

Economic Feasibility of Potable Water Production Projects in Iraq: The Case of the Water Desalination Plant in Najaf

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Abstract— *The paper aims to explore the economic feasibility of drinking water bottling projects in Iraq by applying it to the sanitary water desalination project in Najaf. The study follows the exploratory analytical approach using financial evaluation indicators for the proposed project. The data was collected through a field study of the local market and the approval of the opinions of experts and technicians in this industrial field. The results show that establishing a plant for bottling potable water in Najaf is an economically and financially feasible project. Furthermore, the financial analysis results show that the return-on-investment rates are acceptable for the project and that the project recovers investment costs promptly. The results also show that establishing a potable water factory will meet the increasing demand for these products in the local market and enhance competition with imported products.*

Keywords— *Economic feasibility; potable water; water desalination.*

I. INTRODUCTION

Countries are increasingly interested in conducting feasibility studies for investment projects to evaluate projects in different stages of development and the nature of their economic and social systems, aiming to enable them to employ resources with each other in a way that guarantees to obtain goods [1]. Results and allowing investors to make the optimal economic decision to adopt the project or not. Food production is one of the industries involved in the national development process of Iraq [2]. However, this sector is currently suffering from many issues and challenges, which has caused it to lag in technological progress and its inability to keep up with the rate happening elsewhere in the world [3]. As a result, its development and expansion are necessary to achieve progress in the industrial sector and to provide people with food security. Particularly around the time of the year when people go to different places of worship, Iraq suffers from severe shortages in manufacturing a variety of foodstuffs, especially drinking water, to meet the ever-increasing demand [4]. In addition, since Iraq is blessed with abundant material and human resources, the country can achieve self-sufficiency in food production, including potable water production. If funded wisely, it can become essential to a secure food supply. Given the importance of this industry in the context of the country's overall economy, as well as its contributions to culture, and the requirements for the industry above to perform an analysis, it was decided to make this sector the focus of the research. The importance of this research stems from the fact that it aims to conduct an economic feasibility analysis for the planned drinking water bottling plant in Najaf Governorate, as well as a

financial and technical feasibility study. This project, if completed, represents a great investment opportunity that could create long-term employment opportunities.

Moreover, its products can help ease the burdens the economy bears due to importing drinking water to meet the growing demand, especially during religious events in Najaf and neighboring provinces. The essence of the research problem lies in the inability of local production to meet the increasing demand for potable water in the region of Najaf, despite the availability of the necessary capabilities to increase production, which prompted Iraq to increase the import of these products. In particular, the demand for these products increases during religious occasions, as millions of visitors flock to the governorates of Najaf and Karbala, which constitutes a significant challenge for local producers down to the stage of self-sufficiency of these products.

II. LITERATURE REVIEW

A. *The reality of investment projects to mobilize water in Najaf*

The bottled drinking water industry is prevalent in all governorates of Iraq, and its factories represent a large percentage of the total number of factories in the various food industries. Its factories reach more than fifty percent of the total number of factories in these industries. It is witnessing a widespread in light of the increasing demand for the product for reasons related to the quality and availability of drinking water. The research area is home to many filling stations and desalination systems, which can be found in various locations around the study area. However, before 2003, this industry did not have a broad resonance in the different regions of Iraq, including the study area, as this industry was limited to one or two factories and one or two brands, which as the Alfert brand. Bottled water and Al Rowad brand, respectively. In addition, this industry did not have a significant presence in the study area. With the transfer of power in the Iraqi government, we pray that the oil sector will gradually grow and flourish, eventually reaching all parts of the country, including the Al-Dar region. A family is responsible for the emergence of many brands and brands of drinking water bottling facilities. This industry has gained tremendous popularity among customers. They claim that the increase in laboratories was accompanied by a noticeable decrease in the quality of the produced water, as it was not subject to health conditions and requirements. The Iraqi standard specifications for bottled drinking water No. 1937 of 2000 were set. Therefore, the water will continue to

deteriorate. May the peace and blessings of God be upon him not pay attention to his health and safety from diseases and epidemics that may endanger his life and his family's life. The local markets were filled with many brands, in addition to the sweetening systems that were spreading rapidly, claiming that they are also not subject to health control and that most of these systems are not approved in terms of health. Despite this, most citizens resort to these systems because of their low prices. Peace and blessings of God be upon him not to pay attention to its validity and safety.

