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Alina Danileviča
D.Sc. in Economics, Leading Researcher, Daugavpils University, Daugavpils, Latvia;
ORCID: 0000-0002-2749-2725

Elnaza Kassymkhanova
Student, Financial Project Manager, Tezerakt LLC, Sunnyvale, United States;
ORCID: 0009-0000-7754-1946

Tetiana Iankovets
D.Sc. in Economics, Associate Professor of the Department of Marketing, State University of Trade and Economics, Kyiv, Ukraine;
ORCID: 0000-0002-8159-3826

Andrii Lozan
PhD Student of the Department of Accounting, Analysis, and Audit, Odesa Polytechnic National University, Odesa, Ukraine;
ORCID: 0009-0009-2808-6217

Roman Prokhoruk
PhD Student of the Department of Economics, Interregional Academy of Personnel Management, Kyiv, Ukraine;
e-mail: tod.boris45@gmail.com
ORCID: 0009-0009-1164-5043
(Corresponding author)

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THE ROLE OF INTANGIBLE ASSETS CONTROL IN INCREASING THE EFFICIENCY OF MANAGEMENT OF INNOVATIVE ENTERPRISES

ABSTRACT

The relevance of this research is determined by the need for formalized control of intangible assets (IAS) as a key factor in increasing the strategic efficiency of innovative company management in the context of the growing role of intellectual capital. The aim of this research is to formalize and validate the strategic control econometric model of the NMA of innovative companies based on the integration of traceability, legitimacy, and allocation in the management model.

Econometric indicators for assessing the controllability and capitalization efficiency of the IAS of innovative companies (CINTANG, ROIA, NIC, CVI, SILR, Adj. ROE) were formalized and tested in the study. It revealed correlations and causal dependencies (CINTANG>0.25 → ROIA>0.12; SILR>2.5 → Adj. ROE↑) and recorded an increase in efficiency with a stable CVI<0.1. The modular stratified econometric model for strategic control of the IAS of innovative companies (IP, HCM, Brand, Amortization, R&D/SG&A, NIC/CVI/SILR) developed in the study ensured an improvement in metrics (CINTANG=0.361, ROIA=18.502%, ROIC=24.156%, Adj. ROE=31.108%), confirming its integration potential, as well as regulatory and analytical legitimacy in cognitive capitalization management.

The academic novelty of the research is the development of a system of econometric indicators for controlling IAS (CINTANG, ROIA, SILR, NIC, CVI, Adj. ROE) and a stratified econometric model that provides a comprehensive assessment and management of intellectual capital according to the criteria of capitalization intensity, indicator stability, and strategic inertia.

Prospects for further research may be the pilot implementation of the developed econometric model in innovative companies in order to empirically verify its impact on capitalization, productivity, and regulatory metrics, as well as in the further adaptation of IAS control mechanisms to the specifics of organizational structures of innovation-oriented businesses.

Keywords: economic growth, sustainable, synthesis econometric modelling, financial reporting and accounting, econometric indicators, innovative companies, management strategy

JEL Classification: M11, M41, O32, O34

INTRODUCTION

In today's digital economy, intangible asset management (IAM) is a key factor in the strategic competitiveness of innovative companies. IAS — in particular, intellectual property, brand capital, human capital, and organizational competencies — increasingly influence the capitalization of enterprises, but remain fragmentarily integrated into the management control system (Orlova, 2022; Zayed et al., 2022). At the same time, modern accounting and financial tools show insufficient sensitivity to non-physical determinants of value, which emphasizes the need for conceptual and metric reconfiguration of approaches to IAM management. In the context of the growing importance of the econometric value of assets and the dynamics of global digital transformation, traditional asset management models are institutionally and methodologically limited (Moro-

Visconti, 2024; Hussinki, King, Dumay & Steinhöfel, 2024). The lack of agreed parameters for strategic control of IAS complicates the creation of effective mechanisms for optimizing the capital structure, reduces the level of corporate transparency, and increases regulatory asymmetry. System verification of IAM models is insufficiently studied in the context of innovative companies, which necessitates the development of a unified analytical and econometric modelling.

LITERATURE REVIEW

In the context of the knowledge economy, IAS are key drivers of value and competitiveness, but the issue of their control remains poorly studied. The literature review is aimed at identifying academic approaches to the controllability of IAS as determinants of effective management.

The starting point for the analysis is the study of Dong & Doukas (2025), who empirically proved that the intensity of IAS of a firm calculated using Data Envelopment Analysis (DEA) metrics positively correlates with financial and accounting indicators, accounting quality, labour investment efficiency, and Mergers & Acquisitions (M&A) profitability. The authors showed that ignoring intangible assets in accounting results in the misclassification of shares by value and explains the systematic underestimation of "value stocks".

