

Modelling Cost Management and Analysis for Agricultural Start-Ups to Support Crowdfunding Decisions: A Proposed Model in the Algerian Context

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Abstract

Agricultural start-ups support agricultural development and create new economic opportunities, but they face challenges relating to financing, cost and risk management, and the availability of accurate information. This study therefore aimed to develop a model for managing and analysing the costs of agricultural start-ups in accordance with crowdfunding requirements. It was based on the premise that the principal problem facing these projects lies not only in limited financing sources but, more fundamentally, in the absence of an integrated system for continuously producing, analysing, and updating sufficiently accurate financial and operational information to reduce uncertainty and support investment decisions. Using a descriptive and analytical approach, the study drew on successful international experiences to identify crowdfunding success factors and propose an integrated model combining cost management, risk management, staged financing, and continuous digital monitoring. The analytical assessment indicated that the proposed model could improve cost estimation accuracy, forecasting of financing needs, transparency, and monitoring, while narrowing the information gap and linking financing decisions to actual project performance. The assessment also indicated the model's potential adaptability to agricultural start-ups in the Algerian context, although field testing remains necessary to assess its effectiveness more precisely and inform further development.

Keywords: agricultural start-ups, cost management and analysis, crowdfunding, risk management, financing decisions

JEL classification: M13, G23, D81, G32, Q14, O55.

Introduction

Agricultural start-ups contribute to economic development, strengthen food security, and promote economic diversification, particularly in developing countries seeking to expand their productive capacities and encourage investment based on innovation and technology. In Algeria, these projects have become increasingly important amid efforts to develop the agricultural sector, improve the efficiency of natural resource use, and support modern investment initiatives. However, investment opportunities alone are insufficient to enable these projects to achieve their economic

objectives. Their success also depends on their ability to secure the necessary financing and manage their resources efficiently.

Agricultural start-ups face a range of challenges associated with high levels of risk, inadequate specialised databases, and difficulties in estimating future costs and revenues, as well as limited access to conventional sources of finance. These challenges result in inadequate guarantees and heightened uncertainty, limiting investors' ability to make informed and effective financing decisions (Qattaf Kharkhashi & Azzi, 2025, p. 275).

In this context, crowdfunding has emerged as a modern financing mechanism that mobilises financial resources through digital platforms and offers start-ups a more flexible alternative to conventional sources of finance. Nevertheless, the success of this financing mechanism does not depend solely on the availability of financial resources; it also requires a coherent system capable of producing, analysing, and continuously updating financial and operational information. Such a system enhances transparency and disclosure and reduces information asymmetry, thereby supporting investment decision-making (Akdou, 2026, p. 241).

Despite the growing number of studies on crowdfunding and cost management in recent years, most have focused on investor behaviour and the factors influencing the success of digital platforms (Badrouine, 2026) or examined cost management from a traditional accounting perspective confined to identifying and analysing cost components (Radaoui & Ben Amara, 2025). However, insufficient attention has been devoted to developing an integrated model linking cost management, risk analysis, staged financing, and continuous monitoring, particularly in the Algerian context, where agricultural crowdfunding continues to develop gradually.

The research gap therefore lies in the absence of an integrated model that combines the requirements of cost management and analysis, the principles of crowdfunding, and risk management mechanisms within a unified operational framework compatible with the legal, regulatory, and financing characteristics of the Algerian context.

On this basis, the study addresses the following research question:

How can an integrated model for managing and analysing the costs of agricultural start-ups be developed to support crowdfunding decisions in the Algerian context?

The following subsidiary questions arise from this research question:

- What role do cost management and analysis play in supporting financing decisions?
- What are the principal factors influencing the success of agricultural crowdfunding?
- How can international experiences inform the design of a model suited to the Algerian context?
- How can the proposed model help improve information quality and reduce risk levels?
 - The study therefore aims to:
- Define the fundamental concepts of agricultural start-ups and crowdfunding, highlighting their relationship with cost management and analysis.
- Analyse crowdfunding success factors by drawing on successful international experiences.
- Identify the characteristics of the Algerian context.
- Design an integrated model to support financing decisions based on crowdfunding success factors derived from international experiences.
- Assess the model's applicability.

To achieve these objectives, the study adopted a descriptive and analytical approach to examine the state and characteristics of crowdfunding in Algeria and analyse successful international experiences. It then developed an integrated model adapted to the specific characteristics of the Algerian context.

The study focuses on developing an integrated model for managing and analysing the costs of agricultural start-ups within a crowdfunding framework. It draws on principles derived from relevant international experiences and considers their suitability for the Algerian context. The analytical component assesses the proposed model's applicability and its potential to address the shortcomings of the prevailing traditional, non-integrated approach to managing and financing agricultural projects in Algeria.

Theoretical Framework for Cost Management and Analysis in Agricultural Start-Ups
Fundamental Concepts of Agricultural Start-Ups and Crowdfunding
Agricultural Start-Ups

The term start-up refers to a recently established enterprise in the initial phase of its development. During this early stage of the enterprise's life cycle, the entrepreneur progresses from conceptualisation to securing financing, establishing the project's basic structure, and commencing operations and commercial transactions. A start-up does not necessarily follow predetermined plans; it may experience successive failures before achieving success, while continuously learning and adapting, developing, and refining its initial ideas. The concept is also associated with growth prospects, the use of new technology, the need for external financing, and operation in an environment characterised by uncertainty (Brouba & Ben Zidane, 2024, p. 40).

