Intellectual capital, profitability and corporate governance: An analysis of Italian innovative start-ups

Giacomo Gotti[*]*, Carla Morrone*,*
Maria Teresa Bianchi, Salvatore Ferri**

Received: 05 October 2024
Accepted:04 June 2025

Abstract

This paper aims to investigate the impact of intellectual capital on firm profitability within innovative start-ups in Italy, as a management control indicator, also analyzing the role of corporate governance in moderating this relationship. GLS and OLS regression analyses have been conducted on a 3-year panel by using two accounting-based indicators (return on assets and return on equity) as the dependent variables and the value-added intellectual coefficient (VAIC) as the main explanatory variable. The corporate governance role has been proxied by several interaction variables, such as directors' age, gender diversity, and managerial ownership. Findings suggest that intellectual capital has a positive effect on profitability, and corporate governance characteristics moderate this relationship. The study seeks to go a step forward in understanding the short-term success of start-ups by contributing to resource-based, resource-dependency, and agency theories. Important implications emerge for start-up founders to consider human resources as a driver of short-term success, paying particular attention to board heterogeneity and ownership structure.

Keywords: Intellectual Capital, Start-Up, Profitability, Corporate Governance

1. Introduction

The increasing role played by innovation worldwide contributes to economic development (Fiorentino *et al.*, 2024). In this scenario, innovative startups (ISus) are strongly supported by policymakers (Audretsch *et al.*, 2020). Taking into consideration their potential role, literature has investi-

[*] Sapienza University of Rome, Department of Law and Economics of Enterprise. Corresponding author, e-mail: giacomo.gotti@uniroma1.it.

Management Control (ISSN 2239-0391, ISSNe 2239-4397), 2025, 1 – Special Issue
Doi: 10.3280/MACO2025-001-S1009

gated the critical elements and success factors of these kinds of companies, analyzing some internal and external drivers (Cavallo *et al.*, 2020; Pinelli *et al.*, 2022; Hung and Nabiha, 2024; Matricano, 2024). Among these, the intellectual capital (IC) seems to be less surveyed; in this regard, literature has mainly focused on the relational component and gender issues (Modaffari *et al.*, 2023; Modaffari and Manzo, 2023). Furthermore, most of the research is qualitative, lacking quantitative analyses on the relevance of IC in enhancing the profitability of ISus, which is very important since previous research highlight the poor performance as well as the low survival rate in the long run (Hyytinen *et al.*, 2015; Krishnan *et al.*, 2022).

As known, IC plays a fundamental role in producing a competitive advantage (Barney, 1991) and it is considered an added value to physical and financial capital (Pulic, 2004), able to positively affect financial performance (FP) (Bontis *et al.*, 2000; M. C. Chen *et al.*, 2005; Ricci *et al.*, 2020; Xu and Li, 2022). Academics have widely analyzed this relationship through the Resource-based Theory (RBT) (Wernerfelt, 1984; Riahi-Belkaoui, 2003; Smriti and Das, 2018). Another stream of research on IC focuses on its relationship with corporate governance (Abdallah *et al.*, 2024). According to the Resource Orchestration Theory (Sirmon *et al.*, 2011) – an extension of the RBT – firms' assets must be orchestrated, such as by collecting, combining, and managing them effectively to create value. Thus, the role played by governance in leveraging IC is crucial.

As mentioned, even though literature abounds with studies on IC and FP as well as corporate governance and both IC and FP, some gaps exist concerning: 1) the specific sample of ISus; 2) certain characteristics of governance (e.g., the separation between ownership and control). Furthermore, the moderating role of corporate governance on the relationship between IC and performance is under-explored (Van *et al.*, 2022; Nawaz and Ohlrogge, 2023).

Therefore, this paper intends to explore the relationship between IC and financial results, also considering the moderating role of corporate governance. It proposes a quantitative analysis on a sample of 1.152 Italian ISus (as defined by Law 221/2012) observed in their first three life years. A panel regression is employed by using the VAIC as a proxy for IC efficiency, and two accounting-based indicators, the return on assets (ROA) and the return on equity (ROE), as proxies for profitability. In addition, four moderation factors for corporate governance are included: board independence, gender diversity, ownership-control separation, and directors' average age. In doing so, findings confirm a positive relationship between IC and FP, revealing the moderating role of governance features. It allows for con-

tribution to the current academic debate on value-relevance of IC and governance characteristics, providing at the same time relevant insights to founders, managers, and policymakers.

Thus, the implications are both theoretical and practical; as an example, it suggests that VAIC can function as a key profitability indicator for ISus as well, supporting managers in decision making. Similarly, it provides useful recommendations for start-up founders in terms of corporate governance structure in the early stage of a company's life.

This paper is structured as follows: Section 2 provides a literature review to explicate the research hypotheses; Section 3 shows the dataset and the applied methodological approach; Section 4 presents the results; Section 5 wraps up theoretical and managerial implications, highlighting the limits.

2. Literature review and hypotheses development

2.1 Intellectual capital and profitability in start-ups

Start-ups are early-stage ventures that are increasingly acknowledged as a pillar of the contemporary economy (Fiorentino *et al.*, 2024; Modina *et al.*, 2024). Within the broader category of new ventures, ISus represent a relatively recent one. Even though literature often under-remarks ISus peculiarities, they have specific distinguishing elements (Cavallo *et al.*, 2021) and can be defined as a young, high-tech enterprise with strong growth potential.

Like all new ventures, they face the challenge of securing proper resources at least partially embedded in IC (Penrose, 1959; Barney, 1991). As noted by specific literature, IC – defined as the intellectual material formalized, captured, and leveraged to create wealth by producing higher-value assets (Stewart, 1997) – is essential, impacting the ability of ISus to innovate and grow (Karadag *et al.*, 2023; Modaffari *et al.*, 2023; Cattafi *et al.*, 2024). Among the intangible strategic resources (Heirman and Clarysse, 2004; Fiorentino *et al.*, 2024).

The relationship between IC and FP has been studied (Pal and Soriya, 2012) during various stages of IC research development (Guthrie *et al.*, 2012; Cuozzo *et al.*, 2017; Secundo *et al.*, 2018). From the RBT point of view, a company that holds intangible resources can obtain a sustainable competitive strength (Barney, 1991; Wernerfelt, 1984). In this way, literature has surveyed the relationship between IC (measured using Pulic's

VAIC and MVAIC) and FP, showing occasionally conflicting evidence. As an instance, M. Chen *et al.* (2005) highlight a positive and significant impact of human, structural, and innovative capital on the average ROA of listed companies in Taiwan and Gupta and Raman (2021) demonstrate the same evidence within the pharmaceutical and ICT industries in India. On the other hand, within Pakistani financial institutions, Haris *et al.* (2019) report that human capital (HC) exhibits a positive relationship with FP, while structural capital has a negative impact. Although some studies reveal negative or non-significant relationships, scholars broadly accept a positive impact on FP (M. Chen *et al.*, 2005; Sardo and Serrasqueiro, 2017; Biscotti *et al.*, 2019; Ricci *et al.*, 2020; Gupta and Raman, 2021; Mio and Massaro, 2022), supporting the Resource-Based theory (Wernerfelt, 1984).

As mentioned, among the various methods for measuring IC, Pulic's VAIC (Pulic, 2000, 2004) has been widely embraced by the scientific community due to its ability to leverage market-generated data, eliminating the need for specific external benchmarks (Cenciarelli *et al.*, 2018; Biscotti *et al.*, 2019; Ricci *et al.*, 2020). Indeed, it ensures the valorization of HC, which is considered the most relevant IC dimension, referring to certified accounting information (Iazzolino and Laise, 2013; Ricci *et al.*, 2020). Nevertheless, VAIC is not free from limitations (Iazzolino and Laise, 2013; Ali *et al.*, 2024). As noted also by Ricci *et al.* (2020), it is based on financial and historical data, it does not consider the relationships among its components and it lacks the relational capital component (Ståhle *et al.*, 2011).