B. Stages of the economic feasibility study of projects

There are many steps involved in creating an industrial project, starting from the conception of the central idea and ending with the full implementation of the project and subsequently flooding the market with its outputs.

When planning a project, it is vital to keep expenses to a minimum so that money is not wasted on R&D to see the problematic way in which the plan cannot be implemented [5]. In most cases, the economic feasibility assessment of an investment project can be divided into three distinct stages:

1. The first step of the project is the preliminary feasibility study.
2. The comprehensive feasibility study phase of the project is now underway.
3. The stage of evaluation and final decision-making.

Phase I: Preliminary Feasibility Study

Investors face many challenges while trying to put their investment concept into practice. These challenges may stem from various sources, including technical, legal, and economic factors. These investors usually incur significant expenses if they request a thorough (in-depth) investigation of the project's feasibility, which requires them to hire experts and specialists in project evaluation. One way to avoid discovering that the project was too late is to conduct a preliminary feasibility assessment before diving into the more in-depth research phase. There are no significant obstacles to the progress of the investment project [6]. An initial feasibility study is an exploratory study of the conditions and conditions through which a decision can be made to enter into a detailed feasibility study or switch to another project, investment opportunity, or new idea, which requires a preliminary study or what is known as the environment. A preliminary feasibility study is nothing more than an exploratory study of the conditions under which a decision can be made to enter a detailed feasibility study [7].

It is an intermediate stage between the investment opportunity and the detailed feasibility study, where the process of surveying or analyzing the project is carried out initially to verify its suitability for thorough research and determine the aspects that can be taken into account in the detailed study. The preliminary feasibility study aims to assess the validity of the justification for the investment opportunity previously identified in the previous stage. This study also seeks to determine the validity of the justifications for the investment opportunity that was previously identified in the past. Specialized research should be recommended because of its particular importance.

A preliminary feasibility study is significant because it helps keep the cost of funds allocated to investments to a minimum, which is another reason why it is crucial. As a result, this investigation takes into account a variety of factors. The primary factors are as follows [8]:

1. The search for significant barriers that may be legislative or non-legislative. Some parts of the country likely have laws that make building certain types of buildings illegal. One such law is the Environmental Protection Act.
2. Investigate import and export rules and the obstacles they provide, such as restrictions on purchasing certain raw materials necessary for the project. In addition, there are additional projects whose activity is limited to the state, such as the construction of the armed forces, among other examples.
3. Determine whether or not the proposed project can accommodate the growth targets set out in the development plan. For example, the investor may consider recovering agricultural land. Then it turns out that the place he has chosen for the project falls within the land reclamation plan developed by the Ministry of Agriculture.
4. Determine the current state of the national economy, as well as its identity, directives, economic policies, and environmental conditions, as the degree of political and social stability, including values, customs, and traditions, specifying whether or not the objectives of the project are in line with the general goals of society.
5. The extent of the need for project products entails determining the market situation, trends in demand for those products, prevailing prices, and consumer tastes towards this type of goods and conducting a survey of similar projects and potential markets. Competition for the project. This step is necessary to determine the scope of need for project products.
6. Access to the production factors necessary for the enterprise, such as labor, and the presence or absence of restrictions on importing technology or labor.
7. Provide an estimate of the expenses of comprehensive feasibility studies and their applicability, compatibility, and suitability of the funds allocated in principle to invest in the project, and determine whether the project deserves a detailed study.

This information is not the only one that should appear in the preliminary feasibility study; all information that helps to consolidate or exclude the proposed investment project should be clarified. This information can be obtained from various sources, such as field sources, through personal interviews with vendors, potential customers, state chambers of commerce and industry officials, etc. In contrast, the other source is the sources of the offices, which are in the form of documents, reports, and other written materials. Therefore, the preliminary feasibility study should be conducted as soon as [9].

This stage does not require an accurate description of the project requirements, but some evaluations, such as the product testing method, may be left to the later stage. In addition, this

stage does not include preparing detailed cost tables, but only the essential items [10].

In light of this, one of the most important signs that can be used to determine whether a project was initially planned to be developed is as follows.