Agricultural start-ups are newly established agricultural investment projects that develop production, management, or marketing methods and employ technology and data to improve economic efficiency and maximise value added.

In Algeria, the legislature has not established a direct legal definition of a start-up. Instead, it has adopted eligibility criteria under which a project is awarded the "Start-up" label pursuant to Executive Decree No. 20-254. This reflects an emphasis on identifying the legal characteristics of such enterprises rather than formulating a comprehensive definition. The conceptual overlap between start-ups and small and medium-sized enterprises persists, and no consensus has emerged on their definition despite the widespread use of the term in academic and business contexts (Haid et al., 2026, p. 8).

Given the nature of agricultural activity, these projects exhibit several characteristics, most notably high levels of risk, long production cycles, and exposure to fluctuations in the prices of agricultural inputs and products, alongside the continuing influence of climatic, regulatory, and marketing factors. Moreover, despite its contribution to competitiveness and sustainability, accelerating technological development poses challenges to the growth and success of start-ups (Chachoua et al., 2026, p. 982).

Cost management and analysis become essential to transforming an agricultural start-up from a production activity based on broad estimates of financial requirements into an investment project that can be evaluated and monitored and whose results support financing decisions.

The Concept of Cost Management and Analysis

Cost management is a core function in the management of start-ups. Horngren et al. (2021) define it as the methods and activities managers use to allocate resources, maximise customer value, and achieve organisational objectives. Cost management data support strategy implementation and encompass both financial and non-financial information. Its role also includes planning the use of available resources, analysing cost drivers, measuring performance, and estimating future financing needs, thereby supporting decision-making and improving the efficiency of resource use.

Cost analysis involves examining the relationships among different cost components and determining their effects on production volume, profitability, cash flows, and operational risks (Blocher et al., 2022). This process assumes greater importance in agriculture owing to the distinctive nature of agricultural activity, which is influenced by multiple, variable factors, including climatic conditions, fluctuations in agricultural input prices, and variations in output and prices.

Within conventional financing, cost management is often regarded as an internal accounting tool for controlling expenditure and improving operational efficiency. In crowdfunding, its function extends to producing financial and operational information and transforming raw data into quantitative indicators that can be analysed, interpreted, and monitored. Investors use these indicators to evaluate projects and assess their associated risks. Although revenue forecasts may attract initial interest, cost projections allow investors to assess operational efficiency, financial discipline, and long-term commercial viability. Investment decisions therefore concern both the proposed idea and the project owner's capacity to implement it profitably (Wilson, 2024).

Thus, cost management extends beyond traditional accounting measurement to become a central element in building trust among the various parties involved in the investment process, particularly in environments that depend on continuous information flows and regular data exchange.

The Relationship Between Cost Management and Crowdfunding

Crowdfunding involves mobilising financial resources from a large number of investors through specialised digital platforms that present investment opportunities. The success of this financing mechanism depends on the degree of transparency and mutual trust among the various parties involved in the financing process (Merabet & Abdelhadi, 2024, p. 242).

Unlike traditional financial institutions, crowdfunding participants generally lack direct means of verifying the accuracy of financial and operational data. Contributors therefore evaluate projects using the information that project owners or platforms choose to disclose, while those parties retain more extensive knowledge of the projects' circumstances. Information quality is consequently decisive for the success of the financing process (Akdou, 2026, p. 241).

Cost management plays a central role in providing the information needed to identify financing needs, assess risks, measure performance, and monitor progress throughout project implementation. Efficient cost management is among the factors underpinning the financial stability of agricultural projects, as it enables data to inform technical solutions for reducing risk (Mazur et al., 2025).

In this context, the role of cost management is not confined to determining the value of the resources required; it also encompasses establishing an integrated information system that transforms operational data into indicators that can be measured, compared, and continuously updated. This system also helps narrow the information gap between project owners and investors, enhance transparency and disclosure, and improve the efficiency of financing decision-making.

On this basis, the study proceeds from the premise that successful agricultural crowdfunding depends on both the availability of capital and an integrated cost management and analysis system capable of transforming operational and financial data into accurate information that supports investment decisions and reduces uncertainty.

Crowdfunding Success Factors Derived From International Experiences

Drawing on international experiences is particularly important for agricultural start-ups, given their exposure to multiple sources of risk and their need for continuous monitoring of costs, production, and revenues. For this reason, the study sought to identify practices that have improved the efficiency of financing, reduced information asymmetry, and strengthened funders' ability to monitor projects after financing has been secured.

The examination of diverse, successful international experiences identified several common factors and principles:

Allocation of Roles and Responsibilities

Effective crowdfunding requires a clear delineation of the responsibilities of the parties involved in producing, using, and monitoring information. Entrepreneurs seek financing for their projects, while project owners provide financial and operational data relating to project activities and update them during implementation. Platforms act as intermediaries in selecting and presenting projects and organising financing and monitoring, while funders use the available information to evaluate projects and make financing decisions (Demdoun et al., 2021, p. 443).

The proposed model is designed to structure interactions among investors, farmers, and platforms by clearly defining roles, reducing information asymmetry, and strengthening stakeholder accountability (Fahlevi et al., 2026). The roles of the state in regulation, support, and supervision and of insurance companies in providing risk coverage must also be acknowledged.

This allocation is one of the principal features distinguishing the proposed model from traditional models, as it is based on shared responsibility and interdependence rather than concentrating risk on a single party. It may strengthen trust, support mutually beneficial outcomes, and improve the efficiency of stakeholder cooperation (Fahlevi et al., 2026).

