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# The Reality of Accounting Measurement of Intangible Assets in Startups under the Algerian Financial Accounting System (SCF)

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**Summary:** This study examines the accounting measurement of intangible assets in Algerian startups within the framework of the Financial Accounting System (SCF), against the backdrop of a global transition toward a knowledge-based economy. International reporting standards — notably IAS 38 and US GAAP_impose stringent recognition criteria that systematically exclude most internally generated intangible assets from firms' balance sheets, thereby eroding the value relevance of financial statements and intensifying information asymmetry, with particularly acute consequences for startups whose principal sources of value are innovation, intellectual capital, and human knowledge. Employing a descriptive-analytical design supplemented by a structured field survey, data were collected through a questionnaire administered to 50 valid respondents_ comprising startup founders, practicing accountants, and academic specialists _within the Algerian startup ecosystem and analyzed using the R programming language. The findings demonstrate that the SCF lacks the flexibility necessary to accommodate the innovative character of startups, yielding materially incomplete financial reporting. Although professional and academic awareness of the strategic importance of intangible assets is evident, accounting practice remains predominantly oriented toward tax compliance rather than decision-relevant information production, thereby generating information asymmetry and constraining access to external financing. Critically, one-way ANOVA ($F = 0.188$; Sig. $= 0.904$) and the Kruskal-Wallis non-parametric test ($H = 0.679$; $p = 0.878$), employed as a robustness check, both confirm the absence of statistically significant differences in the severity of the accounting measurement problem across startup age categories. This finding is interpreted as evidence of a deep-seated structural constraint that affects all startups with equal intensity, irrespective of their stage of development _ constituting what this study terms an 'accounting glass ceiling.

**Keywords:** Intangible Assets; Accounting Measurement;; Financial Reporting Standards; Startups; Information Asymmetry; SCF; Algeria
**Jel Classification Codes :** M41, M48, O34, G32, L26

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## I. Introduction :

The contemporary global economy has undergone a fundamental structural transformation, increasingly characterized by the primacy of knowledge resources over conventional physical capital. In this emergent paradigm — broadly designated as the 'knowledge economy' — intangible assets and intellectual capital have displaced buildings, machinery, and equipment as the principal drivers of value creation, competitive advantage, and sustainable enterprise performance.

This transformation carries profound implications at both the macroeconomic and microeconomic levels. At the aggregate level, the conceptual scope of intangible capital has expanded to encompass information technology infrastructure, organizational innovation capacity, and firm-specific capabilities that are difficult to replicate, necessitating a fundamental reconsideration of how these strategically vital resources are identified, measured, and managed (Pulido San Román, 2008; Valdivia López & Borrayo López, 2024). At the firm level, the ability to accurately account for and communicate the value of these assets has become a critical determinant of access to external financing, investor confidence, and overall market valuation.

The macroeconomic significance of this shift is substantiated by compelling empirical evidence. Scholarly estimates indicate that only approximately 8% of aggregate economic growth can be attributed to investments in traditional tangible capital. In the United States alone, annual investments in intangible assets have been estimated at approximately one trillion dollars, with their contribution to GDP having increased twofold — from roughly 4% in the late 1970s to approximately 10% in the first decade of the twenty-first century — reflecting a structural reorientation of the nature of capital formation (Clausen & Hirth, 2016; Rozendal, 2012).

Notwithstanding this remarkable growth in the economic significance of intangible capital, the business environment confronts a serious and persistent accounting dilemma. Of the estimated one trillion dollars invested annually in intangible assets, approximately 800 billion dollars are not recognized or recorded in firms' official financial statements. This systematic accounting exclusion — which disproportionately affects internally generated resources — progressively undermines the 'value relevance' of financial information, creating an information gap that distorts enterprise valuations and imposes material costs on investors due to the resulting information asymmetry between management and external stakeholders (Gu & Lev, 2011; Rozendal, 2012).

In the specific context of startups — enterprises whose primary productive assets consist almost entirely of innovation, technology, algorithms, and human capital — this accounting deficiency is substantially amplified. The inadequacy of prevailing financial reporting standards in faithfully measuring these assets effectively deprives startups of the means to demonstrate their true economic value to prospective investors and financing institutions. This problem is particularly pronounced in developing-country contexts, where institutional frameworks and accounting standards have not evolved sufficiently to accommodate the specificities of knowledge-intensive enterprises.

The present study focuses on this critical gap in the Algerian context. Algeria has pursued an active startup development agenda in recent years, yet the country's Financial Accounting System (SCF) — which constitutes the mandatory accounting framework for Algerian enterprises — continues to impose constraints that are ill-suited to the intangible-intensive nature of these firms. Against this backdrop, this study pursues three interconnected objectives: (i) to examine the theoretical and regulatory framework governing the accounting measurement of intangible assets under the SCF; (ii) to empirically analyze the accounting challenges confronting Algerian startups through a structured field survey; and (iii) to determine whether the severity of the accounting measurement problem varies as a function of startup age and development stage.