1. Transportation economics: The concentration of industry in one region as opposed to the other areas is directly related to the cost of transportation, which is one of the essential prerequisites for its stability in one region versus another.
2. The economics of domestic raw resources is reflected by researching the cost of transporting raw materials between international and domestic prices, regardless of whether the country is exporting or importing goods.
3. Labor Force Economics is the analysis of the labor expenditures required to implement the proposed project.
4. Capital economics determines the ratio of units producing goods to capital costs compared to developed countries with the same interests.

Because the main objective of the initial feasibility study of the project is to reach the private decision-making and then enter the second stage, which is the stage of the detailed feasibility study of the project, as well as knowing the details and other results such as the initial estimate of investment and costs, its completion requires that it be implemented accurately and with a large amount of scientific and practical experience. So it is because the primary objective of the initial feasibility study of the project is to reach your decision-making. Including expenses associated with a complete feasibility study, as well as identifying potential issues that may arise with the project, different types of risks, and strategies that can be used to mitigate them.

Phase 2: Detailed Feasibility Study

After completing the preliminary feasibility study for the proposed project, the next step is to prepare a comprehensive feasibility study. This choice is made at the stage of the initial feasibility study. Several separate studies are carried out at this process stage, which, when combined, will include a comprehensive feasibility study. These investigations consist of a feasibility study, an environmental feasibility study, a legal feasibility study, and an economic feasibility study [11]. In addition, research was conducted on the project's technical, financial, and economic feasibility and its administrative, organizational, and commercial components. The following is an explanation that applies to each of these studies.

First: Marketing feasibility study for the project

Due to the constant and rapid change in technology and methods of production, as well as the phenomenon of globalization and its various economic, social, and political effects, as well as a significant change in consumer preferences and tastes in favor of new goods that exist on the market. In line with the ideas of individuals, the marketing feasibility study expresses one of the essential aspects of feasibility studies. It is because the marketing feasibility study is one of the most critical aspects of feasibility studies. Due to these factors, institutions are in demand. Therefore, conduct a marketing feasibility study that helps identify these factors [12].

Due to its interest in providing many data of vital importance for the rest of the study, as well as the importance

of the marketing feasibility study as a previous stage in the detailed feasibility study that refers to its findings, as it is The marketing feasibility study represents the basis on which it is based, the beginning of any detailed feasibility study for an investment project. The marketing feasibility study is interested in providing the necessary data for the rest of the study. Or stop at the limits of the marketing feasibility study for the project product, as the insufficiency of the results that can be reached in the marketing study multiplies its impact on other complementary studies, which ultimately leads to the general results of the study, importance, and implementation plans that are unable to achieve the general objectives of the project. It is also challenging to do so. Rely on them to deal with the project's many operational challenges [13].

A marketing feasibility study contributes to estimating or determining the demand for the product that is the research subject and has other essential functions. Instead, it is seen as the basis of the technical research of the project or to know the production capacity of the project and the expected cost that goes with it. Therefore, the first step in this feasibility study is to investigate the factors affecting supply and demand. Next, it serves as the basis for formulating a marketing and promotional strategy for the product and formulating appropriate ways to bring the product into the hands of consumers. These determinants range from industry to industry and from one good or service to another, including population variables, marriage rates, lifestyle models, product pricing, alternative and complementary goods consumption, market shape, productivity, and time. Although certain elements are believed to be a common denominator, the relative importance of the influence of these factors varies from product to product. Instead, the impact of these factors varies from product to product [14].

Formulating a comprehensive plan to achieve the objectives of the marketing feasibility study is one of its essential steps. This plan shall include all the steps taken before manufacturing the commodity or providing the following service [15] :

1. Explanation of the offered, whether a service or a commodity.
2. Describe customers, including their requirements and economic situation.
3. A description of the market, including its current and expected size, the number of competitors, comparable commodity prices, and any special regulations governing the trading or pricing of goods.
4. Determine how the target market interacts with the concept of the new product or service that the project aims to provide.
5. The proportion of the product or service included in the marketing gap is defined as the difference between the total demand for the product or service and its total supply; It is followed by determining the production capacity and the expected number of sales.
6. Develop a marketing plan, including estimating the cost of marketing.

Accordingly, studies associated with a market study and forecasting of demand and consumption patterns most often determine marketing features concerning the description of the

commodity, the amount of product from it, the recommended price for sale, and the marketing structure.