Staged Financing

Istisna' contracts embody an outcome-oriented approach to staged financing, whereby funds are disbursed according to project milestones and progress is monitored through digital platforms. This allows the project's financial and operational position to be reassessed in light of actual results before further resources are allocated, potentially reducing the risks associated with allocating resources on the basis of fixed initial estimates. Thus, staged financing

involves distributing financial resources across project implementation stages rather than making them available in a single payment (Fahlevi et al., 2026).

This mechanism is particularly important for agricultural start-ups, whose financing needs may change owing to developments in production, input prices, or market conditions. Within the proposed model, staged financing therefore provides a mechanism for linking the flow of financial resources to the project's development and actual needs.

Digitalisation and Digital Governance

Digitalisation plays a fundamental role in organising information flows among the project, the platform, and funders. It also enables data to be collected, stored, updated, and analysed more systematically. Its importance extends beyond conducting financing electronically to managing financial and operational records, producing monitoring reports, and making performance-related information available. Digital governance also helps ensure transparency, improve the continuity of financing, and distribute risks by transforming administrative and oversight functions into a technological system that enables progress monitoring and the disbursement of funds according to achieved milestones (Fahlevi et al., 2026, p. 30).

Regular Updating

International experiences indicate that effective updating should extend beyond the project presentation and funding application stages and continue throughout implementation. Maintaining up-to-date communication with backers is essential to campaign success, including during the post-campaign period. Updates and communication also support transparency, contributing to the trust required to finance innovation (Bozintan (Cosma-Guler) & Badulescu, 2025, p. 125).

In the proposed model, this includes updating information on actual costs, progress in implementing activities, revenues, deviations from estimates, and changes that may affect risks or financing needs. Regular updating is important to the proposed model because it transforms financial and operational data generated during implementation into current information that can be used to evaluate performance, revise estimates, and make subsequent financing decisions.

Continuous Monitoring and Measurement of Indicators

Monitoring project performance and conducting ongoing evaluations help identify strengths and weaknesses and guide entrepreneurs towards improving their businesses, thereby supporting continuity of financing (Demdoum et al., 2021). Effective project monitoring relies on quantitative indicators that allow progress to be measured periodically rather than restricting evaluation to the beginning or end of the project. Monitoring systems should include specific key performance indicators to track performance, alongside forecasting tools to assess asset values and operational risks (European Commission, 2025). Depending on the nature of the activity, these indicators may include unit cost, production volume, revenues, liquidity, profitability, deviations from estimates, and progress through project stages.

Continuous measurement transforms operational and financial data into comparable indicators, helping to detect deviations at an early stage and providing a quantitative basis for assessing project performance and financing needs.

Linking Financing to Performance Indicators

Linking financing to performance indicators extends staged financing and continuous measurement by allowing actual project results to inform financing decisions. Rather than treating financing as a decision detached from performance, key indicators become a means of assessing progress and determining whether financing should be continued or adjusted. These indicators are crucial to justifying progression to a subsequent stage (International Fund for Agricultural Development, 2025, p. 15).

In the proposed model, linking financing decisions to performance indicators makes financing more closely aligned with actual project performance and less dependent on initial estimates alone.

Risk Management

By its nature, agriculture requires participatory, outcome-based contracts that allow risks and returns to be shared more equitably among stakeholders. Such contracts also allow adaptive adjustments to financing amounts and duration on the basis of project performance, enhancing the project's resilience to agricultural sector fluctuations, such as weather shocks, production variability, and changes in input prices (Fahlevi et al., 2026, p. 34).

Risk management is therefore a key factor in the successful financing of agricultural projects, given the relationship between agricultural activity and production, marketing, financial, and regulatory factors that may affect expected outcomes. Effective risk management requires identifying risk sources, assessing their effects, monitoring their development, and linking them to the project's financial and operational variables.

Feedback

Feedback involves reusing monitoring results to revise estimates, plans, and subsequent decisions. Information generated during implementation does not constitute a final output; instead, it becomes an input into the next stage of planning and decision-making. Continuous improvement therefore requires an established routine for feedback and pre-testing (Richter, 2016, p. 73).

Feedback also enables contributors to provide comments to entrepreneurs and start-up owners, supporting open innovation (Senci & Snieska, 2023). Consequently, the proposed cost management and analysis model shifts from a system based on fixed estimates to a dynamic system that can be updated.

The success factors derived from international experiences can be understood as an interconnected system. This system begins with organising and disclosing information, followed by measuring and monitoring performance, assessing risks, making financing decisions, implementing projects, and using implementation results to update information and inform subsequent decisions. These factors provide an analytical reference framework that requires adaptation to the legal, financing, technological, and regulatory characteristics of the Algerian context.

Characteristics of the Algerian Context

Applying the principles derived from international experiences requires consideration of the institutional, financing, technological, and regulatory characteristics of the Algerian context. This section therefore identifies the principal characteristics relevant to adapting the proposed model, focusing on cost management, information provision, and support for financing decisions.

Legal and Regulatory Characteristics

Agricultural projects in Algeria are subject to a relatively recent legal framework governing project financing through participatory investment, also known as crowdfunding. Regulation No. 23-01 of the Commission for the Organisation and Supervision of Stock Exchange Operations (COSOB), dated 12 April 2023, sets out the conditions governing the authorisation, activities, and supervision of participatory investment advisers and regulates the activities of crowdfunding platforms and the parties involved. This framework also establishes requirements relating to project selection, funder protection, and the provision of necessary information on the projects presented.