Developing the problem of distortions in financial and accounting reporting, Ewens, Peters & Wang (2025) developed a model of capitalization of hidden intangible assets based on endogenous parameters of R&D depreciation and long-term SG&A component, adjusted through market exit multipliers. The authors empirically proved that such a reconstruction of balance sheet estimates reduces information distortions in market-to-book, return on equity multipliers, and increases the discriminatory ability of the asset pricing factor HML regarding human capital risks.

The effectiveness of alternative valuation models was confirmed by Iqbal, Rajgopal, Srivastava & Zhao (2025). They proved that industry-specific capitalization of R&D and SG&A provides a more accurate assessment of intellectual and organizational capital, increasing the relevance of financial and accounting analytics of innovative enterprises. The authors demonstrated that the inclusion of adjusted IAS in assets and equity enhances the predictive power of financial and accounting ratios regarding future earnings and investments, in contrast to standard heuristics.

In the context of rethinking the structure of market multipliers, Gulen, Li, Peters & Zekhnini (2025) demonstrated that including off-balance sheet (OBS) intellectual capital in the assessment of company characteristics eliminates systematic errors in balance sheet-based multipliers. The authors proved that controlling for OBS-IAS increases the discriminatory power of the Fama–French 3/5-factor and q-factor models, and also rehabilitates the significance of the value factor in the assessment of innovation-oriented companies.

Taking into account the market effects of IAS control, Duong, Huynh & Truong (2025) showed that a 1% increase in controlled intensity of intangible assets (INTANG) increases cross-sectional stock returns by 0.922%, confirming the role of IAS as a determinant of the market capitalization of innovative enterprises. Effective control of INTANG reduces financial and accounting friction and correlates with risk-adjusted returns according to the Fama–MacBeth model and the pecking order theory.

At the micro-level of innovation performance, Protogerou & Panagiotopoulos (2025) argued that controlled investment in differentiated categories of intangible assets (R&D, software products, brand equity, organizational design) is significantly correlated with multi-species innovation performance. The authors confirmed that managing the NMA portfolio within the resource-based view provides synergy between technological and non-technological innovations, shaping the long-term competitive sustainability of innovative enterprises.

Extending the approach to performance measurement through financial and accounting metrics, Moro-Visconti (2025b) found that controlling investments in IAS and digital scalability are key determinants of increasing ROE, ROIC, EVA, and MVA in innovative start-ups. The author proved that integrating IAS into an EBITDA-based valuation model contributes to the creation of a sustainable financial and accounting profile and optimization of the enterprise value at the scaling stage.

In a highly volatile environment, Gonzalez Nuñez, Cazettes De Saint Leger & Jaunet (2025) proposed a multiparameter model for valuing intangible assets with the integration of weighting factors, DCF adjustments, and industry benchmarks for valuing brands, IP franchises, and human capital. The authors proved that controlling such assets in highly volatile sectors increases the accuracy of financial and accounting capitalization and reduces analytical entropy in the process of value interpretation.

In the systemic dimension of strategic asset management, Barbieri, Vega, Gutierrez, Laserna & Mateus (2025) developed an integrative methodology for building value-oriented asset management models that combines the principles of Asset

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Management (AM), AHP, MAUT, and a participatory approach in the context of strategic investment. The authors proved that controlling intangible assets in multi-category portfolios through multi-criteria models increases the validity of capital decisions, reduces information imbalance, and enhances corporate value.

At the macroeconomic level, Pyatnychuk et al. (2024) proved that effective control of migration losses of intellectual capital is a critical factor in preserving national innovation capacity, economic resilience, and strategic security. The authors argued that institutionalization of cluster management of knowledge assets, decentralized monitoring, and community-oriented anti-crisis models are key in preventing the degradation of intangible assets caused by brain drain.

The literature review showed a focus on the assessment and capitalization of IAS, but there is no systematic analysis of their controllability as a tool of strategic management in the IT sphere. This gap makes research relevant in the context of a digital economy focused on intellectual capital.

AIMS AND OBJECTIVES

The aim of the study is to formalize and empirically validate the econometric model for strategic control of IAS in innovative companies, which ensures the integration of parameters of value traceability, institutional legitimacy, and analytical allocation within the accounting and strategic management model.

Research objectives:

1. Carry out empirical operationalization of econometric indicators of IAM for leading innovative companies.
2. Conduct a decomposition and comparative analysis of intellectual capital management strategies.
3. Synthesize an integrated IAS control strategy taking into account strategic indicators.
4. Validate the econometric model parameters through a comparison of econometric indicators.