The remainder of this paper is organized as follows. Section 2 presents the theoretical framework, encompassing the nature of intangible assets, the limitations of current accounting standards, and voluntary disclosure as a strategic alternative. Section 3 reviews the pertinent

empirical literature. Section 4 describes the research methodology. Section 5 presents and discusses the empirical results. Section 6 concludes with policy implications and directions for future research.

## I.1. Theoretical Framework

### I.1.1. The Nature of Intangible Assets and Organizational Capital

Intangible assets and intellectual capital are broadly defined as sources of future economic benefits that lack physical substance. Within the academic literature, these assets are conventionally classified into three integrated and mutually reinforcing dimensions: human capital, which embodies the knowledge, skills, and experience of employees; structural capital, which encompasses documented organizational processes, patents, proprietary databases, and technological systems; and relational capital, which represents the enterprise's network of relationships with customers, suppliers, and institutional partners. The interaction among these three dimensions generates the conditions conducive to sustained corporate innovation and knowledge accumulation (Zéghal & Maaloul, 2011).

Building upon this tripartite classification, the concept of 'organization capital' emerges as particularly relevant for understanding firm-level competitive dynamics. Organization capital may be defined as the firm-specific, idiosyncratic capacity to integrate intangible assets with physical and financial resources in order to produce outputs and achieve levels of performance — often characterized as 'abnormal' or supernormal returns — that substantially exceed those attainable through conventional production methods. This capacity constitutes the essence of a firm's sustainable competitive advantage and represents a distinctive source of economic rent that standard accounting frameworks are ill-equipped to capture (Lev & Radhakrishnan, 2003).

### I.1.2. Accounting Constraints: Shortcomings of Current Standards (GAAP and IFRS)

The accounting treatment of intangible assets remains one of the most contested and inadequate domains of contemporary accounting theory and practice. Under both International Accounting Standard No. 38 (IAS 38) and United States Generally Accepted Accounting Principles (US GAAP), the capitalization of internally generated intangible assets is subject to onerous conditions that render their recognition on the balance sheet effectively prohibited in most circumstances. These standards mandate, inter alia, demonstration of the 'technical feasibility' of project completion, reasonable certainty of future economic benefits, and the ability to reliably measure the related expenditure. Given the inherent uncertainty surrounding innovative activities and the high risk associated with early-stage technology development, firms are compelled to expense the majority of their research, development, and software-related outlays in the period incurred, treating strategically critical investments as periodic charges against current income rather than as capital assets (Powell, 2003; Zéghal & Maaloul, 2011).

This accounting complexity imposes a further burden on small and knowledge-intensive enterprises. The successful adoption and effective application of International Financial Reporting Standards (IFRS) requires a robust organizational infrastructure — including sophisticated accounting systems, qualified personnel, and access to expert auditing services. Empirical evidence confirms that institutional readiness for IFRS adoption is positively associated with firm size, profitability, and affiliation with major international audit firms (Big Four), leaving small companies and startups confronting a dual disadvantage: they are subject to standards ill-designed for their operational profile, and they lack the organizational capacity to navigate their complexity (Guerreiro, Rodrigues, & Craig, 2008).

### I.1.3. Voluntary Disclosure and Theoretical Triangulation as a Strategic Alternative

In response to the systematic inadequacies of mandatory accounting standards, a growing number of firms have developed strategies for the voluntary disclosure of knowledge assets and intellectual capital in their annual and supplementary reports. The theoretical foundations of this voluntary disclosure behavior have been analyzed through a 'theoretical triangulation' framework that integrates three complementary theories: Institutional Theory, which attributes disclosure behavior to the enterprise's response to regulatory and social environmental pressures; Stakeholder Theory, which frames voluntary disclosure as a mechanism for meeting the expanding informational demands of investors and other stakeholders for non-financial performance information; and Contingency Theory, which explains disclosure patterns as adaptations to the firm's specific internal conditions and the competitive dynamics of its industry sector. By adopting voluntary disclosure practices, firms can enhance their reputational capital, reduce perceived investment risk, and lower their cost of capital — outcomes that are particularly consequential for startups seeking to attract venture financing (Castilla-Polo & Gallardo-Vázquez, 2008).

## I.2. Literature Review:

The scholarly literature addressing the measurement, disclosure, and valuation of intangible assets is distributed across several complementary research streams, each of which contributes a distinct dimension to the understanding of the phenomenon. The following review synthesizes the most pertinent contributions along four main tracks, before situating the present study within this cumulative body of knowledge.

### I.2.1. Economic Approaches to Measuring the Productivity of Intangible Assets

In response to the recognized failure of traditional accounting metrics to capture the value of intangible resources, researchers have developed alternative measurement models grounded in economic theory. Lev and Radhakrishnan (2003) proposed a measure based on the estimation of a firm's 'abnormal sales' — that is, revenues in excess of those attributable to observable capital inputs — to isolate and quantify the contribution of organization capital. This measure was shown to exhibit strong predictive power for future stock returns, providing evidence that organization capital constitutes a genuine and economically significant asset class that traditional balance-sheet metrics cannot reflect.