This framework was further supported by Instructions Nos. 23-02 and 23-03 of 2023, concerning due diligence procedures for project selection and the information required in the project document published on the platform. Agricultural start-ups must therefore prepare accurate, structured information on their activities, costs, financing needs, and risks to support project evaluation and financing decisions based on clearer and more transparent information (COSOB, 2023a, 2023b).

Subsequent regulatory developments, including Instruction No. 26-01 of 25 February 2026 on the frequency of submitting documents and information, also reflect the continuing emphasis on strengthening monitoring, supervision, and information flows (COSOB, 2026). The proposed model should therefore accommodate these regulatory characteristics by incorporating legal requirements and disclosure and monitoring information into its inputs and linking them to cost estimation, the identification of financing needs, and decision-making, while allowing information to be updated during project implementation.

Financing Characteristics

The financing environment for Algerian agricultural projects is characterised by a variety of potential financing sources, including bank loans for operations and investment, Islamic finance, investment funds and venture capital, loan guarantee mechanisms, and support programmes for start-ups and microenterprises. Some programmes also offer joint financing arrangements combining the project owner's contribution with public and bank financing, reflecting the diversity of available financing instruments and the variation in their conditions according to the project's nature and stage (National Agency for the Support and Development of Entrepreneurship, n.d.).

These characteristics require agricultural start-ups to avoid relying on a single financing source and instead determine their financing needs according to the nature of their costs and the stages of project implementation, taking

into account each source's capacity to cover those needs and its eligibility conditions (Algerian Investment Promotion Agency, n.d.).

Technological and Digital Characteristics

Algeria has moved towards strengthening digital transformation by developing electronic services and platforms, digitising procedures, and improving information exchange among the various stakeholders, while emphasising data security and system interoperability. These efforts have extended to the economic sphere through the development of digital services for economic operators, the interconnection of databases, and the simplification of procedures, creating an environment that relies increasingly on digital information to conduct transactions and make decisions (Ministry of the Interior, Local Authorities, and Transport, n.d.).

Crowdfunded agricultural start-ups rely on digital platforms to present projects and exchange information between project owners and funders, while managing their costs requires continuous data collection, updating, and tracking. Consequently, the proposed model should take account of the availability of the necessary digital infrastructure and rely on databases and platforms that allow financial and operational information to be collected, updated, and shared systematically and securely, in ways that support analysis, oversight, and decision-making.

Current Gaps and Adaptation Requirements

Linking the principles derived from international experiences to the specific characteristics of the Algerian context reveals several gaps that the proposed model should address. The principal gaps are:

- The need to transform cost data from internal accounting information into information that can be disclosed to and monitored by funders in accordance with regulatory requirements.
- The need to integrate financial, operational, and risk data within a single analytical system.
- The need to link the identification of financing needs to project implementation stages rather than relying solely on an aggregate financing estimate.
- The need to adopt quantitative indicators that enable performance to be monitored and deviations to be identified periodically.
- The need to establish a mechanism for updating data and reusing them in subsequent decision-making.
- The need to define clearly the roles and responsibilities associated with data production, verification, and monitoring.

These gaps do not necessarily imply that the identified practices or tools are absent from all Algerian agricultural projects. Rather, they indicate the need to consolidate and connect them within an integrated methodological framework that serves the study's specific purpose: supporting crowdfunding decisions by improving cost management and analysis in agricultural start-ups.

These characteristics and gaps provide the basis for adapting the principles derived from international experiences and developing a local model suited to Algeria's economic systems and specific financing and environmental characteristics.

Development and Analytical Evaluation of the Proposed Model

Conceptual Basis of the Model

The proposed model rests on the premise that the challenge facing agricultural start-ups in crowdfunding concerns both financial resources and the capacity to produce reliable financial and operational information. Organising, analysing, and updating this information enables stakeholders to assess performance, risks, and financing needs on a clear and traceable basis.

Under traditional mechanisms for managing and financing agricultural projects, costs, revenues, and financing needs are often treated as estimates prepared at the planning stage and subsequently used as the basis for decision-making, with limited links to operational variables, risks, and subsequent monitoring mechanisms. This leaves some information dispersed across different sources and makes it difficult to update estimates when production, prices, input costs, or operational conditions change.

This problem becomes more significant in crowdfunding because financing decisions depend largely on information provided by the project owner, the platform, and other relevant parties, rather than on a single funder's direct access to the project. Consequently, weaknesses in information organisation or insufficient updating may increase

information asymmetry between project owners and funders and restrict their ability to assess risks and financing needs accurately.

On this basis, the proposed model entails a shift from cost management as an accounting function focused on measuring expenditure to an integrated information and evaluation system that links operational, financial, legal, marketing, and environmental data and transforms them into measurable, comparable indicators. The analytical results are then used to identify risks and financing needs, monitor project implementation, and update information regularly.

The Problem Addressed by the Model

The proposed model addresses fragmentation among cost management, risk assessment, the identification of financing needs, and performance monitoring. Without such integration, costs may be estimated separately from the risks that could affect them, while financing needs may be determined without directly linking them to project implementation stages and performance indicators.

The model therefore addresses the limited integration of data, costs, risks, financing decisions, and monitoring, and the resulting limitations in the quality of information available to funders and other stakeholders.

