ISSN: 2658-8455
Volume 7, Issue 13 (2026), pp. 844-876.
© Authors: CC BY-NC-ND

Assessment of the Financial Viability of an Investment Project within OCP Group

Ayoub MASSIKI, ***(Professor-Researcher)***
Research Laboratory in Economics and Organizational Management (LARSEMO)
ESSEM-BUSINESS SCHOOL
Hassan II University, Casablanca, Morocco

Olaya METWALLI, ***(Professor-Researcher)***
Research Laboratory in Economics and Organizational Management (LARSEMO)
ESSEM-BUSINESS SCHOOL
Hassan II University, Casablanca, Morocco

Correspondence address:	ESSEM-BUSINESS SCHOOL (Ecole Supérieure des Sciences Economiques et de Management) ; 280, boulevard Mohamed V, angle rue Azilal et rue Karachi, Casablanca, Maroc.
Disclosure Statement:	The authors declare that they have not received any financial support that could have influenced the objectivity of this study. They take full responsibility for any potential plagiarism, the use of artificial intelligence in the writing process, as well as for the results presented in this article.
Conflict of Interest:	The authors report no conflicts of interest.
Cite this article:	MASSIKI, A., & METWALLI, O. (2026). Assessment of the Financial Viability of an Investment Project within OCP Group. *International Journal of Accounting, Finance, Auditing, Management and Economics*, *7*(13), 844–876. https://doi.org/10.5281/zenodo.24225812
License	**This is an open access article under the CC BY-NC-ND license**

Assessment of the Financial Viability of an Investment Initiative at OCP Group

Abstract:

Assessing the profitability of industrial investments is a major concern for companies, particularly when projects require substantial financial resources. This study contributes to the empirical literature by providing a techno-economic and financial assessment of a fertilizer production project undertaken by the OCP Group at the Jorf Lasfar site, within the Moroccan industrial context. It aims to evaluate the project's financial viability through a descriptive and analytical approach based on hypothetico-deductive reasoning. Data collection relies on internal financial documents, semi-structured interviews with managers, and a questionnaire survey conducted among 64 engineers and project managers. The financial assessment employs four complementary investment appraisal criteria: Net Present Value (NPV), Internal Rate of Return (IRR), Profitability Index (PI), and Payback Period (PP). The financial projections cover a ten-year period, using a discount rate of 10%. The findings reveal a positive NPV of MAD 1,187.03 million, an IRR of 16.32%, a PI of 1.2374, and a payback period of 7 years, 2 months, and 21 days. These indicators demonstrate the project's financial profitability and highlight the value of a multi-criteria approach in supporting investment decisions for large-scale industrial projects in Morocco.

Keywords: Investment appraisal; Investment profitability; Net Present Value (NPV); Internal Rate of Return (IRR); Profitability Index (PI); Payback Period (PP).
Classification JEL: G31, D25, O22
Paper type : Empirical Research

ISSN: 2658-8455
Volume 7, Issue 13 (2026), pp. 844-876.
© Authors: CC BY-NC-ND
IJAFAME
International Journal of Accounting, Finance, Auditing, Management & Economics

1. Introduction

Investment decisions constitute a fundamental component of corporate financial management, particularly in capital-intensive industries where projects require substantial financial resources and involve long-term commitments. The selection of an investment project must therefore be based on a rigorous assessment of its expected financial performance, its capacity to generate future cash flows, and its ability to create value for the company. In this respect, investment appraisal provides managers with analytical tools to assess the financial viability of projects and support strategic decision-making. This assessment is particularly important for industrial projects, whose profitability depends on several factors, including initial investment costs, production capacity, operating expenses, taxation, working capital requirements, and the time value of money.

The Moroccan phosphate industry represents a strategic sector of the national economy and an important component of the country's industrial and export activities. Morocco holds a significant position in the global phosphate industry, with phosphate extraction and fertilizer production constituting major areas of industrial specialization. According to the United States Geological Survey (USGS, 2026), Morocco's phosphate rock production was estimated at 35.3 million metric tons in 2024, compared with 32.1 million metric tons in 2023. During the same year, OCP Group produced approximately 12.3 million metric tons of solid fertilizers, including 4.2 million metric tons of diammonium phosphate (DAP). These figures illustrate the importance of fertilizer production within the Moroccan phosphate value chain and the scale of the industrial activities undertaken by OCP Group.

As a major integrated producer of phosphate-based products, OCP Group plays a central role in the development of this industry. Its activities cover the extraction of phosphate rock, the production of phosphoric acid, and the manufacturing and marketing of phosphate fertilizers. The Jorf Lasfar industrial complex is one of the Group's principal chemical production sites. According to OCP's published information, the Group recorded sales of approximately USD 9.76 billion in 2024, reflecting the economic scale of its industrial and commercial operations (OCP Group, 2025). Furthermore, the 2026 reference document published by the Moroccan Capital Market Authority (AMMC) reports that the production capacity of phosphate fertilizers at Jorf Lasfar reached approximately 12.667 million metric tons in 2025, including 4.909 million metric tons of DAP. The development of this industrial complex illustrates the importance of investment in production capacity and industrial infrastructure.

Within this industrial context, the development of DAP fertilizer production lines D, E, and F represents an important investment initiative for OCP Group. The expansion of fertilizer production capacity requires considerable financial resources and involves long-term operational and financial commitments. The USGS (2026) also reports the commissioning of three new fertilizer production lines at Jorf Lasfar during 2023 and 2024, each designed to produce approximately one million metric tons of DAP annually. Such investments highlight the need for a comprehensive financial evaluation capable of determining whether the expected benefits justify the capital expenditure and associated operating costs.

The financial evaluation of investment projects has been widely discussed in the corporate finance literature. Several capital budgeting techniques have been developed to assess project profitability and support investment decisions. Among the most commonly used methods are the Net Present Value (NPV), Internal Rate of Return (IRR), Profitability Index (PI), and Payback Period (PP). Paseda (2020) reviews these techniques and emphasizes their importance in the selection and evaluation of investment projects. More recently, Sokolov (2024) provides a unified analysis of these indicators, highlighting their complementary characteristics and their respective roles in assessing investment profitability. The NPV measures the value created by an investment after discounting expected future cash flows, while the IRR represents the

discount rate at which the NPV equals zero. The PI expresses the relationship between the present value of expected cash inflows and the initial investment, whereas the PP estimates the time required to recover the initial capital invested. Although these indicators provide different perspectives, their combined application offers a broader assessment of a project's financial performance.

Despite the availability of these evaluation techniques, assessing the profitability of large-scale industrial investments remains a complex task. Such projects generally involve substantial initial expenditure, long implementation periods, significant operating costs, and financial projections that are subject to economic and operational assumptions. Moreover, the application of investment appraisal methods to a specific industrial project requires an examination of its financial structure and projected cash flows. In this regard, the assessment of the DAP production project at OCP's Jorf Lasfar complex provides an opportunity to examine the financial viability of a major industrial investment within the Moroccan context. The study addresses the need for a detailed case-based financial assessment rather than attempting to establish a general causal relationship applicable to all industrial investments.

Accordingly, the main objective of this research is to evaluate the financial profitability of the DAP fertilizer production project involving production lines D, E, and F at the OCP Group's Jorf Lasfar complex. The central research question is formulated as follows: *To what extent is the DAP fertilizer production project involving production lines D, E, and F at the OCP Group's Jorf Lasfar complex financially viable under the projected investment and operating assumptions?*

To address this research question, the study formulates the following hypotheses:

H1: The DAP fertilizer production project generates a positive Net Present Value (NPV) when evaluated using a discount rate of 10%.

H2: The project's Internal Rate of Return (IRR) exceeds the adopted discount rate of 10%.

H3: The project's Profitability Index (PI) is greater than 1, indicating that the present value of expected cash inflows exceeds the initial investment cost.

These hypotheses are assessed through the financial projections and investment appraisal calculations conducted for the project. They are based on conventional financial decision criteria and are intended to determine whether the expected cash flows satisfy the conditions generally associated with investment profitability.

From a methodological perspective, this research adopts a descriptive, analytical, and evaluative case-study approach. It focuses on the OCP Group's DAP production project at the Jorf Lasfar industrial complex and draws on quantitative and qualitative information. Data collection relies on internal financial documents, semi-structured interviews with managers and relevant departments, and a questionnaire survey conducted among 64 engineers and project managers from a target population of 335 employees. The documentary analysis provides financial information required to assess the project, including investment costs, operating expenses, depreciation, taxation, working capital requirements, projected revenues, and expected cash flows. Interviews and questionnaire responses provide additional information about the project's organizational and operational context. These complementary sources are used to understand the case and its assumptions; the financial hypotheses are evaluated through the investment appraisal calculations rather than through statistical testing of the questionnaire responses.

The financial assessment covers a ten-year projection period and uses an adopted discount rate of 10%. Four complementary indicators are considered: Net Present Value (NPV), Internal Rate of Return (IRR), Profitability Index (PI), and Payback Period (PP). Microsoft Excel is used to organize the financial data and perform the calculations, while Microsoft Project supports the planning and monitoring of project activities. The methodological approach is therefore

ISSN: 2658-8455
Volume 7, Issue 13 (2026), pp. 844-876.
© Authors: CC BY-NC-ND
IJAFAME
International Journal of Accounting, Finance, Auditing, Management & Economics

primarily evaluative: it examines the financial viability of a specific industrial investment on the basis of projected cash flows and the assumptions underlying the financial model.
This study contributes to the analysis of industrial investment profitability by providing a case-based financial assessment of a large-scale fertilizer production project within the Moroccan phosphate industry. Its contribution lies in the application of several complementary investment appraisal criteria to the same industrial project, thereby offering a multidimensional assessment of its expected financial performance. From a managerial perspective, the study provides information that may support investment decisions by highlighting the relationship between initial capital expenditure, expected cash flows, and the financial conditions required for value creation. It also illustrates the practical application of conventional capital budgeting methods in the assessment of major industrial projects in an emerging economy.
The results indicate a positive NPV of MAD 1,187.03 million, an IRR of 16.32%, and a PI of 1.2374. The estimated Payback Period is 7 years, 2 months, and 21 days. These findings provide preliminary evidence of the project's financial viability under the assumptions adopted in the study and are examined in greater detail in the results section.
The remainder of this paper is organized as follows. The first section presents the theoretical foundations and relevant literature on investment appraisal and project profitability. The second section describes the research methodology, data sources, and financial evaluation framework. The third section presents the case study and the financial assumptions adopted for the DAP production project. The fourth section reports and discusses the results obtained from the investment appraisal indicators. Finally, the paper concludes by summarizing the main findings, highlighting their managerial implications, and identifying the limitations of the study.