In a complementary direction, Clausen and Hirth (2016) introduced an innovative measure grounded in 'operating earnings' to assess the productivity of pre-existing intangible assets — encompassing established brands, customer bases, and distribution networks — as distinct from expenditures on research and development, which represent investments in prospective rather than existing intangible assets. Their measure demonstrated capacity to explain cross-sectional variation in the market value of firms and to inform fair acquisition pricing in mergers and acquisitions (M&A) transactions. A further notable finding was that knowledge-intensive firms characterized by substantial intangible asset bases tend to exhibit lower leverage ratios, suggesting that intangible capital and financial structure are systematically related. Gu and Lev (2011) extended this analytical tradition by demonstrating that the construction of 'value driver' indicators — based on observable expenditures on advertising, technology licensing, and brand development — enables investors to more effectively discriminate between overvalued and undervalued equities, thereby contributing to market efficiency.

### I.2.2. Value Relevance and the Consequences of Accounting Shortcomings

A second body of literature has focused on the negative externalities generated by the systematic exclusion of intangible assets from financial reporting. The critical review conducted by Zéghal and Maaloul (2011) demonstrated that the omission of intangible investments from the balance sheet leads to the systematic distortion of key performance indicators — most notably, Return on

Assets (ROA) — and impairs the efficient allocation of capital in financial markets by increasing the informational opacity of technology-intensive firms and amplifying stock price volatility. These findings highlight the direct link between accounting measurement deficiencies and market-level inefficiencies.

In the United States context, Rozendal (2012) documented a gradual and sustained decline in the 'value relevance' of conventional accounting outputs — including reported earnings and book value — over recent decades under US GAAP, attributing this trend to the progressive underrepresentation of intangible-intensive firms' true economic worth in official financial statements. This erosion of value relevance renders financial reports decreasingly informative to analysts and investors, undermining one of their principal purposes under the FASB and IASB conceptual frameworks.

### I.2.3. Field Surveys and Macroeconomic Analysis

A third research strand has employed direct field surveys and macroeconomic accounting methods to address the data limitations inherent in balance-sheet-based analyses. Haltiwanger, Haskel, and Robb (2009) conducted large-scale enterprise surveys in both the United Kingdom and the United States to collect primary, unpublished data on actual spending on design activities, process improvement initiatives, and corporate reputation development. Their work established that direct statistical survey methodology is capable of accurately bridging the accounting data gap and capturing the full scope of intangible investment activity that conventional financial data obscures.

At the macroeconomic level, Valdivia López and Borrayo López (2024) provided a comprehensive longitudinal estimate of intangible asset stocks in the Mexican economy over the period 1990–2020. Their findings indicate that investment in knowledge capital grows at approximately twice the rate of physical investment in emerging economies, with a marked sectoral concentration in software development and a pronounced geographical clustering effect in major metropolitan areas. These macroeconomic patterns are strikingly consistent with the sectoral distribution observed in the present study's Algerian sample.

### I.2.4. Managerial Awareness and Impact on Financial Performance

A fourth, complementary research stream has examined managerial attitudes toward intangible assets and the relationship between active intangible asset management and financial performance outcomes. A large-scale survey of financial managers in Spain conducted by García Merino et al. (2008) revealed a deep and sophisticated awareness among senior executives of the importance of intangible asset valuation, with the management of core competencies identified as the primary mechanism through which firms protect and sustain their competitive position. This finding suggests that the gap between awareness and accounting practice is not primarily attributable to ignorance of the strategic importance of intangibles, but rather to institutional and regulatory constraints.

Building on this finding, García-Zambrano, Rodríguez-Castellanos, and García-Merino (2014) demonstrated empirically that the active and continuous management of competitive intangible assets by firm leadership not only enhances innovation capacity, but also exerts a direct, positive, and statistically significant effect on sustainable financial performance — specifically on Return on Assets (ROA). This finding underscores the material economic cost of accounting frameworks that fail to provide incentives for intangible asset management by rendering such assets invisible in official performance metrics.

### I.2.5. Positioning of the Present Study

The preceding four research streams collectively illuminate the multidimensional nature of the intangible asset measurement problem but leave an important empirical gap unaddressed: the structural dimension of this problem in the context of a developing-country accounting system, and specifically whether its severity varies systematically with the stage of firm development. The present study addresses this gap through a field investigation of the Algerian startup ecosystem, employing both parametric and non-parametric inferential tests to examine the relationship between firm age and the intensity of accounting measurement challenges under the SCF. By demonstrating that the measurement problem constitutes a structural, stage-invariant constraint rather than a developmental or transitional challenge, this study makes an original theoretical and policy contribution that extends the existing literature in a direction not previously explored in the Algerian or broader North African academic context.