Limitations of Traditional Mechanisms

The proposed model does not assume that traditional mechanisms are entirely ineffective. Rather, it recognises their limited capacity to meet the requirements of an agricultural start-up that relies on crowdfunding and requires continuously updated information. These limitations are most evident in the relative reliance on initial cost estimates, limited links between cost components and sources of risk, irregular data updating, weak integration of financial and operational data, and limited links between financing decisions and indicators of actual project performance.

The proposed model reorganises traditional cost management approaches within an integrated framework. This enables their results to inform risk analysis, the identification of financing needs, performance monitoring, and information disclosure.

The Model's Added Value

The added value of the proposed model lies in combining functions that are often treated separately: data collection and verification, cost classification and analysis, risk assessment, calculation of performance indicators, identification of financing needs, organisation of staged financing, continuous monitoring, and information updating.

This integration and coordination enable raw project data to be transformed into information that can be used at different stages of the financing cycle. Cost data are used not only to calculate production costs but also to estimate financing needs and analyse the effects of changes in inputs on performance. Similarly, performance indicators are not confined to evaluating results; they can also provide a basis for decisions on subsequent financing and for monitoring project progress.

Overall, the model's added value lies in the transition from separate estimation to coherent, integrated analysis; from financing detached from performance to staged financing; from initial disclosure to regular monitoring; and from static data to an information system that can be updated.

Reducing the Information Gap

One of the proposed model's core functions is to improve the quality of information available to funders by organising the management, verification, analysis, and regular updating of project data. Rather than relying solely on information provided at the beginning of the campaign, funders can use the model to monitor project development through updated data on costs, production, revenues, risks, and deviations from previous estimates.

The model also links monitoring results to subsequent financing decisions, making disclosure part of evaluation and decision-making rather than merely the presentation of information. This is particularly evident in staged financing, where actual performance indicators can be used to assess project progress before proceeding to a subsequent financing stage.

The model thus seeks to narrow the information gap between the project owner and the funder through a continuous cycle that begins with data collection and verification, followed by analysis and conversion into indicators that can be measured and disclosed, and then performance monitoring, data updating, and reassessment.

General Structure of the Proposed Model

The model's general structure specifies how information flows through an integrated system linking cost management, risk analysis, financing decisions, and continuous operational monitoring.

The model rests on the premise that successful agricultural crowdfunding depends primarily on the quality of information available to investors and its capacity to reduce uncertainty, as well as on the amount of financing available. Its general structure reflects the transformation of raw data into information and indicators that can be used in project management, financing decisions, and implementation monitoring.

Inputs

Inputs constitute the model's starting point and encompass all the data used to describe the project, analyse its legal, operational, financial, and marketing position, and assess the associated risks, as these areas influence project performance and financing needs.

The model's principal inputs comprise:

Legal and Regulatory Data. These include the project's legal status, ownership documents or rights of use, tax status, administrative permits, preliminary marketing and supply contracts, and relevant regulatory obligations.

Technical and Operational Data. These include the nature of the agricultural activity, cultivated area and production capacity, quantities of agricultural inputs used, labour requirements, water and energy consumption, and other data relating to the production process.

Financial and Accounting Data. These include initial investment costs, operating costs, financing and funding campaign costs, expected cash flows, the proposed financing structure, financing needs, and the data required to calculate cost, profitability, and liquidity indicators.

Marketing Data. These include benchmark selling prices, expected demand volume, marketing channels, reference prices for agricultural products, marketing and distribution costs, and factors that may affect the project's ability to sell its output.

Environmental Data and Risks Associated with the Activity. These include climatic, production, and environmental factors that may affect production, costs, and revenues, alongside variables that may constitute sources of operational, financial, or marketing risks.

Inputs provide an integrated information base that allows different variables to be linked within the analytical process. Their quality and reliability must be verified to support subsequent decisions.

Data Processing

Once the data have been collected and their suitability for use verified, they enter the processing stage, which constitutes the analytical component of the model. This stage aims to transform raw data into information and indicators that can be used to evaluate the project and determine its financing needs.

Processing encompasses four principal functions:

Cost Classification and Analysis. Cost components are classified according to their nature and function, distinguishing investment costs, operating costs, and costs associated with financing and the campaign. This makes it possible to identify the cost structure and analyse each component's contribution to it.

Risk Analysis. Sources of project-related risk are identified and linked to relevant variables, such as productivity, input prices, selling prices, operating costs, and regulatory and marketing conditions. This enables the effects of potential changes on project performance and financing needs to be estimated.

Calculation of Performance Indicators. Financial and operational data are converted into quantitative indicators that measure project efficiency, such as unit cost, the break-even point, the margin of safety, profit margin, and return on investment, alongside production, operational, monitoring, and disclosure indicators.

Identification of Financing Needs. The results of the analysis of costs, investment, cash flows, and risks are used to determine the scale of financing needs, enabling the required amount to be estimated and initial needs to be distinguished from those that may arise during implementation.

The model thus treats financing needs not as an amount predetermined independently of the project but as the outcome of an integrated analysis of resources, costs, risks, and expected performance.

Outputs

Outputs comprise the information and indicators generated by the model following data processing, which can be used by the project owner, the platform, funders, and relevant parties within the scope of their respective roles.

The principal outputs include:

- Financial and operational performance indicators that enable an assessment of the project's position and results.

- Risk indicators that identify the principal sources of uncertainty and potential changes in project performance.
- Estimates of financing needs that specify and justify the amount of resources required.
- Disclosure and monitoring reports that transform analytical results into information that can be presented, compared, and updated.
- Information on deviations that enables actual results to be compared with planned values and identifies areas requiring intervention or correction.

