AN ANALYSIS OF WASIT THERMAL POWER STATION'S PERFORMANCE IN THE ZUBAYDAH DISTRICT

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Abstract
Iraq's electrical energy output must be improved to fulfill the country's needs. Thus, more energy must be produced, either by building new power plants or increasing the effectiveness of existing ones, like the Wasit thermal power plant. Through study and research, it has become obvious that the Zubaydah power station is a groundbreaking and significant project. At a time when the nation is experiencing a major crisis in the supply of electric power, it is regarded as one of the important development projects as this project contributes to generating an annual production capacity that cannot be dispensed with, in addition to the existence of some problems and obstacles that affected On its production, including lack of fuel supply, maintenance problems, and breakdowns, as effective solutions to these problems were proposed.
Keywords*: Thermal Power, Performance Evaluation, Zubaydah District.*

1. INTRODUCTION

Natural resources like oil, fertile land, and two freshwater rivers are abundant in a wealthy nation like Iraq. Wealth needs to be invested, and with contemporary technology, electricity has replaced other energy sources in many enterprises. As a result, it necessitates the existence of electrical energy-producing stations; as such, we shall discuss Wasit Thermal Station as one of those stations. By understanding how it operates, we may gain from it. Wasit station, with a design output of 2540 megawatts, is among the most significant facilities for generating electrical energy. Crude oil, natural gas, and black oil are some of the fuels it uses to run. A water treatment facility and a series of cooling towers for the power system are also included. It also has a boiler and a turbine for power generation, which filter the water drawn from the Tigris River. It was created in 2010 and finished in 2015; it houses several electric power transmission lines. On the means required to meet the fundamental needs of citizens and to meet those requirements, Using the various state resources available locally and covering the deficit caused by import, and Iraq's need for electric power increases due to the suffocating conditions, it went through, such as multiple wars and economic blockade, which greatly affected the sectors of generation, distribution, and investment of electric power. Until government efforts bear fruit in return for this sector to perform the role assigned to it, it is necessary to work to measure the performance of the power plants, evaluate this performance, and improve it to approach the global performance levels, which is what this research tried to do by measuring the evaluation of the efficiency of the performance of the power plant, Wasit Thermal Station for the period 2015-2021. Iraq's ability to produce enough electricity to fulfill local demand is insufficient, so more must be produced by building new power plants or enhancing the efficiency of those already in operation, like the Wasit thermal power plant. The purpose of this study is to evaluate the efficiency and efficacy of the Wasit thermal station in the Zubaidiyah district. It also seeks to increase the Wasit Thermal Power Plant's efficacy so that more electrical energy is available.

2. THE CONCEPT AND INDICATORS OF EVALUATING THE EFFICIENCY OF ECONOMIC PERFORMANCE.

2.1. The concept of evaluating performance efficiency

The idea of economic performance in economic units has evolved along with the growth of the organizational and productive structure of the economic units themselves. At first, it was modestly represented by the employer's control over the employees to ensure their effectiveness and integrity

in carrying out the work assigned to them. Still, as time passed, this concept expanded to become more comprehensive. On the one hand, the rise of economic units, and on the other, the advancement of technology and scientific advancements 1.

Several ideas underpin the process of assessing the effectiveness of economic performance. According to some experts, the performance review process aims to identify variances by comparing actual performance to predetermined indicators. Then, whenever possible, the essential right measures are taken, and frequently a comparison is made between what was accomplished and what was intended after a given time frame, which is frequently one year.

When evaluating the effectiveness of economic performance, specialists use various criteria and indicators to uncover the truth about the effort and how it affected the outcomes that should have been achieved in the economic units. The word "evaluation" is derived from the word "value," which means "value," and performance evaluation is defined as "a set of scientific procedures aimed at evaluating the efforts made to achieve certain goals in light of the agreed-upon standards and prior planning," according to the language dictionary. And judging the effectiveness of these efforts and the obstacles and difficulties encountered in implementation to improve performance and raise the degree of productive efficiency in a way that helps achieve the goals.