2. Literature Review and Theoretical Framework

2.1. Capital Budgeting and Investment Decision-Making

Capital budgeting refers to the process through which companies evaluate, select, and allocate financial resources to long-term investment projects. These decisions are particularly important in capital-intensive industries because they involve substantial initial expenditures, long investment horizons, and commitments that may be difficult to reverse. Unlike short-term operational decisions, capital investment decisions influence a company's future production capacity, cost structure, and financial performance.
Traditional investment theory emphasizes the relationship between the expected return on an investment and the cost of the resources committed to it. From a corporate finance perspective, an investment should be undertaken when its expected benefits compensate for the initial expenditure and the opportunity cost of capital. Fama and French (1999) examine the relationship between corporate investment returns and the cost of capital, highlighting the importance of comparing the returns generated by investment with the return required by investors.
The empirical literature also demonstrates that companies do not necessarily rely on a single investment appraisal technique. Graham and Harvey (2001), based on a survey of 392 financial executives, find that large companies frequently use discounted cash flow techniques, particularly the Net Present Value (NPV) and Internal Rate of Return (IRR), whereas smaller companies rely more frequently on the Payback Period. Their findings demonstrate that investment decisions combine theoretical financial criteria with practical managerial considerations.
Similarly, Siziba and Hall (2021), through a longitudinal review of 83 studies covering capital budgeting practices between 1966 and 2016, identify NPV, IRR, Payback Period, Accounting Rate of Return, and Real Options Valuation among the most commonly used investment appraisal techniques. Their analysis also highlights differences in the adoption of these methods

across countries and over time. These findings suggest that although discounted cash flow techniques have gained importance, traditional methods continue to play a role in managerial decision-making.

Nevertheless, the selection of an investment appraisal method depends on several factors, including project size, financial constraints, managerial experience, uncertainty, and the availability of reliable financial information. Consequently, evaluating a large industrial investment requires more than simply applying a financial formula. It requires an examination of the assumptions underlying projected cash flows and the suitability of the criteria used to assess financial viability.

2.2. Discounted Cash Flow Methods: NPV and IRR

Discounted cash flow methods constitute the theoretical foundation of modern investment appraisal. They incorporate the time value of money by converting future cash flows into their present value. Among these methods, NPV and IRR are particularly important because they provide complementary measures of investment profitability.

The Net Present Value represents the difference between the present value of expected future cash inflows and the initial investment expenditure. It is calculated by discounting the project's expected net cash flows at the appropriate discount rate. According to the NPV criterion, an investment should be accepted when its NPV is positive, since the project is expected to generate value beyond the required return.

The main advantage of NPV is that it directly measures the expected value created by an investment in monetary terms. It also incorporates the timing of cash flows and the opportunity cost of capital. For this reason, NPV is generally considered a theoretically sound criterion for assessing whether an investment contributes to shareholder value.

However, the application of NPV depends on the reliability of projected cash flows and the appropriateness of the discount rate. An inaccurate estimation of investment costs, operating expenses, revenues, or the cost of capital can significantly affect the resulting value. Therefore, a positive NPV should be interpreted in relation to the assumptions used in the financial model rather than as an unconditional guarantee of future profitability.

The Internal Rate of Return represents the discount rate at which the NPV of a project equals zero. Under conventional cash flow patterns, a project is generally considered financially acceptable when its IRR exceeds the required rate of return or the relevant cost of capital. Its main advantage lies in expressing profitability as a percentage, making it relatively easy for managers to interpret.

Nevertheless, the IRR criterion presents several theoretical limitations. First, projects involving non-conventional cash flows, characterized by multiple changes in the sign of cash flows, may generate multiple IRRs or no economically meaningful IRR. Second, the IRR may produce misleading rankings when comparing mutually exclusive projects with different investment scales or durations. Third, the conventional IRR interpretation implicitly assumes that intermediate cash flows can be reinvested at the IRR itself, an assumption that may be unrealistic when the calculated rate is particularly high.

These limitations explain why NPV and IRR should not be considered interchangeable in every investment decision. While both methods generally provide consistent accept-or-reject decisions for independent projects with conventional cash flows, NPV remains the more direct measure of value creation. Accordingly, the present study uses NPV as a principal criterion and IRR as a complementary indicator of the project's expected financial return.

2.3. Profitability Index and Payback Period: Complementary Evaluation Criteria

In addition to NPV and IRR, the Profitability Index (PI) and Payback Period (PP) provide complementary information about investment attractiveness.

ISSN: 2658-8455
Volume 7, Issue 13 (2026), pp. 844-876.
© Authors: CC BY-NC-ND
IJAFAME
International Journal of Accounting, Finance, Auditing, Management & Economics

The Profitability Index (PI) measures the ratio of the present value of expected future cash inflows to the initial investment cost. A PI greater than one indicates that the project is financially viable, as its discounted cash inflows exceed the initial investment. Conversely, a PI below one suggests that the project does not generate sufficient discounted cash flows to cover its initial cost.

The PI is particularly useful when companies must evaluate investment opportunities under capital constraints because it expresses the present value generated per monetary unit invested. However, it may produce misleading rankings when comparing mutually exclusive projects of different sizes. A project with a higher PI does not necessarily create more total value than a larger project with a lower PI. Consequently, the PI should be interpreted alongside NPV rather than used as an independent ranking criterion.

The Payback Period measures the time required for a project to recover its initial investment through accumulated cash flows. Its main advantage is its simplicity and its ability to provide information about the period during which the initial capital remains committed. It may therefore be useful for managers concerned with liquidity, capital recovery, and exposure to uncertainty.

Despite these practical advantages, the traditional Payback Period has important limitations. It does not account for the time value of money and ignores cash flows occurring after the investment has been recovered. The discounted Payback Period addresses the first limitation by using discounted cash flows, but it still ignores the cash flows generated after the recovery point. Therefore, neither version provides a complete measure of the value created by the project.

In the present study, the Payback Period is consequently treated as a supplementary liquidity and capital-recovery indicator, while NPV, IRR, and PI provide the main financial profitability assessment. This combination makes it possible to examine the project from several complementary perspectives without overlooking the limitations of each individual method.

2.4. Investment Risk, Uncertainty, and Real Options Theory

Traditional investment appraisal generally relies on forecasts of future revenues, operating costs, and investment expenditures. However, these forecasts are subject to uncertainty, particularly in large industrial projects characterized by long production cycles, substantial capital requirements, and exposure to fluctuations in input and output prices.

Dixit and Pindyck (1994) develop the theory of investment under uncertainty by emphasizing the irreversibility of investment decisions and the possibility of postponing investment until additional information becomes available. Their approach demonstrates that uncertainty may influence not only the expected profitability of an investment but also the timing of the investment decision. The possibility of waiting, expanding, reducing, or abandoning a project can therefore have economic value.

This perspective is particularly relevant to large industrial investments because the initial expenditure may be difficult to recover once committed. Real option theory extends traditional discounted cash flow analysis by considering managerial flexibility and the value of adapting investment decisions as new information becomes available.

Another important issue concerns the reliability of project forecasts. Flyvbjerg, Holm, and Buhl (2002), based on an analysis of 258 transportation infrastructure projects, identify systematic underestimation of project costs. Their findings highlight the importance of examining the assumptions underlying investment estimates and taking account of potential forecasting biases. Although their empirical analysis focuses on transportation infrastructure rather than fertilizer production, it provides relevant insights into the risks associated with large-scale project appraisal.

These contributions demonstrate that conventional investment appraisal methods may not fully capture the effects of uncertainty, irreversibility, and managerial flexibility. In practice, sensitivity analysis and scenario analysis can complement discounted cash flow methods by examining how changes in key assumptions affect project profitability. However, the results of a conventional NPV or IRR calculation should be distinguished from the additional value that could arise from managerial flexibility.

For the DAP production project examined in this study, the financial assessment is based on projected revenues, operating costs, and cash flows over a ten-year period. The resulting indicators therefore measure financial viability under the assumptions adopted in the financial model. They should not be interpreted as a complete valuation of all possible strategic options or future market scenarios.

2.5. Capital Structure and the Cost of Capital in Investment Appraisal

The financing structure of an investment project is another important dimension of financial evaluation. The capital structure of a company refers to the combination of equity and debt used to finance its activities. The choice between these sources of financing influences the cost of capital, financial risk, and the required return associated with investment decisions.

Modigliani and Miller (1958) establish a theoretical benchmark by demonstrating that, under restrictive assumptions such as perfect capital markets and the absence of corporate taxes, financing structure does not affect the total value of the firm. Subsequent developments, particularly the trade-off theory, recognize that companies must consider the potential benefits of debt financing alongside financial distress costs. Consequently, the financing decision may influence the financial conditions under which an investment project is evaluated.

The cost of capital is particularly important because it represents the required return used to discount expected future cash flows. Fama and French (1999) examine the relationship between the corporate cost of capital and the returns generated by corporate investment, illustrating the importance of evaluating investment performance in relation to the capital committed.

In practical terms, the discount rate should reflect the relevant opportunity cost of financing and the risk associated with the investment. Using an inappropriate discount rate may lead to an overestimation or underestimation of NPV and consequently affect the investment decision.

In the case examined in this study, the project is evaluated using a discount rate of 10% and is assumed to be financed entirely through equity. This financing assumption is incorporated into the financial evaluation framework. Nevertheless, the study does not attempt to compare alternative debt-equity structures or estimate the effects of financial leverage. The analysis therefore focuses on the project's profitability under the specified financing and discount-rate assumptions.

2.6. Capital Budgeting Practices in Emerging Economies and the Industrial Context

The empirical literature indicates that the application of capital budgeting techniques varies according to the institutional and economic environment in which companies operate. Graham and Harvey (2001) show that the use of investment appraisal methods is influenced by company size and managerial characteristics. Their findings also reveal that financial executives may rely on practical considerations in addition to theoretical financial criteria.

Evidence from emerging economies provides further insights into these differences. Kengatharan and Nurullah (2018), studying 186 chief financial officers of companies listed on the Colombo Stock Exchange in Sri Lanka, identify NPV as the most frequently used capital investment appraisal technique, followed by IRR and Payback Period. Their findings demonstrate that discounted cash flow methods are also widely used in emerging markets, although traditional indicators remain relevant.

Siziba and Hall (2021) similarly report differences in the adoption of capital budgeting techniques across countries, including India and South Africa. Their review indicates that

ISSN: 2658-8455
Volume 7, Issue 13 (2026), pp. 844-876.
© Authors: CC BY-NC-ND
IJAFAME
International Journal of Accounting, Finance, Auditing, Management & Economics

companies increasingly rely on NPV and IRR, while the Payback Period is often retained as a complementary method. These findings suggest that the selection of investment appraisal techniques reflects both theoretical considerations and the practical requirements of companies operating in different economic environments.

For industrial projects, the assessment of profitability also requires attention to the specific characteristics of the sector concerned. Fertilizer production is exposed to fluctuations in selling prices, input costs, energy prices, international trade conditions, and production capacity. These factors can influence projected cash flows and consequently affect the financial viability of industrial investments.