Basically, the accumulation of IC represents a key element in the start-up strategic management, supporting the development of innovational potential and hence their profitability. Therefore, consistent with previous literature, the following hypotheses are proposed:

H1: IC has a positive impact on ISus' profitability;
H1a: Human capital has a positive impact on ISus' profitability;
H1b: Structural capital has a positive impact on ISus' profitability;
H1c: Employed capital has a positive impact on ISus' profitability.

2.2 Intellectual capital, corporate governance and profitability

Corporate governance (CG) represents how a company is directed and controlled to achieve satisfying performance (O'Leary and Stewart, 2007). From a conceptual standpoint, CG plays a pivotal role in every firm, as it possesses the capacity to consolidate all organizational resources and transform them into the wealth of the company. The link between CG and per-

formance is studied through different theoretical lenses (Hillman and Dalziel, 2003), such as Agency Theory (Jensen and Meckling, 1976) and Resource Dependence Theory (Pfeffer and Salancik, 1978). Agency Theory emphasizes the board's monitoring role in reducing agency costs arising from the separation of ownership and control; it highlights the importance of board independence and the alignment of interests (Jensen and Meckling, 1976). In contrast, Resource Dependence Theory (Pfeffer and Salancik, 1978), applied to CG, underscores the role of the board as a strategic resources' provider.

Nevertheless, it has been widely assumed by scholars the importance of CG in improving financial and non-financial outcomes (Holland, 2001; Nawaz and Ohlrogge, 2023; Shahzad *et al.*, 2023). As reported by Farooq and Ahmad (2023), CG mechanisms impact IC development, as executives are in charge of its proper handling. However, just a few studies focus on the moderating role played by CG variables in affecting the relationship between IC and FP (Ouni *et al.*, 2022; Van *et al.*, 2022; Farooq and Ahmad, 2023; Nawaz and Ohlrogge, 2023; Shahzad *et al.*, 2023). Literature points out that some features of the board, such as expertise and diversity, contribute to maximizing IC usefulness. Among CG variables employed in previous studies as IC-FP moderators, board diversity emerges as one of the most applied (Farooq and Ahmad, 2023; Tiwari and Arora, 2024). Board diversity refers to different aspects, including gender, age, and nationality (Morrone *et al.*, 2022). Following a cognitive resource-diversity view, group diversity positively influences performance due to the promotion of innovation, flair and problem-solving by (gender) heterogeneous members, thereby leading to a better decision-making process (Scafarto *et al.*, 2021). On the other hand, according to the similarity-attraction paradigm, homogeneous groups outperform heterogeneous ones (Horwitz, 2005). This is attributed to shared language and opinions, increased cooperation, reduced emotional conflicts, and the development of efficient decision-making processes (Andreoni and Vesterlund, 2001). Consistent with this approach, Adams and Ferreira (2009) found a negative relationship between the proportion of female directors and performance in US companies.

Even though no unanimous consensus about the impact of board gender diversity on financial outcome has been reached in the literature (Post and Byron, 2015; Ouni *et al.*, 2022), part of the literature, drawing upon the resource dependency theory (Pfeffer and Salancik, 1978), demonstrates that gender diversity can enhance communication with a variety of stakeholders and strength monitoring systems (Adams and Ferreira, 2009) as well as fi-

nancial results (Low *et al.*, 2015; Nguyen *et al.*, 2015). Focusing on the moderation role, Tiwari and Arora (2024) do not find any significant interaction on IC-FP, while others point out that gender diversity positively moderates the relationship (Gao *et al.*, 2024; Gotti and Morrone, 2025).

Hence, the following null hypothesis is proposed:

H2a: Board gender diversity treated as an interaction variable produces a significant association with IC and ISus' profitability.

The separation of the board of directors from owners is often approached through the Agency Theory (Fama and Jensen, 1983), discussing its impact on financial results (C. J. Chen and Yu, 2012; Dony *et al.*, 2019). In this regard, some authors analyze the so-called managerial ownership, that is, the percentage of shares owned by the managers in a corporation (Ogabo *et al.*, 2021). Although most research highlights the positive effect due to the convergence of interests, some others point out diverging evidence (Shan *et al.*, 2024).

To the best of the authors' knowledge, no previous research focused on the effect of this separation on IC. The only exception is Bemby *et al.* (2015), who investigate the impact of IC on firm value, taking into account the moderating role of ownership structure in Indonesian banks. Even if no scholar analyzes this link under the Resource Dependency lens (Pfeffer and Salancik, 1978), this theory could help explain the other side of the coin. Since directors bring resources other than the owners', external directors can increase the IC with a positive influence on financial results; therefore, focusing on IC, managerial ownership, which on one side reduces agency costs, can limit the IC availability, resulting in a negative impact on FP.

Hence, the following hypothesis is proposed:

H2b: Managerial ownership treated as an interaction variable produces a negative association with IC and ISus' profitability.

In BoD, old and young individuals bring notable distinctions, including their interests, career experiences, educational backgrounds, technological skills, and social networks. As a result, a team composed of members from different age groups can draw on a wider range of resources, strengthening the organization's collective knowledge and its ability to process information effectively (Harrison and Klein, 2007). Age diversity allows individuals to apply varied practices and competencies to solve challenges. Framing under resource-dependency theory, the age of directors may play an important role in leveraging IC, due to the experience consolidated (Vetchagool, 2025).

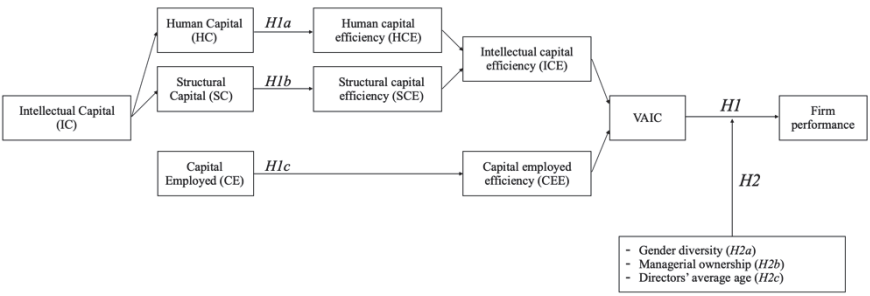
Despite many studies have investigated the link between age diversity and performance, identifying both non-significant relationships (Zimmer-

man, 2008; Morrone *et al.*, 2022) and significant ones (Ferrero-Ferrero *et al.*, 2015; Talavera *et al.*, 2018; Han, 2024), few studies have focused on the average BoD age. While experienced executives may help in improving corporate activities, their attention risks focusing on standing up for themselves (Ferrero-Ferrero *et al.*, 2015). As already noted by Beji *et al.* (2021), directors' age reflects their business acumen, capabilities, and new idea development.

Hence, taking into account also the literature gap concerning start-ups (Han, 2024), the following hypothesis is developed:
H2c: Board average age treated as an interaction variable produces a positive association with IC and ISus' profitability;

According to previous hypotheses, the conceptual framework of this paper is shown in Figure 1.

Figure 1 - Conceptual Framework



Source: authors' own elaboration

3. Research Methods

3.1. Sample and Data Collection

This empirical study is focused on innovative start-ups (ISus), established in Italy by Law 221/2012, over a three-year timespan. They are limited companies that must meet specific requirements. Thanks to the support granted by ad hoc regulations, the number of entities records a substantial increase during the period 2018-2022 (Ministero delle Imprese e del Made in Italy, 2023).

The sample has been extracted from AIDA Bureau van Dijk, filtering ISus operating in the Italian market established between 2017 and 2018. From the broader sample, all companies whose governance was not stable in the first four years or for which not all data (financial and governance)

related to the first three full years of activity were available in AIDA are deleted. Hence, the final dataset has a panel structure, referring to 1.152 entities.

3.2. Variables

3.2.1 Dependent variable

Profitability of ISus is measured by a widely used accounting-based indicator, i.e., the Return on Assets (ROA) (Pal and Soriya, 2012; Nimtrakoon, 2015). Furthermore, ROE is used for robustness checks, as observed in prior studies (Gupta *et al.*, 2020; Huang, 2020).