Additionally, the Office of Financial Supervision in Iraq defines the evaluation of performance efficiency as an objective assessment made by policies, systems, operations management, and activity results for a body subject to evaluation and performance, with a comparison of actual achievement with the planned, identification of deviations and their causes, putting forward proposals that address them, and directing performance towards achieving effectiveness and economy and increased interest in the process Evaluation of economic performance because of its results for the extent of efficiency in implementing the programs and plans specified by senior management in the economic units, whether in a planned or directed economy or a market economy, where the economic return represents a basic profit for each economic project represented by good performance.

Planning and performance efficiency evaluation are related processes. It is one tool for monitoring how effectively projects progress and how much they depend on the manufacturing units' long-term objectives. As a result, it is strongly tied to planning, and using the concepts provided above; one can define performance efficiency as the process of assessing performance efficiency. To be aware of the degree of its capacity to transform inputs into outputs of the necessary quality and quantity and to use the most effective and cutting-edge techniques available in its line of work to accomplish its objectives.

2.2. The importance of evaluating performance efficiency

An ongoing evaluation of the manufacturing units is necessary for those managing economic projects. There are numerous methods and formulas for monitoring and evaluating performance, including studies of performance efficiency, to help an economic unit understand the degree to which it achieves its objectives and how its production units use their resources over time which focus on the efficiency of the economic unit in achieving operations that need to be performed; This is done by comparing what is achieved with what is consumed during a specific period, which is often a year. Hence, such studies gain importance to detect imbalances and deviations that may occur and keep the economic unit away from achieving its set objectives.

As a result, it was necessary to select the right standards and indicators that are in line with the objectives of each economic unit, its capabilities, and the activities it engages in. This relationship between evaluating performance efficiency and the project or economic unit is evident from the information provided.

The following aspects determine the importance of evaluating the performance efficiency of economic units:

1- The performance appraisal process aids in enhancing and developing officials' performance by assisting senior management in identifying areas of worker inefficiency and imbalance that can be corrected through training and raising workers' awareness of these areas of deficiency and weakness.

2- The performance appraisal process measures what is accomplished on the ground. It compares it physically with other production units, over time with previous periods, or both to show us the economic unit's development during its march ahead or backward.
3- Through the results of the actual performance in time in the establishment from one period to another and spatially in similar units and establishments, the performance evaluation process illustrates the development achieved by the establishment or the production unit in its path towards better or transformation towards the worse.
4- If the production unit can fully use and make the best use of the economic resources at its disposal, measuring performance efficiency reveals the unit's potential to us.
5- The information obtained from evaluating performance efficiency will activate the oversight bodies to carry out their duties. Those entities will be able to confirm that the institutions carry out their functions efficiently and accomplish their objectives.
6- The availability of the performance evaluation process as a gauge of an organization's or an economic establishment's ability to continue operating to meet its goals. Evaluation of performance effectiveness aids in developing and improving officials' performance in the production unit; it assists senior management in identifying employee performance flaws and working to improve them.

Indicators of the process of evaluating the efficiency of economic performance

Choosing the relevant indicators and criteria and organizing them according to priority is key to the evaluation process' effectiveness. Some might look after the project's economic efficiency criteria, while others look after the financial criteria.

These chosen indicators and criteria must demonstrate the project's reality more than others in a way that makes it possible to utilize them to evaluate the results quickly. The following goals are made possible by these circumstances:-

1. Being aware of the standard production rates, how they can be deviated from, the suitable solutions to their effects, and the steps to be taken to deal with them.
2. Ensuring the best means for the progress of the production process and the completion of production on time.
3. Reaching the shortest and most appropriate way to perform productive work and reaching the ideal time for various economic activities.
4. Determining the normal productive sufficiency and the connection between wage, price, and productivity levels. The proportion of female employees to output can be used to gauge productivity.
5. Assuring a balance between supply and demand as well as production capacity, including projections for the future. Ensuring that production reaches the level of the goal value specified in the project plan.

The effectiveness of the performance of economic activity within the economic unit can be measured using a variety of indicators and criteria, some of which are:

A. Standards of production capacity

The number of units an economic unit can produce over a given period using the resources at its disposal and the lowest possible production cost is known as the production capacity. The significance of this criterion is demonstrated by the close relationship between the extent of utilization of the available productive capacities on the one hand and between costs and profits on the other. Others and it's important to recognize the different kinds of production capacity when using this criterion to assess the performance efficiency of the production unit:

(First) - Design capacity: The production capacity of machinery and equipment in the economic unit is determined by the company producing it.