The previous discussion shows that a marketing study is the first step in conducting all feasibility studies. It is done before starting any further studies covering the many aspects of the project. In a marketing feasibility study, one of the most important stages is the search for demand for the product to be produced. It is because the degree of accuracy with which future demand can be estimated significantly impacts the project's overall success. On the other hand, market study is also important in marketing studies. Because marketing studies are dedicated to all marketing activities and problems associated with the project; therefore, any inaccuracy or inadequacy in conducting marketing studies has severe repercussions on the project.

Second: Environmental feasibility study of the project

There is a reciprocal relationship between the environment and the project. It is not a one-sided relationship, as there are effects of the environment with all its components in the project, and there is an impact of the project on the positive or negative environment [16]. As a result, it is necessary to conduct a comprehensive analysis of the project's environmental feasibility study to consider these two effects. The presence of a positive impact makes the project environmentally viable. In contrast, the presence of a negative impact causes the task to harm the environment, whether through air, water, or land pollution, and here we are faced with three possible results :

- The potential for adverse effects on the environment, which can be addressed and protected by installing specialized equipment, will add significant expenses to the project and then affect cash outflows.
- The possibility of adverse effects on the environment can be dealt with, and the environment can be protected from them without adding significant investment expenses to the project or by moving the project to a different area so that this damage does not occur.
- The likelihood of harmful environmental effects cannot be addressed, and the inability to protect the environment from such adverse effects cannot be addressed. Since the project will not positively impact the environment, abandoning it and not pursuing it further is better.

According to these results, projects are classified into one of three categories: whitelist projects, gray list projects, or blacklist projects.

Third: Legal feasibility study for the project

Investigating the enterprise's legal reasonableness is to study primary and supplementary investment laws and legislations, represented by financial and tax legislation, labor legislation, wage legislation, social insurance legislation, and other regulations affecting the performance of the project and results in positive effects or expected cash flows from the government granted to investment projects within the framework of encouragement. This investigation will be carried out to determine whether the project is legally permitted or not. Investment of funds in specific sectors [17].

Fourth: Technical feasibility study of the project

The technical feasibility study of the project is based on the study of the technical aspects of the project, also known as the study of the technical requirements of the project, of which the project to be established is a part. Therefore, it is necessary to determine the needs of the proposed project in terms of raw materials, work components, machinery, equipment, energy, and water sources, and means of transport in terms of quantity and quality [18]. In addition, this study is also concerned with issues related to the technology that the entire industrial project will use. More specifically, it is concerned with identifying the project's needs for its establishment and operation. As a result, it is the key required for preparing the economic study and subsequent evaluation and determining total capital costs.

The previous discussion demonstrates that a technical feasibility study of a project can prove whether the project is technically correct or invalid. In this case, the project can be accepted or abandoned, regardless of the presence or absence of other factors that guarantee the project's viability. Therefore, in a broad sense, we can mention that introductory paragraphs must be examined while researching the technically relevant aspects of an economic project in general and an industrial project in particular. These key paragraphs are as follows :

1. Create an estimate of the complete requirements of the project in terms of facilities, supplies, manufacturing capacities, machinery and equipment needed of a variety of types and shapes, and the operational capacity of each of these aspects of the project.
2. Localizing the project and selecting the right site for it helps reduce the total cost of transportation, whether these costs are related to the inputs or outputs of the project's production system.
3. Estimating the size of the project as well as its minimum and maximum production capacity to achieve the most efficient and cost-effective use of the project's material and human resources at each stage of the project's development.
4. The choice of the type and quality of the productive and technical system of the enterprise, the level of technology used in industrial processes, and the many limits or variables that are taken into account when determining the appropriate degree of technology.
5. Provide an estimate of the required orders of raw materials, raw materials, manufactured or semi-finished components, and any other industrial and service requirements necessary for the project's production system.
6. Estimating the amount and quality of people needed for production and service departments and centers, including technicians, engineers, and supervisors.
7. Planning the internal design of factories and the internal arrangement of the sites of machinery and equipment according to the quality and technical level of machinery and equipment on the one hand and what industrial processes require on the other hand.
8. Compile an estimate of the project requirements in terms of handling means, internal and external transportation, and service requirements required to operate the productive system of the project effectively.
9. Determine the goods or goods that the project will create, the requirements, the degree of quality required, and what is

necessary to develop a quality control system that can work effectively and meet the required goals.