3.2.2 Independent variables

The independent variable is based on VAIC (Pulic, 2000, 2004), which derives from the value-added (VA) that the firm possesses, which has been widely recognized by the literature to investigate the influence of IC on FP (Chiucchi *et al.*, 2018; Fontana *et al.*, 2019; Singla, 2020; Mio and Massaro, 2022; Xu *et al.*, 2023). In this sense, previous studies assessed VAIC as a bridge between IC accounting and research on performance measurement (Ricci *et al.*, 2020). VAIC is calculated as follows:

$$VAIC™ = HCE + SCE + CEE$$

HCE is Human Capital Efficiency, which is the ratio between value added and total cost for employees. SCE is Structural Capital Efficiency, which is the ratio between structural capital (the difference between value-added and total cost for employees) and value-added. CEE is Capital Employed Efficiency, that is the ratio between value added and total assets, net of intangible ones. Value added (VA) is calculated as follows:

$$VA = OP + EC + D\&A + P$$

VA depends on the algebraical sum of operating profit (OP), the total cost for employees (EC), depreciation and amortization (D&A), and provisions (P).

To avoid omitted variable bias in quantitative models, a set of control variables is included: firm size (SIZE), leverage as a proxy for the firm's financial vulnerability (LEV) and Return on Sales as a proxy for profitability (ROS) (Zhang *et al.*, 2021; Ouni *et al.*, 2022). Literature has shown the

suitability of debt and firm size in capturing FP (Sardo and Serrasqueiro, 2017; Haris *et al.*, 2019). Hence, the following are used:

- "LEV", gauged as the ratio between debt and equity;
- "SIZE", gauged as the natural logarithm of the firm's annual sales;
- "ROS", gauged as the ratio between operating income and sales.

Furthermore, the other two variables are included to control for time effect (*year*) and industry specification (*industry*), which comprises eight dummy variables designed for the purpose of mitigating the influence of divergences across distinct industry sectors (Scafarto *et al.*, 2021).

Because of the year of birth of the start-ups in the sample, which by construction dates to 2017 or 2018, firm's age control has not been included in models.

3.2.3 CG variables

The interaction term consists in CG variables: *i)* board gender diversity; *ii)* managerial ownership; *iii)* directors' average age.

i) Board gender diversity

Following previous studies, two variables are used as a proxy for female participation (Torchia *et al.*, 2011; Nadeem *et al.*, 2017). (1) The Blau Index of gender diversity (Blau, 1977) is used to explore the change in general diversity (Vafaei *et al.*, 2015), calculated as $1 - \sum_{i=1}^{2} p_i^2$, where p_i is the portion of female and male directors and *n* is the total number of directors. The Blau index ranges from 0 to 0.5, where 0.5 occurs when the number of men and women is the same, by representing the maximum board's heterogeneity. (2) A dummy variable is applied: 1 if in the boardroom there is at least one woman and 0 otherwise.

ii) Managerial ownership

This variable is measured using a dummy, which is equal to 1 if at least one director is also a shareholder, and 0 otherwise (Li *et al.*, 2020). The standardized formulation is adopted to mitigate the multicollinearity issue.

iii) Directors' average age

This variable represents the average age of directors (Ferrero-Ferrero *et al.*, 2015), for which the standardized form is employed to avoid multicollinearity problems.

3.3. Models

A suitable model for capturing the ISus profitability in the Italian market is implemented. The functional form of the model is the following:

(1)

$$ROA_{i,t} = \beta_0 + \beta_1 VAIC_{i,t} + \beta_2 LEV_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 ROS_{i,t} + year + industry + \varepsilon_{i,t}$$

(2)

$$ROA_{i,t} = \beta_0 + \beta_1 VAIC_{i,t} + \delta_1 VAIC * CG_{i,t} + \beta_2 LEV_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 ROS_{i,t} + \beta_5 CG_{i,t} + year + industry + \varepsilon_{i,t}$$

Where *i* and *t* symbolize firm and year, respectively and ε is the error term; *year* is a dummy variable that includes time-specific effects and *industry* is another dummy for sector control. Model 1 is derived in multiple models (1.1, 1.2, 1.3), in which VAIC is replaced by HCE, SCE and CEE, respectively. Model 2 is also estimated in multiple specifications (2.1, 2.2, 2.3, 2.4, 2.5), which aim to regress individual CG explanatory variables, as discussed in the previous section.

Two different estimators have been employed to carry out our analysis. According to the Hausmann Test (Hausman, 1978), it has been employed a generalized least squares (GLS) random effects estimator to fit the regression models. The choice is supported by two main reasons: (1) The contingency table regarding all corporate governance variables is time-invariant and their coefficient cannot be appraised through the fixed-effects regression as they would be absorbed in the "within-transformation" or "time-demeaning" process of the variables (Scafarto *et al.*, 2021). (2) When collected data cover a small period with a large number of statistic units, the fixed-effect estimator will be inconsistent (Baltagi, 2005).

4. Empirical results

4.1. Descriptive statistics

Table 1 presents a summary of the descriptive statistics on the variables. Italian ISus show a slightly negative total asset profitability, as evidenced by the average value of -3.28% for ROA. The average leverage of the sample is found to be high (10.35), associated with the financial structure of start-ups and their need for financing.

Turning to the efficiency of IC, the efficiency of human, structural, and employed capital is respectively equal to 43.7, 0.88 and 1.05. Among them,

HCE remains a significant contributor to attaining the maximum IC efficiency, consistent with literature (Zhang *et al.*, 2021).

Furthermore, start-up's BoD's structure consists in the following evidence. Firstly, the average BLAU of 0.02 highlights the low level of BoD's gender heterogeneity, confirmed by the average value of FEM_DUMMY, which emphasizes that only 20% of entities has at least one woman in the BoD.

Table 1 - Descriptive statistics

VARIABLES	*OBS*	*MEAN*	*STD. DEV.*	*MIN*	*MAX*
ROA	3456	-3.28	38.9	-646.27	346.03
VAIC	3456	45.67	2,823.31	-100,029.10	100,762.50
HCE	3456	43.74	2,823.25	-100,029.00	100,760.80
SCE	3456	0.88	6.49	-148.12	328.94
CEE	3456	1.05	10.52	-368.42	207.38
SIZE	3456	8.39	4.84	0.00	16.19
LEV	3456	10.35	150.86	-690.05	7,714.83
ROS	3456	-1.12	1.45	-7.02	7.46
BLAU	3456	0.02	0.10	0.00	0.50
BOD_AGE	3456	0.00	1.00	-2.25	3.82
FEM_DUMMY	3456	0.21	0.40	0.00	1.00
MAN_OWN	3369	0.00	1.00	-2.19	0.45
BOD_SIZE	3456	1.28	0.70	1.00	6.00

Source: authors' own elaboration

4.2. Correlation analysis

The correlation matrix in Table 2 shows the association between variables. The dependent variable (ROA) is significantly and positively correlated with VAIC, as widely demonstrated in the literature; in addition, it is positively and significantly correlated with HCE, CEE, SIZE, ROS and BLAU.

Correlation analysis is also useful in detecting multicollinearity problems within the dataset among explanatory variables when the correlation between predictors is larger than 0.80 (Kennedy, 1985). However, an additional test for multicollinearity is shown in section 4.3.