Outputs link the project's internal analysis to decisions concerning financing, monitoring, and disclosure. The cost management system is thus transformed from a traditional accounting tool into an integrated system for supporting investment decisions.

Monitoring and Feedback Mechanism

The model's cycle continues after indicators have been produced and financing needs identified, with monitoring and the incorporation of new data into the system. Feedback is a central element of the proposed model because it supports a continuous flow of information among the parties involved in the investment process. It enables actual results to be compared with previous estimates, deviations to be identified, assumptions to be updated, and financing needs and risks to be reassessed as necessary.

For this purpose, the model relies on a set of operational and financial indicators, principally rates of progress in project implementation, actual production levels, deviations in cost components, and changes in revenue levels, alongside indicators of operational and marketing risks.

To enhance transparency, the model incorporates a digital monitoring dashboard through which data can be updated periodically and made available to stakeholders. This is intended to strengthen trust and improve the efficiency of financing decisions.

This mechanism comprises three interrelated functions:

- **Regular updating:** Incorporating new actual data on costs, production, revenues, and performance.
- **Continuous correction:** Addressing deviations and revising estimates or procedures when monitoring reveals significant changes.
- **Reassessment:** Reviewing performance indicators, risks, and financing needs in light of new data.

The proposed model operates through a continuous information cycle. Information flows enable the transition from a system reliant on initial estimates to one that can be updated and adapted to changes in the project and its operational environment.

The model's components operate as interrelated, integrated elements rather than independent stages. Legal, technical, financial, marketing, and environmental data provide the basis for analysis, while processing converts them into usable indicators and information. These outputs inform decisions concerning costs, risks, financing needs, and monitoring. Implementation results are then fed back into the system to update data and support reassessment.

The proposed model thus provides an integrated framework for cost management and analysis, risk assessment, and performance monitoring in an environment characterised by high levels of uncertainty.

Operational Stages and Information Flow

The proposed model operates through an interconnected sequence of processes, beginning with data collection and verification, followed by analysis and conversion into indicators that support decision-making, and progressing to the implementation of staged financing, performance monitoring, and continuous information updating.

The first stage involves data collection and verification. Legal and regulatory, technical and operational, financial and accounting, marketing, and environmental data are collected and then checked for completeness, consistency, and suitability for subsequent analysis.

The second stage focuses on analysing costs, risks, and cash flows. It aims to classify and analyse cost components, identify sources of risk affecting the project, and examine cash flows and financing needs, thereby clarifying the relationship between the project's operational and financial variables.

In the third stage, analytical results are converted into quantitative indicators that enable the project's financial and operational performance to be assessed. These include total initial investment, total operating costs, unit production cost, the break-even point, the margin of safety, profitability, and return on investment, alongside indicators specific to

the nature of the activity. These results are used to determine financing needs and decide whether to launch a crowdfunding campaign and under what conditions.

The fourth stage involves implementing staged financing. Project implementation is divided into successive stages, with progression from one financing stage to the next linked to meeting specified performance targets and prerequisites. This aligns financing with the project's development and actual needs.

The fifth stage consists of monitoring and updating. Information on costs, production, revenues, progress in implementing activities, and risk indicators is updated regularly. This enables actual performance to be compared with planned objectives and deviations to be detected early, while making information available to relevant parties according to their roles and applicable disclosure requirements.

In the final stage, monitoring results are reintroduced into the model through feedback and reassessment to update financial and operational data, revise estimates, assess deviations, and review performance indicators, risks, and financing needs where necessary. Thus, the process underpinning the proposed model does not end with the financing decision; it continues as a recurring cycle that enables adaptation to changes in the project and its environment.



Figure
 General Structure of the Proposed Model for Managing and Analysing the Costs of Agricultural Start-Up Projects