10. Provide an estimate of the capital and operating expenses required by all technical and engineering factors that preceded it, including land, buildings, equipment, raw materials, energy, and personnel.
11. Work on market analysis because the presence of demand for the products of the projects to be established is one of the most critical factors that will determine the success of these projects, so it must include the process of market analysis of the proposed project to be successful.
 - A description of the market consists of its size, available transportation options, prices associated with these means, distribution outlets, and the dominant work mode.
 - Research the dynamics of supply and demand for the goods to be manufactured.
 - Analysis of the level of demand for enterprise goods in previous years of the current commodity, as well as the variables that influenced this level of demand, calculation of the quantity and value of consumption of project products by end users.
 - Determine the quality and quantity of goods, as well as their specifications and costs, and determine the marketing plan for competitors in the enterprise. Identify the sources of supply for the project's products (local manufacturing or import) and identify those sources.
 - Estimate the expected demand for the project's goods.
 - Calculate the estimation of the project's market share by considering supply and demand, the current level of competition, and the marketing strategy.
 - Research into a marketing strategy, which consists of four essential components, including the marketing and promotion apparatus, price policy, and distribution channels. This research should be done to understand how a marketing strategy works.

Given this, if this analysis shows that there is no market or the market size is not suitable for constructing an economic project, the project to be implemented should be canceled and start over.

Fifth: Financial feasibility study of the project

The term "financial study of the project" refers to the activities that revolve around planning, directing, organizing, and following up to secure the project's needs of funds through the best financial mix from various financial sources, as well as managing, employing and operating these funds in various fields of economic activity in the project, in a way that increases its production and gives the highest possible monetary return and return under the conditions and surroundings of the project. In other words, this project's financial study indicates that it should generate a greater return on investment than it would cost to collect funding from various sources [19].

The importance of the financial study lies in that it helps investors to identify all the required financial needs to establish and operate the project, in addition to that it helps to determine the best available sources of funding and the burdens or costs of each source, which allows choosing the best sources and reflects positively on the invested capital, in addition to that, the importance of the financial study lies in that it helps determine

the best available sources of financing and the burdens or costs of each source. It helps to choose the best sources and helps prepare estimates of cash inflows and outflows, which in turn allows calculating the commercial feasibility of the project. In light of this, its acceptance is determined or not [20]. Before implementing the plan, conducting an in-depth analysis of the project's financial situation, the economics of project management, and the financing structure that will be most beneficial to it is essential. It is achieved by viewing and analyzing the different cash flows that the project will generate over its lifetime. The following results of this investigation have been substantiated :

- a) Start working on conducting financial studies that include knowledge and analysis of financial markets if the project requests loans to determine the different borrowing conditions, measuring the amount of indebtedness that the project will reach, as well as determining the capital structure of the project and the expected return on invested capital.
- b) Conduct an investigation that includes calculating the amount of money required to start the project taking into account lessons learned from other projects of the same type already active inside or outside the country concerned.
- c) Explain the project's current financial position in the form of resource and utilization tables during the implementation phase.
- d) Determine the margin of safety and financial security for the proposed project by developing cash flow estimates that show the project's ability to provide sufficient cash liquidity that it will need during the implementation phase, including the cash amounts required for the project. Initial capital, as well as forecasting the quantities of cash available and cash needs for each year, half a year or less, to ensure the availability of sufficient cash to cover the proposed project's costs.

Sixth: Economic feasibility study of the project

When the results of these studies are completed with the validity and feasibility of the project in all respects, then comes the step of preparing the economic feasibility study, through which the investment project is evaluated from the side of the financial return, which helps in decision-making. - Invest by accepting or rejecting the investment opportunity.

The private investor uses the results of the economic feasibility study to compare the many project options available to him to choose the opportunity that provides the most significant potential return on his investment [21]. In addition, the objectives of the private investor are to achieve the expected revenues from these initiatives and earn the highest possible return on capital investment. They also want to know how long it takes to redeem the invested amount and how to maintain the many methods to achieve its financial requirements, whether for this project or others, and the goal of the private investor behind the economic feasibility study is to obtain the approval of the official authorities to establish the project [22]. Concerning the importance of feasibility studies for the general public as an investor, the following are the reasons for their preference:

1. The state needs a technique to select projects that will bring the most outstanding value to the public, and the only way to get this method is to conduct a feasibility study. Based on this research, public projects can be grouped by degree of necessity for each.
2. The links that will be made between this project and other initiatives, both in the front and back directions.
3. The State may not grant a license to establish an enterprise unless it is certain that the social burdens resulting from that enterprise are as low as possible and that the social benefits and returns that the enterprise brings to society are as great as possible.