Table 2 - Correlation matrix

	ROA	VAIC	HCE	SCE	CEE	SIZE	LEV	ROS	BLAU	BOD_AGE	FEM_D	MAN_OWN	BOD_SIZE
ROA	1.00												
VAIC	0.052***	1.00											
HCE	0.052***	1.00***	1.00										
SCE	0.00	0.0025	0.003	1.00									
CEE	0.074***	0.0063	0.002	-0.01	1.00								
SIZE	0.293***	0.043**	0.042**	*-0.02	0.09***	1.00							
LEV	0.01	-0.001	-0.001	-0.012	-0.009	-0.028*	1.00						
ROS	-0.25***	0.00	0.001	0.03*	-0.13***	-0.53***	-0.009	1.00					
BLAU	-0.058***	-0.0025	-0.002	0.008	0.06***	0.014	-0.001	0.034**	1.00				
BOD_AGE	-0.0045	0.042**	0.042**	0.004	-0.007	0.003	0.034**	0.013	0.026	1.00			
FEM_ DUMMY	-0.03**	0.015	0.015	-0.008	-0.004	-0.016	-0.004	0.015	0.433***	-0.016	1.00		
MAN_OWN	0.02	0.005	0.004	0.020	-0.03**	-0.013	0.013	0.006	-0.045***	-0.125***	0.041**	1.00	
BOD_SIZE	-0.03*	-0.826	-0.003	0.007	0.037**	0.010	0.013	0.027	0.452***	0.026	0.109***	-0.163***	1.00

Note: * $\rho < 0.10$; ** $\rho < 0.05$; *** $\rho < 0.01$

Source: authors' own elaboration

4.3. Regression results

The regression results regarding the impact of IC on ISus profitability are shown in Table 3. The fixed effects or random effects estimator is determined by the Hausman test (Hausman, 1978). Moreover, robust standard errors are applied to avoid heteroscedasticity by adding "robust" option on STATA. This choice is based on the robustness of the previous literature (White, 1980), which proves useful in data where heteroskedasticity is present (Long and Ervin, 2000). Furthermore, another test for multicollinearity, consistent with Weisberg (2005), is conducted through the estimation of the variance inflation factors (VIF). By setting a cut-off value of mean VIF = 5, no serious concern of multicollinearity among regressors is detected. To test relationships stated on H1 and H2 the "xtreg" function on STATA is used, which is able to estimate both cross-sectional and time-series regressions. Further estimations are carried out in order to confirm the results.

Consistent with the literature, VAIC positively affects profitability, reporting a magnitude of 0.0004 on ROA (%). The t-test confirms the significance of the result with 99% confidence. Turning to the different weights of IC components, a positive and significant influence of human capital (HCE) on profitability is reported, as confirmed by model 2.1. On the other hand, CEE also positively and significantly influences profitability. Results of models 1, 1.1 and 1.3 supports the H1, H1a and H1c. These results are in line with the RBT and other previous studies (Sardo and Serrasqueiro, 2017; Xu and Li, 2022).

Table 4 shows whether and how CG characteristics moderate the relationship between IC and profitability. The first two variables (BLAU index of gender diversity and the woman dummy variable (FEM_DUMMY)) are aimed at testing the role of gender diversity in the BoD. Consistent with Sanyaolu *et al.* (2022) and Adams and Ferreira (2009), the role of diversity negatively affects profitability (direct effect) at a significance level of 5%, even if the presence of one woman in the BoD does not have a significant direct effect on profitability. Moving to moderation analysis, the combination of IC and diversity provides an enhancement of the relationship between IC and profitability. This evidence follows Nguyen *et al.* (2015) and Low *et al.* (2015). The same evidence is found in the FEM_DUMMY variable. Results are consistent in estimations via GLS and OLS, supporting H2a.

Regarding the average age of BoD members, there is no evidence about the impact of this on profitability, in line with previous studies (Morrone *et al.*, 2022; Zimmerman, 2008). However, a moderation role has been detected. In particular, the increasing age of board members triggers a strengthen-

ing of the impact of IC on profitability at 1% significance level. The results remain strongly significant for each estimator, providing empirical support for H2c.

The model 2.4 tests the role of managerial ownership. Consistent with all our estimates, this factor does not have a direct link to profitability, while it shows a significant impact through its interaction with IC. In line with H2b, an increase in managerial ownership produces a worse exploitation of IC efficiency. This evidence is supported by all the estimators used according to a confidence level of 5%.

4.4. Robustness check and diagnostics

The robustness of the results obtained through the multiple regressions used is tested and confirmed through different control techniques. In particular, the estimation of models using two indicators, ROA and ROE, led to consistent and similar results (Xu *et al.*, 2023) as shown in Table 5. The second way consists of multiple models' estimation. First, the GLS – Random effects estimator has been chosen, according to the Hausman Test. Moreover, the OLS estimator is employed to assess all moderation models, and the outcomes are comparable to previous estimations. The findings are consistent with earlier estimates obtained through GLS, providing robustness. In the final stage of control, Generalized Estimating Equations (GEE) are employed, confirming previous findings (Hardin and Hilbe, 2012).

Table 3 - Regression results via GLS and OLS (H1 testing)

	(1)		*(1.1)*		*(1.2)*		*(1.3)*	
Y = ROA	**GLS**	**OLS**	**GLS**	**OLS**	**GLS**	**OLS**	**GLS**	**OLS**
VAIC	0.00044 ***	0.00055 ***						
HCE			0.00044 ***	0.00052 ***				
SCE					-0.044	0.031		
CEE							0.1437 *	0.1743 *
LEV	0.0017 *	0.0035 ***	0.0020 *	0.0034 ***	0.0017 *	0.0035 ***	0.0019 **	0.0035 ***
SIZE	2.3789 ***	2.3407 ***	2.3790 ***	2.3596 ***	2.3765 ***	2.3557 ***	2.3513 ***	2.3210 ***
ROS	0.00033	0.00058	0.00033	0.00050	0.0003	0.0005	0.0003	0.0005
YEAR	no	no	no	no	no	no	no	no
INDUSTRY	not included	not included	not included	not included	not included	not included	not included	not included
_CONS	-23.1388 ***	-22.9899 ***	-23.1376 ***	-23.0040 ***	-23.1126 ***	-23.0365 ***	-23.1046 ***	-22.9149 ***
OBSERVATIONS	3456	3456	3456	3456	3456	3456	3456	3456
ENTITIES	1152	1152	1152	1152	1152	1152	1152	1152
PROB. > CHI2	179.53***	44.83***	179.41***	20.96***	153.22***	42.84***	166.81***	44.92***
R-SQ (BETWEEN)	0.12	0.09	0.12	0.09	0.11	0.09	0.12	0.09
ROBUS STD. ERR.	yes	yes	yes	yes	yes	yes	yes	yes
VIF	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12

Note: * $\rho < 0.10$; ** $\rho < 0.05$; *** $\rho < 0.01$. *Source*: authors own elaboration

Table 4 - Regression results via GLS and OLS (H2 testing)

	(2.1)		*(2.2)*		*(2.3)*		*(2.4)*	
Y = ROA	**GLS**	**OLS**	**GLS**	**OLS**	**GLS**	**OLS**	**GLS**	**OLS**
VAIC	0.00044 ***	0.00054 ***	0.00036 ***	0.00045 ***	0.00042 ***	0.00050 ***	0.0032 ***	0.0036 ***
BLAU	-26.8787 **	-27.5729 ***						
C.VAIC#C.BLAU	0.1532 **	0.2031 **						
FEM_DUMMY			-3.0719	-3.0943 *				
C.VAIC#C.FEM_DUMMY			0.00038 ***	0.00043 **				
BOD_AGE					-0.2086	-0.2310		
C.VAIC#C.BOD_AGE					0.00011 **	0.0001 ***		
MAN_OWN							1.0163	1.0251 *
C.VAIC#C.MAN_OWN							-0.0060 **	-0.0069 **
LEV	0.0016	0.0033 **	0.0017 *	0.0034 **	0.0017 *	0.0035 ***	0.0014	0.0032
SIZE	2.3718 ***	2.3533 ***	2.3624 ***	2.3379 ***	2.3657 ***	2.3419 ***	2.2453 ***	2.2516 ***
ROS	0.0003	0.0006	0.00039	0.0006	0.0003	0.0005	0.0004	0.0006
YEAR	no	no	no	no	no	no	no	no
INDUSTRY	not included	not included	not included	not included	not included	not included	not included	not included
_CONS	-22.7027	-22.6090	-22.4891	-22.3284	-23.1696	-23.0284	-21.9507	-22.0370