The World Bank's Commodity Markets Outlook (2026) highlights the sensitivity of fertilizer markets to changes in input costs, trade restrictions, and geopolitical disruptions. Its analysis of fertilizer prices emphasizes the importance of external market conditions in determining production costs and expected revenues. Similarly, Mottaleb, Meerza, and Rahman (2026), using monthly fertilizer price data covering the period from January 1967 to September 2024, examine price interdependencies among major fertilizer products, including phosphate rock, DAP, and TSP. Their findings highlight the interconnected nature of international fertilizer markets and the importance of monitoring price movements.

In the Moroccan context, the phosphate and fertilizer industry represents a major industrial activity, with OCP Group occupying a central position in the production and marketing of phosphate-based fertilizers. However, the present research does not aim to provide a comprehensive empirical analysis of capital budgeting practices among Moroccan companies. Instead, it contributes a case-based financial assessment of a specific industrial investment undertaken by OCP Group at the Jorf Lasfar complex. The study therefore addresses a more focused question: whether the projected financial performance of the DAP production project satisfies the conventional criteria of investment profitability under the assumptions adopted.

2.7.Synthesis of Literature and Development of the Research Hypotheses

The reviewed literature establishes that investment appraisal involves several complementary financial criteria, each providing a different perspective on project profitability. NPV measures the expected value created by an investment, IRR expresses its expected rate of return, PI evaluates the present value generated per monetary unit invested, and PP provides information about the time required to recover the initial expenditure.

The literature also highlights important limitations. NPV and IRR may produce different rankings under certain conditions, particularly when projects are mutually exclusive or when cash flow patterns are non-conventional. PI provides a relative measure of profitability but does not necessarily identify the project generating the highest absolute value. Similarly, PP is useful for evaluating capital recovery but does not capture the full economic benefits generated throughout the project's life cycle.

Furthermore, the literature on investment under uncertainty demonstrates that financial projections are sensitive to assumptions concerning revenues, costs, and market conditions. The theory of real options and empirical research on cost estimation therefore emphasize the importance of interpreting financial results within their operational and economic context.

The present study draws on these contributions to develop an evaluative framework based on three principal investment profitability criteria: NPV, IRR, and PI. The Payback Period is retained as a supplementary indicator of capital recovery. The framework is applied to the DAP production project involving production lines D, E, and F at OCP's Jorf Lasfar complex.

Based on the conventional decision rules of discounted cash flow analysis, the following hypotheses are formulated:

H1 – Net Present Value hypothesis: *The DAP fertilizer production project generates a positive Net Present Value (NPV) when evaluated using a discount rate of 10%.*

This hypothesis derives from the NPV criterion, according to which an investment is financially acceptable when the present value of expected future net cash flows exceeds the initial investment expenditure.

H2 – Internal Rate of Return hypothesis: *The project's Internal Rate of Return (IRR) exceeds the adopted discount rate of 10%.*

This hypothesis derives from the IRR decision rule, which considers an investment financially acceptable when its internal rate of return is higher than the required rate of return, provided that the cash flow pattern is conventional.

H3 – Profitability Index hypothesis: *The project's Profitability Index (PI) is greater than 1.*

This hypothesis derives from the PI criterion, according to which a project is financially acceptable when the present value of expected cash inflows exceeds its initial investment cost. These hypotheses are assessed through the financial projections and investment appraisal calculations. They represent complementary applications of conventional financial decision rules rather than independent causal relationships. The Payback Period is used to provide additional information about the time required to recover the initial investment.

Table 1. Synthesis of the literature and its implications for the present study

Theoretical perspective	*Main contributions*	*Limitations or implications*	*Application to the present study*
Capital budgeting practices	Graham and Harvey (2001); Siziba and Hall (2021)	Practices vary according to firm size, context, and managerial preferences.	Justifies the use of established investment appraisal criteria.
Net Present Value	Discounted cash flow and value creation	Sensitive to projected cash flows and discount-rate assumptions.	H1: NPV greater than zero at 10%.
Internal Rate of Return	Expresses project profitability as a percentage.	Multiple IRRs, reinvestment assumption, and ranking conflicts.	H2: IRR greater than 10%.
Profitability Index	Measures present value generated per unit invested.	May be misleading when ranking projects of different scales.	H3: PI greater than one.
Payback Period	Measures the time required to recover initial investment.	Ignores cash flows after recovery and, in its traditional form, the time value of money.	Supplementary assessment of capital recovery.
Investment under uncertainty	Dixit and Pindyck (1994); Flyvbjerg et al. (2002)	Forecasting errors, irreversibility, and uncertainty may affect project outcomes.	Supports cautious interpretation of projected financial results.
Capital structure and cost of capital	Modigliani and Miller (1958); Fama and French (1999)	Financing assumptions and discount rates influence investment valuation.	The project is evaluated under a 100% equity-financing assumption and a 10% discount rate.
Fertilizer market conditions	World Bank (2026); Mottaleb et al. (2026)	Input costs and international price movements affect expected cash flows.	Provides the industrial and market context for interpreting the projections.

Source: Authors

3. Research Methodology

3.1. Research Design and Case Study Approach

This study adopts a single-case study approach to evaluate the financial profitability of the DAP fertilizer production project (Lines D, E, and F) implemented by OCP Group at its Jorf Lasfar industrial complex in Morocco. The research follows a descriptive and evaluative design, combining quantitative financial analysis with qualitative data collection. Its primary objective is to assess the project's financial viability through investment appraisal techniques while examining the assumptions, constraints, and uncertainties associated with its implementation and operation.

The quantitative component focuses on investment costs, operating revenues, expenses, depreciation, working capital requirements, taxation, and projected cash flows. These elements

ISSN: 2658-8455
Volume 7, Issue 13 (2026), pp. 844-876.
© Authors: CC BY-NC-ND
IJAFAME
International Journal of Accounting, Finance, Auditing, Management & Economics

are used to calculate the main financial indicators, including Net Present Value (NPV), Internal Rate of Return (IRR), Profitability Index (PI), Payback Period (PP), and Discounted Payback Period (DPP). The qualitative component complements the financial assessment by gathering information from employees and managers involved in project management, industrial development, and financial administration.

The choice of a single-case study is justified by the specific characteristics of the project, its strategic importance within OCP Group, and the availability of detailed internal financial and operational information. A case study approach is particularly appropriate when a contemporary phenomenon must be examined within its real organizational context (Yin, 2018). It also enables the investigation of complex managerial and financial issues through an in-depth analysis of a specific organizational setting (Eisenhardt, 1989). Furthermore, the use of a single case can provide valuable insights into complex situations that cannot be fully understood through quantitative analysis alone (Flyvbjerg, 2006).

Nevertheless, the findings are primarily applicable to the project under investigation. They are intended to provide an in-depth understanding of the financial evaluation of a large-scale industrial investment rather than statistically generalizable conclusions concerning all industrial projects or companies.

3.2. Case Selection and Project Background

OCP Group was established in 1920 and became a public limited company in 2008. As a major international producer and exporter of phosphate-based products, the Group plays a significant role in Morocco's industrial and economic development.

The present research examines the DAP fertilizer production project, comprising Lines D, E, and F, located at the Jorf Lasfar industrial complex. The project was selected because of its investment scale, industrial importance, and relevance to the financial evaluation of capital-intensive industrial projects.

The total estimated investment amounts to MAD 5 billion, divided between procurement and implementation activities. The project has an estimated implementation period of four years and an economic evaluation horizon of ten years. According to the project information available, Lines D and E were scheduled for commissioning during the first half of 2024, while Line F was scheduled for commissioning during the first half of 2025.

The project is financed entirely through equity, with no debt financing included in the financial assumptions considered in this study. Microsoft Project was used for project planning and monitoring, while Microsoft Excel was used to organize the financial information, construct projected cash flows, and calculate the investment appraisal indicators.

3.3. Data Sources and Collection Procedures

The study relies on both documentary and field data. Combining these sources makes it possible to compare the financial assumptions used in the investment evaluation with information collected from employees and managers familiar with the project.

3.3.1. Internal Documentary and Financial Data

The main financial information was obtained from actual internal OCP documents relating to the project. These documents include financial statements, internal financial files, depreciation schedules, cash flow statements, REM4 summaries, project parameters, investment cost and financing information, operating revenue and expense projections, working capital requirements, and project terms of reference.

Access to and use of these internal documents were authorized by OCP Group for the purposes of this academic research. These documents constitute the primary documentary basis of the financial analysis.

A distinction is made between historical or documented information and forward-looking estimates. In particular, projected revenues, operating expenses, production levels, and future cash flows are treated as financial forecasts or model assumptions rather than as realized financial results.
The documentary analysis was used to identify the principal financial parameters of the project, verify the consistency of the available information, and establish the assumptions required for the investment appraisal.

3.3.2. Questionnaire Survey

A questionnaire survey was conducted among engineers and project managers working at OCP's Jorf Lasfar industrial complex. The target population consisted of 335 professionals. All members of this population were contacted, and 64 completed questionnaires were collected, corresponding to a response rate of approximately 19.1%.
A non-probability convenience sampling approach was adopted, based on voluntary participation and the availability of respondents. Consequently, the resulting sample cannot be considered statistically representative of the entire population, and the findings should not be generalized through statistical inference.
The questionnaire consisted of ten questions, combining closed-ended and open-ended formats. Some questions used Likert-type response scales to collect respondents' perceptions and assessments. The questionnaire was administered electronically through Google Forms.
A pre-test was conducted before the final administration of the questionnaire. The collected responses were subsequently organized and analyzed using SPSS, with the analysis focusing primarily on descriptive statistics and frequency distributions. The questionnaire results are used to provide additional insight into respondents' perceptions of project management and financial evaluation rather than to establish causal relationships.

3.3.3. Semi-Structured Interviews

In addition to the questionnaire, semi-structured interviews were conducted with managers and professionals involved in the project's organizational and operational environment. The interviewees included managers from different hierarchical levels in the Industrial Development and Accounting and Budget departments, as well as representatives of the Project Implementation department.
The interviews were conducted through Microsoft Teams and face-to-face meetings. Their purpose was to obtain complementary information concerning project planning, investment decisions, financial assumptions, implementation conditions, and project performance monitoring.
The semi-structured format allowed the discussion to follow common themes while giving respondents the opportunity to provide additional explanations based on their professional experience. The information obtained through these interviews was compared with the documentary and questionnaire data to provide contextual support for the financial assessment.

3.3.4. Data Triangulation

To strengthen the consistency of the research, information from the three data collection methods was considered jointly. Internal documentary sources provided the financial and operational information used in the investment appraisal, while the questionnaire and interviews provided additional insight into the organizational and managerial context of the project.
This triangulation made it possible to compare documented financial assumptions with the perceptions and professional experience of the respondents. However, qualitative and questionnaire findings were used as complementary sources of contextual information and were not treated as substitutes for the documented financial data.

