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The Evaluation of Development Plan for Doroud Gaseous Powerhouse

Seyed Mehdi Hassani Esfahani[1], Sohrab Niketeghad[2]

[1] Faculty Member of Islamic Azad University, Arak Branch, Iran,
[2]B. A. Students of Payam Nour University, Borujerd Branch, Iran

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ABSTRACT

There are many industrial unites affected by the lack of proper survey regarding the plans related and also there exist many projects needing financial support. So, the correct evaluation of plans is necessary to reduce the costs and financial sources. There is a possibility for a case study in Doroud's Powerhouse to increase the capacity of outputs by building a gaseous powerhouse beside two other powerhouses. This issue, considering technological advances and energy consumptions, can provide social welfare. Moreover, one of the purposes is to find out the return of financial sources. To reach such an idea, the researchers in this study will investigate some items such as the voltage and the frequency of the network, updating the technology used, absorbing of financial sources, reducing electricity cut, entrepreneurship, and absorbing experts in this field. There are three main hypotheses in this study including; (a) the first one refers to building more gaseous units and increasing the capacity of the units, (b) the second one refers to the point that building a new gaseous powerhouse in Doroud can increase the social welfare, and (c) the third one refers to the idea that building a modern gaseous powerhouse can increase the return of financial sources and entrepreneurship. To gather the data needed, the researchers used a questionnaire. In order to analysis the hypotheses, a descriptive method of analyzing is used. The results of the study show that after evaluating the first hypothesis by two Engineering-Economy techniques (ROR and BEP) in three situations, it is accepted. Moreover, regarding the second and the third hypotheses, the results show that by means of questionnaires and statistical indexes, they both are accepted. Therefore, it is confirmed that building a new gaseous powerhouse in Doroud is justified and logical financially, technically and socially.

KEY WORDS: Development Plan, Gaseous Powerhouse, Capacity of Units, Two Engineering-Economy techniques (ROR and BEP), Social Welfare, Return of Financial Sources, and Social Welfare.

INTRODUCTION

All the economical development experiences in the world, especially the history of Industrial Revolution, the reconstruction of Europa after the second World War, Japan's development after 1950's, and the great development of Republic of Korea after 1965, indicate that industrialization and industrialized development are the necessities of economical and social developments. One of the important tools in reaching such a development is electricity which is produced by powerhouses.

A powerhouse is an industrialized facility for producing of electricity. At the core of all powerhouses, there is a generator, changes mechanical power into electricity by creating relative motion. The energy source connected to move the generator differs extensively. It primarily depends on which fuels are easily accessible, inexpensive and on the types of machinery that the power company has the right to use to. Many powerhouses in the world burn fossil fuels such as coal, oil, and ***natural gas*** to generate electricity (*C. Elliott, Chen, and Swanekamp 1997, p. 22*). Providing and transferring electricity is very necessary through warehouses and the networks. In a country like Iran which is at the beginning of reconstruction and development way, there is a very important emphasis on the use of cheap energy which is easy accessible. In each government, the main focus is to satisfy people and in the industry of electricity, the focus is to provide the essential electricity for the people usage. This issue leads to a kind of economical and social welfare desirable for people. Therefore, all units and powerhouses try to reach such an aim.

Moreover, according to the Fourth Plan of Development, about 25.000 megawatt should be added to the capacity of the powerhouse production of the country. Nevertheless, because of being so expensive and difficult, it is better to support electricity powerhouses with gaseous units which are innovative.

If we don't want to face problems, we should be able to anticipate future. According to the development and rapid progress of the world, we should be able to adapt ourselves and our country to such a procedure. Therefore, when we have many gaseous powerhouses around the world, it is better to construct the same powerhouses to have a more reliable source of energy. But we should be careful about the evaluations in advanced. The evaluations of such plans are very important because the investment and financial support are big and the risk is very high. But if they succeed, they result in the development of knowledge and therefore economy and industry.