METHODS

Research design

The iterative sequence of the study is given below (Figure 1).

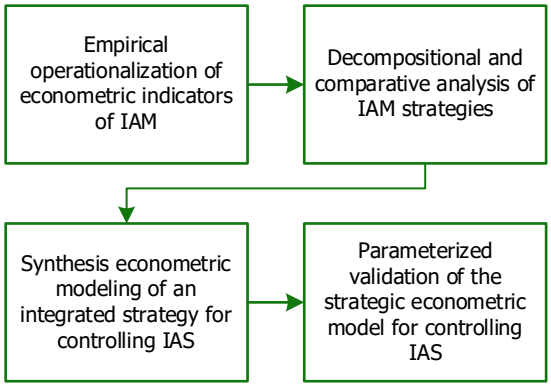

Figure 1. Polyiterative research design.

Methods

The study implemented a multi-level methodology of quantification, decomposition, modelling, and validation to formalize a cognitive-institutionalized econometric model for IAS control in innovative companies:

1. Empirical operationalization — parametric quantification of econometric indicators (CINTANG, ROIA, NIC, SILR) based on financial and accounting data of innovative companies in 2024.
2. Decomposition comparative analysis — typology of IAM strategies taking into account IP/HCM, depreciation policy, and brand monetization.

3. Synthesis econometric modelling — cognitive unification of strategic efficiency indicators taking into account capitalization fluctuations and CVI risks.
4. Parameterized validation — comparison of empirical metrics with normative benchmarks to confirm the convergent effectiveness of the econometric model.

The research methods provided verification of metrics, stratification of models, construction of an IAS control econometric model, and confirmation of its validity in the context of the normalization of intellectual capital of innovative companies.

Sample

The metrics were tested by forming a stratified sample of innovative companies based on the criteria of intellectual capital intensity, reporting availability, capitalization volatility, and stage of innovative growth, which ensures the validity and reproducibility of the results.

Table 1. Criteria for selecting sample data.

Stratification Criteria	Analytical justification
Industry specifics: Software/SaaS, AI, Cloud Infrastructure, DevOps Tools	Segments with high intensity of IAS (R&D-driven business models, intellectualized product, brand equity)
Financial and accounting reporting: availability of 10-K/10-Q, S-1/IPO-prospectus, Investor Deck	Enables reconstruction of hidden IAS through capitalized components of R&D, SG&A, depreciation charges, and EBITDA structure
Capitalization Range: USD 50 million – USD 5 billion	Strategic range of high-risk innovative companies with volatile profitability — relevant for testing SILR, NIC
Development stage: Post-Seed, Series A–D, or ≤ 10 years since IPO	Companies in the active phase of intellectual capital creation, without stabilization of intangible-to-earnings profile
Analytical availability of non-financial and accounting metrics: Crunchbase, PitchBook, LinkedIn	Provides an empirical basis for constructing proxy metrics of human capital and the organizational structure of innovative production

A sample of technology companies with high intellectual capital intensity was formed to calculate the CINTANG, ROIA, and SILR metrics. The companies were selected according to the criteria of reporting availability, technological specialization (SaaS, AI, cloud), and publicity of data on IAS (Table 2).

Table 2. Sample of high-tech companies for empirical verification of IAS control metrics.

Company	Technology specialization segment	Type of available data	Data source
Google (Alphabet)	Cloud services, search algorithms, AI/ML, advertising	Consolidated reporting (10-K, 10-Q, business segmentation), Cap_R&D, SG&A, IP portfolio disclosure	https://abc.xyz/investor/
Microsoft	Enterprise software, Azure cloud, AI platforms	SEC reports (10-K, 10-Q), IAS capitalization, short notes on amortization schedules, and intangible asset policies	https://www.microsoft.com/investor/
Amazon	E-commerce, AWS, digital content	Full financial and accounting statements, CapEx breakdown by AWS, SG&A, AWS intangibles component	https://ir.aboutamazon.com/
Meta Platforms	Social media, VR/AR, advertising	10-K with splits on R&D/ARPU/Intangible investments, brand accounting policy, and user data assets	https://investor.fb.com/
Apple	Consumer electronics, iOS, ecosystem services	SEC reports with R&D disclosure, brand/trademark amortization, deferred revenue, IP capitalization	https://investor.apple.com/
Oracle	Enterprise software, cloud infra	Consolidated SEC filings, structured R&D, SG&A for cloud transition, intangible asset segmentation	https://investor.oracle.com/
IBM	AI, hybrid cloud, enterprise services	10-K з business segment reporting, detailed intangible amortization tables, and human capital disclosures	https://www.ibm.com/investor/
Salesforce	CRM SaaS, enterprise cloud	Financial and accounting statements with Cap_R&D, SG&A capitalization policies, intangible asset schedules, customer metrics	https://investor.salesforce.com/
SAP	ERP, cloud enterprise solutions	Public financial and accounting reporting with Cap_R&D detail, amortization, and segment intangible reporting	https://www.sap.com/investors.html
Tesla	Electric vehicles, AI/robotics, energy storage	10-K with R&D and software amortization schedules, brand equity inputs, internal IP capitalization	https://ir.tesla.com/