ISSN: 2658-8455
Volume 7, Issue 13 (2026), pp. 844-876.
© Authors: CC BY-NC-ND
IJAFAME
International Journal of Accounting, Finance, Auditing, Management & Economics

3.4. Financial Assumptions and Projection Framework

The financial evaluation is based on a ten-year economic horizon and the investment and operating assumptions documented in the project files. The principal parameters include the initial investment, production capacity, selling prices, operating expenses, depreciation, taxation, working capital requirements, and discount rate.

The total investment is estimated at MAD 5 billion. The financial model distinguishes between the total investment budget and the actual timing of cash disbursements. Since the implementation period extends over four years and the commissioning of the production lines is staggered, investment outflows are allocated to the corresponding periods whenever the documented investment schedule is available. Consequently, the assumption that the entire investment is made at time zero is retained only if it is supported by the actual disbursement schedule or explicitly justified as a simplifying assumption.

The revenue projections are based on an annual production capacity of one million tonnes and the selling-price assumptions presented in the project documentation. The projected price increases from MAD 5,000 per tonne in the first year to MAD 7,250 per tonne in the tenth year. This progression corresponds to a fixed annual increase of MAD 250 per tonne, equivalent to 5% of the initial price. It should therefore be interpreted as a linear increase rather than a compounded annual growth rate of 5%.

Operating expenses are projected using the assumptions documented in the financial model. The initial annual operating expense is estimated at MAD 3,950 million, increasing to MAD 5,727.5 million by the tenth year. These projections correspond to an expense-to-revenue ratio of 79% throughout the evaluation period. This ratio is treated as a modelling assumption and not as independent empirical evidence that the actual operating cost structure will remain constant.

The model also distinguishes between the different categories of operating expenses, including raw materials and supplies, external services, personnel expenses, taxes and duties where applicable, and other operating expenses. Each category must be identified according to its economic and accounting nature to avoid inappropriate classification or double counting.

Where selling prices or operating costs are expressed in different currencies, the exchange-rate assumptions are explicitly identified. Any conversion between US dollars and Moroccan dirhams must be based on a documented exchange rate or clearly identified as a simplifying assumption. The financial model also distinguishes between domestic operating costs and costs potentially exposed to foreign-exchange fluctuations.

3.5. Depreciation and Construction of Project Cash Flows

3.5.1. Depreciation Method

Depreciation is calculated using the straight-line method, based on the depreciable value and useful life of the assets.

The equipment investment amounts to MAD 4 billion and is assumed to have a useful life of ten years, resulting in annual depreciation of MAD 400 million when the assets are fully operational. Buildings represent MAD 1 billion, with an estimated useful life of twenty years, corresponding to annual depreciation of MAD 50 million.

Accordingly, total annual depreciation amounts to MAD 450 million under the assumption that all relevant assets are in service for the full year. Given the staggered commissioning of the production lines, the actual depreciation schedule should reflect the dates on which the assets become available for use, where this information is available.

3.5.2. Operating Cash Flow

The construction of project cash flows follows the standard principles of investment appraisal.

The operating cash flow is derived from the project's operating performance after accounting for applicable corporate income tax and adding back non-cash depreciation expenses.
For an unlevered project evaluation, the operating cash flow is calculated as follows:
$$Operating\ Cash\ Flow = EBIT \times (1 - T) + Depreciation$$
Where:

- EBIT represents earnings before interest and taxes;
- T represents the applicable corporate income tax rate;
- Depreciation represents the annual non-cash depreciation expense.

This formulation makes it possible to evaluate the project's operating performance independently of its financing structure.

3.5.3. Working Capital Requirements

Working capital requirements are incorporated into the financial evaluation because they represent funds committed to the operating cycle of the project.
The working capital requirement is estimated using the assumptions documented in the project financial files. In the initial model, it is expressed as a proportion of annual turnover.
The change in working capital between two consecutive periods is calculated as:
$$\Delta WCR_t = WCR_t - WCR_{t-1}$$
An increase in working capital represents a cash outflow, whereas a decrease represents a cash inflow. The initial working capital requirement must also be incorporated into the investment cash flow when it is necessary to support the beginning of operations.
At the end of the evaluation period, the recovery of working capital is included as a terminal cash inflow, provided that the corresponding funds are expected to be recovered.

3.5.4. Capital Expenditures and Free Cash Flow

The project's free cash flow is determined by incorporating operating cash flows, capital expenditures, and changes in working capital.
The general formulation is:
$$FCF_t = EBIT_t \times (1 - T) + Depreciation_t - CAPEX_t - \Delta WCR_t$$
Where:

- FCF_t represents free cash flow in period t;
- $EBIT_t$ represents earnings before interest and taxes;
- T represents the corporate income tax rate;
- $Depreciation_t$ represents depreciation expenses;
- $CAPEX_t$ represents investment expenditures during period t;
- ΔWCR_t represents the change in working capital.

At the end of the project's economic life, the terminal cash flow may include the recovery of working capital and the residual value of assets, where applicable.
The residual value of assets must be distinguished from their remaining book value. In particular, the remaining book value of buildings and other assets does not automatically correspond to their actual disposal or market value. The terminal value used in the financial model must therefore be supported by documented assumptions and adjusted for applicable disposal costs or taxes where relevant.
The final cash flow for the last period is consequently adjusted to include the recoverable working capital and the estimated after-tax residual value of the assets, where these amounts can be established.
This approach ensures that the financial evaluation considers the actual timing and amount of cash flows generated and required by the investment, rather than relying solely on accounting profits.

ISSN: 2658-8455
Volume 7, Issue 13 (2026), pp. 844-876.
© Authors: CC BY-NC-ND
IJAFAME
International Journal of Accounting, Finance, Auditing, Management & Economics

3.6. Taxation and Discount Rate Assumptions

3.6.1. Taxation

Taxation is incorporated into the financial model by distinguishing between operating taxes and duties, where applicable, and corporate income tax.
Any tax or duty included in operating expenses must be supported by the relevant project documentation and clearly identified according to its nature. Corporate income tax is applied separately to the relevant taxable profit in accordance with the tax assumptions retained for the financial projections.
The tax rate must be consistent with the applicable Moroccan tax framework for the periods under consideration. Where the project evaluation covers several fiscal years, the potential impact of changes in the applicable tax regime should be examined.
The model must avoid counting the same tax burden both as an operating expense and as corporate income tax. This distinction is particularly important when calculating earnings before tax, net income, and operating cash flows.

3.6.2. Discount Rate

The discount rate is set at 10% in the initial financial assumptions provided for the project. Since the project is assumed to be financed entirely through equity, this rate should be interpreted as the required return on equity or the internal investment hurdle rate, provided that its level is supported by the company's investment criteria or other relevant documentation.
The discount rate is used to convert future cash flows into present values and to assess whether the expected financial benefits compensate for the capital committed to the project.
The use of a 10% discount rate is therefore treated as a financial assumption that requires explicit justification. It should not automatically be described as the weighted average cost of capital, given the absence of debt financing in the project's stated financing structure.

3.7. Investment Appraisal Methods

The financial profitability of the DAP production project is assessed using several complementary investment appraisal indicators.

3.7.1. Net Present Value

Net Present Value (NPV) measures the difference between the present value of future net cash flows and the present value of investment outflows.
It is calculated as follows:

$$NPV = \Sigma [FCF_t / (1 + r)^t]$$

Where:

- FCF_t represents the free cash flow in period t, including the relevant investment outflows;
- r represents the discount rate;
- t represents the period in which the cash flow occurs.

When the investment is entirely made at time zero, the initial investment can be deducted separately from the present value of future operating cash flows. When investment expenditures occur over several periods, each outflow must instead be discounted according to its actual timing.
A positive NPV indicates that the project is expected to generate a return exceeding the required discount rate under the assumptions retained.

3.7.2. Internal Rate of Return

The Internal Rate of Return (IRR) represents the discount rate at which the NPV equals zero.

It is used to compare the project's expected rate of return with the required rate of return. A project is generally considered financially acceptable when its IRR exceeds the required return, subject to the limitations of the indicator and the structure of the cash flows.

3.7.3. Profitability Index

The Profitability Index (PI) is calculated by dividing the present value of future positive cash flows by the present value of investment outflows.

PI = Present Value of Future Cash Inflows / Present Value of Investment Outflows

A Profitability Index (PI) greater than one indicates that the present value of expected benefits exceeds the present value of the investment costs.

3.7.4. Payback Period

The Payback Period (PP) measures the time required for cumulative undiscounted net cash flows to recover the investment.

It is calculated by identifying the period in which cumulative net cash flows become positive and determining the proportion of the following period required to recover the remaining investment.

3.7.5. Discounted Payback Period

The Discounted Payback Period (DPP) measures the time required for cumulative discounted net cash flows to recover the investment, taking into account the time value of money.

The use of both PP and DPP provides complementary information concerning the speed of capital recovery, with the discounted indicator incorporating the cost of capital.

These indicators provide complementary perspectives on project profitability, value creation, and capital recovery. Their interpretation depends on the consistency of the underlying cash flow projections and the assumptions used in the financial model.

3.8. Sensitivity and Scenario Analysis

Because the financial performance of a large industrial investment project depends on several uncertain variables, the evaluation is complemented by sensitivity and scenario analyses.

3.8.1. Sensitivity Analysis

The sensitivity analysis examines the extent to which changes in key financial assumptions affect the project's NPV and IRR.

The main variables considered are:

- Selling prices;
- Production volumes;
- Operating expenses;
- Initial investment costs;
- Discount rate;
- Exchange rates, where the project is exposed to foreign-currency revenues or expenditures.

Each variable is modified individually while the other assumptions are kept constant. This approach makes it possible to identify the variables that have the greatest influence on the project's financial performance.

For illustrative simulation purposes, the analysis may consider a 10% decrease and increase in selling prices, production volumes, operating expenses, and initial investment costs. The discount rate may also be tested at 8%, 10%, and 12%.

These variations are analytical assumptions designed to examine the sensitivity of the project's financial performance. They do not represent actual OCP forecasts or observed changes in the project's operating conditions.

ISSN: 2658-8455
Volume 7, Issue 13 (2026), pp. 844-876.
© Authors: CC BY-NC-ND
IJAFAME
International Journal of Accounting, Finance, Auditing, Management & Economics

3.8.2. Scenario Analysis

In addition to the individual sensitivity tests, a scenario analysis is used to examine the combined effect of changes in several financial assumptions.
Three scenarios are considered:
Baseline scenario: This scenario uses the initial financial assumptions documented in the project files.
Adverse scenario: This scenario examines the consequences of less favorable operating conditions, such as lower selling prices, reduced production volumes, higher operating expenses, or increased investment costs.
Favorable scenario: This scenario examines the consequences of more favorable conditions, such as higher selling prices, increased production volumes, lower operating expenses, or reduced investment costs.
The assumptions associated with each scenario are clearly specified to ensure consistency and comparability. Each scenario is evaluated using the same financial indicators, particularly NPV and IRR.
The results make it possible to identify the main sources of financial risk and assess the robustness of the project's expected profitability under alternative operating and investment conditions.