In Doroud gaseous powerhouse, along with two other units, adding another gaseous unit increases the capacity and therefore, social and economical welfare. Generally, the main aims of this research are whether (a) studying the economical

Corresponding Author: Seyed Mehdi Hassani Esfahani, Faculty Member of Islamic Azad University, Arak Branch, Iran,
Email: seyedmehdiesfahani@yahoo.com. Phone: +989128854300

pattern can evaluate the development plan of Doroud gaseous powerhouse, (b) establishing such a plan leads to developments and progresses, and (c) it is available to consider other elements as influencing when private companies do not want to attend?

Consequently, according to the aims mentioned, there are three hypotheses including (a) constructing the unit and increasing the capacity of Doroud Gaseous Powerhouse is logical in terms of economical and financial issues, (b) constructing a new gaseous unit in Doroud Powerhouse increases social and economical welfare, and (c) constructing a new unit increases the investments and opportunity for getting job.

LITERATURE REVIEW

Investment: It refers to physical, financial and fixed or current possessions. They are some sources that their benefits are shown during the time and are related to investing and opposite to consuming (*Taghavi and Mir Taheri 1970, p. 165*).The word investment is typically stated when denoting to a long-term viewpoint. This is the contradictory of short-term practices which contribute to considerable grade of jeopardy.

Evaluation: It refers to the study of quality and quantity or the issue that whether the plan is on its proper routine at the time of running and after it, what results will be obtained and how much it is confirmed (*Farhang 1992, p. 1743*).

Cash Current: It refers to the money or financial support which is remained after providing the primary materials, equipment and costs.

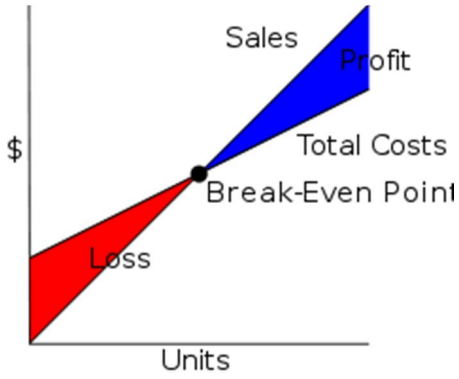
Cost: It refers to an amount of money spent to gain something else or to produce the materials. It can be divided into different categories such as monetary costs, actual costs, personal costs, social costs, average costs, fixed costs, and alternative costs.

Investing: It refers to a circle in which investment is used in order to provide a service or produce goods (*Tafazoli 1987, p. 151*).

Ratio of Return (ROR): It is a standard to confirm or reject a project or plan. In fact, it is the balance between the incomes and costs. In other words, in finance return on investment, rate of profit or occasionally just return, is the ratio of currency added or gone (recognized or unrecognized) on an investment relative to the sum of invested money. The invested money invested can be considered as the asset, capital, principal, or the cost basis of the investment. ROR is typically conveyed as a percentage (*Groppelli, and Nikbakht 2000, pp. 442–456*). When the ratio of return is higher than the ratio of absorbance, the plan or project is confirmed.

Break-even Point (BEP): In finance and economy, it is the point where costs and income are equivalent (Image 1): when there would be no loss or gain. There is no profit or a loss, even if opportunity costs are paid and investment reached the risk-attuned, predictable return. By means of graphs, the point is where the total revenue and total cost curves meet (*Levine, and Boldrin 2008, p. 312*).

Figure 1: Break-even Point (BEP)



RESEARCH METHODOLOGY

According to the fact that all the data and statistics are documentary and actual, the method used is descriptive and practical. Moreover, because of the reason that the statistical sampling is used, therefore, the statistics are deductive and consequently the methodology is also descriptive-deductive. Moreover, due to the aims of the research, it is a practical one. The statistical population of the research includes the gaseous powerhouses (N=100) which the researchers analyzed the capacity of energy producing. Because the research is especially decided to be for Doroud Powerhouse, therefore, the members of samplegroup (n=33) are decided to select from14 powerhouses in the west of Iran such as Orumiyeh, Shiraz, Zanbagh, Yazd and Zahedan. A questionnaire containing 9 questions is used to gather the data from the managers, semi-mangers, representatives and experts in those powerhouses mentioned. In order to confirm the questionnaire, the reliability and validity are tested and they are equal to αr = 0.8046. The researchers used accounting and economical engineering techniques to analyze and calculate the indexes and ratios such as ROR and BEP.