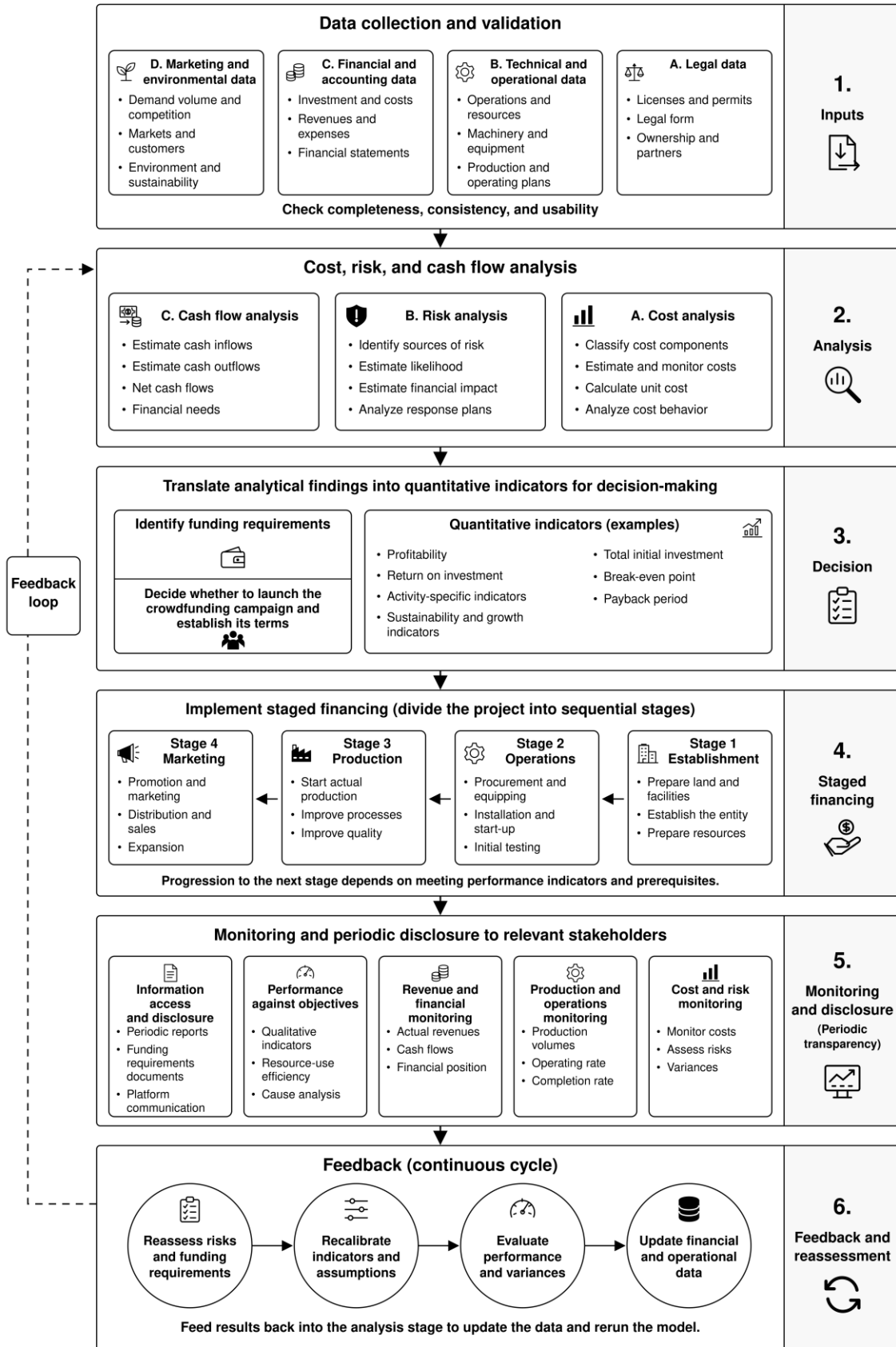


Figure 1 illustrates the model's operational stages within its general structure, which links four principal units encompassing six operational stages. These begin with inputs, data collection, and verification, proceed through the analysis of costs, risks, and cash flows and the transformation of analytical results into information and quantitative indicators that support decision-making, and then move to staged financing, monitoring, and disclosure, culminating in feedback and reassessment.

The figure also highlights the interdependence of the model's components through information flows among its stages and the relevant parties. This allows monitoring results to be used to update data, assess performance and deviations, and revise estimates, indicators, and financing needs where necessary. The model thus moves beyond a linear sequence of stages ending with the financing decision to form a recurring cycle that enables newly generated information to be reintroduced into analysis and evaluation, enhancing its capacity to adapt to actual changes in the project and its environment.

The proposed model therefore combines cost management and analysis, risk assessment, the identification of financing needs, staged financing, monitoring, and disclosure within an integrated information framework. This is intended to support crowdfunding decisions that are more closely aligned with the project's actual needs and to sustain monitoring and reassessment throughout implementation.

Evaluation of the Model and Assessment of Its Applicability

The final analytical step assesses the proposed model's potential applicability in the Algerian context. It examines the model's capacity to transform available data into information and indicators for cost and risk management, financing, and monitoring. In particular, it considers the model's suitability as an integrated framework for managing information, costs, and risks in an environment characterised by high levels of uncertainty.

Evaluation Methodology

The study evaluated the model by identifying differences between the characteristics of the traditional and proposed models, particularly regarding the scope of information, risk management, disclosure mechanisms, monitoring frequency, and the relationship between financing and performance. This involved comparing the proposed model's characteristics and outputs with those offered by the traditional model for managing and financing agricultural projects in the Algerian context.

Comparison Between the Traditional and Proposed Models

The characteristics of the proposed and traditional models were compared across dimensions relating to cost management, information management, risk management, financing, and monitoring. Table 1 presents this comparison using a set of key indicators.

Table 1

Comparison of the Traditional and Proposed Models

Indicator	Traditional Model	Proposed Model
Costing method	General estimates	Detailed analysis
Risk management	Reactive response	Proactive monitoring
Financing mechanism	Single disbursement	Staged financing
Financial disclosure	Limited	Periodic disclosure
Monitoring and evaluation	Irregular	Continuous monitoring
Decision-making	Personal experience	Quantitative indicators
Data updating	Limited	Periodic
Digitalisation	Limited	Integrated
Deviation tracking	Limited	Continuous
Data integration	Partial	Comprehensive

The comparison shows that the distinction between the two models lies in the nature of the information system supporting decision-making. Whereas the traditional model relies more heavily on initial estimates and experience, the proposed model generates and updates information and links it to indicators and financing decisions.

Utility of the Proposed Model for Cost and Risk Management

To ensure consistency, the study assessed the proposed model against four principal criteria:

Applicability. The model incorporates inputs, indicators, and procedures that can be applied to different agricultural start-ups, while allowing data and assumptions to be adjusted according to the nature of the activity.

Flexibility. The model allows cost components, indicators, sources of risk, and financing needs to be adjusted in response to changes in the project or its environment.