(Second) - Theoretical capacity: This is the ability of machines to operate at maximum efficiency and without interruption, presuming that the production unit uses only machines. However, this is illogical and impossible due to the need for maintenance and repairs, the slow availability of raw materials, the shortage of qualified labor, and the presence of sick and administrative workers.

(Third) - Planning energy means the energy planned to be attained during a specific period.

(Fourth) Actual capacity: This refers to the volume of output that the production unit achieves during a given period. Typically, (75–85%) of the theoretical manufacturing capacity is assumed.
(Fifth) - Maximum capacity is represented by the largest production achieved from the output under ideal operating conditions.
(VI) - Available or operational production capacity: - It is equal to the maximum production capacity after excluding all interruptions in the production process.
Maximum production capacity minus stops and bottlenecks in the manufacturing process equals the available production capacity.
The most important criteria for production capacity are:

The first criterion: - The percentage of utilization of the designed capacity =

$$\frac{\text{Actual Production Capacity}}{\text{Design production capacity}} \times 100$$

This indicator expresses the actual production achieved by the economic unit, the utilization of the available design capacity, and the possibility of optimizing it.
The second criterion: - The percentage of actual energy implementation from the planned energy =

$$\frac{\text{Actual Production Capacity}}{\text{Design production capacity}} \times 100$$

This percentage shows the extent to which the production plan drawn by the economic unit has been implemented during a certain period.
The third criterion: the percentage of operation of the planned energy from the designed energy =

$$\text{energy} = \frac{\text{Actual Production Capacity}}{\text{Design production capacity}} \times 100$$

This indicator expresses the planning deviations in using the existing energies, i.e. the designed energy. It expresses the utilization of the available capabilities in the economic unit during a certain period.
The fourth criterion: the percentage of energy utilization available from the designed energy =

$$\text{energy} = \frac{\text{Actual Production Capacity}}{\text{Design production capacity}} \times 100$$

The fourth criterion: is the percentage of energy utilization available from the designed

$$\text{energy} = \frac{\text{Actual Production Capacity}}{\text{Design production capacity}} \times 100$$

On the one hand, this percentage demonstrates how far the available energy deviates from the designed energy. On the other, it demonstrates how seriously the administration in the economic unit takes the calculation of the available energy in light of the design capacity.

B. Productivity standard

This criterion is one of the most significant ones, particularly in emerging nations that have economic resource shortages, which is represented in the amount of production:-
The productivity of a single work element that is reliant on the production elements is referred to as the second type of productivity, and the following formula may explain it:
Partial productivity = output/value of one productive factor
There are several criteria for productivity, including:

$$\text{The first criterion: productive work} = \frac{\text{The quantity or value of production}}{\text{Number of employees}}$$

This criterion tells us how much or how much money one worker produces or how much each employee in the production unit contributes to achieving the overall added value.

$$\text{The second criterion: wage productivity} = \frac{\text{The quantity or value of production}}{\text{Total salaries and wages}}$$

This criterion shows us the productivity of one monetary unit of wages and salaries in producing a specific quantity or value of production.

3. Evaluation of the efficiency of Wasit thermal power plant performance using economic criteria

This topic focuses on evaluating the effectiveness of the Wasit thermal power plant's economic performance for electricity generation during the years (2015–2021) using a set of economic criteria that have been chosen and are appropriate for the station's operations. The following criteria are the most crucial:

First: The value of production and its expenditures at the Wasit Thermal Power Station

One of the most crucial metrics for assessing a facility's performance is the production value index, calculated by multiplying the production quantity by the associated pricing. The production capacity of thermal stations for producing electric energy is evaluated using a variety of factors. Based on the following factors: labor productivity, operational efficiency, and economic efficiency.