FINDINGS

THE FIRST HYPOTHESIS: In order to know whether the first hypothesis is confirmed or not, the researcher calculated the ROR in three sub-hypotheses.

Calculating ROR: For constructing and running Doroud Gaseous Powerhouse, the primary investment is estimated to be P=432.000.000.000 Rials and the amount of annual income concerning the lowest price of currency for 36.000 Rials per a megawatt, is estimated to be 36.495.360.000. Moreover, the useful life time is estimated to be 30 years and SV is 50.000.000.000. In the calculation of ROR, the researcher considered three situations because of the alternative price of energy which is between 34.000 to 54.000 Rials. Therefore, the researcher considered three hypotheses:

The first sub-hypothesis hypothesis: The price of energy is estimated to be 36.000.

$$-P+A\ (P/A, i\%\ n) + SV\ (P/F, i\%, N) = 0$$

1. ***i%*= 7% *P/F*= 0.1314** ***P/A*= 12.4090**
2. ***i%*= 8% *P/F*= 0.0994** ***P/A*= 11.2578**

$$i_{ROR}= 7+0.67=7.67\%$$

The secondsub-hypothesis hypothesis: The price of energy is estimated to be 45.000.

$$-P+A\ (P/A, i\%\ n) + SV\ (P/F, i\%, N) = 0$$

1. ***i%*= 9% *P/F*= 0.0754** ***P/A*= 10.2736**
2. ***i%*= 10%** ***P/F*= 0.0573** ***P/A*= 9.4269**

$$i_{ROR}= 10\%$$

The thirdsub-hypothesis hypothesis: The price of energy is estimated to be 54.000.

$$-P+A\ (P/A, i\%\ n) + SV\ (P/F, i\%, N) = 0$$

1. ***i%*= 12%** ***P/F*= 0.0334** ***P/A*= 8.0552**
2. ***i%*= 15%** ***P/F*= 0.0151** ***P/A*= 6.566**

$$i_{ROR}= 12+2.66=14.66\%$$

Therefore, in the third situation or hypothesis the project is logical financially and the first hypothesis is confirmed in its third situation.

THE SECOND HYPOTHESIS: The second hypothesis refers to the idea that building a new gaseous powerhouse in Doroud can increase the social welfare. In the questionnaires scattered, there are 5 questions which refer to this hypothesis and table below is the descriptive data regarding it.

Table 1: Descriptive data regarding the second hypothesis

			Statistics	Std. Error
HYPO 2	Mean		4.0303	0.09420
	95% confidence	Lower Bound	3.8384	
	Interval for mean	Upper Bound	4.2222	
	5% Trimmed mean		4.0337	
	Median		4.0000	
	Variance		0.293	
	Std. Deviation		0.54111	
	Minimum		3.00	
	Maximum,		5.00	
	Range		2.00	
	Interquartile Range		0.9000	
	Skewnwss		0.91	0.409
	Kurtosis		-1.022	0.798

According to table above we have:

$$x=4.0303 \quad M=4 \quad R=D=2 \quad s^2=0.293 \quad I.R=q_3-q_1=0.9$$
$$k=-1.022 \quad x_r=4.0337 \quad s=0.5411 \quad s_k=0.091$$

Moreover, the normality is tested and because sig. = 0.451 and it is lower than *a*=0.005, therefore, the data are normal.

In order to confirm or reject the hypothesis, the researcher considered u>3 (the options after the mean) as the confirmation. The results are as follow:

Table 2: Confirmation of the Second Hypothesis

One-sample T: HYPO 2 Test of mu = 3 vs mu > 3				
Variable	**N**	**Mean**	**Deviation**	**SE Mean**
HYPO 2	33	4.0303	0.5411	0.0942
Variable	**95% Lower Bound**		**T**	**P**
HYPO 2	3.8707		10.94	0.000

$$H_0: u<3,\ p > (a = 0.05)$$
$$H_1: u>3,\ p < (a = 0.05)$$

Therefore

H1 : u>3

It is Confirmed

Therefore, building a new gaseous powerhouse in Doroud can increase the social welfare.