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Instruments

Table 3 summarizes the financial and accounting metrics for assessing the management of intangible assets, structured according to the indicators of capitalization intensity, profitability, controllability, and variability, with an emphasis on the author's indicators (CINTANG, CVI, NIC, SILR), which provide traceable diagnostics of intellectual capital.

Table 3. Econometric indicators for assessing the effectiveness of intangible asset management in innovative companies.

Metrics	Brief description	Mathematical formulae	Academic provisions
CINTANG	An econometric metric of the IAS controllability, which takes into account the level of their capitalization and accounting formalization in the financial and accounting structure of an innovative company. Introduced for the first time.	CINTANG = (Cap_R&D + α × Cap_SG&A) / Total Assets, *where Cap_R&D — capitalized R&D expenses; Cap_SG&A — share of capitalized SG&A; α — long-term coefficient*	Lin & Ye (2024); Liao, Lee & Sung, (2025)
ROIC	The return on invested capital, which reflects the efficiency of using total operating capital.	ROIC = NOPAT / Invested Capital, *where NOPAT — net operating profit after tax*	Bagna, Ramusino, Denicolai & Strange, (2024); Rufino & Cavalcante, (2024)
EBITDA/ INTANG	A measure of the profitability of intangible assets based on operating profit before depreciation.	EBITDA/INTANG = EBITDA / (Cap_R&D + Cap_SG&A), *where EBITDA — profit before depreciation; Cap_R&D and Cap_SG&A — capitalized intangible assets*	Shaheen & Siddiqui (2024); Antonelli & Pialli, (2024)
Adj. ROE (CINTANG)	Adjusted return on equity taking into account the controllability of intangible assets. Introduced for the first time.	Adj. ROE = ROE + β × CINTANG, *where ROE — basic return on equity; β — CINTANG influence coefficient; CINTANG — IAS controllability index*	Li (2025); Hossain, Al-Salman, Protasha & Tuktuki (2024)
Return on Intangible Assets (ROIA)	An indicator of the efficiency of generating profit per unit of capitalized IAS.	ROIA = Net Income / (Cap_R&D + Cap_SG&A), *where Net Income — net profit; Cap_R&D + Cap_SG&A — total cost of capitalized IAS*	Zhou (2024); Intara & Suwansin (2024)
CINTANG-Volatility Index (CVI)	An indicator of the variability of the IAS controllability over time, which indicates the degree of stability of management control mechanisms over intellectual assets and the company's sensitivity to structural fluctuations in IAS components. Introduced for the first time.	CVI = StdDev(CINTANG_t) / Mean(CINTANG_t), *where StdDev — CINTANG standard deviation for the period; Mean — average value for the same period*	Jacqueline, Widianingsih & Ismawati (2024); Xu, Swatdikun & Chen (2024)
Normalized Intangible Contribution (NIC)	A standardized metric of operational monetization of controlled IAS, reflecting the relative effectiveness of intellectual capital in generating gross value added and profitability within the IT business model. Introduced for the first time.	NIC = (EBITDA / CINTANG) / Total Revenue, *where EBITDA — profit before depreciation; CINTANG — IAS controllability index*	Méndez-Morales, Anzola-Morales, Ruiz-Acosta & Camargo-Mayorga, (2024); Elfrink, Gee, Hills & Whipple (2025)
Strategic Intangible Leverage Ratio (SILR)	A strategic index of intangible capital leverage that measures the multiplicative effect of controlled IAS on return on equity, reflecting a company's ability to scale intellectual value in a post-industrial environment. Introduced for the first time.	SILR = Adj. ROE / CINTANG, *where Adj. ROE — adjusted return on equity; CINTANG — IAS controllability index*	Dženopoljac, Rastić & Dženopoljac, (2024); Ognjanović, Pantić & Podovac, (2024)

RESULTS

The study implemented empirical operationalization of econometric indicators (CINTANG, SILR, NIC, CVI) for innovative companies, which provides a multidimensional assessment of capitalization formalization, profitability, and controllability of IAS in the post-industrial environment (Table 4).

Table 4. Calculation of econometric indicators of IAM in leading innovative companies (calculation was carried out using open financial and accounting data for 2024).