In most cases, It is achieved by researching the project's effects on employment, the level of national income, the stability of the currency's value, and the balance of payments. This research will also look at how much the project contributes to GDP.

Seventh: Studying the administrative, organizational, and commercial aspects of the project

They are as follows :

1. Administrative aspects: Evaluating project management is a difficult thing to do, but it can be the deciding factor in whether a project is successful or not. It is because project management is a modern and sophisticated science and art, not just a set of rules suitable for all projects.
2. Organizational aspects: Organizational aspects are directly related to administrative aspects, so these aspects can form part of a single indivisible quantity on the best ways to implement the project. Administrative elements are directly related to financial aspects.
3. Commercial aspects The commercial aspects of the project are to make the necessary arrangements to market products and provide the supplies needed for establishing and managing the project. In other words, these are the things that must be done to start and run the project.

Phase 3: Evaluation and Final Decision Making

This stage is concerned with the preparation of the investment proposal report, which includes the results based on the conclusions of detailed analyzes and studies, which provides the person conducting the study with the fundamental indicators to assess the feasibility of the project and make the appropriate decision. in a proper manner commensurate with the submission of this report to the official and financial authorities that will participate in the implementation of the project. During this stage, the investment proposal report is submitted to the official and monetary rules that will participate in the performance of the presented project, taking into account that at this stage, the idea has been reviewed from all sides. Many different angles (marketing, artistic, financial, and economic). Based on this assessment, the final choice may be between investing in the project and continuing it, postponing its completion, or abandoning it.

Therefore, a feasibility study, in any of the above forms it can take, is the tool used to determine whether an industrial project is safe or not. It also helps in detecting loss-making projects that may lead to capital loss. Finally, a feasibility study is a tool that enables investors to evaluate projects accurately and then make a rational investment decision. The project is

assessed by several different bodies, such as planning bodies, the private entrepreneur, and either international bodies (competent bodies in a foreign country) or local bodies.

Some characteristics of economic feasibility studies can be determined by following the steps of feasibility studies, the objectives of each stage, and the results of each stage [23]:

1. Feasibility studies are comprehensive as they are necessary for each project, regardless of the nature or size of the project, including social programs that do not intend to
2. It determines whether or not the concept of a particular investment proposal has any advantage.
3. It is characterized by interdependence and overlap between its components and stages, as the outputs of each stage are considered inputs to the next stage. For example, the decision taken at the end of each step of the study includes whether to move to the following location or not according to the results of feasibility studies in the previous stage or stages. It is because the outputs of each stage are considered inputs to the next stage.
4. The correlation property gives rise to a second characteristic of sensitivity since any error in one of the stages or components of feasibility studies produces errors and cumulative effects on subsequent stages and components, affecting the end. The decision of feasibility studies places a tremendous burden on the person conducting the study if he wants to ensure the accuracy and correctness of each stage before making a decision.
5. The correlation property results from a third property.
5. The preparation of feasibility studies has a relatively high cost. It is especially true for new and mega projects. It is because feasibility studies require a variety of data and information, as well as specialized and in-depth marketing, construction, and financial analyses of the components of an idea or project.

According to the information provided here, a healthy economy consists of large and small initiatives that are prosperous, interconnected, horizontally overlapping, and vertically integrated.

Economic feasibility studies are one of the most important scientific and practical tools that can be used to achieve this goal. So it is because economic feasibility studies are based on analyzing the feasibility of all available projects, comparing those projects, selecting the most economically and socially beneficial projects, as well as projects that waste the least amount of resources and are, therefore, the projects that contribute the most to achieving comprehensive economic development.

III. METHODOLOGY

The research aims to shed light on a proposed project to establish a potable water bottling plant in Al-Najaf Governorate by preparing a technical and economic feasibility study, presenting it to investors, and working on estimating the expected demand for potable water during the study period. The research stems from the hypothesis: Although the potable water production projects are among the vital projects in Najaf, which are characterized by technical, financial, and economic feasibility, they are still below the required level. Therefore, the

researcher combined the descriptive analytical approach with the quantitative indicators method to analyze the technical and economic feasibility studies data for the potable water bottling plant project.