THE THIRD HYPOTHESIS: The third hypothesis refers to the idea that constructing a new unit increases the investments and opportunity for getting job and 4 last questions of the questionnaire are related to itand table below is the descriptive data regarding it.

Table 3: Descriptive data regarding the third hypothesis

			Statistics	**Std. Error**
HYPO 3	Mean		4.0076	0.08391
	95% confidence	Lower Bound	3.8367	
	Interval for mean	Upper Bound	4.1785	
	5% Trimmed mean		4.0084	
	Median		4.0000	
	Variance		0.232	
	Std. Deviation		0.48204	
	Minimum		3.00	
	Maximum,		5.00	
	Range		2.00	
	Interquartile Range		0.8750	
	Skewnwss		0.010	0.409
	Kurtosis		-0.690	0.798

According to table above we have:

$$x=4.0076 \quad M=4 \quad R=D=2 \quad s^2=0.232 \quad I.R=q_3-q_1=0.875$$
$$k=-0.69 \quad x_r=4.0084 \quad s=0.482 \quad s_k=0.01$$

Moreover, the normality is tested and because sig. = 0.474 and it is lower than *a*=0.005, therefore, the data are normal.

In order to confirm or reject the hypothesis, the researcher considered u>3 (the options after the mean) as the confirmation. The results are as follow:

Table 4: Confirmation of the Third Hypothesis

One-sample T: HYPO 2 Test of mu = 3 vs mu > 3				
Variable	**N**	**Mean**	**Deviation**	**SE Mean**
HYPO 3	33	4.0076	0.4820	0.0839
Variable	**95% Lower Bound**		**T**	**P**
HYPO 3	3.8654		12.01	0.000

H_0: u<3, p > (a = 0.05)
H_1: u>3, p < (a = 0.05)

Therefore

H1 : u>3

It is Confirmed

Therefore, constructing a new unit increases the investments and opportunity for getting job.

CONCLUSION

As it is stated, the method used in this research is descriptive and practical and the statistics are deductive and consequently the methodology is also descriptive-deductive. The statistical population of the research includes the gaseous powerhouses (N=100) which the researchers analyzed the capacity of energy producing. Because the research is especially decided to be for Doroud Powerhouse, therefore, the members of sample group (n=33) are decided to select from 14 powerhouses in the west of Iran. A questionnaire containing 9 questions is used to gather the data from the managers, semi-mangers, representatives and experts in those powerhouses mentioned. In order to confirm the questionnaire, the reliability and validity are tested and they are equal to αr = 0.8046. The researchers use accounting and economical engineering techniques to analyze and calculate the indexes and ratios such as ROR and BEP.

There are three main hypotheses. ***The first hypothesis*** refers to the idea that building a unit and increasing the capacity of production for Doroud Gaseous Powerhouse is logical concerning the development plan both economically and technically. The results obtained from the analysis and the evaluation of the data related to the first hypothesis state that there are three situations and for the first and second ones, ROR is lower than MARR, but for the third one, it is vice versa and therefore, the capacity of electricity production would reach the ROR by the amount of 876.5 kw per year. Consequently, the hypothesis is confirmed in the third satiation. ***The second hypothesis*** **refers** to the idea that building a new unit increases civil and social welfare of inhabitants. The results obtained through the analysis and the evaluation of data state that because *t=10.94*, therefore, the null hypothesis (H_0) is rejected and H_1 is accepted with the certainty of 95%. Consequently, the second one is also confirmed. ***The third or the last hypothesis*** refers to the idea that building a new unit increases the investment and the opportunity for getting jobs. According to the results obtained through the analysis and the evaluation of the data related, it is concluded that because *t=12.01*, therefore, the null hypothesis (H_0) is rejected and H_1 is accepted with the certainty of 95%. As a result, the third hypothesis is also confirmed.

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The authors declare that they have no conflicts of interest in the research.

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