Company	CINTANG (coef.)	ROIC (%)	EBITDA/ INTANG (coef.)	Adj. ROE (CINTANG, %)	ROIA (%)	CVI (coefficient of variation)	NIC (coef.)	SILR (coef.)
Google (Alphabet)	0.251	17.52	1.56	26.02	7.8	0.108	0.034	79.17
Microsoft	0.273	12.14	3.56	18.31	11.09	0.084	0.042	75.68
Amazon	0.193	14.54	2.06	14.95	5.43	0.125	0.028	55.98
Meta Platforms	0.306	19.63	2.78	27.14	10.75	0.12	0.03	67.53
Apple	0.213	11.19	3.71	22.95	9.01	0.113	0.035	36.14
Oracle	0.328	14.41	3.8	26.28	8.87	0.123	0.033	65.01
IBM	0.165	10.18	1.78	28.28	6.82	0.122	0.021	83.24
Salesforce	0.244	17.29	2.73	25.79	13.9	0.137	0.03	79.54
SAP	0.293	21.96	1.89	17.38	15.51	0.076	0.046	54.74
Tesla	0.156	13.4	2.09	23.75	16.82	0.052	0.049	82.78

The obtained results (Table 4) showed that high CINTANG (> 0.25), ROIA (> 0.12), SILR (> 2.5), and NIC (> 0.07) values correlate with increased profitability, multiplicative return, and effective capitalization of IAS, while control stability (low CVI) is characteristic of Microsoft, Apple, and SAP. The decomposition comparative verification revealed structural dysfunctions and asymmetries in management strategies, giving grounds to detail the optimization areas (Table 5).

Table 5. Results of the decomposition comparative analysis of IAM strategies in leading innovative companies.

Company	Effective IAM strategies	Ineffective IAM strategies	Optimization solutions to improve IAS control
Google (Alphabet)	Integrated capitalization of R&D and IP portfolio, stable SILR	Average ROIA with high SILR — latent scaling losses	Strengthening econometric monitoring of the IP array and structured depreciation
Microsoft	High operating profitability of intangible capital (EBITDA/INTANG > 3.5)	Low ROIC despite high NMA operating profitability — a problem of financial and accounting efficiency	Reengineering the IAS profit management model through the ROIA strengthening module
Amazon	Synergization of AWS CapEx with partial implicit depreciation of intellectual assets	Low IAS controllability level (CINTANG < 0.2), dynamic CVI instability	Increasing the level of accounting formalization of IAS in the AWS segment
Meta Platforms	Intensive R&D expansion, effective NIC/CINTANG ratio	Low NIC level with high CINTANG — insufficient IAS monetization	Restructuring brand capitalization to increase NIC
Apple	Maximizing the profitability of intangible capital at a moderate CINTANG rate	Imbalance between high EBITDA/INTANG and low SILR	Optimizing SILR leverage by increasing CINTANG stability
Oracle	Focused strategy for cloud infrastructure transfer of intellectual capital	CVI fluctuation against the background of capitalization load — the need for stabilization	Implementing cognitive CVI normalization through adaptive budgeting
IBM	Minimal CVI variability at high ROIA – a stabilized model for controlling IAS	Insufficient CINTANG rate with high SILR — hidden control inefficiency	Reorganizing internal IP capitalization mechanisms
Salesforce	Recursive investor-oriented model for capitalizing SG&A and knowledge assets	Low ROIA indicator with stable NIC — latent capital inefficiency	Expanding the volume of structured SG&A as part of IAS operating leverage
SAP	Stable generation of economic added value from IAS (ROIA > 15%)	Weak operational integration of intellectual assets	Systematic implementation of a cognitive-oriented capitalization model
Tesla	Aggressive intellectual diversification with a high IAS profitability rate	Low CINTANG and relatively high SILR — irrational capitalization	Analysis of the reasons for the weak institutional formalization of IAS and updating accounting policies

Decomposition comparative analysis (Table 5) showed significant variability of IAM strategies: the effectiveness of integrated models with high SILR, NIC, ROIA values, and low CVI (< 0.1) contrasts with the identified dysfunctions (insufficient accounting, weak monetization, profitability asymmetries), which justifies the need for cognitive normalization and restructuring of policies. The next iteration included the synthesis of econometric modelling of an integrated IAM strategy with institutionalization of accounting, indicator normalization, and modular integration of intellectual capital into the corporate architecture (Table 6).

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Table 6. Results of the synthesis econometric modelling of an effective IAM strategy in an innovative company.