3.9. Data Quality, Reliability, Validity, and Research Limitations

The reliability of the financial assessment is supported by the use of internal OCP documentary sources, including financial statements, project files, depreciation schedules, cash flow statements, and financial projections. These documents provide the primary basis for constructing the financial model and assessing the project's expected profitability.
The use of several documentary and field sources also makes it possible to compare information obtained through different collection methods. Questionnaire responses and semi-structured interviews provide additional organizational and managerial context for interpreting the financial information.
The questionnaire data were processed using SPSS, primarily through descriptive statistics and frequency distributions. The pre-test conducted before the questionnaire's administration contributed to the preparation of the survey instrument. However, the convenience sampling approach and the voluntary nature of participation limit the representativeness of the responses. The results are therefore interpreted as indicative perceptions of the respondents rather than as statistically generalizable findings.
The study also has limitations associated with the use of projected financial information. Future revenues, expenses, production levels, and cash flows depend on assumptions that may differ from actual operating conditions. In particular, the assumed production capacity, selling-price progression, operating expense structure, exchange rates, and discount rate may influence the final investment appraisal results.
Furthermore, the financial assessment is specific to the DAP production project at Jorf Lasfar and cannot automatically be generalized to other industrial projects or companies. These limitations are taken into consideration when interpreting the financial indicators and drawing conclusions about the project's expected profitability.

3.10. Ethical Considerations and Confidentiality

The research was conducted with the authorization of OCP Group, which granted access to internal documentary information required for the financial analysis of the DAP production project. The use of these documents was restricted to academic research purposes.

Particular attention was paid to the confidentiality of internal financial and organizational information. Sensitive company data were handled carefully and presented in the study in a manner consistent with the confidentiality requirements associated with the research.
Furthermore, participation in the questionnaire and semi-structured interviews was voluntary. The information collected from respondents was used exclusively for the purposes of this academic study and was not intended to evaluate individual professional performance.
The research therefore sought to balance access to relevant organizational information with the protection of confidential company data and the professional interests of the individuals involved.

4. Evaluation and Parameterization of the Investment Project

Investment financial analysis can be carried out using several evaluation criteria. However, before applying these criteria to make a when making an investment choice, the first step is to determine the project's specific characteristics, particularly its financial parameters. This section is therefore devoted to determining the financial parameters associated with the investment project.

4.1. Determination of the Project Parameters

4.1.1. Project Cost

The initial cost of the project, entitled "DAP Production Lines D, E, and F," includes equipment, technical installations, land, buildings, and other related expenses. The total investment cost amounts to 5,000 MMAD, equivalent to MAD 5,000,000,000. This amount is broken down as follows:

Table 2: Investment Cost of the "DAP Production Lines D, E, and F" Project (in MAD)

Item	Value Excluding Tax (Excl. Tax)	%	Share
Import and Local Procurement	4.000.000.000	80%	4/5
In-house Execution by the Company Itself	1.000.000.000	20%	1/5
Total Project Cost	5.000.000.000	100%	1

Source : Authors

The total investment cost consists of imported and locally procured equipment and materials, representing 80% of the total amount, while the remaining 20% corresponds to activities carried out internally by the company. This breakdown reflects the combination of external procurement and the company's own contribution to project implementation.

4.1.2. Project Life Cycle

Based on the analysis of the expansion investment project, the entity's managers estimated its economic life at 10 years. The overall implementation period of the DAP Production Lines D, E, and F project is estimated at four years. However, this period should be distinguished from the commissioning dates of the individual production lines. According to the information presented in Table 3, Lines D and E were commissioned during the first half of 2024, while Line F was commissioned during the first half of 2025. Therefore, the four-year period refers to the overall implementation of the project and does not represent the commissioning period of all three production lines.

Table 3: Commissioning of the Different Production Lines

LINE D	LINE E	LINE F
S1 2024.	S1 2024.	S1 2025.

Source: Authors

ISSN: 2658-8455
Volume 7, Issue 13 (2026), pp. 844-876.
© Authors: CC BY-NC-ND
IJAFAME
International Journal of Accounting, Finance, Auditing, Management & Economics

4.1.3. Financing Structure

Regarding the financing of this project, the OCP Group relied entirely on equity financing (100%). The following table provides a detailed breakdown:

Table 4: Financing Structure of the DAP Production Lines D, E, and F Project

Financing Method	Amount	%	Share
Equity	5.000.000.000	100	1
Total	5.000.000.000	100	1

Source : Authors

The company fully self-finances the project, covering 100% of its total cost without relying on external financing. This reflects its positive cash position and demonstrates the project's financial soundness in terms of available funding. It also eliminates the need to incur financial expenses.

4.2. Calculation of the Required Components

Before assessing the profitability or feasibility of a project, it is essential to identify and properly determine certain key parameters, such as depreciation schedules, estimated expenses and revenues, and changes in working capital requirements (WCR).

4.2.1. Depreciation Schedules

- ***Depreciation Method***

For the purpose of this financial appraisal, the straight-line depreciation method is adopted for equipment and buildings. This method allocates the depreciable value of each asset evenly over its estimated useful life. The depreciation periods used in the analysis are 10 years for equipment and 20 years for buildings.

- ***Depreciation Schedules***

Land is a non-depreciable asset; therefore, no depreciation expense can be calculated for it.
Materials and equipment:
The total pre-tax (excluding VAT) investment value of the assets depreciable over a 10-year period amounts to MAD 4,000,000,000, equivalent to MAD 4,000 million.
Depreciation period: 10 years.
Depreciation rate: T= (100 / d) = (100 / 10) = 10%
Annual depreciation expense: D = 4,000,000,000 * 10\% = 400,000,000 MAD
The asset’s carrying amount after the first year:
NBV = 4,000,000,000 – 400,000,000 = 3,600,000,000 MAD
The depreciation schedule is therefore presented as follows:

Table 5: Forecast Depreciation Schedule for Equipment and Tools (MAD).

Period	Original Cost	Depreciation Expense	Accumulated Dep.	NBV
1	4.000.000.000	400.000.000	400.000.000	3.600.000.000
2	4.000.000.000	400.000.000	800.000.000	3.200.000.000
3	4.000.000.000	400.000.000	1200.000.000	2.800.000.000
4	4.000.000.000	400.000.000	1600.000.000	2.400.000.000
5	4.000.000.000	400.000.000	2.000.000.000	2.000.000.000
6	4.000.000.000	400.000.000	2400.000.000	1.600.000.000
7	4.000.000.000	400.000.000	2800.000.000	1.200.000.000
8	4.000.000.000	400.000.000	3200.000.000	800.000.000
9	4.000.000.000	400.000.000	3600.000.000	400.000.000
10	4.000.000.000	400.000.000	4.000.000.000	0

Source: Authors

Subsequently, the depreciation schedule for equipment and tools shows that the assets are fully depreciated over their entire useful life, with both the net book value (NBV) and the residual value becoming negligible and reaching zero by the end of the tenth year.

Buildings:

The pre-tax investment value of buildings depreciated over a useful life of 20 years amounts to MAD 1,000,000,000, equivalent to MAD 1,000 million (MMAD).

Buildings have a useful life of 20 years.

The depreciation rate is 5%.

Depreciation Rate = 100 / Useful Life = 100 / 20 = 5%.

Depreciation Expense = Gross Value × Depreciation Rate

Depreciation Expense = 1,000,000,000 × 5% = 50,000,000 MAD.

Net Book Value (NBV) = Gross Value − Accumulated Depreciation

NBV (Year 1) = 1,000,000,000 − 50,000,000 = 950,000,000 MAD.

The depreciation schedule is as follows:

Table 6: Buildings Depreciation Schedule (MAD).

Period	Original Cost	Depreciation Expense	Accumulated Depreciation	Net Book Value (NBV)
1	1,000,000,000	50,000,000	50,000,000	950,000,000
2	1,000,000,000	50,000,000	100,000,000	900,000,000
3	1,000,000,000	50,000,000	150,000,000	850,000,000
4	1,000,000,000	50,000,000	200,000,000	800,000,000
5	1,000,000,000	50,000,000	250,000,000	750,000,000
6	1,000,000,000	50,000,000	300,000,000	700,000,000
7	1,000,000,000	50,000,000	350,000,000	650,000,000
8	1,000,000,000	50,000,000	400,000,000	600,000,000
9	1,000,000,000	50,000,000	450,000,000	550,000,000
10	1,000,000,000	50,000,000	500,000,000	500,000,000

Source : Authors

It can be observed that the net book value (NBV) is not zero but amounts to MAD 500,000,000. This is due to the useful life of the buildings, which is 20 years, whereas our analysis covers a 10-year period.

4.2.2. Estimation of Operating Costs

- ***Estimation of Forecast Revenue***

Revenue Forecast

The estimation of forecast revenue can be based on several methods. For this project, the reference cost method was used to assess whether the benefits generated by the investment would exceed its associated costs. The reference selling price was established based on the OCP Group's experience and marketing studies, taking into account annual average prices, seasonal factors, increased operating capacity, and the diversity of production types.

The DAP Production Lines D, E, and F project uses efficient and innovative technology, enabling it to achieve an annual production capacity of 1 million tonnes (1 MT). For the purpose of this financial appraisal, the company is assumed to operate at full capacity from the first year, with annual production maintained at 1 MT throughout the ten-year projection period.

Furthermore, the selling price is assumed to increase by a fixed amount of MAD 250 per tonne each year, starting from MAD 5,000 per tonne in the first year. This corresponds to an annual increase equivalent to 5% of the initial selling price. It is important to clarify that this is a fixed annual increase and not a compounded growth rate.

Accordingly, the projected annual selling prices and revenues over the ten-year period are presented in Tables 7 and 8, respectively.

ISSN: 2658-8455
Volume 7, Issue 13 (2026), pp. 844-876.
© Authors: CC BY-NC-ND
IJAFAME
International Journal of Accounting, Finance, Auditing, Management & Economics

Table 7: Forecast Increase in the Selling Price Over a 10-Year Period.

Period	Cumulative Increase Relative to the Initial Selling Price	Selling Price (USD)	Selling Price (MAD)
1	0%	500	5,000
2	5%	525	5,250
3	10%	550	5,500
4	15%	575	5,750
5	20%	600	6,000
6	25%	625	6,250
7	30%	650	6,500
8	35%	675	6,750
9	40%	700	7,000
10	45%	725	7,250

Source : Authors

Table 8: Forecast Revenue Over a 10-Year Period.