	***	***	***	***	***	***	***	***
OBSERVATIONS	3546	3456	3456	3456	3456	3456	3369	3369
ENTITIES	1152	1152	1152	1152	1152	1152	1123	1123
PROB. > CHI2	176.30***	35.46***	449.61***	53.45***	219.54***	40.80***	250.67***	42.02***
R-SQ (BETWEEN)	0.13	0.10	0.12	0.09	0.12	0.09	0.12	0.09
ROBUS STD. ERR.	yes	yes	yes	yes	yes	yes	yes	yes
VIF	1.09	1.09	1.17	1.17	1.10	1.10	1.20	1.20

Note: * $\rho < 0.10$; ** $\rho < 0.05$; *** $\rho < 0.01$

Source: authors own elaboration

Table 5 - Regression results via GLS (y = ROE)

	(2.1)	*(2.2)*	*(2.3)*	*(2.4)*
Y = ROE	**GLS**	**GLS**	**GLS**	**GLS**
VAIC	0.0006	0.0005	0.00068	0.003716
	***	***	***	**
BLAU	-26.9669			
	**			
C.VAIC#C.BLAU	0.1325			
	***			
FEM_DUMMY		-2.6527		
C.VAIC#C.FEM_DUMMY		0.00054		
		***		
BOD_AGE			-1.3310	
C.VAIC#C.BOD_AGE			-0.00011	
MAN_OWN				-0.2238
C.VAIC#C.MAN_OWN				-0.0067
				**
LEV	0.0020	0.0020	0.0022	0.0022
	**	**	***	
SIZE	3.6707	3.6616	3.6603	3.6933
	***	***	***	***
ROS	0.0011	0.0111	0.0011	0.0010
	**	**	**	
YEAR	yes	yes	yes	yes
INDUSTRY	no	no	no	no
_CONS	-13.6369	-12.7402	-13.5562	-13.7858
OBSERVATIONS	2911	2911	2911	2833
ENTITIES	1088	1088	1088	1059
PROB. > CHI2	481.97***	1148.41***	627.16***	412.74***
R-SQ (BETWEEN)	0.20	0.20	0.20	0.20
ROBUS STD. ERR.	yes	yes	yes	no

Note: * ρ < 0.10; ** ρ < 0.05; *** ρ < 0.01
Source: authors own elaboration

5. Discussion

IC plays a key role in ensuring a sustainable competitive advantage (Barney, 1991; Ricci *et al.*, 2020) and it seems to be even more critical for ISus, as it enhances the innovation capability, ultimately impacting their financial results (Karadag *et al.*, 2023; Modaffari *et al.*, 2023). With this background, this research aims to bridge a literature gap, focusing on the IC-FP relationship among Italian ISus, also analyzing the moderation of some CG variables. In doing so, a positive influence of IC on profitability

is pointed out, suggesting the relevant function played by HC (Karadag *et al.*, 2023) as well as the moderation role of board gender diversity, managerial ownership and directors' age.

As reported in Table 3, profitability can be enhanced by increasing IC, supporting H1. Concerning VAIC components, CEE positively affects profitability as well as HCE (Nimtrakoon, 2015; Sardo and Serrasqueiro, 2017; Haris *et al.*, 2019; Gupta and Raman, 2021), while SCE does not. Specifically, HCE has the strongest effect on FP, as already shown by Ricci *et al.* (2020). Therefore, results support H1, H1a and H1c, confirming IC is a strategic asset that should be strategically managed (Barney, 1991; M. Chen *et al.*, 2005).

Moreover, findings shed light on the moderating role of CG, providing insight into how some governance mechanisms improve FP through IC management. All these outcomes can be read under the resource-dependency lens (Hillman and Dalziel, 2003) as better detailed in the following. In particular, board gender diversity allows the promotion of innovation and a greater involvement of stakeholders (Adams and Ferreira, 2009; Modaffari *et al.*, 2023), able to positively moderate the relationship between IC and FP, as confirmed by the present study. This result can be interpreted under the resource-dependency theory (Pfeffer and Salancik, 1978), which posits the potential benefits of a diverse board. Relying on external resources, ISus, which appoint both male and female directors, tend to better develop IC (Modaffari and della Corte, 2022; Modaffari *et al.*, 2023), positively impacting FP.

Managerial ownership, less investigated as a moderator, is mainly analyzed in the literature through the Agency Theory (Dony *et al.*, 2019; Shan *et al.*, 2024). In this study, the adoption of the resource dependency lens provides an innovative perspective able to explain the results of the models, which show that the appointment of directors who are also owners holds the attraction of external resources back. This situation led to ineffective IC exploitation, which negatively affects its development, resulting in a worsening of the FP.

Directors' age impinges on skills, expertise and experience brought into the boardroom (Beji *et al.*, 2021; Han, 2024). In line with the resource dependency theory, the results reveal that an increasing age improves FP thanks to the ability to better handle IC. As noted by Vetchagool (2025), the resources embedded in experienced directors require a longer time to convert into better FP, similarly to the results of this paper that point out the moderating role of directors' age, while no direct effect is detected.

6. Conclusion

The results previously discussed provide several contributions.

From a theoretical point of view, they confirm the importance of intangible assets for competitive advantage, as already pointed out by scholars (Bontis, 1998; Bismuth and Tojo, 2008; Sardo and Serrasqueiro, 2017; Cenciarelli *et al.*, 2018; Mio and Massaro, 2022). Moreover, they enrich the RBT and start-ups literature by investigating a new and under-researched context, such as that of ISus which are little investigated regarding the role of IC and CG. Furthermore, they suggest an innovative lens in reading the relationship between managerial ownership, IC and firm outcome. In addition, building on the integrated framework of Hillman and Dalziel (2003), findings contribute to the advancement of both Agency Theory and Resource Dependence Theory by examining how specific board characteristics moderate the relationship between IC and profitability. In line with Resource Dependence Theory, gender diversity and board age can act as strategic resources by enriching the board's capital and improving the company's ability to exploit IC. Finally, about managerial ownership, although Agency Theory highlights its role in reducing agency costs, the findings are aligned with the Resource Dependence perspective, as the limited presence of external directors may reduce access to external knowledge and relationships, thereby constraining the development and exploitation of IC in entities where, given the relevance of innovation, the role of IC is even more important than usual.

From a practical point of view, insightful implications emerge, giving possible guidance to ISus governance. Underlying the relevance of IC in improving FP, ISus governance shall bear in mind the applied variables in designing their own strategies, hoping to avoid an early termination of the business. Hence, ISus should adopt a strategic approach to measure IC from the earliest stages to rapidly gain a competitive advantage. However, it is important to note that excessive investments in SC might not be optimal for firms' financial health. Finally, ISus must have an adequate set of IC from their inception and carefully train employees to be able to retain not only them but also potential customers. HC is the resource that most significantly influences firm profitability, so ISus need previous experience and well-trained human competencies to manage the complexity of operations. This second implication is in strong contrast to the concept of start-ups, requiring them to enrich their staff with qualified resources from the early stages.

This paper suffers from some limitations. Firstly, the construction of the sample refers to only Italian ISus. Secondly, the analysis is focused on two accounting-based indicators, limiting the understanding of the market outcome. Lastly, the three-year timespan of analysis falls during the COVID-19 emergency, causing possible issues in terms of generalizability. Thus, future research could expand the sample to international young companies, involve replication of the analysis, using MVAIC (Pulic, 2004) and include variables suitable for capturing compliance with ESG as well as other intangible assets and finally cover a different and longer period of analysis.

References

Abdallah A. S., Amin H., Abdelghany M., Elamer A. A. (2024), Antecedents and consequences of intellectual capital: a systematic review, integrated framework, and agenda for future research, *Management Review Quarterly*. DOI: 10.1007/s11301-024-00454-9.