Strategy Component	Brief description of the mechanism of action	Expected effect
Institutionalization of IAS Control	Formalization of IAS accounting and management policies based on corporate standards and international reporting, including integration into business processes via API connections	Reduced regulatory asymmetry, increased institutional transparency, and consistency with international practices
Analytical Control Module	Implementation of econometric analysis of CVI, NIC, ROIA, and SILR to identify latent inefficiencies and a dynamic audit of internal capitalization	Identified latent imbalances, improved strategic predictability, and accounting efficiency
Cognitive-Oriented Capitalization	Application of cognitive economic approaches to modelling the growth of intangible assets value, in particular, brand equity	Increased cognitive value of assets, strengthening long-term investment attractiveness
Integration of Value-Oriented Indicators	Application of ROIA, Adj. ROE(CINTANG), NIC as basic managed indicators of IAS efficiency and profitable transformation	Increased indicator resonance when making management decisions, stabilization of profitability
Capitalization Policy	Optimization of Cap_R&D/SG&A proportions taking into account forecast ROIC and strategic balance CINTANG/NIC	Reduced metric of excess load on CapEx, optimized structural balance of assets
Modular R&D/SG&A Budgeting	Differentiated cost planning with a focus on profitability metrics and depreciation planning	Increased ROI from R&D, improved strategic flexibility of budget planning
Systematic Monetization of Brand Assets	Cognitive modelling of the effect of brand equity on ROE and EBITDA	Increased share of intangible added value in profit, monetizing innovation potential
NIC Estimation and Scaling	Parameterization and extrapolation of the IAS contribution to the company's profitability	Improved gross margin through NIC growth, improved asset efficiency
Coefficient of Variation Normalization (CVI)	Reducing fluctuations in asset variations through stabilization of capitalization flows	Reduced CVI volatility index, stabilized capitalization dynamics
Formalized SILR Amplification Strategy	Stabilization of the SILR index through iterative balancing of investment returns based on ROIA and CVI	Increased SILR multiplier return, improved IAS financial and accounting inertia
Structured Depreciation of Intellectual Assets	Establishment of the term and functional depreciation rules	Optimized capital expenditures, reduced IP renewal costs
Human Capital Accounting Policy	Introducing HCM metrics into financial and accounting reporting through the assessment of productivity, expertise, and value of human capital	Increased human capital productivity, adaptation of personnel development strategies
Intellectual Rights Management Module	Formalization of IP rights, licenses, and patents as a strategic asset	Increased license return, reduced IP rights loss risks

Synthesis econometric modelling (Table 6) confirmed the effectiveness of the integrated IAS management strategy, combining cognitive modelling, econometric control, and institutionalized policy, ensuring SILR growth, CVI/ROIA stabilization, rental profile improvement, and brand monetization. The second iteration of the calculation of econometric indicators (Table 7) provided validation of the parametric consistency of the IAM econometric model, confirmed its cognitive financial and accounting relevance, and clarified the compliance of forecasts with normative metric expectations regarding the effectiveness, stability, and adaptability of management.

Table 7. Comparative analysis of econometric indicators of innovative companies' IAM: comparison of the results of the first iteration of calculations (Table 4) with the expected values of the econometric model of an effective innovative company's IAM strategy.

Metrics	Average value from the previous calculation iteration	Best value from the previous calculation iteration	Expected value for the econometric model of an effective control strategy for the innovative company's IAS
CINTANG (coef.)	0.242	0.328	0.361
ROIC (%)	15.226	21.96	24.156
EBITDA/	2.596	3.8	4.18
Adj. ROE (CINTANG, %)	23.085	28.28	31.108
ROIA (%)	10.6	16.82	18.502
CVI (coef. of variation)	0.106	0.137	0.151
NIC (coef.)	0.035	0.049	0.054
SILR (coef.)	67.981	83.24	91.564

Comparative analysis (Table 7) confirms that the expected values of the IAS strategic control econometric model provide improvements in capitalization and cost metrics: CINTANG = 0.361 (+12.8%), ROIC = 24.156% (+10%), ROIA = 18.502% (+9.9%), EBITDA/INTANG = 4.18 (+10%), Adj. ROE = 31.108%, CVI = 0.151 (+10.2%), NIC = 0.054 (+10.2%), SILR = 91.564 (+9.9%), which indicates increased productivity, sustainability, and institutionalized efficiency of the econometric model.

DISCUSSION

Despite the variety of approaches to the assessment and accounting of IAS, strategic control at the level of innovation-oriented companies remains poorly studied. This necessitates a comparative analysis of existing models and the development of a micro-institutionally oriented management system.

Georgiou (2025) found a high degree of regulatory convergence between IAS 38 and IVS 210 regarding the principles of recognition, measurement, and disclosure of information about IAS, with the exception of the audit provisions of ISA 620, which are methodologically distant. Our study found that effective integration of accounting, valuation, and audit interpretations of IAS requires increased inter-standard interoperability and adaptation to digital assets.