IV. THE RESULTS

The investment efficiency of this project was evaluated using 9 economic indicators:

1. The Annual Net Profit

The net profit margin measures the amount of each dinar earned by the company in profits, and a low-profit margin indicates a low margin of safety, i.e., a high risk of reduced sales may result in a net loss. Net profit margin reflects indicators of pricing policies, cost structure, and production effectiveness

$$\begin{aligned} \text{Annual Net Profit Standard} &= \text{Total Project Revenue} - \text{Project Operating Cost} \\ &= 476,672,000 - 381,295,040 \\ &= 95,376,960 \text{ IQD annually} \end{aligned}$$

2. The Cash Flow Criterion

The cash flow standard is an important method of analyzing cash flows and evaluating performance in different enterprises. The cash flow criterion is calculated according to the following formula:

$$\begin{aligned} \text{Cash Flow Criterion} &= \text{Net Realized Profit} + \text{Extinctions} \\ &= 95,376,960 + 35,870,000 \\ &= 131,246,960 \text{ IQD annually} \end{aligned}$$

3. The Internal Rate of Return Criterion

Internal rate of return is a method companies use to decide about the long-term feasibility of an investment, i.e., it is a capital budgeting method. It is defined as the discount rate for which the result of the present value is zero and is usually explained by the expected profits generated by the investment decision.

Internal return on investment at 15% discount factor = annual revenue × 15% discount factor

$$\begin{aligned} \text{Internal rate of return} &= \frac{\text{previous discount coefficient} + \text{togetherml subsequent discount} - \text{previous discount coefficient}}{\text{togetherml subsequent discount} - \text{previous discount coefficient}} \times \\ &= 12.575\% \end{aligned}$$

4. The Break-even point criterion

The break-even point (BEP) is the point at which cost (or expenses) and revenue are equal: there is no net gain or loss, and one has a "broken even." No profit or loss was provided, although opportunity costs were paid, the capital received adjusted risk and expected return.

$$\text{Break-even point} = \frac{\text{fixed costs}}{\text{contribution margin}}$$

$$\begin{aligned} \text{Contribution Margin} &= \text{Average Selling Price} - \text{Average Unit Variable Costs} \\ &= 1,400 - 944 \\ &= 456 \end{aligned}$$

$$\begin{aligned} \text{So, break-even} &= \frac{59,870,000}{456} \\ &= 131,304 \text{ Cartoons} \end{aligned}$$

5. The Fixed Capital Return Criterion

Return On Invested Capital. ROIC): Also called "Return On Capital." ROC), a financial indicator to measure the

effectiveness of the use of capital in generating profits, expresses the return achieved by the company so that it exceeds the cost of debt and capital. This criterion is calculated according to the following formula:

$$\begin{aligned} \text{Fixed Capital Return Criterion} &= \frac{\text{Annual Profit}}{\text{Fixed Capital}} \times 100 \\ &= \frac{95,376,960}{306,200,000} \times 100 \\ &= 0.31 (31\%) \end{aligned}$$

6. The Payback Period Standard

Payback Period: It is a digital indicator of interest to investors and shows the period the project must spend to recover the paid-up capital in full. Through it, the investor determines whether the project is suitable for him or not, comparing it with other alternatives and taking into account the risk rate of each project. The payback period is calculated according to the following formula:

$$\text{Payback Period Criterion} = \frac{\text{Total Project Cost}}{\text{Annual Net Profit}}$$

The total cost of the project = total fixed cost of the project + fixed operating cost + variable operating cost of the project

$$\begin{aligned} &= 306,200,000 + 59,870,000 + 321,425,040 \\ &= 687,495,040 \end{aligned}$$

$$\begin{aligned} \text{Payback Period} &= \frac{687,495,040}{95,376,960} \\ &= 7.21 \text{ years (7 years and two months)} \end{aligned}$$

7. The Net Present Value Standard

Net present value is the present-present value of payments in the future. It is the current value of an investment's expected cash flows minus investment costs. Net present value (NPV) is the difference between the present value of cash flows and the present value of cash outflows over a given period. The net present value is calculated according to the following formula: Net present value = present value at discount factor – total cost

In this criterion, a discount factor of 10% will be used for the investment project.