Adams R. B., Ferreira D. (2009), Women in the boardroom and their impact on governance and performance, *Journal of Financial Economics*, *94*(2), pp. 291-309. DOI: 10.1016/j.jfineco.2008.10.007.

Ali S. E. A., Lai F. W., Jan A. A., Rahman H. ur, Shah S. Q. A., Hamad S. (2024), Does intellectual capital curb the long-term effect of information security breaches on firms' market value?, *Quality and Quantity*, *58*(4), pp. 3673-3702. DOI: 10.1007/s11135-023-01797-3.

Andreoni J., Vesterlund L. (2001), Which is the Fair Sex? Gender Differences in Altruism, *The Quarterly Journal of Economics*, *116*(1), pp. 293-312. DOI: 10.1162/003355301556419.

Audretsch D., Colombelli A., Grilli L., Minola T., Rasmussen E. (2020), Innovative start-ups and policy initiatives, *Research Policy*, *49*(10), 104027. DOI: 10.1016/j.respol.2020.104027.

Baltagi B. H. (2005), *Econometric Analysis of Panel Data Third edition*, John Wiley & Sons, Ltd.

Barney J. (1991), Firm Resources and Sustained Competitive Advantage, *Journal of Management*, *17*(1), pp. 99-120. DOI: 10.1177/014920639101700108.

Beji R., Yousfi O., Loukil N., Omri A. (2021), Board Diversity and Corporate Social Responsibility: Empirical Evidence from France, *Journal of Business Ethics*, *173*(1), pp. 133-155. Doi: 10.1007/s10551-020-04522-4.

Bemby S., Mukhtaruddin B., Hakiki A., Ferdianti R. (2015), Intellectual capital,firm value and ownership structure as moderating variable: Empirical study on banking listed in indonesia stock exchange period 2009-2012, *Asian Social Science*, *11*(16), pp. 148-159. DOI: 10.5539/ass.v11n16p148.

Bismuth A., Tojo Y. (2008), Creating value from intellectual assets, *Journal of Intellectual Capital*, *9*(2), pp. 228-245. DOI: 10.1108/14691930810870319.

Blau P. M. (1977), *Inequality and heterogeneity: a primitive theory of social structure*. Free Press.

Bontis N. (1998), Intellectual capital: an exploratory study that develops measures and models, *Management Decision*, *36*(2), pp. 63-76. DOI: 10.1108/00251749810204142.

Bontis N., Chua Chong Keow W., & Richardson S. (2000), Intellectual capital and business performance in Malaysian industries, *Journal of Intellectual Capital*, *1*(1), pp. 85-100. DOI: 10.1108/14691930010324188.

Cattafi G., Mariani G., Pistolesi F., Nicolò D. (2024), Cheating in the evaluation. An expedient to estimate the impact of intangibles on the enterprise value of the high-growth start-ups, *Management Control*, *3*, pp. 193-218. DOI: 10.3280/maco2023-003009.

Cavallo A., Ghezzi A., Colombelli A., Casali G. L. (2020), Agglomeration dynamics of innovative start-ups in Italy beyond the industrial district era, *International Entrepreneurship and Management Journal*, *16*(1), pp. 239-262. DOI: 10.1007/s11365-018-0521-8.

Cavallo A., Ghezzi A., Rossi-Lamastra C. (2021), Small-medium enterprises and innovative startups in entrepreneurial ecosystems: exploring an under-remarked relation, *International Entrepreneurship and Management Journal*, *17*(4), pp. 1843-1866. DOI: 10.1007/s11365-020-00698-3.

Cenciarelli V. G., Greco G., Allegrini M. (2018), Does intellectual capital help predict bankruptcy?, *Journal of Intellectual Capital*, *19*(2), pp. 321-337. DOI: 10.1108/JIC-03-2017-0047.

Chen C. J., Yu C. M. J. (2012), Managerial ownership, diversification, and firm performance: Evidence from an emerging market, *International Business Review*, *21*(3), pp. 518-534. DOI: 10.1016/j.ibusrev.2011.06.002.

Chen M. C., Cheng S. J., Hwang Y. (2005), An empirical investigation of the relationship between intellectual capital and firms' market value and financial performance, *Journal of Intellectual Capital*, *6*(2), pp. 159-176. DOI: 10.1108/14691930510592771.

Chen M., Cheng S., Hwang Y. (2005), An empirical investigation of the relationship between intellectual capital and firms' market value and financial performance, *Journal of Intellectual Capital*, *6*(2), pp. 159-176. DOI: 10.1108/14691930510592771.

Chiucchi M. S., Giuliani M., Poli S. (2018), The Relationship Between Intellectual Capital Performance and Ownership Gender Diversity in Small-Sized Italian Companies, in Paoloni P., Lombardi R. (Eds), *Gender Issues in Business and Economics*, pp. 67-79. DOI: 10.1007/978-3-319-65193-4_5.

Cuozzo B., Dumay J., Palmaccio M., Lombardi R. (2017), Intellectual capital disclosure: a structured literature review, *Journal of Intellectual Capital*, *18*(1), pp. 9-28. DOI: 10.1108/JIC-10-2016-0104.

Dony N., Joseph C., James B. J. (2019), *Corporate Governance Attributes and Firm's Value* (pp. 227-245). DOI: 10.1007/978-981-13-3203-6_13.

Fama E. F., Jensen M. C. (1983), Separation of Ownership and Control, *The Journal of Law & Economics*, *26*(2), pp. 301-325. -- http://www.jstor.org/stable/725104.

Farooq M., Ahmad N. (2023), Nexus between board characteristics, firm performance and intellectual capital: an emerging market evidence, *Corporate Governance (Bingley)*, *23*(6), pp. 1269-1297. DOI: 10.1108/CG-08-2022-0355.

Ferrero-Ferrero I., Fernández-Izquierdo M. Á., Muñoz-Torres M. J. (2015), Age Diversity: An Empirical Study in the Board of Directors, *Cybernetics and Systems*, *46*(3-4), pp. 249-270. DOI: 10.1080/01969722.2015.1012894.

Fiorentino R., Longobardi S., Morrone C., Scaletti A. (2024), Educational heterogeneity of the founding team of innovative start-ups: confirmations and denials, *International Entrepreneurship and Management Journal*, *20*(3), pp. 2347-2367. DOI: 10.1007/s11365-024-01005-0.

Fontana S., Coluccia D., Solimene S. (2019), VAIC as a Tool for Measuring Intangibles Value in Voluntary Multi-Stakeholder Disclosure, *Journal of the Knowledge Economy*, *10*(4), pp. 1679-1699. DOI: 10.1007/s13132-018-0526-0.

Gao Y., Tian X., Xu J. (2024), Intellectual Capital, Board Diversity, and Firms' Financial Performance: A Complex System Perspective, *Systems*, *12*(9), 363. DOI: 10.3390/systems12090363.

Gotti G., Morrone C. (2025), Exploring the Impact of Board of Directors' Diversity on Corporate Performance: Does Intellectual Capital Efficiency Matter? Primary Evidence, in P. Paoloni (Ed.), *Shaping Tomorrow* (pp. 181-196). Springer. DOI: 10.1007/978-3-031-78999-1_13.

Gupta K., Goel S., Bhatia P. (2020), Intellectual Capital and Profitability: Evidence from Indian Pharmaceutical Sector, *Vision: The Journal of Business Perspective*, *24*(2), pp. 204-216. DOI: 10.1177/0972262920914108.

Gupta K., Raman T. V. (2021), Influence of Intellectual Capital on Performance, *International Journal of Human Capital and Information Technology Professionals*, *12*(2), pp. 53-71. DOI: 10.4018/IJHCITP.2021040104.

Guthrie J., Ricceri F., Dumay J. (2012), Reflections and projections: A decade of Intellectual Capital Accounting Research, *British Accounting Review*, *44*(2), pp. 68-82. DOI: 10.1016/j.bar.2012.03.004.

Han S. X. (2024), Are young CEOs a better match for young firms? Evidence from age, firm performance and CEO compensation, *International Journal of Managerial Finance*, *20*(1), pp. 94-118. DOI: 10.1108/IJMF-12-2021-0607.