1- Production

The production value of the Wasit thermal station for the production of electric power can be shown through the following table data:

Table 1 The reality of productivity in the Wasit thermal station for the period 2015-2021, the value is (one thousand dinars)

Year	2015	2016	2017	2018	2019	2020	2021
produced quantity)MW/H(	17423670	20391120	1737753 6	18696096	17523000	17541144	15927323
The price is in thousand of dinars	34	34	34	34	34	34	34
the value	592404780	693298080	59083 6224	635667264	59578 2000	59639 8896	541528982

Source: Al-Zubaydiyah Power Station, Planning Directorate at Wasit Thermal Station, statistical data for 2015-2021 .

According to Table (1) above, the production values varied throughout the study, as they went from (592 404 780) thousand dinars in 2015 to (693 298,080) thousand dinars in 2016. This increase is attributable to the country's modernization, which has increased the amount of electrical energy produced. Station and the absence of symptoms; This resulted in a lack of maintenance windows, following which the production value fluctuated up and down until it reached (541,528,982) thousand

dinars for the year 2021, which is the lowest value of production during the study period, due to the entry of most stations into the maintenance phase and a large number of symptoms during this period.

2- Production requirements

To produce electric power, three fuel kinds (crude oil, black oil, and natural gas) are the most crucial production requirements for the Wasit thermal power plant. The value of these classes' production needs from 2015 to 2021 is shown in Table 2.

Table (2). Fuel expenditures at Wasit Thermal Power Station for the period (2015-2021) (1,000 dinars)

Fuel type / cubic meters	Crude Oil	black oil	Natural gas
2015	2866781.45	1117506.98	142127767.2
2016	3963182.76	3992128.32	671817029
2017	3075948	1096506.72	862530946.4
2018	2755781.28	1096506.72	1240277592
2019	3009359.232	369496.8	930208194
2020	2648327.616	370509.12	932756709.6
2021	2985781.64	1897406.88	1345377987
The price is in thousand of dinars	50	150	0.05

Source: Al-Zubaydiyah Power Station, Planning Directorate at Wasit Thermal Station, statistical data for 2015-2021.

According to the information in the table above, the fuel cost used to process crude oil was 2866781.45 thousand dinars per cubic meter in 2015, rose to (3009359.232) thousand dinars per cubic meter in 2019, and fell to (2648327.616) thousand dinars per cubic meter in 2020. Black oil expenditures increased from (3992128.32) thousand dinars/m3 in 2016 to (1897406.88) thousand dinars/m3 in 2021, while natural gas station expenditures fluctuated between the lowest value of (142127767.2) m3 in 2015 and the highest value of (1897406.88) m3 in 2021. For 2020, it was (932,756,709.6) thousand dinars per m3, and the fluctuation in fuel consumption and the variance in the quantities supplied by the Ministry of Oil are cited as the causes of the mismatch in the fuel consumption numbers.

2- Other operating expenses

The costs of the spare parts required for the operation of the station, along with the costs of the oils, grease, and fats required to sustain the operation of the equipment necessary for the production of electric power, are represented by the operating expenses other than the fuel required for the production of electric power and are shown in Table 3.

Table (3) Operating expenses for the other Wasit thermal station (2015-2021)

Year	2015	2016	2017	2018	2019	2020	2021
Backup expenses	543342	557137	3379724	18778691	2947842	3064357	4145643
Cost (MWH) of oils, greases, and fats	1965678	2415300	2329700	2588000	2291100	1784840	3759827
Total	2509020	2972437	5709442	21366691	5238942	4849197	7905470

Source: Al-Zubaydiyah Power Station, Planning Directorate at Wasit Thermal Station, statistical data for 2015-2021.

According to the above table, we can see that the station's operating costs fluctuated in line with the amount of production. For example, they were (2509020) thousand dinars in 2015, when the amount produced was (17423670) (MW/H), and they increased to (21366691) thousand dinars in 2018. The accompanying figure illustrates that this increase is related to an increase in the cost of spare

parts for this year, after which the value started to vary up and down until it reached (7905470) thousand dinars in 2021.