## II. Methods and Materials:

### **II.1.**Research Design and Epistemological Approach

This study adopts a descriptive-analytical research design, combining theoretical analysis with empirical field investigation. The choice of a quantitative survey-based approach is justified by the study's objective of systematically documenting the prevalence and perceived intensity of accounting measurement challenges across a heterogeneous population of stakeholders in the Algerian startup ecosystem, and of formally testing a hypothesis concerning the relationship between firm developmental stage and the severity of these challenges. This approach aligns with the established practice in the accounting measurement literature, which has frequently employed survey methodology to elicit professional and managerial perceptions of accounting practice and its adequacy (García Merino et al., 2008; Haltiwanger et al., 2009).

### **II.2.Study Population and Sample**

The target population consists of stakeholders directly engaged with the accounting and financial management of startups in Algeria. To ensure a comprehensive and multi-perspective approach to the research problem, the sample was intentionally diversified to include three distinct respondent categories: (i) startup founders and chief executives, who provide the managerial perspective; (ii) practicing accountants and financial officers operating within the startup sector, who offer the technical professional perspective; and (iii) academic specialists in accounting and finance, who provide the theoretical and normative perspective. This triangulation of perspectives is particularly appropriate for a study examining the interface between accounting practice and accounting theory in an under-researched institutional context.

### **II.3.**Data Collection Instrument and Administration

A structured questionnaire instrument was developed based on a systematic review of the relevant literature and the conceptual framework of the study. The instrument comprises 30 items distributed across two principal dimensions: the Second Axis, consisting of 15 items addressing the practical accounting challenges encountered by Algerian startups; and the Third Axis, comprising 15 items specifically addressing the problem of accounting measurement of intangible assets under the SCF. Items were measured using a five-point Likert response scale. The questionnaire was distributed to a total of 70 target respondents, of whom 50 returned valid, complete responses, yielding a response rate of 71.4%. Prior to final administration, the instrument was reviewed by subject-matter experts to ensure face validity and terminological precision.

**II.4.**Research Hypothesis

The central testable hypothesis of the study is formulated as follows:

**Null Hypothesis ($H_0$ ):** There are no statistically significant differences in the severity of the accounting measurement problem for intangible assets among Algerian startups based on firm age (development stage).

**Alternative Hypothesis ($H_1$ ):** There are statistically significant differences in the severity of the accounting measurement problem for intangible assets among Algerian startups based on firm age (development stage).

**II.5.Statistical Analysis Methods**

All data processing and statistical analysis were performed using the R programming language (version 4.x) in the RStudio integrated development environment, chosen for its analytical power, reproducibility, and widespread adoption in academic research. The following analytical procedures were applied sequentially:

**(i) Reliability Analysis:** Cronbach's alpha (α) coefficient was computed for each study axis and for the total instrument to assess internal consistency and confirm the reliability of the questionnaire.

**(ii) Descriptive Statistics:** Arithmetic means (M) and standard deviations (SD) were computed for all questionnaire items to characterize respondent trends and identify the most prominent accounting challenges.

**(iii) Normality Testing:** The Shapiro-Wilk test was applied to the composite score of the Third Axis to evaluate the distributional assumptions underlying subsequent parametric testing. The Shapiro-Wilk test is well-suited to samples of this size (n = 50), exhibiting superior power compared to alternative normality tests in small-to-moderate sample contexts.

**(iv) One-Way ANOVA:** A one-way analysis of variance was conducted to test for statistically significant mean differences in the Third Axis composite score across firm age categories, constituting the primary inferential test of the study hypothesis.

**(v) Kruskal-Wallis Non-Parametric Test:** The Kruskal-Wallis H-test was applied as a robustness check to corroborate the ANOVA results through a distribution-free method that does not rely on the normality assumption, thereby providing convergent validation of the findings and mitigating concerns about small-sample parametric inference.

## III. Results and discussion

This section presents the empirical findings of the field study in sequence, proceeding from descriptive characterization of the sample and measurement instrument to inferential hypothesis testing, and concluding with an integrated discussion that situates the findings within the broader theoretical and institutional context.