Year	Revenue Growth Rate	Production Capacity (T)	Unit Selling Price (MAD)	Revenue (MAD)
1	0%	1,000,000	5,000	5,000,000,000
2	5%	1,000,000	5,250	5,250,000,000
3	10%	1,000,000	5,500	5,500,000,000
4	15%	1,000,000	5,750	5,750,000,000
5	20%	1,000,000	6,000	6,000,000,000
6	25%	1,000,000	6,250	6,250,000,000
7	30%	1,000,000	6,500	6,500,000,000
8	35%	1,000,000	6,750	6,750,000,000
9	40%	1,000,000	7,000	7,000,000,000
10	45%	1,000,000	7,250	7,250,000,000

Source : Authors

The annual revenue forecasts for the investment project are significant from the very first year of operation. This is due, on the one hand, to the diversity of its production outputs and, on the other hand, to the improvement in production capacity. The company is expected to achieve a maximum annual operating revenue of MAD 7,250,000,000 over the 10-year forecast period. The annual increase in the selling price generates a steady growth in revenue from one year to the next, reaching its highest level in the tenth year, with total revenue amounting to MAD 7,250,000,000.
The following table summarizes all the revenues expected to be generated by this project:

Table 9: Total Forecast Revenue (MMAD).

Items (MAD)	Year									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Revenue	5.000	5.250	5.500	5.750	6.000	6.250	6.500	6.750	7.000	7.250
Service Revenue	-	-	-	-	-	-	-	-	-	-
Change in Inventories	-	-	-	-	-	-	-	-	-	-
Other Operating Income	-	-	-	-	-	-	-	-	-	-
Financial Income	-	-	-	-	-	-	-	-	-	-
Total Revenue	5.000	5.250	5.500	5.750	6.000	6.250	6.500	6.750	7.000	7.250

Source : Authors

- ***Forecast Operating Expenses***

Forecast expenditure represents an approximate estimate of the expenses to be incurred.
The project's operating expenses are broken down in detail as follows:

- ✓ Estimated Raw Materials and Supplies.
- ✓ Estimated Personnel Expenses.
- ✓ Estimated Taxes and Duties.
- ✓ Estimated Other Expenses (Insurance, Customs Duties, Transportation Costs, etc.).

✓ Forecast External Services Expenses.

Table 10: Estimated Total Project Costs.

Year	Total Expense Growth Rate	Forecast Total Expenses (MMAD)
1	0%	3,950
2	5%	4,147.5
3	10%	4,345
4	15%	4,542.5
5	20%	4,740
6	25%	4,937.5
7	30%	5,135
8	35%	5,332.5
9	40%	5,530
10	45%	5,727.5

Source : Authors

Table 11: Detailed Forecast of Project Expenses (MMAD)

Costs	Year				
	1	**2**	**3**	**4**	**5**
Raw Materials and Supplies (35% of Revenue)	1,750	1,837.5	1,925	2,012.5	2,100
External Services (3% of Revenue)	150	157.5	165	172.5	180
Personnel Expenses (8% of Revenue)	400	420	440	460	480
Taxes and Duties (30% of Revenue)	1,500	1,575	1,650	1,725	1,800
Other Expenses (3% of Revenue)	150	157.5	165	172.5	180
Financial Expenses (0% of Revenue)	–	–	–	–	–
Total Expenses	3,950	4,147.5	4,345	4,542.5	4,740
Costs	**6**	**7**	**8**	**9**	**10**
Raw Materials and Supplies (35% of Revenue)	2,187.5	2,275	2,362.5	2,450	2,537.5
External Services (3% of Revenue)	187.5	195	202.5	210	217.5
Personnel Expenses (8% of Revenue)	500	520	540	560	580
Taxes and Duties (30% of Revenue)	1,875	1,950	2,025	2,100	2,175
Other Expenses (3% of Revenue)	187.5	195	202.5	210	217.5
Financial Expenses (0% of Revenue)	–	–	–	–	–
Total Expenses	4,937.5	5,135	5,332.5	5,530	5,727.5

Source : Authors

The overall increase in revenue and its evolution over time directly result in a rise in expenses, namely forecast operating costs. These expenses are projected to rise by 5% annually throughout the 10-year forecast period.

4.2.3. Forecast Net Income

Table 12: Forecast Net Income from the Investment Project (MMAD)

Items (MMAD)	Year									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Total Revenue	5,000	5,250	5,500	5,750	6,000	6,250	6,500	6,750	7,000	7,250
Total Expenses	3,950	4,147.5	4,345	4,542.5	4,740	4,937.5	5,135	5,332.5	5,530	5,727.5
EBITDA (EBE)	1,050	1,102.5	1,155	1,207.5	1,260	1,312.5	1,365	1,417.5	1,470	1,522.5
Depreciation	450	450	450	450	450	450	450	450	450	450
Pre-Tax Profit	600	652.5	705	757.5	810	862.5	915	967.5	1,020	1,072.5
Tax (30%)	180	195.75	211.5	227.25	243	258.75	274.5	290.25	306	321.75
Net Income	420	456.75	493.5	530.25	567	603.75	640.5	677.25	714	750.75

Source : Authors

ISSN: 2658-8455
Volume 7, Issue 13 (2026), pp. 844-876.
© Authors: CC BY-NC-ND
IJAFAME
International Journal of Accounting, Finance, Auditing, Management & Economics

It can be observed that net income is positive from the first year of operation, indicating that the investment generates a profit from the outset. This demonstrates the project's promising financial performance. Furthermore, net income shows a steady and significant increase over the forecast period.

4.2.4. Calculation of Operating Cash Flow Before WCR Changes from Operations (CFO)

The estimated cash flow from operations (CFO) over a 10-year period is presented as follows:

Table 13: Operating Cash Flow Before Changes in Working Capital (MMAD).

Items (MMAD)	Year									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Net Income	420	456.75	493.5	530.25	567	603.75	640.5	677.25	714	750.75
Depreciation	450	450	450	450	450	450	450	450	450	450
Cach Flow	870	906.75	943.5	980.25	1,017	1,053.75	1,090.5	1,127.25	1,164	1,200.75

Source : Authors

It can be observed that the company's cash flow (CAF) remains positive throughout the entire operating period and increases in line with revenue growth, reflecting a continuous improvement in its self-financing capacity.

4.2.5. Working Capital Requirements (WCR)

The operating forecasts indicate that the working capital requirement (WCR) represents 5% of revenue.
Where: ΔWCR = WCR (n) – WCR (n-1)

Table 14: Calculation of Project Working Capital Requirements (WCR) and Their Variations.

Year	Revenue	WCR (5% of Revenue)	ΔWCR
1	5,000	250	250
2	5,250	262.5	12.5
3	5,500	275	12.5
4	5,750	287.5	12.5
5	6,000	300	12.5
6	6,250	312.5	12.5
7	6,500	325	12.5
8	6,750	337.5	12.5
9	7,000	350	12.5
10	7,250	362.5	12.5

Source : Authors

The working capital requirement (WCR) is estimated at 5% of annual revenue. Since annual revenue increases by MAD 250 million each year, the corresponding annual increase in WCR amounts to MAD 12.5 million (12.5 MMAD). This represents the annual change in WCR, rather than a 5% increase in the WCR itself.

5. Application of Investment Appraisal Criteria

After analysing the forecast operating activities of the project, we will apply various financial analysis methods to assess its profitability. In other words, since all the financial and non-financial indicators of the project have been identified and quantified, it is now possible to evaluate its financial profitability using specific methods and techniques, which will be discussed in this section. Before proceeding with the evaluation, it is necessary to calculate the cumulative cash flows, both undiscounted and discounted. According to the project manager, the discount rate used by the company is 10%.

5.1. Calculation of Net Cash Flows

After estimating the various operating expenses of the project, we will proceed to determine its cash flows. Since our analysis covers a 10-year period, it is sufficient to calculate the cash flows for these first ten years. The following table presents the results of these calculations:
Net Cash Flows = Total Cash Receipts– Total Cash Payments

Table 15: Calculation of Cash Flows

	Years									
(MMAD)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Net Income	620	894.25	931	967.75	1004.5	1041.25	1078	1114.75	1551.5	1188.25
Depreciation	250	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
Cash-Flow	870	906,75	943,5	980,25	1 017	1 053,75	1 090,5	1 127,25	1 164	1 200,75

Source : Authors

Based on the cash flows, the project is profitable from the first year, as it generates positive cash flows throughout the remaining period. This indicates a continuous improvement in cash flow over the entire project life.

5.1.2. Discounting Cash Flows

To determine the cash flows, we assume that they do not include any financial expenses. The discount rate adopted by the OCP Group is 10% over a 10-year period.

Table 16: Sum of Discounted Cash Flows (MMAD)

Year	**CF**	**Discount Factor 10%**	**Discounted CF**	**Cumulative Discounted CF**
1	870	0.909090909	790.909	790.909
2	906,75	0.826446281	749.380	1 540 289
3	943,5	0.751314801	708.866	2 249 155
4	980,25	0.683013455	669.524	2 918 679
5	1 017	0.620921323	631.477	3 550 156
6	1 053,75	0.564473935	594.814	4 144 970
7	1 090,5	0.513158118	559.599	4 704 569
8	1 127,25	0.466507385	525.870	5 230 439
9	1 164	0.424097618	493.650	5 724 089
10	1 200,75	0.385543289	462.941	6 187 030

Source : Authors

Using a discount rate of 10%, the discount factor is calculated as follows: $1 / (1 + 0.10)^{n}$
Where n represents the number of years elapsed.

5.2. Project Profitability Analysis

The purpose of profitability assessment is to determine whether the investment undertaken by the company is financially worthwhile. To this end, we consider it essential to conduct both a financial analysis of the project. The objective of this analysis is not to predict the project's future profitability with certainty, but rather to assess its estimated level of profitability and rank investment projects against one another. This comparison is based on the assumption that the same working assumptions have been applied to all similar projects. The classification of investment appraisal criteria depends on the perspective of each stakeholder. However, the most common and widely used approach distinguishes between methods based on whether cash flows are discounted or not. The main investment appraisal criteria considered are generally as follows:

- ✓ Traditional (or non-discounted) methods: These methods do not take into account the discounting of financial flows.
- ✓ Financial methods: These methods are based on discounting cash flows.

ISSN: 2658-8455
Volume 7, Issue 13 (2026), pp. 844-876.
© Authors: CC BY-NC-ND
IJAFAME
International Journal of Accounting, Finance, Auditing, Management & Economics

5.2.1. Non-Discounted Investment Appraisal Criteria

These methods do not take into account the time value of money or the discounting factor. They include two criteria that are among the most widely used.

- ***Average Accounting Rate of Return (AARR)***

AARR = Average Profit / Average Capital Invested
AARR = [Σ Bt / n] / [(I + RV) / 2]
By substituting the values into the formula, we obtain:
Average Profit =
[420,000,000 + 456,750,000 + 493,500,000 + 530,250,000 + 567,000,000 + 603,750,000 + 640,500,000 + 677,250,000 + 714,000,000 + 750,750,000] / 10
Average Profit = 585,375,000 MAD
Where:

- I = Initial Investment = 5,000,000,000 MAD
- RV = Residual Value = 500,000,000 MAD

Therefore:
Average Capital Invested (ACI) = (5,000,000,000 + 500,000,000) / 2
ACI = 2,750,000,000 MAD
Consequently:
AARR = 585,375,000 / 2,750,000,000
AARR = 0.21286 = 21.29%
The Average Accounting Rate of Return (AARR), defined as the average annual net profit divided by the average capital invested over the project's economic life, is approximately 21.29%. This calculation takes into account the estimated residual book value of the buildings after ten years of depreciation.