Hardin J. W., Hilbe J. M. (2012), *Generalized Estimating Equations*, Chapman and Hall/CRC. DOI: 10.1201/b13880.

Haris M., Yao H., Tariq G., Malik A., Javaid H. (2019), Intellectual Capital Performance and Profitability of Banks: Evidence from Pakistan, *Journal of Risk and Financial Management*, *12*(2), 56. DOI: 10.3390/jrfm12020056.

Harrison D. A., Klein K. J. (2007), What's the difference? Diversity constructs as separation, variety, or disparity in organizations. *The Academy of Management Review*, *32*(4).

Hausman J. A. (1978), Specification Tests in Econometrics, *Econometrica*, *46*(6), 1251. DOI: 10.2307/1913827.

Heirman A., Clarysse B. (2004), How and Why do Research-Based Start-Ups Differ at Founding? A Resource-Based Configurational Perspective, *The Journal of Technology Transfer*, *29*(3/4), pp. 247-268. DOI: 10.1023/B:JOTT.0000034122.88495.0d.

Hillman A. J., Dalziel T. (2003), Boards of Directors and Firm Performance: Integrating Agency and Resource Dependence Perspectives, *The Academy of Management Review* 28(3). -- https://www.jstor.org/stable/30040728.

Holland J. (2001), Financial institutions, intangibles and corporate governance, *Accounting, Auditing & Accountability Journal*, *14*(4), pp. 497-529. DOI: 10.1108/EUM0000000005871.

Horwitz S. K. (2005), The Compositional Impact of Team Diversity on Performance: Theoretical Considerations, *Human Resource Development Review*, *4*(2), pp. 219-245. DOI: 10.1177/1534484305275847.

Huang Q. (2020), Ownership concentration and bank profitability in China, *Economics Letters*, *196*, 109525. DOI: 10.1016/j.econlet.2020.109525.

Hung C., Nabiha A. K. S. (2024), The design and use of performance management systems in China's innovative start-ups using GLOBE cultural and leadership elements: a proposed conceptual framework, *International Journal of Business Excellence*, *32*(4), pp. 413-432. DOI: 10.1504/IJBEX.2024.137568.

Hyytinen A., Pajarinen M., Rouvinen P. (2015), Does innovativeness reduce startup survival rates?, *Journal of Business Venturing*, *30*(4), pp. 564-581. DOI: 10.1016/j.jbusvent.2014.10.001.

Iazzolino G., Laise D. (2013), Value added intellectual coefficient (VAIC), *Journal of Intellectual Capital*, *14*(4), pp. 547-563. DOI: 10.1108/JIC-12-2012-0107.

Jensen M. C., Meckling W. H. (1976), Theory of the firm: Managerial behaviour, agency costs and ownership structure, *Journal of Financial Economics*, *3*(4), pp. 305-360. DOI: 10.1016/0304-405X(76)90026-X.

Karadag H., Sahin F., Bulut C. (2023), When does intellectual capital enhance innovation capability? A three-way interaction test, *International Journal of Entrepreneurial Behaviour and Research*. DOI: 10.1108/IJEBR-12-2021-0976.

Kennedy P. (1985), A rule of thumb for mixed heteroskedasticity, *Economics Letters*, *18*(2-3), pp. 157-159. DOI: 10.1016/0165-1765(85)90172-7.

Krishnan C. S. N., Ganesh L. S., Rajendran C. (2022), Management accounting tools for failure prevention and risk management in the context of Indian innovative start-ups: a contingency theory approach, *Journal of Indian Business Research*, *14*(1), pp. 23-48. DOI: 10.1108/JIBR-02-2021-0060.

Li S., Fu H., Wen J., Chang C. P. (2020), Separation of ownership and control for Chinese listed firms: Effect on the cost of debt and the moderating role of bank competition, *Journal of Asian Economics*, *67*. DOI: 10.1016/j.asieco.2020.101179.

Long J. S., Ervin L. H. (2000), Using Heteroscedasticity Consistent Standard Errors in the Linear Regression Model, *The American Statistician*, *54*(3), 217. DOI: 10.2307/2685594.

Low D. C. M., Roberts H., Whiting R. H. (2015), Board gender diversity and firm performance: Empirical evidence from Hong Kong, South Korea, Malaysia and Singapore, *Pacific-Basin Finance Journal*, *35*, pp. 381-401. DOI: 10.1016/j.pacfin.2015.02.008.

Maria Biscotti A., D'Amico E., Vinci S. (2019), The effectiveness of intellectual capital disclosure in market assessments of corporate value creation, *Financial Reporting*, *1*, pp. 5-35. DOI: 10.3280/fr2019-001001.

Matricano D. (2024), The influence of the technological regime on the performance of Italian innovative start-ups, *Technology Analysis & Strategic Management*, *36*(5), pp. 902-915. DOI: 10.1080/09537325.2022.2065978.

Ministero delle Imprese e del Made in Italy (2023), *Relazione Annuale al Parlamento sullo stato di attuazione delle policy in favore delle startup e PMI innovative*.

Mio C., Massaro M. (2022), Performance and company crisis. the intellectual capital role, *Rivista Italiana di Ragioneria e di Economia Aziendale*, *11-12*, pp. 260-281. DOI: 10.17408/RIREACMMM091011122022.

Modaffari G., della Corte G. (2022), *Female Agri-Food Start-Ups: Mapping the Italian Context During the Coronavirus Era* (pp. 171-190). DOI: 10.1007/978-3-030-89412-2_13.

Modaffari G., Manzo M. (2023), Relational Capital to Revamp the Pink Side of Agri-food, in *SIDREA Series in Accounting and Business Administration* (pp. 75-87). DOI: 10.1007/978-3-031-21932-0_5.

Modaffari G., Paoloni N., Manzo M. (2023), Intellectual capital's contribution to innovative female agri-start-ups: a multiple case study, *Journal of Intellectual Capital*, *24*(6), pp. 1506-1531. DOI: 10.1108/JIC-07-2022-0150.

Modina M., Capalbo F., Sorrentino M., Ianiro G., Khan M. F. (2024), Innovation ecosystems: a comparison between university spin-off firms and innovative start-ups. Evidence from Italy, *International Entrepreneurship and Management Journal*, *20*(2), pp. 575-605. DOI: 10.1007/s11365-023-00857-2.

Morrone C., Bianchi M. T., Marsocci V., Faioli D. (2022), Board diversity and firm performance: An empirical analysis of Italian small-medium enterprises, *Corporate Ownership and Control*, *19*(3), pp. 8-24. DOI: 10.22495/cocv19i3art1.

Nadeem M., De Silva T.-A., Gan C., Zaman R. (2017), Boardroom gender diversity and intellectual capital efficiency: evidence from China, *Pacific Accounting Review*, *29*(4), pp. 590-615. DOI: 10.1108/PAR-08-2016-0080.

Nawaz T., Ohlrogge O. (2023), Clarifying the impact of corporate governance and intellectual capital on financial performance: A longitudinal study of Deutsche Bank (1957-2019), *International Journal of Finance & Economics*, *28*(4), pp. 3808-3823. DOI: 10.1002/ijfe.2620.

Nguyen T., Locke S., Reddy K. (2015), Does boardroom gender diversity matter? Evidence from a transitional economy, *International Review of Economics and Finance*, *37*, pp. 184-202. DOI: 10.1016/j.iref.2014.11.022.

Nimtrakoon S. (2015), The relationship between intellectual capital, firms' market value and financial performance, *Journal of Intellectual Capital*, *16*(3), pp. 587-618. DOI: 10.1108/JIC-09-2014-0104.

Ogabo B., Ogar G., Nuipoko T. (2021), Ownership Structure and Firm Performance: The Role of Managerial and Institutional Ownership-Evidence from the UK, *American Journal of Industrial and Business Management*, *11*(07), pp. 859-886. DOI: 10.4236/ajibm.2021.117053.