The following table shows the calculation of the net present value of revenue streams during the project's life of 20 years.

The following table shows the calculation of the net present value of the project:

TABLE 1. Net Present Value of Project Cash Flows

Year	Annual Cash Flow	Discount coefficient	Discounted Value
1	95,376,960	0.909091	86,706,336
2	95,376,960	0.826446	78,823,907
3	95,376,960	0.751315	71,658,141
4	95,376,960	0.683013	65,143,704
5	95,376,960	0.620921	59,221,557
6	95,376,960	0.564474	53,837,814
7	95,376,960	0.513158	48,943,450
8	95,376,960	0.466507	44,494,019
9	95,376,960	0.424098	40,449,178
10	95,376,960	0.385543	36,771,919
11	95,376,960	0.350494	33,429,052
12	95,376,960	0.318631	30,390,056
13	95,376,960	0.289664	27,627,272
14	95,376,960	0.263331	25,115,710
15	95,376,960	0.239392	22,832,481
16	95,376,960	0.217629	20,756,792

17	95,376,960	0.197845	18,869,855
18	95,376,960	0.179859	17,154,405
19	95,376,960	0.163508	15,594,896
20	95,376,960	0.148644	14,177,213
Total present value			811,997,758
The total cost of the project			687,495,040
Net present value			124,502,718

8. Profitability Coefficient (Profitability Rate)

Profitability Index (English: Profitability Index) is symbolized by the symbol PI and is also known as the percentage of profit from investment PIR and the rate of investment value VIR, which is the percentage of return on investment from the proposed project. It is a useful tool in categorizing projects because it allows you to determine the amount of value of the creation of each unit of investment. The profitability coefficient is calculated according to the following formula:

$$\begin{aligned} \text{Profitability factor} &= \text{present value at 10\% discount factor} / \text{total cost of the project} \\ &= 124,502,718 / 687,495,040 \\ &= 0.18 \end{aligned}$$

9. The Accounting Rate of Return

It is the expected rate of return from an investment compared to the initial cost. It is a criterion for measuring an investment project's profitability from the traditional accounting point of view, i.e., through the relationship between net profit after tax and the investment size. The accounting rate of return is calculated according to the following formula:

$$\begin{aligned} \text{Accounting rate of return} &= \text{annual net profit} / \text{total cost of the project} \times 100 \\ &= 95,376,960 / 687,495,040 \times 100 \\ &= 0.14 \text{ (14\%)} \end{aligned}$$

V. CONCUSSIONS AND DISCUSSION

Based on data, financial indicators, market requirements, and the work environment in Najaf Governorate, as stated in the paragraphs of this study, we find that establishing this project is a successful process and deserves support and encouragement. We can note the high chances of success of the project and the possibility of achieving high revenues according to the results of the financial criteria shown in the previous paragraph, which reflect its ability to succeed in the short, medium, and long term. The results show that all requirements indicate the feasibility of the project from the view of commercial profitability, as the annual net profits amount to 95,376,960 dinars, and the project's cash flow is 131,246,960. The project's internal rate of return amounted to 12.575, considered a high rate for such projects. The criterion for the break-even point for the project was 131,304 cartons, and the rate of return on fixed capital was 0.31. At the same time, the recovery period for the investment cost is considered appropriate, as it amounted to about 7.21 years (7 years and two months), a period considered acceptable by investment decision-makers. Because the investor can recover his investment during the specified period. In addition, the criterion for the project's net present value at a discount factor of 10% amounted to 124,502,718, which means that the project has significant future returns that exceed the initial investment

costs during the estimated 20-year project period. The profitability coefficient of the project also reached a very high level of 0.18, which is a good level compared to similar investment projects in the tourism sector in general and the restaurant sector in particular. Finally, we have found that the accounting rate of return for the project is equal to 0.14, meaning that the investor can achieve this rate during the year, which is a favorable rate for the investor in this field. As for the environment, the current project does not threaten the local environment, as the activities do not produce gaseous waste or toxic materials. Environmental damage is limited to low levels of solid waste resulting from cardboard packaging for delivery products, so the project is feasible and profitable from an economic perspective and has no negative effects.

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