### III.1. Descriptive Analysis of Sample Characteristics

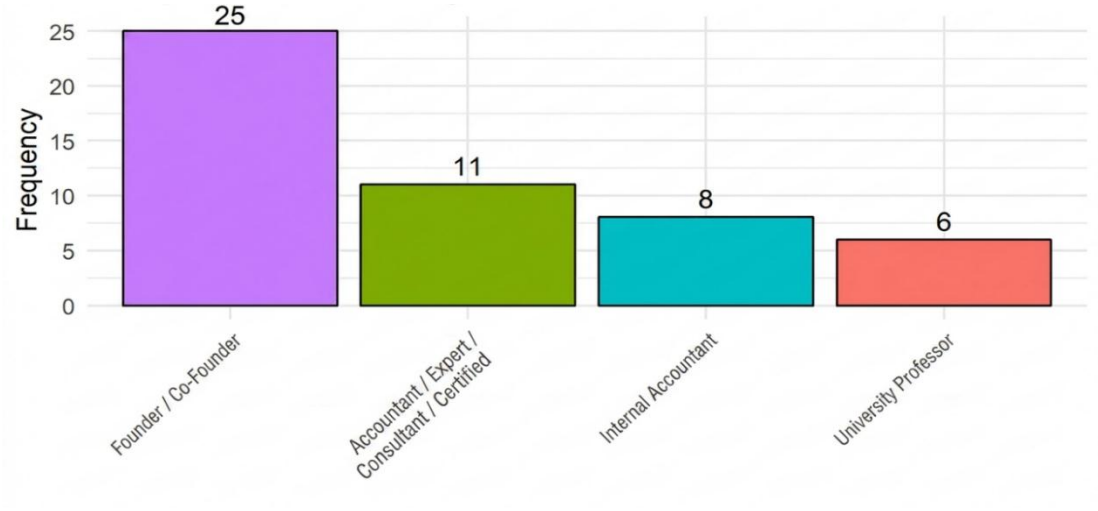
To establish an accurate understanding of the studied population, the professional and sectoral characteristics of respondents were analyzed across two dimensions.

#### III.1.1. Sample Distribution by Professional Category

The sample was distributed across three professional categories — startup founders, practicing accountants, and academic specialists — ensuring the representation of administrative, technical,

and academic perspectives on the research problem. Figure 1 presents the sample distribution by professional category.

**Figure 1.** Sample Distribution by Professional Category

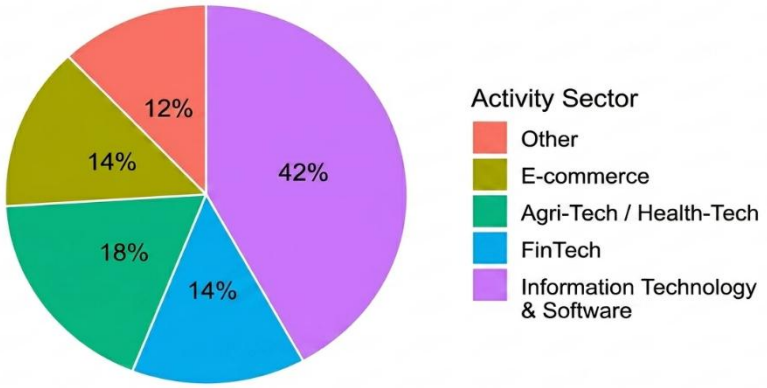



**Source**: Authors' compilation based on RStudio output.

### III.1.2. Sample Distribution by Sector of Activity

Sectoral analysis reveals a clear dominance of the Information Technology and E-commerce sectors within the sample. This distributional pattern is economically significant and directly relevant to the study's central thesis: these sectors are precisely those in which enterprise value is predominantly generated by intangible assets — algorithms, software, data infrastructure, and digital platforms — rather than by physical capital. This finding resonates with the macroeconomic evidence presented by Valdivia López and Borrayo López (2024), who documented the pronounced sectoral concentration of intangible investment in software and digital technologies in emerging economies. In the Algerian context, it implies that the SCF's inadequacy in accounting for intangible assets is not a peripheral concern but a systemic deficiency with direct relevance to the most economically dynamic segments of the startup sector. Furthermore, as Zéghal and Maaloul (2011) demonstrated, the omission of intangible investments from balance sheets systematically distorts performance indicators such as Return on Assets (ROA) and impairs capital market efficiency — consequences that are particularly consequential for the technology-intensive firms that dominate this sample. Figure 2 presents the sectoral distribution.

**Figure 2.** Sample Distribution by Sector of Activity




**Source**: Authors' compilation based on RStudio output.

### III.2. Reliability and Internal Consistency of the Study Instrument

The internal consistency of the questionnaire was assessed using Cronbach's alpha (α) coefficient. Table 1 presents the results.

**Table 1. Reliability Analysis Results (Cronbach's Alpha)**

| Study Dimensions | No. of Items | Alpha (α) | Reliability Assessment |
|---|---|---|---|
| **Second Axis: Accounting Challenges Facing Startups** | 15 | 0.635 | Acceptable |
| **Third Axis: Accounting Measurement Problem under the SCF** | 15 | 0.658 | Acceptable |
| **Total Study Instrument** | 30 | 0.647 | Acceptable (Exploratory) |

**Source**: Authors' calculations based on RStudio output.

The extracted alpha values — ranging from 0.635 to 0.658, with a total-instrument value of 0.647 — satisfy the threshold of acceptability for exploratory research in emerging institutional contexts. While the conventional threshold of $\alpha \geq 0.70$ is standard for confirmatory studies employing well-established scales, exploratory investigations addressing complex, multifaceted institutional phenomena — particularly in settings where standardized instruments do not exist — regularly yield alpha values in the 0.60–0.70 range, which are broadly regarded as acceptable in the methodological literature. The observed values are therefore considered consistent with the exploratory and diagnostic purpose of this study. Importantly, the homogeneous direction of the reliability coefficients across axes indicates that the items within each dimension measure a shared construct in a coherent and consistent manner.

