annual depreciation = Protectors cost / its useful age

$$= 93\,420\,000 / 5$$

$$= 18684\,000$$

The annual depreciation represents the cost of decreasing the noise pollution which represents the annual amount that helps the company in reducing the noise pollution.

Fifth: the effect of reducing noise pollution on the production cost and the company's subject of the study profit.

The decrease in production is determined by using sound protectors by the following:

Decrease in production cost = noise pollution cost – cost of decreasing noise pollution

$$= 1\,285\,576\,00 - 18\,684\,000$$

$$= 1\,266\,892\,200 \text{ dinars}$$

Thus, the company's use of sound protectors shall reduce sound pollution which shall reduce production cost by 1 266 892 200 Iraqi dinars and increases the company profit by the same value of decreasing the production cost beside preserving the health of the workers which shall affect the production quality the thing that proves the second theory.

The fourth aspect: conclusions and recommendations:

Divided into the following:

First: conclusions:

- a) sound pollution is considered the most important environment pollution in the economic units that causes big damage to the economic unit productivity and the lives of the workers from the negative effects on the pulmonary and gastrointestinal and Nervous system.
- b) It was revealed from the study that the company subject of the study suffers from high noise intensity that affects the workers that caused severe psychological and physiological damages to the workers which affected in a clear way the increase of the costs.
- c) It was revealed that using sound protectors as fixed assets in the company subject of the study leads to decrease of the costs and increase of the

profit by 1 266 892 200 dinars because of eliminating noise and its effects.

On the workers in the company subject of the study beside preserving the health and safety of personnel working in the company.

Second: recommendation: can be specified by the following:

- a) Necessity to urge to increase the attention of the economical units to measure the costs of noise pollution and its effect on increasing the costs and finding the suitable ways to reduce it.
- b) The company subject of the study to use sound protectors for all the workers to safeguard them and their health and increase productivity and profit.
- c) The company subject of the study should conduct periodic routine checks to safeguard the workers' health specially the workers who are suffering from loud noise that affects their health.

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