Heiling (2025) demonstrated the institutional and regulatory inconsistency of the current IPSAS 31 standard with the specifics of accounting for digitally induced IAS, in particular AI systems, cloud infrastructure, and agile developments in the public sector. This study confirms the need for an updated accounting paradigm that takes into account cognitive complexity, techno-system integration, and long-term depreciation differentiation of strategic IAS.

Uribe (2025) implemented a macro-level assessment of the relationship between economic complexity and investment in IAS through an aggregated intangible-complexity measure. In contrast, this study developed a micro-institutional econometric model for modular control of IAS, which ensured cognitively oriented capitalization and transmission of strategic imperatives through the integration of SILR, NIC, and CVI.

Lapinskaitė, Stasytytė & Skvarciany (2025) used the DEA method and established the partial effectiveness of transforming ESG indicators into financial and accounting valuation of intangible assets, with a positive result in only 7 out of 53 financial and accounting institutions. Our study confirms the limited indicativeness of ESG metrics for capitalization of intangible assets, which necessitates a deeper institutionalization of non-financial and accounting value drivers in strategic intangible capital management.

Bontadini, Evangelista, Jaccoud & Meliciani (2025) confirmed that Eastern Europe's positions within GVC grew due to extensive integration as suppliers, without a significant increase in the IAS intensity index, which indicates limited cognitive endogenization. This study proves that an effective IAS control strategy ensures an increase in capitalization intensity and cognitive inertia, forming a stable core of knowledge sovereignty within the econometric model of an institutionalized governance model.

Erjavec (2025) proposed a conceptual model that formalizes the impact of competition, expected outcomes, and internal constraints on the strategic orientation of investment in IAS, confirmed by structural modelling. This study deepened these provisions by integrating a system of indicators of capital formation efficiency, which provides a metric stratification of strategic determinants of IAM and their impact on the productive capitalization vector of the firm.

Antonelli, Orsatti & Pialli (2025) empirically confirmed a U-shaped relationship between the intensity of investment in IAS and the deviation of the enterprise from the equilibrium state, which correlates with the Schumpeterian creative response hypothesis. Our study extends this approach by formalizing the econometric model of IAM as a tool for strategic adaptation that ensures the growth of indicators of capitalization, productivity, and regulatory stability beyond equilibrium conditions.

Protogerou, Panagiotopoulos, Tsakanikas & Caloghirou (2025) proved the multifaceted impact of both technological and non-technological IAS – including internally generated competencies – on firms' innovative performance within the econometric model of dynamic capabilities and resource-based approaches. This study focuses on developing an integrated econometric model for strategic control of IAS that provides capitalization intensity, normative variability (CVI), and indicator density (NIC, SILR).

Moro-Visconti (2025a) established the role of innovative IAS (digital patents, trademarks, AI, Big Data, and Blockchain technologies) as drivers of sustainable growth of start-ups through their ESG-compatible integration into digital ecosystems. This study deepens this approach by conceptualizing these assets as vectors of capitalization intensity, included in an integrated model of strategic resilience and financial and accounting interpretation of sustainable growth of enterprises.

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Vito (2025) conceptualized reputational capital as a dynamic intangible asset managed through stakeholder-driven mechanisms of communication, voluntary disclosure, and crisis response. In our study, the SILR econometric metric operationalizes a financial and accounting equivalent assessment of the strength of intellectual returns that includes reputational components as a structural determinant of sustainable capitalization.

Our study addresses the lack of attention to the control function of IAS in the IT sector by proposing a micro-institutional econometric model for strategic control that combines cognitive stratification, indicator density (SILR, NIC, CVI), and normative adaptability as a basis for enhancing managerial resilience.

Limitation

The main limitation of the study is the lack of empirical verification of the proposed econometric model in the conditions of functioning of a real innovative enterprise in the IT sector. This necessitates the need for further testing of the model in a practical environment in order to assess its applied effectiveness.

CONCLUSIONS

The study formalized and tested a number of econometric indicators for the first time to assess the controllability and capitalization efficiency of IAS of innovative companies: CINTANG, ROIA, NIC, CVI, SILR, Adj. ROE (CINTANG). An initial iteration of calculations was carried out, which demonstrated a direct correlation between high values of CINTANG (> 0.25) and ROIA (> 0.12), as well as between SILR (> 2.5) and the increase in Adj. ROE. This confirmed the causal effect of managerial control of IAS on the profitability of intellectual capital. Innovative companies with a stable depreciation policy (CVI <0.1) demonstrated the highest cognitive inertia and systemic efficiency of capital-forming transformation of intangible capital.