O'Leary C., Stewart J. (2007), Governance factors affecting internal auditors' ethical decision-making, *Managerial Auditing Journal*, *22*(8), pp. 787-808. DOI: 10.1108/02686900710819643.

Ouni Z., Ben Mansour J., Arfaoui S. (2022), Corporate Governance and Financial Performance: The Interplay of Board Gender Diversity and Intellectual Capital, *Sustainability*, *14*(22), 15232. DOI: 10.3390/su142215232.

Pal K., Soriya S. (2012), IC performance of Indian pharmaceutical and textile industry, *Journal of Intellectual Capital*, *13*(1), pp. 120-137. DOI: 10.1108/14691931211196240.

Penrose E. T. (1959), *The Theory of the Growth of the Firm*, Basil Blackwell.

Pfeffer J., Salancik G. R. (1978), *The External Control of Organizations: A Resource Dependence Perspective*, University of Illinois at Urbana-Champaign's Academy for Entrepreneurial Leadership Historical Research Reference in Entrepreneurship.

Pinelli M., Cappa F., Franco S., Peruffo E., Oriani R. (2022), Too Much of Two Good Things: Effects of Founders' Educational Level and Heterogeneity on Start-Up Funds Raised, *IEEE Transactions on Engineering Management*, *69*(4), pp. 1502-1516. DOI: 10.1109/TEM.2020.2991607.

Post C., Byron K. (2015), Women on Boards and Firm Financial Performance: A Meta-Analysis, *Academy of Management Journal*, *58*(5), pp. 1546-1571. DOI: 10.5465/amj.2013.0319.

Pulic A. (2000), VAIC™ an accounting tool for IC management, *International Journal of Technology Management*, *20*(5/6/7/8), 702. DOI: 10.1504/IJTM.2000.002891.

Pulic A. (2004), Intellectual capital – does it create or destroy value?, *Measuring Business Excellence*, *8*(1), pp. 62-68. DOI: 10.1108/13683040410524757.

Riahi-Belkaoui A. (2003), Intellectual capital and firm performance of US multinational firms:A study of the resource-based and stakeholder views, *Journal of Intellectual Capital*, *4*(2), pp. 215-226. DOI: 10.1108/14691930310472839.

Ricci F., Scafarto V., Ferri S., Riso T. (2020), Management control systems in the knowledge economy: assessing the role of intellectual capital in value creation, *Management Control*.

Sanyaolu W. A., Eniola A. A., Zhaxat K., Nursapina K., Kuangaliyeva T. K., Odunayo J. (2022), Board of directors' gender diversity and intellectual capital efficiency: the role of international authorization, *Cogent Business & Management*, *9*(1). DOI: 10.1080/23311975.2022.2122802.

Sardo F., Serrasqueiro Z. (2017), A European empirical study of the relationship between firms' intellectual capital, financial performance and market value, *Journal of Intellectual Capital*, *18*(4), pp. 771-788. DOI: 10.1108/JIC-10-2016-0105.

Scafarto V., Ricci F., Magnaghi E., Ferri S. (2021), Board structure and intellectual capital efficiency: does the family firm status matter?, *Journal of Management and Governance*, *25*(3), pp. 841-878. DOI: 10.1007/s10997-020-09533-x.

Secundo G., Massaro M., Dumay J., Bagnoli C. (2018), Intellectual capital management in the fourth stage of IC research: A critical case study in university settings, *Journal of Intellectual Capital*, *19*(1), pp. 157-177. DOI: 10.1108/JIC-11-2016-0113.

Shahzad K., Shah S. Q. A., Lai F.-W., Jan A. A., Shah S. A. A., Shad M. K. (2023), Exploring the nexus of corporate governance and intellectual capital efficiency: from the lens of profitability, *Quality & Quantity*, *57*(3), pp. 2447-2468. DOI: 10.1007/s11135-022-01472-z.

Shan Y. G., Troshani I., Wang J., Zhang L. (2024), Managerial ownership and financial distress: evidence from the Chinese stock market, *International Journal of Managerial Finance*, *20*(1), pp. 192-221. DOI: 10.1108/IJMF-06-2022-0270.

Singla H. K. (2020), Does VAIC affect the profitability and value of real estate and infrastructure firms in India? A panel data investigation, *Journal of Intellectual Capital*, *21*(3), pp. 309-331. DOI: 10.1108/JIC-03-2019-0053.

Sirmon D. G., Hitt M. A., Ireland R. D., Gilbert B. A. (2011), Resource orchestration to create competitive advantage: Breadth, depth, and life cycle effects, *Journal of Management*, *37*(5), pp. 1390-1412. DOI: 10.1177/0149206310385695.

Smriti N., Das N. (2018), The impact of intellectual capital on firm performance: a study of Indian firms listed in COSPI, *Journal of Intellectual Capital*, *19*(5), pp. 935-964. DOI: 10.1108/JIC-11-2017-0156.

Ståhle P., Ståhle S., Aho S. (2011), Value added intellectual coefficient (VAIC): a critical analysis, *Journal of Intellectual Capital*, *12*(4), pp. 531-551. DOI: 10.1108/14691931111181715.

Stewart T. A. (1997), *Intellectual Capital: The New Wealth of Organizations*, Crown Business.

Talavera O., Yin S., Zhang M. (2018), Age diversity, directors' personal values, and bank performance, *International Review of Financial Analysis*, *55*, pp. 60-79. DOI: 10.1016/j.irfa.2017.10.007.

Tiwari R., Arora A. (2024), Moderating role of gender diversity in the relationship between intellectual capital efficiency and corporate performance, *International Journal of Productivity and Performance Management*. DOI: 10.1108/IJPPM-12-2023-0698.

Torchia M., Calabrò A., Huse M. (2011), Women Directors on Corporate Boards: From Tokenism to Critical Mass, *Journal of Business Ethics*, *102*(2), pp. 299-317. DOI: 10.1007/s10551-011-0815-z.

Vafaei A., Ahmed K., Mather P. (2015), Board Diversity and Financial Performance in the Top 500 Australian Firms, *Australian Accounting Review*, *25*(4), pp. 413-427. DOI: 10.1111/auar.12068.

Van L. T. H., Vo D. H., Hoang H. T. T., Tran N. P. (2022), Does corporate governance moderate the relationship between intellectual capital and firm's performance?, *Knowledge and Process Management*, *29*(4), pp. 333-342. DOI: 10.1002/kpm.1714.

Vetchagool W. (2025), Board Age Diversity and Firm Performance: Empirical Evidence from Thailand, *Review of Integrative Business and Economics*, *14*(2).

Weisberg S. (2005), *Applied Linear Regression*, Wiley. DOI: 10.1002/0471704091.

Wernerfelt B. (1984), A Resource-Based View of the Firm, *Strategic Management Journal*, *5*(2), pp. 171-180.

White H. (1980), A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity, *Econometrica*, *48*(4), 817. DOI: 10.2307/1912934.

Xu J., Haris M., Liu F. (2023), Intellectual capital efficiency and firms' financial performance based on business life cycle, *Journal of Intellectual Capital*, *24*(3), pp. 653-682. DOI: 10.1108/JIC-12-2020-0383.

Xu J., Li J. (2022), The interrelationship between intellectual capital and firm performance: evidence from China's manufacturing sector, *Journal of Intellectual Capital*, *23*(2), pp. 313-341. DOI: 10.1108/JIC-08-2019-0189.

Zhang L., Yu Q., Jin Z., Xu J. (2021), Do Intellectual Capital Elements Spur Firm Performance? Evidence from the Textile and Apparel Industry in China, *Mathematical Problems in Engineering*, pp. 1-12. DOI: 10.1155/2021/7332885.

Zimmerman M. A. (2008), The Influence of Top Management Team Heterogeneity on the Capital Raised through an Initial Public Offering, *Entrepreneurship Theory and Practice*, *32*(3), pp. 391-414. DOI: 10.1111/j.1540-6520.2008.00233.x.