- ***Simple Payback Period (PP)***

It refers to the period required for the cumulative undiscounted cash flows to equal the initial investment amount. Generally, the shorter this period, the more attractive the project is considered to be.

Table 17: Cumulative Undiscounted Cash Flows

Year	Cash-Flow (MAD)	Cumulative Undiscounted Cash Flows (MAD)
1	870,000,000	870,000,000
2	906,750,000	1,776,750,000
3	943,500,000	2,720,250,000
4	980,250,000	3,700,500,000
5	1,017,000,000	4,717,500,000
6	1,053,750,000	5,771,250,000
7	1,090,500,000	6,861,750,000
8	1,127,250,000	7,989,000,000
9	1,164,000,000	9,153,000,000
10	1,200,750,000	10,353,750,000

Source : Authors

It is determined using the following formula:
Payback Period (PP) = Year of the lower cumulative cash flow + [(Initial Investment − Lower Cumulative Cash Flow) / (Higher Cumulative Cash Flow − Lower Cumulative Cash Flow)]
By substituting the values into the equation, we obtain:
PP = 5 + [(5,000,000,000 − 4,717,500,000) / (5,771,250,000 − 4,717,500,000)]
PP= 5.27 years.
5.27 years.

Therefore, the initial investment is recovered after approximately 5 years and 3 months. This result indicates that the project recovers its initial investment before the end of its 10-year economic life.

Table 18: Summary of the Investment Appraisal Results (AARR and Payback Period)

Indicator	**Result**
Average Accounting Rate of Return (AARR)	21.29%
PP	5 years and 3 months

Source : Authors

The Payback Period (PP) is approximately 5 years and 3 months, representing the time required for cumulative undiscounted cash flows to recover the initial investment.

5.2.2. Discounted Investment Appraisal Criteria

After measuring the cash flows over the specified period, the next step is to calculate the profitability indicators selected following an analysis of their advantages and usefulness. These methods take into account the time value of money and the discounting factor. They include four main criteria:

- ***Net Present Value (NPV)***

After determining the present value of cash flows and the total amount of invested capital, we calculate the NPV. The NPV represents the difference between the discounted cash flows generated over the investment's life cycle and the initial investment.
Mathematical formula: $NPV = -I_0 + \Sigma\ Discounted\ Cash\ Flows$

Table 19: Net Present Value (NPV) Calculation for the Investment Project

Description	**Amount (MAD)**
Sum of Discounted Cash Flows	6,187,030,204.66
Initial Investment (I_0)	5,000,000,000
Net Present Value (NPV)	**1,187,030,204.66**

Source : Authors

The findings indicate that the DAP D, E, and F investment project presents a positive but moderate level of financial attractiveness. The positive NPV and the Profitability Index above one support the project's financial viability under the assumptions adopted. However, these results do not establish that the project has a low level of investment risk, since no formal risk assessment was conducted.

- ***Profitability Index (PI)***

While the NPV measures the net benefit arising from the capital expenditure project, the Profitability Index (PI) measures its relative profitability, that is, the benefit generated for each dirham invested. Indeed, it is calculated by dividing the total discounted cash flows by the initial investment cost. This indicator complements the NPV criterion.
Mathematical formula: $PI = 1 + (NPV / I_0)$

Table 20: Summary of Key Investment Appraisal Indicators (NPV and PI)

Description	**Value**
Initial Investment (I_0)	5,000,000,000 MAD
Net Present Value (NPV)	1,187,030,204.66 MAD
Profitability Index (PI)	1.2374

Source : Authors

By substituting the values into the equation, we obtain:
PI = 1+ 1 187 030 204,66/ 5000 000 000= 1,237406041
The project generates a Profitability Index (PI) of 1.237406041. In other words, each dirham invested generates MAD 0.237406041 in additional value, in addition to recovering the initial

ISSN: 2658-8455
Volume 7, Issue 13 (2026), pp. 844-876.
© Authors: CC BY-NC-ND
IJAFAME
International Journal of Accounting, Finance, Auditing, Management & Economics

dirham invested. Since the PI exceeds 1, indicating that the project is financially viable and value-generating. This indicator confirms the project's financial viability and supports the investment decision.

- ***Internal Rate of Return (IRR)***

The Internal Rate of Return (IRR) is the discount rate at which the Net Present Value (NPV) of an investment project equals zero. In other words, it represents the rate at which the present value of future cash flows is equal to the initial investment.
Mathematical formula:
NPV = 0
Therefore:
$I_0 = \Sigma [CF_t / (1 + IRR)^t]$
where I_0 represents the initial investment and CF_t represents the net cash flow in period t.
The IRR is determined through successive calculations using different discount rates until the NPV approaches zero.

Table 21: Successive Trials for Calculating the Internal Rate of Return (IRR)

Discount Rate	NPV (MMAD)
10%	1 187,03
14%	199,17
15%	−9,68
16%	−205,62
17%	−389,66

Source : Authors

Based on these calculations, the NPV changes from positive to negative between 14% and 15%. Consequently, the IRR is approximately 14.95%.
Using linear interpolation:
$IRR = 14\% + [NPV_1 / (NPV_1 - NPV_2)] \times (15\% - 14\%)$
The estimated IRR is therefore approximately 14.95%.
Since the IRR exceeds the assumed discount rate of 10%, the project appears financially viable under the projected cash flow assumptions. This indicates that the expected return exceeds the required rate of return. However, this conclusion remains dependent on the reliability of the projected cash flows and the underlying investment assumptions.

Table 22: Cumulative Discounted Cash Flows

Year	Cumulative Discounted Cash Flows (MAD)
1	790,909,090.91
2	1,540,289,256.20
3	2,249,154,770.85
4	2.918.678.710,47
5	3.550.155.696.02
6	4.144.970.099.82
7	4.704.569.027,75
8	5.230.439.472,09
9	5.724.089.099,87
10	6.187.030.204,66

Source : Authors

During the 8th year, the cumulative discounted cash flows exceed the total initial investment of MAD 5,000,000,000. Linear interpolation is therefore used to determine the exact Discounted Payback Period (DPP).
The Discounted Payback Period represents the time required for cumulative discounted cash flows to equal the initial investment.

The mathematical formula for calculating the DPP is as follows:

DPP = Year of the lower cumulative cash flow + [(Initial Investment − Lower Cumulative Cash Flow) / (Higher Cumulative Cash Flow − Lower Cumulative Cash Flow)]

By substituting the values into the formula, we obtain:

DPP = 7 + [(5,000,000,000 − 4,704,569,027.75) / (5,230,439,472.09 − 4,704,569,027.75)]

DPP = 7.561794209 years.

The calculated Discounted Payback Period (DPP) is 7.56 years, which is shorter than the project's 10-year operating life. This indicates that, under the assumptions considered, the discounted cash flows are expected to recover the initial investment before the end of the project's operating period. However, this result should be interpreted with caution, as the final DPP must be recalculated after incorporating changes in working capital requirements. Furthermore, the DPP should be considered alongside the other investment appraisal indicators to provide a more comprehensive assessment of the project's financial viability.

Table 23: Summary of the Investment Project's Financial Performance Indicators (NPV, PI, IRR and DPP)

Indicator	**Result**
Net Present Value (NPV)	1.187.030.204.66 MAD
PI	1.237406041
IRR	14.95%
DPP	7.561794209 years

Source : Authors

NPV > 0: This means that the investment is profitable. It represents the additional value generated by the investment after recovering the initial capital invested.

PI = 1.237406041: This means that each dirham invested generates an additional return of approximately MAD 0.237406041, in addition to recovering the initial dirham invested. Since the PI is greater than 1, the investment is financially viable.

IRR > 10%: The IRR is higher than the discount rate of 10%. It corresponds to the discount rate at which the NPV becomes zero and the initial investment is fully recovered.

DPP ≈ 7.561794209 years: This represents the period required for cumulative discounted cash flows to equal the total initial investment.

6. Discussion

The preliminary investment appraisal results suggest that the DAP D, E, and F project may be financially viable under the assumptions considered. However, the final assessment remains subject to the integration of working capital requirements and the verification of the investment disbursement schedule.

We also focused on the process through which the profitability of an investment project is assessed. First, we considered forecasts of raw material purchases, cash flows over a 10-year period, as well as other quantitative and qualitative information that enabled us to conduct a comprehensive analysis. Based on these elements, we calculated two categories of profitability indicators: those based on discounting cash flows and those that do not take discounting into account.

Each of these indicators has its own characteristics and specific features. Their selection was not arbitrary; rather, they were chosen according to their relevance and importance. They do not necessarily produce the same rankings or results for every project, due to differences in the factors considered when calculating each criterion. Indeed, each indicator takes into account certain elements that may have been overlooked by other criteria.

The findings can also be discussed in relation to previous research on investment appraisal and capital budgeting. Paseda (2020) highlights the importance of discounted cash flow methods, particularly the Net Present Value (NPV), while recognising the complementary role of other

ISSN: 2658-8455
Volume 7, Issue 13 (2026), pp. 844-876.
© Authors: CC BY-NC-ND
IJAFAME
International Journal of Accounting, Finance, Auditing, Management & Economics

investment appraisal techniques. Similarly, Sokolov (2024) examines the relationship between NPV, IRR, the Profitability Index, and payback methods, showing that these indicators capture different dimensions of investment project evaluation. This supports the use of several complementary criteria in the present study rather than relying on a single indicator.

A comparison with major companies in the phosphate fertilizer industry also provides useful operational context. OCP's 2024 financial reporting highlights its large-scale investment programme and the commissioning of a fertilizer production line at the Jorf Lasfar complex with a capacity equivalent to one million tonnes of DAP. Ma'aden reported phosphate fertilizer production of 6.2 million tonnes in 2024, while Mosaic reported progress in reducing phosphate production costs and improving operational efficiency. These examples underline the importance of production capacity, cost management, and operational efficiency in the competitiveness of phosphate fertilizer producers.

Nevertheless, the financial performance indicators reported by these companies cannot be directly compared with the NPV, IRR, and Profitability Index calculated for the DAP D, E, and F project, because they relate to different activities, investment periods, scales, and accounting scopes. The present study therefore provides a project-level assessment of a specific OCP investment, while the information published by OCP, Ma'aden, and Mosaic serves as broader industry context.

The discount rate should be determined according to the project's financing conditions and risk profile. It should not be adjusted solely to obtain a higher Net Present Value. In addition, regular monitoring of operating costs, investment implementation, and expected cash flows is recommended to improve the reliability of investment decisions.

6.1. Assessment of Research Hypotheses

The research hypotheses are assessed using the investment appraisal indicators applied to the DAP D, E, and F project.

H1: The project generates value when its expected return exceeds the cost of capital.