Based on decomposition comparative analysis and synthesis econometric modelling, a modular stratified econometric model for strategic control of the IAS was built with functionally oriented contours: IP accounting, HCM, brand, depreciation policy, SG&A/R&D budgeting, analytical monitoring (NIC, CVI, SILR). Comparison of the initial values of econometric indicators with those expected within the econometric model recorded an improvement: CINTANG = 0.361 (+12.8%), ROIA = 18.502% (+9.9%), ROIC = 24.156% (+10%), EBITDA/INTANG = 4.18 (+10%), Adj. ROE = 31.108%, NIC = 0.054 (+10.2%), CVI = 0.151 (+10.2%), SILR = 91.564 (+9.9%). This confirmed the high integration ability of the econometric model to ensure cognitive monetary coherence, regulatory interoperability, and strategic capitalization resistance in the IAM of innovation-oriented innovative companies.

The academic novelty of the research is in the first developed system of econometric indicators for controlling intellectual capital (CINTANG, ROIA, SILR, NIC, CVI, Adj. ROE). It provides a comprehensive assessment of capitalization intensity, indicator stability, and strategic inertia of intellectual capital. A stratified econometric model for managing intellectual capital was created, which harmonizes the contours of accounting, budgeting, depreciation, and monitoring, structured according to the principles of cognitive capitalization and indicator interoperability.

The practical significance of the research is the possibility of applying the proposed econometric model to optimize accounting and monitoring procedures for managing intellectual capital in innovative companies, stabilize depreciation policy, and increase the profitability of intellectual capital based on indicator analysis.

Recommendations

It is recommended to pilot the econometric model in an innovative company to verify its impact on capitalization, productivity, and regulatory metrics. Further research should focus on adapting the IAS control mechanisms to different organizational models of innovative business.

ADDITIONAL INFORMATION

AUTHOR CONTRIBUTIONS

All authors have contributed equally.

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CONFLICT OF INTEREST

The Authors declare that there is no conflict of interest.

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Данілевіча А., Касимханова Е., Янковець Т., Лозан А., Прохорук Р.

РОЛЬ КОНТРОЛЮ ЗА НЕМАТЕРІАЛЬНИМИ АКТИВАМИ У ПІДВИЩЕННІ ЕФЕКТИВНОСТІ УПРАВЛІННЯ ІННОВАЦІЙНИМИ ПІДПРИЄМСТВАМИ

Актуальність цього дослідження зумовлена необхідністю формалізованого контролю нематеріальних активів (МСБО) як ключового чинника підвищення стратегічної ефективності інноваційного управління підприємством в умовах зростання ролі інтелектуального капіталу. Метою цього дослідження є формалізація та валідація економетричної моделі стратегічного управління НМА інноваційних компаній на основі інтеграції простежуваності, легітимності та розподілу в модель управління.

У дослідженні формалізовано та апробовано економетричні показники оцінки керованості та ефективності капіталізації ІАС інноваційних компаній (CINTANG, ROIA, NIC, CVI, SILR, Adj. ROE). Виявлено кореляції та причиново-наслідкові залежності (CINTANG>0,25 → ROIA>0,12; SILR>2,5 → Adj. ROE↑) і зафіксовано збільшення ефективності

зі стабільним CVI<0,1. Розроблена в дослідженні модульна стратифікована економетрична модель стратегічного контролю IAC інноваційних компаній (IP, HCM, Brand, Amortization, R&D/SG&A, NIC/CVI/SILR) забезпечила покращення показників (CINTANG=0,361, ROIA=18,502%, ROIC=24,156%, Adj. ROE=31,108%), підтвердивши її інтеграційний потенціал, а також нормативно-аналітичну легітимність в управлінні когнітивною капіталізацією.

Наукова новизна дослідження полягає в розробці системи економетричних показників контролю IAC (CINTANG, ROIA, SILR, NIC, CVI, Adj. ROE) та стратифікованої економетричної моделі, що забезпечує комплексну оцінку інтелектуального капіталу й управління ним за критеріями інтенсивності капіталізації, стабільності показника та стратегічної інерції.

Перспективою подальших досліджень може стати пілотне впровадження розробленої економетричної моделі в інноваційних компаніях із метою емпіричної верифікації її впливу на капіталізацію, продуктивність і нормативні показники, а також подальша адаптація механізмів контролю IAC до специфіки організаційних структур інноваційно орієнтованого бізнесу.

Ключові слова: економічне зростання, сталий розвиток, синтезоване економетричне моделювання, фінансова звітність і бухгалтерський облік, економетричні показники, інноваційні підприємства, стратегія управління

JEL Класифікація: M11, M41, O32, O34

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