From an accounting and institutional perspective, this level of internal consistency reflects a firmly established shared professional and academic perception in Algeria regarding the magnitude of the gap between accounting practice and the actual economic reality of knowledge-intensive startups. This finding is conceptually consistent with García Merino et al. (2008), who documented high levels of awareness among financial managers regarding the strategic importance of intangible assets. The critical distinction in the Algerian context, however, is that this awareness has not translated into corresponding improvements in accounting practice — a gap attributable not to

insufficient cognitive understanding, but to the structural rigidity of the SCF conceptual framework and its inability to accommodate the requirements of knowledge-intensive enterprises. This is compounded by the evidence of García-Zambrano et al. (2014), who demonstrated that active intangible asset management generates direct and positive effects on ROA — returns that Algerian startups are structurally prevented from achieving and reporting under the current accounting regime.

### III.3. Descriptive Statistics of Key Variables

The arithmetic means and standard deviations of questionnaire items were computed to identify the most prominent accounting challenges perceived by respondents. Table 2 presents the five highest-ranked items by mean score.

**Table 2.** Descriptive Statistics — Top Five Accounting Challenge Items (Ranked by Mean Score)

| Rank | Item Code | Accounting Challenge Item | Mean (M) | Std. Dev. (SD) |
|---|---|---|---|---|
| **1** | Q2-3 | Managers' awareness of the importance of accounting as a measurement and decision-support tool | 2.72 | 1.09 |
| **2** | Q2-14 | The need for precise analytical accounting to control costs | 2.70 | 1.05 |
| **3** | Q2-9 | Difficulty in preparing financial statements within statutory deadlines | 2.68 | 0.91 |
| **4** | Q2-15 | The necessity of simplifying accounting procedures for this category of enterprise | 2.68 | 1.06 |
| **5** | Q2-10 | The role of accounting report quality in attracting external funding | 2.66 | 0.96 |

**Source**: Authors' calculations based on RStudio output.

The mean scores cluster around M ≈ 2.67–2.72 on a five-point Likert scale, consistently reflecting a tendency toward negation or insufficient practice across all ranked items. This convergence of low mean scores across heterogeneous accounting challenge dimensions is analytically significant. It indicates not merely the presence of specific, isolated accounting deficiencies, but a pervasive marginalization of the accounting function within Algerian startups.

The highest-ranked item — managerial awareness of accounting's role as a measurement and decision-support tool (M = 2.72) — reveals that even the most basic strategic appreciation of accounting's informational function is weak within this population. Founders' attention is disproportionately concentrated on product development and market penetration, with accounting relegated to a compliance instrument rather than a strategic information system. This orientation is consistent with the phenomenon documented by Rozendal (2012), who identified a progressive erosion of the 'value relevance' of accounting outputs when financial reporting becomes decoupled from economic value creation — a process that renders financial statements increasingly uninformative to capital market participants.

The relatively low mean score for item Q2-10 (the role of accounting report quality in attracting funding, M = 2.66) is especially consequential. In a context where startups are predominantly

financed through venture capital, angel investment, and public financing programs, the inability to produce high-quality, informative financial statements represents a structural barrier to external financing. This deficiency directly generates the 'information asymmetry' dynamic described by Gu and Lev (2011), wherein investors are unable to reliably distinguish between overvalued and undervalued investment opportunities, resulting in a 'crisis of financial credibility' for knowledge-intensive startups seeking to attract capital. The findings of Haltiwanger et al. (2009) further reinforce this interpretation: their demonstration that direct survey methodologies can capture actual expenditures on design, process improvement, and institutional reputation development — categories systematically omitted by traditional accounting frameworks — underscores the urgent need for complementary measurement mechanisms capable of liberating Algerian startups from the constraints of the current rigid accounting framework.

### III.4. Hypothesis Testing (Inferential Statistics)

#### III.4.1. Normality Test (Shapiro-Wilk)

As a prerequisite to parametric inference, the distributional properties of the Third Axis composite score were examined using the Shapiro-Wilk test. Table 3 reports the results.

**Table 3.** Shapiro-Wilk Normality Test Results

| Examined Variable | W Statistic | P-value | Statistical Decision |
|---|---|---|---|
| **Accounting Measurement Problem Score (Third Axis)** | 0.982 | 0.641 | Data are normally distributed |

**Source**: Authors' calculations based on RStudio output.

The Shapiro-Wilk statistic (W = 0.982) and its associated p-value (p = 0.641) indicate that the null hypothesis of normality cannot be rejected at any conventional significance level. The data are therefore consistent with the assumption of normal distribution, validating the subsequent application of the One-Way ANOVA. From a broader substantive perspective, the near-perfect W statistic reflects a high degree of homogeneity in respondents' perceptions of the accounting measurement problem — a finding that reinforces the interpretation of this problem as a systemic, environment-wide phenomenon rather than an idiosyncratic or respondent-specific concern.