4 - Total expenditures

Through the above, the total expenses of Wasit thermal station during the study period can be shown in the following table:

Table (4) Total operating expenses of Wasit thermal station (2015-2021) (million dinars)

Years	Expenses for oils, greases, chemicals, and reserves MW.H	Expenditure of various types of fuel annually	maintenance expenses	Salaries and wages	total summation
2015	2509.020	374.274958	200231	2655	205769.294958
2016	2972.437	830.569237	202319	2676	208798.006237
2017	5709.442	361.399955	198395	4084	208549.841955
2018	21366.691	364.278951	107902.8	4169	133802.769951
2019	5238.942	252.402891	69600	4714	79805.344891
2020	4849.197	234.630584	67160	12454	84697.827584
2021	7905.479	244.683562	70230	23299	101679.162562

Source: - Al-Zubaydiyah Power Station, Planning Directorate at Wasit Thermal Station, statistical data for 2015-2021.

The table above makes it abundantly evident that during the study period, the value of operational expenses reached varying levels. We note that the lowest value of operating expenses for the year 2019 amounted to (79,805.344891) million dinars and the reason for this is due to the decrease in maintenance expenses, raw materials, and others, while the highest value of operating expenses for the same year was due to the fluctuation in production at Wasit thermal station and was related to the processing of raw materials required for operation as well as maintenance and maintenance operations, due to the increase in the quantity produced and thus the increase in the expenses of fuel used in addition to the increase in maintenance expenses for the station, and the figure.

5- The cost of establishing the station

Table (11) indicates capital expenditures for 10 years, noting that the number of operating hours to work with the design capacity of the station is (80,000 hours).

Table (5) Capital Expenditures for Wasit Thermal Power Plant

Data	The amount is in US dollars	The amount is in a million dinars
First stage	924000000	1016,400
Second stage	1024000,000	1126400
Total	1948000000	2142,800
-10year annual extinction	194800000	214280

Source: Al-Zubaydiyah Power Station, Planning Directorate at Wasit Thermal Station, statistical data for 2015-2021.

According to the above table, the station was built in two stages, the first of which had a value of 1,016,400 trillion dinars and the second of which had a value of 1,126,400 trillion dinars.

Second: - Performance efficiency standards for the station

After we previously clarified the expenses of operating the station and its production during the study period, the criteria used for the production of electric power can be calculated as follows:

1- Economic Efficiency Standard (ID/MW.H):

The following equation can calculate this criterion:

η_{eco}= **Economic Efficiency=** $\frac{Production\ Costs}{Total\ Production}$ **(ID/MW.H)**

By applying the economic efficiency equation for the Wasit thermal power plant production project during the study period, we obtain the results shown in the following table:

Table (6) Coefficient of economic efficiency of Wasit thermal station for the period 2015-2021

Years	Production MW.H	total expenses In a million dinars	Capital recovery In a million dinars	Economic Efficiency ID/MW.H
2015	17423670	205769.294958	214280	*21428.00*
2016	20391,120	208798.006237	214280	*20748.15*
2017	17377,536	208549.841955	214280	*24331.98*
2018	18696,096	133802.769951	214280	*18617.93*
2019	17523,000	79805.344891	214280	*16782.81*
2020	16875,840	84697.827584	214280	*17716.32*
2021	15927323	101679.162562	214280	*1837.545*

Source: Al-Zubaydiyah Power Station, Planning Directorate at Wasit Thermal Station, statistical data for 2015-2021.

In 2019, the value of megawatt-hour production was between (16782.81) billion dinars at the lowest end and (24331.98) billion dinars at the highest, according to Table (6).

1- **Operational efficiency (%):**
2- **Operational efficiency is calculated using the following equation:**

η_{op}= **Operational Efficiency =** $\frac{Total\ Production}{Max.Potential\ Production} \times 100$

Table (7) Operational efficiency coefficient of Wasit thermal power station (2015-2021)

Year	Actual production MW.H	Actual production MW.H	Possible production after deleting maintenance days MW.H	Operational efficiency without deleting maintenance days	Operational efficiency after omitting maintenance days
2015	17423670	22250400	19812000	78.30%	87.94%
2016	20391120	22250400	19812000	91.16%	95 %
2017	17377536	22250400	19812000	78.10%	87.71%
2018	18696096	22250400	19812000	84.03%	94.37%
2019	17523000	22250400	19812000	78.75%	88.45%
2020	16875840	22250400	19812000	75.64%	84.92%
2021	15927323	22250400	19812000	71.58%	80.39%

Source: - Prepared by the researcher based on the data of the Planning Directorate at Wasit Thermal Power Station, statistical data for 2015-2021.