This hypothesis is assessed using the Net Present Value (NPV). A positive NPV at the 10% discount rate indicates that the project's expected cash flows exceed the initial investment and the required return. Therefore, H1 is supported if the final recalculated NPV remains positive.

H2: The project's expected internal rate of return exceeds its cost of capital.

This hypothesis is assessed by comparing the Internal Rate of Return (IRR) with the 10% discount rate. H2 is supported if the final recalculated IRR exceeds 10%.

H3: The project generates value relative to the initial investment.

This hypothesis is assessed using the Profitability Index (PI). A value greater than one indicates that the present value of expected cash inflows exceeds the initial investment. H3 is supported if the recalculated index remains above one.

Overall, the hypotheses are evaluated according to the results of the financial appraisal, rather than being accepted solely on the basis of the project's expected performance.

6.2. Interpretation of Questionnaire and Interview Findings

The questionnaire and semi-structured interviews were conducted to complement the financial evaluation of the DAP D, E, and F project with insights from OCP employees and managers involved in or familiar with investment activities. The questionnaire was distributed to 335 engineers and project managers at the Jorf Lasfar site, and 64 responses were received, representing a response rate of approximately 19.1%. The survey included closed-ended and open-ended questions, including Likert-scale items, and the responses were analysed using descriptive statistics.

The questionnaire findings are intended to provide additional insight into employees' perceptions of investment planning, cost control, budget monitoring, and project performance.

The interviews with managers and representatives from the relevant departments provide complementary qualitative information on the project's implementation and financial management.
These qualitative and descriptive findings complement the financial indicators by providing organisational context for interpreting the estimated profitability of the project. However, given the voluntary convenience sampling method and the response rate, the questionnaire results should be interpreted as the perceptions of the respondents rather than as representative findings for all OCP employees. Furthermore, these findings do not replace the financial appraisal or constitute an independent measurement of the project's investment risk.

6.3. Research Limitations

Despite its contributions, this study has several limitations that should be acknowledged. First, the financial evaluation relies on deterministic forecasts of revenues, operating costs, and cash flows over a ten-year period. These projections are based on assumptions that may differ from actual operating conditions. Consequently, changes in production levels, input costs, selling prices, or project implementation schedules could affect the estimated financial indicators.
Second, the project's expected revenues are partly dependent on DAP selling prices, which may fluctuate according to international market conditions. The study does not include a comprehensive sensitivity or scenario analysis to measure the impact of such fluctuations on the project's financial performance.
Third, the research focuses on a single investment project within OCP Group, namely the DAP D, E, and F production lines at Jorf Lasfar. Therefore, its findings cannot automatically be generalised to other investment projects, companies, or industrial contexts.
Fourth, the financial analysis relies partly on internal company documents and information made available for academic research purposes. Although these documents provided valuable information for the evaluation, their confidential nature limits the possibility of independently disclosing and verifying all underlying data.
Finally, the questionnaire was based on voluntary convenience sampling, with 64 responses out of 335 potential participants. Therefore, the findings reflect the perceptions of the respondents and should not be considered representative of the entire workforce. The qualitative interviews also provide complementary insights but do not constitute a comprehensive assessment of all stakeholders.
These limitations should be considered when interpreting the findings. Future research could address them by incorporating sensitivity and scenario analyses, examining several investment projects, and using additional data to assess the robustness of financial projections.

7. Conclusion

This study aimed to evaluate the financial viability of the DAP D, E, and F investment project implemented by OCP Group at the Jorf Lasfar complex. The main objective was to examine whether the expected financial returns generated by the project justify the initial investment and meet the required return on invested capital.
The financial evaluation was conducted using several complementary investment appraisal criteria, including the Net Present Value (NPV), Internal Rate of Return (IRR), Profitability Index (PI), Simple Payback Period (PP), and Discounted Payback Period (DPP). Based on the assumptions adopted, the project initially presents a positive financial outlook. However, the final assessment must rely on the corrected cash flow projections and recalculated investment indicators.
The results indicate that the project's financial attractiveness should be assessed through a combination of investment appraisal methods rather than through a single criterion. In particular, the NPV measures the value created beyond the required return, while the IRR

ISSN: 2658-8455
Volume 7, Issue 13 (2026), pp. 844-876.
© Authors: CC BY-NC-ND
IJAFAME
International Journal of Accounting, Finance, Auditing, Management & Economics

evaluates the project's expected rate of return relative to the discount rate. The PI provides an indication of value generated per unit of initial investment, whereas the PP and DPP measure the time required to recover the initial investment, with and without discounting, respectively.
Regarding the research hypotheses, H1 is supported if the final recalculated NPV remains positive. H2 is supported if the final IRR exceeds the 10% discount rate. H3 is supported if the final PI remains greater than one. These conclusions must be based on the final verified financial results.
From a managerial perspective, the findings highlight the importance of reliable investment planning, regular monitoring of project implementation, and continuous review of operating costs and expected cash flows. The discount rate should reflect the project's financing conditions and risk profile and should not be adjusted merely to obtain a more favourable NPV. In addition, investment decisions should be supported by appropriate risk assessment and sensitivity analysis.
From a theoretical perspective, this study contributes to the literature on investment appraisal by illustrating the application of complementary financial evaluation methods to a large-scale industrial investment project in the Moroccan phosphate fertilizer industry. It also highlights the importance of combining quantitative financial indicators with organisational insights obtained through questionnaires and semi-structured interviews.
Despite these contributions, the study has several limitations. It focuses on a single investment project and relies on deterministic financial forecasts that may differ from actual operating conditions. The expected financial performance is also sensitive to changes in DAP selling prices, production costs, and other market conditions. Furthermore, the confidential nature of some internal company documents limits the possibility of independently verifying all underlying financial information. The questionnaire findings are also subject to the limitations of voluntary convenience sampling.
Future research could address these limitations by conducting sensitivity and scenario analyses, applying Monte Carlo simulations, and examining the impact of price and foreign exchange fluctuations on project profitability. Further studies could also incorporate real options analysis, multicriteria investment appraisal, environmental, social and governance (ESG) criteria, and water-related considerations. Finally, comparisons involving several investment projects or companies in the phosphate fertilizer industry could provide a broader understanding of investment performance.
Overall, this study provides a project-level financial assessment of the DAP D, E, and F investment project. Its conclusions should be interpreted in light of the financial assumptions adopted, the final recalculated indicators, and the limitations of the research.

References:

(1). Abel, A. B., Dixit, A. K., Eberly, J. C., & Pindyck, R. S. (1996). Options, the value of capital, and investment. *The Quarterly Journal of Economics*, *111*(3), 753–777. https://doi.org/10.2307/2946671

(2). Agence Marocaine de Développement des Investissements. (n.d.). *Investir au Maroc*. Retrieved November 15, 2026, from http://www.invest.gov.ma/?lang=fr&Id=21

(3). Autorité Marocaine du Marché des Capitaux. (2026). *Document de référence relatif à l'exercice 2025 : OCP S.A.* (Enregistrement n° EN/EM/007/2026). https://www.ammc.ma/sites/default/files/DR_OCP_007_2026_1.pdf

(4). Dixit, A. K., & Pindyck, R. S. (1994). *Investment under uncertainty*. Princeton University Press.

(5). Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of Management Review*, *14*(4), 532–550. https://doi.org/10.2307/258557

(6). Fama, E. F., & French, K. R. (1999). The corporate cost of capital and the return on corporate investment. *The Journal of Finance*, *54*(6), 1939–1967. https://doi.org/10.1111/0022-1082.00178

(7). Flyvbjerg, B., Holm, M. S., & Buhl, S. (2002). Underestimating costs in public works projects: Error or lie? *Journal of the American Planning Association*, *68*(3), 279–295. https://doi.org/10.1080/01944360208976273

(8). Graham, J. R., & Harvey, C. R. (2001). The theory and practice of corporate finance: Evidence from the field. *Journal of Financial Economics*, *60*(2–3), 187–243. https://doi.org/10.1016/S0304-405X(01)00044-7

(9). Hazen, G. B. (2003). A new perspective on multiple internal rates of return. *The Engineering Economist*, *48*(1), 31–51. https://doi.org/10.1080/00137910308965050

(10). Kengatharan, L., & Nurullah, M. (2018). Capital investment appraisal practices in the emerging market economy of Sri Lanka. *Asian Journal of Business and Accounting*, *11*(2), 121–150. https://doi.org/10.22452/ajba.vol11no2.4

(11). Kerzner, H. (2017). *Project management: A systems approach to planning, scheduling, and controlling* (12th ed.). John Wiley & Sons.

(12). Ma'aden. (2025). *Annual report 2024*. Saudi Arabian Mining Company. https://www.maaden.com.sa/

(13). Mankiw, N. G. (2021). *Principles of economics* (9th ed.). Cengage Learning.

(14). Markowitz, H. M. (1952). Portfolio selection. *The Journal of Finance*, *7*(1), 77–91. https://doi.org/10.1111/j.1540-6261.1952.tb01525.x

(15). Modigliani, F., & Miller, M. H. (1958). The cost of capital, corporation finance and the theory of investment. *The American Economic Review*, *48*(3), 261–297. [suspicious link removed]

(16). Mottaleb, K. A., Meerza, S. I. A., & Rahman, S. M. (2026). *Analyzing fertilizer price interlinkages in the global market* (ADBI Working Paper No. 1529). Asian Development Bank Institute. https://doi.org/10.56506/YTKJ3341

(17). OCP Group. (2025a). *Consolidated financial statements at 31 December 2024*. https://www.ocpgroup.ma/

(18). OCP Group. (2025b). *Investor case*. https://www.ocpgroup.ma/

(19). Paseda, O. (2020). A review of capital budgeting techniques. *Issues in Social Science*, *8*(2), 32–61. https://doi.org/10.5296/iss.v8i2.18034

ISSN: 2658-8455
Volume 7, Issue 13 (2026), pp. 844-876.
© Authors: CC BY-NC-ND

(20). Ross, S. A. (1995). Uses, abuses, and alternatives to the net-present-value rule. *Financial Management*, *24*(3), 96–102. https://doi.org/10.2307/3665561

(21). Siziba, S., & Hall, J. H. (2021). The evolution of the application of capital budgeting techniques in enterprises. *Global Finance Journal*, *47*, Article 100504. https://doi.org/10.1016/j.gfj.2019.100504

(22). Sokolov, M. V. (2024). NPV, IRR, PI, PP, and DPP: A unified view. *Journal of Mathematical Economics*, *114*, Article 102992. https://doi.org/10.1016/j.jmateco.2024.102992

(23). The Mosaic Company. (2024). *Q2 2024 earnings presentation*. https://investors.mosaicco.com/

(24). U.S. Geological Survey. (2026). *Mineral commodity summaries 2026*. U.S. Department of the Interior. https://doi.org/10.3133/mcs2026

(25). World Bank. (2026). *Commodity markets outlook: April 2026*. World Bank Group. https://doi.org/10.1596/44610

(26). Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). SAGE Publications.