#### III.4.2. One-Way ANOVA Test

The One-Way ANOVA was conducted to test whether the mean score of the accounting measurement problem (Third Axis composite) differs significantly across firm age categories. Table 4 presents the full ANOVA decomposition.

**Table 4.** One-Way ANOVA Results — Effect of Firm Age on Accounting Measurement Problem Score

| Source of Variance | df | SS | MS | F | Sig. |
|---|---|---|---|---|---|
| **Between Groups (Firm Age)** | 3 | 0.094 | 0.0313 | 0.188 | 0.904 |
| **Within Groups (Error)** | 46 | 7.695 | 0.1672 | — | — |

**Source**: Authors' calculations based on RStudio output.

The ANOVA results indicate an F-statistic of 0.188 and a significance level of Sig. = 0.904, substantially exceeding the adopted significance threshold of $\alpha = 0.05$. The null hypothesis is therefore accepted: there are no statistically significant differences in the severity of the accounting measurement problem across startup age categories. The between-groups sum of squares (SS = 0.094) is negligible relative to the within-groups residual sum of squares (SS = 7.695), confirming that firm age accounts for a trivially small proportion of the observed variance in accounting measurement perceptions. This result has a clear and profound economic interpretation: the shortcomings of the SCF in accommodating intangible-intensive enterprises do not attenuate as startups mature and gain operational experience. Rather, they constitute a structural, institutional barrier that affects all startups — from the seed stage to the established growth stage — with equal and undiminished force.

### III.4.3. Robustness Check: Kruskal-Wallis Non-Parametric Test

To ensure the robustness of the foregoing parametric results and to address potential concerns associated with parametric inference in samples of moderate size, the Kruskal-Wallis H-test — a non-parametric rank-based analog of the One-Way ANOVA — was applied to the same data. Table 5 reports the results.

**Table 5. Kruskal-Wallis Non-Parametric Test Results (Robustness Check)**

| Independent Variable | Dependent Variable | Chi-Square (H) | df | P-value |
|---|---|---|---|---|
| **Firm Age (Stage)** | Accounting Measurement Problem Score | 0.679 | 3 | 0.878 |

**Source**: Authors' calculations based on RStudio output.

The Kruskal-Wallis test yields a chi-square statistic of H = 0.679 (df = 3; p = 0.878), providing conclusive non-parametric corroboration of the ANOVA findings. The convergence of the parametric ANOVA and non-parametric Kruskal-Wallis results substantially strengthens the inferential validity of the study's central conclusion: the accounting measurement problem is demonstrably and robustly invariant across firm age categories.

## III.5. Discussion: The 'Accounting Glass Ceiling' — A Structural Interpretation

The combined statistical evidence from the ANOVA and Kruskal-Wallis tests constitutes the most theoretically significant finding of this study and the one most revealing of the fundamental nature of the accounting crisis confronting Algerian startups. Prevailing Life-Cycle Theory literature posits that a firm's administrative, financial, and informational challenges evolve progressively as it transitions through successive developmental stages — from the seed stage, through the early growth stage, to the expansion stage. Clausen and Hirth (2016) reinforced this developmental perspective by demonstrating that knowledge-intensive firms exhibit financing characteristics that change substantially with firm maturity, with each growth stage requiring increasingly sophisticated metrics capable of reflecting the firm's accumulated intangible value — including competencies, brand equity, and customer capital. Under this framework, one would anticipate that older, more established startups would have developed greater accounting sophistication and encountered fewer measurement constraints.

However, the empirical findings of the present study are unequivocally at variance with this expectation in the Algerian institutional context. The data reveal that startups at the earliest stage of their existence and those that have attained several years of operational experience confront the same 'accounting glass ceiling': the SCF does not adapt to a firm's growth trajectory and does not

enable it to translate its innovations, market achievements, and accumulated intangible capital into financial figures that reflect fair value. This finding is directly consistent with the theoretical argument advanced by Lev and Radhakrishnan (2003), who demonstrated that organization capital metrics possess high predictive power for future stock returns irrespective of firm maturity — precisely because traditional accounting figures fail to perform this predictive function at any stage of the firm life cycle.

The policy implications of this finding are far-reaching. As Clausen and Hirth (2016) showed, merger and acquisition transactions are routinely evaluated using alternative intangible asset metrics because accounting book values systematically understate the true economic value of the target firm in knowledge-intensive transactions. Algerian startups that possess genuine and substantial knowledge-based value are therefore unable to substantiate this value through the instruments of the current accounting system, leaving them structurally disadvantaged in their pursuit of merger opportunities, strategic partnerships, and major investment — whether domestic or foreign. In essence, the SCF produces a 'truncated' financial representation of knowledge-intensive firms that progressively distorts capital allocation decisions and undermines the development of a competitive, internationally connected startup ecosystem.