The operational efficiency coefficient of the station appears during the study years, as it is shown that it ranged between (71.58%) as a minimum in 2021 and (91.16%) as a maximum in 2016, and this is a good indicator of the efficiency of the station's work, despite its decline at the epoch. Additionally, the maintenance period for one group was approved as 40 days. The operational efficiency coefficient of the station appears during the study years, as it is shown that the operational efficiency coefficient without deleting The following figure illustrates the operational efficiency

coefficient, which showed higher rates that varied between (80.93%) in 2021 as a minimum and between (95%) as a maximum after the deletion of maintenance days.

-productivity 0fficiency standard

The production efficiency standard is calculated according to the following equation:

(P .O.S) ($= \frac{production}{actual\ working\ hours} x\ 100$

Table (8) The production efficiency of the units for the period 2015-2021(%)

Year	output MW.H	An average The number of working hours	production efficiency%
2015	17423670	7800	22.3
2016	20391120	7800	26.1
2017	17377,536	7800	22.2
2018	18696096	7800	23.9
2019	17523000	7800	22.4
2020	17541144	7800	22.4
2021	15927323	7800	20.4

Source: - Prepared by the researcher based on the data of the Planning Directorate at Wasit Thermal Power Station, statistical data for 2015-2021.

As can be seen from the table data, the standard of production efficiency of the production units of the Wasit thermal station was stable during the study period. The coefficient reached (22.3%) MW.H for the year 2015, increased slightly to (26.1% MW.H for the year 2016, and then started to fluctuate up and down until it reached (20.4%) MW.H. These recorded values are a good indicator of the efficiencies.

Third: Standards of production capacity

The standards for the production capacity of the Wasit thermal power station can be stated through the following criteria:

1- The criterion for the percentage of utilization of the production capacity

This standard is calculated according to the following formula:

Production capacity utilization ratio = actual production capacity * 100

In addition, Table 9's data, which depicts the Wasit Thermal Station's production capacity percentage utilization during the study, suggests that the station had variable production rates.

Table (9) The percentage of utilization of production capacity for the period 2015-2021

Year	actual production MW.H	output power MW.H	Energy utilization%
2015	17423670	22250400	0.78307221
2016	20391120	22250400	0.916438356
2017	17377536	22250400	0.780998814
2018	18696096	22250400	0.840258872
2019	17523000	22250400	0.787536404
2020	16875840	22250400	0.758451084
2021	15927323	22250400	0.71582187

Source: - Prepared by the researcher based on the data of the Planning Directorate at Wasit Thermal Power Station, statistical data for 2015-2021.

According to the information in the previous table, the rate of production capacity utilization was (78%) in 2015, increased to (91%) in 2016, and then fluctuated up and down until it reached (71.5%) after the station's work was stabilized and supplies were received from the Chinese side. The following chart demonstrates that in 2021, this variation is caused by a lack of consistency in supplying the station with the required fuel sources and other ailments occurring in the national grid.

Total productivity standard

This criterion is calculated through the following equation:

$$\text{Total productivity} = \frac{\text{Production volume}}{\text{Materials used}}$$

And table data that shows the results of this criterion for Wasit thermal station during the study period:

Table (10) Total production indicators values for the period 2015-2021

Years	Production Value	Total Expenses	The value of the aggregate production index
2015	592404	205769.294	2.8789
2016	693298.080	208798.006	3.320
2017	590836.224	208549.841	2.833
2018	635667.264	133802.769	4.750
2019	595782.000	79805.344	7.465
2020	596398.869	84697.827	7.041
2021	541528	101679.162	5.3

Source: - Prepared by the researcher based on the data of the Planning Directorate at Wasit Thermal Power Station, statistical data for 2015-2021.

According to the information in the table above, the overall productivity index rose from 2.8% in 2015 to 3.3% in 2016 and 4.7% in 2018. The 2019 overall productivity hit its greatest percentage ever, with the productivity index at 7.4%.

1- Value Added Standard:

This standard is calculated according to the following formula:

Value Added Standard = Production Value - Value of Production Requirements

Through the data of the following table, the values of the added value standard can be clarified during the study period.