Scalability. The model is not restricted to a particular agricultural activity; its inputs and indicators can be adapted to the specific characteristics of the agricultural activity under examination.

Adaptation to the Algerian Context. The model draws on the legal, financing, technological, and regulatory characteristics discussed in the theoretical framework, allowing adaptation to local agricultural start-ups.

Nevertheless, this remains an analytical assessment and cannot substitute for field testing on actual projects. Field testing therefore constitutes a subsequent stage that could help verify the model's efficiency and identify areas for further development.

The analytical assessment indicated that the proposed model provides an integrated framework linking cost management, risk analysis, measurement, disclosure, financing, and monitoring, while allowing adaptation and further development to reflect the characteristics of agricultural start-ups in Algeria. The analysis suggests logical consistency among the model's components and the potential for its application and development in the Algerian context. Field testing remains necessary to substantiate these findings.

Discussion of the Model's Suitability

The comparison identifies several interrelated improvements that the proposed model could support:

- Broadening the scope of data beyond direct costs to include legal, technical, financial, marketing, and environmental information provides a more comprehensive basis for project evaluation.
- Classifying cost components and converting them into quantitative indicators could improve the identification of the most significant sources of cost, the measurement of unit cost, and the estimation of profitability, the break-even point, and financing needs.
- Integrating risk into the analytical process links potential changes in production, prices, and inputs to their financial and financing implications within cost analysis.
- Periodic disclosure and continuous updating could broaden the information available to funders, extending evaluation beyond the data presented at campaign launch to performance monitoring during implementation.
- Staged financing linked to performance indicators makes subsequent financing decisions contingent on actual project progress.
- Digitalisation can help organise data flows, facilitate updating, and generate reports and indicators, thereby supporting continuous monitoring.

The proposed model could improve the quality of financial and operational data, increase transparency, reduce uncertainty and the information gap, and improve the efficiency of regular performance monitoring. These potential improvements include:

- Increased accuracy in cost estimation.
- Improved capacity to forecast financing needs.
- Greater transparency and financial disclosure.
- Reduced information asymmetry among the various parties.
- More efficient monitoring of operational performance.
- Lower operational, financing, and marketing risks.

These analytical findings suggest that the model's principal value lies in establishing an integrated system for continuously producing, analysing, and updating information. The model also rests on functional integration among the parties involved in the investment process, with responsibilities distributed according to their respective tasks.

Conclusion

This study examined cost management and analysis in agricultural start-ups and their role in supporting crowdfunding decisions. It combined a theoretical framework with an analysis of success factors derived from international experiences and adapted these factors to the legal, financing, technological, and regulatory characteristics

of the Algerian context. The analysis suggests that successful crowdfunding for agricultural projects requires financial resources alongside an integrated system for managing costs, information, and risks and supporting continuous monitoring.

The study highlighted cost management and analysis as an essential link between operational and financial data and financing decisions. The examination of international experiences identified several interrelated principles and factors, particularly the allocation of roles, staged financing, and regular information updating. These provide a basis for developing a more integrated model suited to agricultural start-ups.

The proposed model integrates cost management and analysis within a dynamic information system that can be updated and adapted to changes in the project, extending the use of cost data beyond separate initial estimates.

The principal findings are as follows:

- In addition to offering an alternative to conventional financing sources, crowdfunding constitutes an integrated mechanism for information exchange and the management of relationships among the various parties involved in the investment process. Information quality and transparency are therefore essential to the success of the financing process.
- Cost management extends beyond measuring, classifying, and analysing expenditure components to producing quantitative indicators that help project owners and funders assess financing needs, monitor performance, and support appropriate financing decisions.
- Transparency, financial disclosure, and continuous monitoring play a central role in strengthening trust and helping reduce information asymmetry between project owners and investors through the provision of more systematic and traceable information.
- The Algerian context presents legal, regulatory, technological, and financing challenges that limit the adoption of agricultural crowdfunding models. This calls for alternative financing mechanisms to be adapted to the specific characteristics of the local context and the requirements of agricultural start-ups.
- The analytical assessment indicated that the model could improve cost estimation accuracy and forecasting of financing needs, narrow the information gap, enhance transparency and monitoring, and link financing decisions to actual project performance.
- The comparison with the traditional model indicated the proposed model's potential applicability and adaptability to agricultural start-ups in the Algerian context. Field testing on actual projects remains necessary to assess its effectiveness more precisely and inform further development.
 - In light of these findings, the study proposes the following principal recommendations:
- Develop the legal and regulatory frameworks governing agricultural crowdfunding.
- Strengthen digital infrastructure and expand the use of modern technologies in the agricultural sector.
- Encourage the adoption of standardised accounting systems suited to the nature of agricultural start-ups.
- Support education and training programmes in agricultural accounting, financial management, and risk management.
- Encourage the establishment of digital platforms specialising in financing and monitoring agricultural projects.

The study also encountered methodological limitations, primarily the limited availability of data on agricultural crowdfunding experiences in Algeria and the absence of integrated accounting and financial databases that could support applied testing based on actual data. These limitations constrained empirical validation of the model's performance and the measurement of its quantitative impact in practice.

Future studies could test the proposed model using actual project data and assess its applicability to different agricultural activities. They could also examine how digital technologies, artificial intelligence, and the internet of things affect cost management efficiency and the development of mechanisms for monitoring, disclosure, and risk analysis, with a view to enhancing the effectiveness of crowdfunding in the Algerian agricultural sector.

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