## IV. Conclusion

### IV.1. Synthesis of Findings and Scientific Contribution

This study represents a systematic effort to document and analyze the disjuncture between the requirements of a knowledge-intensive startup economy and the constraints imposed by a traditional accounting framework in an emerging-market context. While the global economy has structurally shifted toward a model in which the preponderant share of enterprise value derives from knowledge resources and intangible capital, accounting practice in Algeria remains anchored to a framework that treats strategically critical investments as periodic expenses rather than capital assets.

The study's principal empirical contribution is the demonstration — through convergent parametric (ANOVA: $F = 0.188$, Sig. $= 0.904$) and non-parametric (Kruskal-Wallis: $H = 0.679$, $p = 0.878$) evidence — that the accounting measurement problem under the SCF is not linked to the developmental life cycle of the firm. Rather, it constitutes a constant structural barrier that affects all Algerian startups with equal intensity, irrespective of their age or stage of maturity. This finding supports the theoretical conceptualization of the problem as an 'accounting glass ceiling' — an immovable institutional constraint that prevents startups at every stage of development from translating their market achievements and technological innovations into balance-sheet representations of fair economic value.

The consequences of this structural constraint are multiple and compounding. First, it distorts key performance indicators — particularly Return on Assets (ROA) — by inflating the denominator relative to true economic assets and suppressing the numerator through the expensing of productive investments. Second, it deepens information asymmetry between startups and external capital providers, producing a 'crisis of financial credibility' that complicates the valuation and due-diligence processes of venture capital funds, angel investors, and institutional financiers. Third, it weakens Algeria's startup ecosystem by rendering knowledge-intensive firms systematically less able to compete for international investment or to participate in cross-border M&A processes on terms reflective of their true economic value.

### IV.2. Study Limitations

Several limitations of the present study warrant explicit acknowledgment. First, the sample size of 50 respondents, while adequate for exploratory research and supported by non-parametric robustness testing, constrains the generalizability of the findings to the broader population of Algerian startups. Future research employing larger, more systematically drawn probability samples would strengthen the external validity of these conclusions. Second, the study relies on a perceptual, self-reported measurement instrument; while this approach captures the lived professional experience of practitioners and is appropriate for the study's exploratory objectives, objective archival data on startup financial reporting practices would provide a valuable complementary evidence base. Third, the geographic scope of the study is limited to the Algerian context; comparative research across North African or MENA-region startup ecosystems would enrich the generalizability and policy relevance of the findings.

### IV.3. Policy Implications and Recommendations

Based on the foregoing analysis, the study advances the following evidence-based recommendations for policymakers, practitioners, and researchers:

**At the Legislative and Regulatory Level:** The most urgent priority is a comprehensive review of the SCF standards governing the recognition and measurement of intangible assets. This review should incorporate greater flexibility in the capitalization of research and development expenditures and software innovations that satisfy probability-weighted criteria of future economic benefit. Furthermore, the introduction of a specialized accounting category for startup enterprises

one that reflects their intangible-intensive operational profile and growth-stage characteristics is strongly warranted. Such a reform would align Algerian accounting standards more closely with international best practice while acknowledging the specific institutional context of an emerging knowledge economy.

**At the Enterprise Level:** Pending legislative reform, startups are strongly encouraged to adopt voluntary disclosure of intellectual capital and intangible asset information as a strategic compensatory mechanism. As Castilla-Polo and Gallardo-Vázquez (2008) demonstrated, voluntary disclosure reduces the cost of capital and improves investor confidence by mitigating information asymmetry — outcomes that are directly relevant to the financing constraints identified in this study. The development of supplementary reporting frameworks — whether through narrative intellectual capital reports, key performance indicator dashboards, or sector-specific disclosure guidelines — represents an actionable near-term strategy.

**At the Research Level:** This study opens several productive avenues for future research. These include: (i) the development and validation of an Algeria-specific intangible asset measurement framework adapted to the SCF institutional context; (ii) longitudinal archival studies examining the financial reporting behavior and performance outcomes of Algerian startups over time; (iii) comparative cross-country analyses of how other emerging economies have reformed their accounting frameworks to accommodate knowledge-intensive enterprises; and (iv) investigation of the potential role of artificial intelligence and digital technologies in automating the identification and measurement of intangible assets within existing accounting systems.

Addressing the accounting 'information gap' that this study has empirically documented is not an academic abstraction but an operational imperative for the sustainable development of Algeria's startup ecosystem and its transformation into a genuine engine of knowledge-driven economic growth. The present findings provide a rigorous empirical foundation upon which policymakers, standard-setters, and practitioners can base evidence-informed reforms.

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