Table (11). The added value of Wasit thermal station for the period 2015-2021

Year	output value In a million dinars	Total supplies In a million dinars	Value Added In a million dinars
2015	592404.78	205769.294	386635.56
2016	693298.08	208798.01	484500.07
2017	590836.22	208549.84	382286.38
2018	635667.26	133802.77	501864.50
2019	595782.00	79805.34	515976.66
2020	596398.87	84697.83	511701.04
2021	541528.98	101679.162	439849.45

Source: - Prepared by the researcher based on the data of the Planning Directorate at Wasit Thermal Power Station, statistical data for 2015-2021.

The table mentioned above shows a consistent rise in the added value of the Wasit electric power plant, with the added value rising from (484500.07) million dinars in 2016 to (515976.66) million dinars in 2019, the highest value recorded during the study period before declining to 439,849.45) million dinars in 2021 due to high production costs, a high number of maintenance issues, and accidents .

4- Standard of worker productivity

This criterion shows the amount produced by the worker from the production units during the study period, as this indicator shows the quantity of production per person. Therefore it can reflect the high productivity of the labor component or the low productivity of labor. It may also indicate the existence of a surplus in the labor force and, through the following table, data, Worker productivity standard results.

Table (11) Worker productivity factor for Wasit thermal station for the period 2015-2021

Yare	actual production MW.H	daily output	Number of Workers	worker productivity MW/PERSON
2015	17423670	50654	534	95
2016	20391120	55713	626	89
2017	17377536	47610	626	76
2018	18696096	51222	3524	15
2019	17523000	48008	2981	16
2020	16875840	46109	2992	15
2021	15927323	48886	3500	14

Source: Prepared by the researcher based on the data of the Planning Directorate at Wasit Thermal Power Station, statistical data for 2015-2021.

It can be seen from the data in the previous table that the worker's productivity had a large decline from the start of the research period to the end, dropping from (76) in 2017 to (14) in 2021. This obvious decline is the result of the hiring of many more employees after 2017 than were required. The following figure illustrates a decline in the productivity of the labor component during the research period. This is especially true given that electric power generation is a capital-intensive business with minimal labor. As a result, productivity declines with an increase in workers.

4. CONCLUSIONS AND DISCUSSION

The results show that the highest production value was recorded in 2016, which amounted to (693,298,080) billion dinars, due to the station’s modernity and the lack of symptoms, which reduced the maintenance period, while the lowest value was recorded, which is one billion dinars in 2021, amounting to (541,528,982) due to the entry of most stations into maintenance and the large number of symptoms that occur. I got it this year. By observing the standard of economic efficiency, we note that the value of production for the years 2015-2016-2017 is the highest because the maintenance expenses were borne by the Chinese company implementing it. By applying the operational efficiency criterion, and after deleting the days of downtime for periodic maintenance, we find that it amounted to 91.61%, and this percentage is considered good and indicates the high operating efficiency of the station. Through the results of the production capacity standard, it became clear that the energy utilization rate ranged between 91% for the year 2016 and 71% for the year 2021, and this is a good indicator of the station’s production. By applying the factor productivity criterion, we notice a significant decrease in worker productivity between the years 2015-2021, and this reason is attributed to the appointment of large numbers of workers in 2018, and this is a serious indicator that shows the extent of benefiting from the labor force. There are many employees in this station and their specializations are not compatible with the work of the station, and it is necessary to coordinate with the Ministry of Planning and redistribute them according to their specializations and to the departments that are compatible with their educational attainments, as the factor productivity

standard indicated a significant increase in the number of workers and a decrease in worker productivity. There is a population near the station, not more than 500 meters away, and these people are exposed to pollution resulting from the station and to the noise that occurs from the station. It is possible to compensate these people and move them to safer areas and invest in these places to establish pioneering projects that benefit from the availability of energy. Building 132 and 400-megawatt stations and expanding the station's capacity due to the importance of its location near Baghdad and close to the central and southern governorates, and completing work on the 132-megawatt station in Zubaydiyah district. Diverting the route of the public road (Souira - Zubaidiyeh - Numaniye), which has become de facto no more than 50 meters from the station, causes a future security presence for the station.

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